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# IS INFLATION RATE OF TURKEY STATIONARY? EVIDENCE FROM UNIT ROOT TESTS WITH AND WITHOUT STRUCTURAL BREAKS

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**Abstract:** *Turkey has high inflation experience and in order to bring inflation rate down as well as maintaining macroeconomic stability many policy changes and reforms have been implemented. Despite some success, decreasing inflation rate is still an aim of monetary policy and price stability is still faraway. This article investigates time series properties of Turkish CPI inflation rate in both seasonally unadjusted and adjusted forms. Results of various unit root tests without structural breaks generally show that inflation rate is a nonstationary variable. This article also uses one and two breaks minimum LM unit root tests due to Lee and Strazicich (2004, 2003), respectively. In this case, test results show that inflation rate is a stationary variable with breaks. Although selected break points differ with respect to models and variables to some extent, it is observed that one break occurred around March 1994, and the second break occurred around April 2001.*

**Keywords:** *Structural Breaks, Unit Root, Stationarity, Inflation Rate, Turkey*

**JEL Classification:** *E31, C22*

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## 1. INTRODUCTION

Whether the inflation rate is a nonstationary, due to unit root, or a stationary process has a number of important implications. From an economic point of view, many economic models and hypotheses take different approaches to stationarity properties of the inflation rate and hence validity of models depends heavily on validity of these approaches. For instance, the Fisher hypothesis requires the inflation rate to be  $I(1)$  while the long-run purchasing power relationship requires the inflation rate to be  $I(0)$ . Also, as Romero-Avila and Usabiaga (2009, 154) point out, “a unit root behavior in inflation would not be consistent with the sticky price

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model analyzed by Taylor (1979) or the Phillips curve model of Calvo (1983), for which the price level is trend-stationary and nonstationary, respectively” while as Byrne et al. (2010, 34) point out, “according to the accelerationist Phillips curve model employed by Svensson (1997) and Ball (1999), among others, lagged inflation displays a unit coefficient and therefore inflation is a unit root process.” In addition to this, monetary policy rules, money demand functions and the consumption-based capital asset pricing model are some other fields that integrational properties of the inflation rate have important consequences.

From an econometric point of view, since the work of Granger and Newbold (1974), it has been known that using nonstationary variables in regression models might give unreliable results. Also, knowledge of integrational properties of the variables will enable one to select the statistical models to use: If the system consisting of inflation rates is stationary then vector autoregression (VAR) in levels can be estimated, otherwise co-integration tests should be carried out before choosing between VAR in first differences and vector error correction models. Finally, as Narayan and Narayan (2010) point out, from a policy point of view, it is crucial to know whether effects of any shocks on an interested variable are permanent or transitory. If the inflation rate is a nonstationary variable, then effects of shocks on the inflation rate will be permanent. On the other hand, if the inflation rate is a stationary variable, then this implies that effects of shocks will necessarily be short-lived.

Among the studies which investigate time series properties of the inflation rate, Culver and Papell (1997) find evidence of stationarity in only four of the 13 OECD countries by using the Augmented Dickey-Fuller (ADF) and the Kwiatkowski et al. (1992, hereafter KPSS) tests. Although further investigation with sequential break model does not change the results, panel unit root tests give strong evidence in favour of a stationarity hypothesis. Lai (1997) uses more powerful unit root test than the ADF test and finds strong evidence supporting the stationarity hypothesis in monthly inflation rates for the G-7 countries. However, he also notes that using alternative data frequencies and price indices to measure the inflation rate might be reasons for differences in findings about stationarity hypothesis. Lee and Wu (2001) reinvestigate stationarity of inflation rates of 13 OECD countries which were analysed in Culver and Papell (1997) and find similar

and weak evidence of stationarity by using the ADF test. However, results of panel unit root tests give strong evidence to support stationarity of inflation rates.

Based on M tests with Generalized Least Squares (GLS) detrending and modified information criterion (MIC) of Ng and Perron (2001), Yoon (2003) shows that Brazilian inflation rate is not stationary. However, his results are sensitive to detrending methods (i.e. GLS or Ordinary Least Squares) and information criteria used. Henry and Shields (2004) test for a unit root as well as structural break and nonlinearity in the US, the UK and Japanese inflation rates. They find that for the UK and Japan, the inflation rate is consistent with a threshold unit root process, while for the USA a linear ARIMA model is more suitable. Costantini and Lupi (2007) find that inflation rates of 19 countries are stationary by using panel unit root tests with and without breaks. As is Lee and Wu (2001), the primary aim of Basher and Westerlund (2008) is to check robustness of Culver and Papell (1997) results via recently developed panel unit root tests, which allow for more general data generating processes. The results suggest that the inflation rate is a stationary variable. Lee and Chang (2008) use longer span of historical inflation rates of 11 OECD and Asian countries and employ a battery of unit root tests with and without structural breaks. Test results obtained by minimum Lagrange Multiplier (LM) univariate unit root tests, developed by Lee and Strazicich (2003, 2004) and allowing for two and one endogenous structural breaks respectively, show that inflation rates are trend stationary. Romero-Avila and Usabiaga (2009) investigate stationarity properties of 13 OECD countries inflation rates which were originally analysed by Culver and Papell (1997) by extending the time period from September 1994 to June 2005 and, in addition to others, using panel stationarity test allowing for both cross sectional dependence and multiple breaks. Only in this case, contradictory evidence disappears and test results give strong support for regime-wise stationarity hypothesis. Halunga et al. (2009) investigate whether the order of integration for the US and the UK inflation rate has changed and find that for both countries the inflation rate changes from  $I(0)$  to  $I(1)$  in the early 1970s and reversion takes place in the early 1980s.

Byrne et al. (2010) examine aggregate and three sets of increasingly disaggregate level of the consumer price index (CPI) inflation data for the UK and find that rejection frequencies of the unit root hypothesis, obtained from Lee and Strazicich (2003) test, typically increase with disaggregation level. Also, they use a

panel unit root test and confirm this result. Narayan and Narayan (2010) show that inflation rates of 17 OECD countries are stationary by utilising a panel unit root test which allows for structural breaks. However, there is mixed or contrary evidence obtained from univariate tests with and without structural breaks. Caporale and Paxton (2013) show that inflation rates of three out of five Latin American countries which have hyperinflation experience are stationary by employing the ADF test. Also, they show that inflation rates of other two countries whose inflation rates were found nonstationary by the ADF test turn out to be stationary when structural breaks are incorporated into analysis by using Perron (1989) method. Narayan (2014) first extends the KPSS test by allowing for multiple structural breaks and then using this test shows that inflation rates of fourteen out of seventeen Sub-Saharan countries are stationary. He also uses a panel version of this test and finds that for a panel consisting of all 17 countries the inflation rate is stationary. Only when, however, three countries whose univariate test fails to support the stationarity hypothesis are grouped into a panel, does he still find that the inflation rate is nonstationary.

Turkey is a developing and relatively open country and has had both creeping and galloping inflation experience. The annual CPI inflation rate historically became high and persistent level at the first half of 1970s, from one digit levels in 1960s. Subsequently, the average inflation rate increased to 35% in the second half of the 1970s mainly because of the oil price shocks as well as political, economic and social unrest prevailing in those years of the Republic history. What's more, the inflation rate reached three digit levels first time in the year 1980, while real gross domestic product (GDP) decreased by 2.45%.

Following the January 24, 1980 structural reform program, which mainly aimed to liberalize the economy and pursue an export-led growth policy instead of import-substitution one, the inflation rate initially declined. But this decrease was not long-lasting and the inflation rate started to rise again. The average inflation rate was 48% over the 1980-1988 period. Further liberalization was accomplished in the year 1989 by abolishing restrictions on capital movements. However, in the first half of 1990s, the Turkish economy experienced another major crisis: the inflation rate reached three digit levels the second time in the Republic history and real GDP fell by 5.4% in 1994. After the 1994 crisis and throughout second half of 1990s, some more series efforts, most of them IMF backed, were undertaken to

bring down the inflation rate. However, the inflation rate continued to fluctuate around 74% in the first half and 81% in the second half of 1990s. At the end of the year 1999, an exchange rate based stabilization program, supported by IMF and titled as “Disinflation Program for the Year 2000” was launched with the aim of decreasing the inflation rate to single digit levels by the end of 2002. Although some targets of the program were initially realized, the program had to be revised in November 2000 and a few months later, in February 2001, had to be abandoned.

Despite the fact that the inflation rate reduced to 55% and 54% in the years 2000 and 2001, respectively, cost of this disinflation was too acute: real GDP fell by 9.2% in 2001. Following 2001 crisis, serious structural reforms such as restructuring banking system, strengthening independence of the central bank of Turkey and establishing and maintaining fiscal discipline and policy changes such as switching to a floating exchange rate regime and adoption of the implicit inflation targeting were implemented. Afterwards, the inflation rate decreased to single digit levels in 2004, for the first time over the past 30 years, and remained single digit levels except for the years 2008 and 2011.

Given its unique inflation experience, the aim of this study is to investigate stationarity properties of the monthly CPI inflation rate of Turkey over the 1982:02-2016:07 period. Main contributions of this study are as follows: First, neither of those studies, mentioned above, investigates the unit root hypothesis for the Turkish inflation rate even Turkey as a panel member if panel data are used. Therefore, this study hopes to add current discussion with an examination of the Turkish case which generally has high and volatile inflation experience. Second, a unit root investigation for the inflation rate is carried out not only by the ADF, Phillips-Perron (PP) and KPSS tests, which are conventionally and widely used, but also by the Dickey-Fuller GLS (DF-GLS), Point Optimal and M Tests, which generally have much power or less size distortion. Third, both raw and seasonally adjusted monthly CPI data are used when forming inflation rates. Thus, two inflation rate series are analysed throughout the study in order to see whether seasonality has any important effect on the results. Fourth, possible one or two endogenous structural breaks are accounted for appropriately by using Lee and Strazicich (2004, 2003) methodology when stationarity of the inflation rate is tested. Fifth, possible dates of structural breaks are determined and their relations

with major policy changes or shocks originated from inside or outside of the Turkish economy are discussed.

The data set consists of CPI data, which is observed at monthly frequency, and covers 1982:01-2016:07 period. To the best of my knowledge, this is the first study which investigates stationarity properties of the Turkish CPI inflation rate during the period covered, when all other characteristics of the analysis such as unit root tests chosen and treatment of seasonality and structural break are taken into account. The remainder of this article is organized as follows: section two introduces the tests which are used in this article. Section three presents the data and gives the main results. Finally, section four concludes.

## 2. ECONOMETRIC METHODS

### 2.1. Unit root or stationarity tests without structural break

There are various unit root and stationarity tests which can be used to determine time series properties of any series and some widely used tests are applied in this study. Among them, the first one used in this study is the ADF test due to Fuller (1976) and Dickey and Fuller (1979). The ADF test is based upon following regression equations:

$$\Delta y_t = a_0 + \gamma y_{t-1} + \sum_{i=1}^p \beta_i \Delta y_{t-i} + \varepsilon_t \quad (1)$$

$$\Delta y_t = a_0 + a_1 t + \gamma y_{t-1} + \sum_{i=1}^p \beta_i \Delta y_{t-i} + \varepsilon_t \quad (2)$$

Where  $y_t$  is a time series (i.e. the inflation rate) being tested for a unit root,  $\Delta$  is a differencing operator,  $t$  is a deterministic time trend variable and  $\varepsilon_t$  is a white noise error term. In order to handle serially correlated errors, above equations are augmented by  $p$  lags of the dependent variable ( $\Delta y_{t-i}$ ). The null hypothesis,  $H_0 : \gamma = 0$ , denotes the unit root in  $y_t$  and the alternative hypothesis,  $H_1 : \gamma < 0$ , denotes the absence of the unit root in  $y_t$ . Computed test statistics are evaluated by using Mackinnon (1996) critical values.

The second one used in this study is the PP test. This test has been developed by Phillips (1987) and Phillips and Perron (1988) and differs from the ADF test in that the test allows for weak dependence and heterogeneity in the data and uses

nonparametric corrections instead of adding  $p$  lags of the dependent variable to the right hand side of above equations as in the ADF test. The null and alternative hypotheses and asymptotic critical values of the test are the same as the ADF.

The third group of tests used in this study includes the DF-GLS and Point Optimal Tests which are developed by Elliott et al. (1996, hereafter ERS). These tests are more powerful than the DF test because of the detrending procedure used when the data contains a deterministic mean or a trend. The DF-GLS test is based on the following regression equation:

$$\Delta y_t^d = \gamma y_{t-1}^d + \sum_{i=1}^k a_i \Delta y_{t-i}^d + \varepsilon_t \quad (3)$$

Where locally detrended  $y_t$  series is called  $y_t^d$ . The locally detrending procedure has two options: one denotes the only constant case and the other denotes the constant and trend case. Similar to the ADF and the PP tests, the unit root null hypothesis in  $y_t$  can be tested via the t-statistic of  $\gamma=0$  in equation (3). In case of the only constant, the asymptotic distribution of the test statistic is the same as the ADF test, while in case of the constant and trend, the asymptotic distribution is different from the ADF test and simulated critical values are reported in Table 1 in the ERS.

The other one, Point Optimal Test statistic, can be calculated as follows:

$$P_T = \frac{SSR(\bar{a}) - \bar{a}SSR(1)}{s_\infty^2} \quad (4)$$

Where  $SSR(\bar{a})$  and  $SSR(1)$  denote sum of squared errors obtained from the regressions using transformed series and  $s_\infty^2$ , also known as long-run variance, can be calculated from the autoregression as recommended by the ERS. Asymptotic critical values which depend on deterministic terms are simulated and reported in Table 1 in the ERS. The unit root null hypothesis will be rejected for small values of test statistics in both of the ERS tests.

M Tests suggested by Ng and Perron (2001) are used in this study as well. Using GLS detrending of the ERS, Ng and Perron (2001) propose four test statistics known as  $M^{GLS}$  tests:

$$MZ_{\alpha}^{GLS} = \left( T^{-1} (y_T^d)^2 - s_{\infty}^2 \right) \left( 2T^{-2} \sum_{t=1}^T (y_{t-1}^d)^2 \right)^{-1} \quad (5)$$

$$MSB^{GLS} = \left( \left( T^{-2} \sum_{t=1}^T (y_{t-1}^d)^2 \right) \div (s_{\infty}^2) \right)^{1/2} \quad (6)$$

$$MZ_t^{GLS} = MZ_{\alpha}^{GLS} \times MSB^{GLS} \quad (7)$$

$$MP_T^{GLS} = \begin{cases} \left[ \bar{c}^2 T^{-2} \sum_{t=1}^T (y_{t-1}^d)^2 - \bar{c} T^{-1} (y_T^d)^2 \right] \div s_{\infty}^2, & \text{if } x_t = (1) \\ \left[ \bar{c}^2 T^{-2} \sum_{t=1}^T (y_{t-1}^d)^2 + (1 - \bar{c}) T^{-1} (y_T^d)^2 \right] \div s_{\infty}^2 & \text{if } x_t = (1, t)' \end{cases} \quad (8)$$

These tests are constructed by modifying the PP  $Z_{\alpha}$ , Bhargava (1986)  $R_1$ , the PP  $Z_t$  and the ERS Point Optimal Test statistics, respectively. In order to estimate the long-run variance, Ng and Perron (2001) suggest using the ERS autoregression with GLS detrended data, i.e.  $y_t^d$  in place of  $y_t$ , and without deterministic right-hand-side variables. In this case, the above  $M^{GLS}$  tests are called the  $\bar{M}^{GLS}$  tests. They also suggest an information criterion with a penalty factor that is sample dependent and named them MIC. They show that using the  $\bar{M}^{GLS}$  tests along with the MIC gives much improvement in size and power properties of the related unit root tests.

The last test used in this section differs from other tests employed in this study in that the null hypothesis denotes (trend) stationarity and the alternative hypothesis denotes difference stationarity. The KPSS test assumes that a time series can be decomposed into the sum of its parts as follows:

$$y_t = \delta \bar{x} + r_t + \varepsilon_t \quad (9)$$

Where  $t$  is the (deterministic) time variable once again,  $r_t$  is the random walk, i.e.  $r_t = r_{t-1} + u_t$ ,  $u_t \sim iid(0, \sigma_u^2)$  and  $\varepsilon_t$  is the stationary error term. The null and alternative hypotheses of the KPSS test are  $H_0 : \sigma_u^2 = 0$  and  $H_0 : \sigma_u^2 > 0$ .

These hypotheses corresponding to the series under investigation are a trend stationary and a difference stationary, respectively. If there is no deterministic trend in (9), the above hypotheses correspond to  $y_t$  which is the stationary around the level and the random walk, respectively. The test is an upper tail test and asymptotic critical values are reported in Table 1 in KPSS.

## **2.2. Unit root tests which allow for one and two endogenous structural breaks**

Perron (1989) is the first study which shows that if the true data generation process of a trend-stationary series contains a shift in the intercept or the slope of the trend function and this shift is ignored, one could hardly reject the unit root null hypothesis by using DF unit root tests. He also points out that, therefore, there is a need to develop statistical procedures which can differentiate a time series with a unit root from a stationary time series around a breaking trend function. Perron (1989) also develops such a test assuming that the date of structural break is known a priori or an exogenous event and tabulates asymptotic critical values.

A priori known or an exogenous break date assumption of Perron (1989) test is criticized by some authors including Perron (1989) himself and Zivot and Andrews (1992, hereafter ZA) among others, in that problems associated with pre-testing and data-mining are present in the methodology. Based mainly upon this remark, the ZA develops a test similar to Perron (1989) test in some respects but with an important difference that the date of structural break is now regarded as an endogenous event. Furthermore, the ZA test differs from Perron (1989) test by ignoring any structural break under the null hypothesis and states simply that the time series being investigated is an integrated process.

Lee and Strazicich (2004) point out that the ZA and other similar tests in terms of regarding structural break date as an endogenous event such as Lumsdaine and Papell (1997), Perron (1997) and Vogelsang and Perron (1998) tests, have one common limitation. These “endogenous break unit root tests” ignore any possible break under the null hypothesis. They also state that, as a consequence, if there is a break under the null hypothesis, these tests have two major shortcomings. First, there will be a size distortions problem such that the unit root null hypothesis will be rejected too often. Hence, results of these tests may incorrectly support the hypothesis that time series is stationary with break when actually the series is

nonstationary with a break. Second, these “endogenous break unit root tests” estimate break dates incorrectly as noted by Lee and Strazicich (2001). Lee and Strazicich (2004), by extending the work of Schmidt and Phillips (1992), develop an endogenous one break minimum LM unit root test which is free from above shortcomings. They consider the following data generating process (DGP):

$$y_t = \delta Z_t + X_t, \quad X_t = \beta X_{t-1} + \varepsilon_t \quad (10)$$

where  $Z_t$  is a vector consisting of exogenous variables and  $\varepsilon_t \sim iid N(0, \sigma^2)$ .

Lee and Strazicich (2004) model structural change in two different ways. There is a one-time change in the intercept under the alternative hypothesis in Model A,

which can be described by  $Z_t = [1, t, D_t]'$ , where  $D_t = \begin{cases} 1, & t \geq T_B + 1 \\ 0, & \text{otherwise} \end{cases}$ ,  $T_B$  is the date of structural break and  $\delta' = (\delta_1, \delta_2, \delta_3)$ . This model also known as a “crash” model. There is a one-time change in the intercept and the trend slope under the alternative hypothesis in Model C, which can be described by  $Z_t = [1, t, D_t, DT_t]'$ , where

$DT_t = \begin{cases} t - T_B, & t \geq T_B + 1 \\ 0, & \text{otherwise} \end{cases}$ . This model also known as a “crash-cum-growth” model.

Lee and Strazicich (2003) state that allowing for only one structural break in many economic time series may be too restrictive and then suggest an endogenous two-break minimum LM unit root test. For DGP as in (10), they again model structural change in two different ways. Model A (hereafter Model AA) is an extension of Model A of Lee and Strazicich (2004) and allows for two shifts in the level. This model can be described by  $Z_t = [1, t, D_{1t}, D_{2t}]'$ , where

$D_{jt} = \begin{cases} 1, & t \geq T_{Bj} + 1 \\ 0, & \text{otherwise} \end{cases}$  and  $T_{Bj}$  are the dates of structural breaks. In Model AA, depending on the value of  $\beta$ , the null ( $\beta = 1$ ) and alternative ( $\beta < 1$ ) hypothesis correspond to following:

$$H_0 : y_t = \mu_0 + d_1 B_{1t} + d_2 B_{2t} + y_{t-1} + v_{1t}$$

$$H_1 : y_t = \mu_1 + \gamma + d_1 D_{1t} + d_2 D_{2t} + v_{2t}$$

Where error terms  $v_{1t}$  and  $v_{2t}$  are stationary processes,  $B_{jt} = \begin{cases} 1, & t = T_{Bj} + 1 \\ 0, & \text{otherwise} \end{cases}$   $j=1,2$ , and  $d = (d_1, d_2)'$ . Model C (hereafter Model CC) is an extension of Model C of Lee and Strazicich (2004) and allows for two changes in the level and the trend. This model can be described by  $Z_t = [1, t, D_{1t}, D_{2t}, DT_{1t}, DT_{2t}]'$ , where  $DT_{jt} = \begin{cases} t - T_{Bj}, & t \geq T_{Bj} + 1 \\ 0, & \text{diğer} \end{cases} j=1,2$ . In Model CC, depending on the value of  $\beta$ , the null ( $\beta=1$ ) and alternative ( $\beta < 1$ ) hypothesis correspond to following:

$$H_0 : y_t = \mu_0 + d_1 B_{1t} + d_2 B_{2t} + d_3 D_{1t} + d_4 D_{2t} + y_{t-1} + v_{1t}$$

$$H_1 : y_t = \mu_1 + \gamma + d_1 D_{1t} + d_2 D_{2t} + d_3 DT_{1t} + d_4 DT_{2t} + v_{2t}$$

Lee and Strazicich (2003, 2004) show that, according to the LM (score) principle, unit root tests statistics can be calculated by estimating following regression equation:

$$\Delta y_t = \delta' \Delta Z_t + \phi \bar{S}_{t-1} + u_t \quad (11)$$

Where  $\bar{S}_t = y_t - \hat{\psi}_x - Z_t \hat{\delta}$ ,  $t=2,3,\dots,T$ ,  $\hat{\delta}$  are coefficients estimated by regressing  $\Delta y_t$  on  $\Delta Z_t$ ,  $\hat{\psi}_x$  is calculated by  $y_1 - Z_1 \hat{\delta}$ ,  $y_1$  and  $Z_1$  are first observations of  $y_t$  and  $Z_t$ , respectively. The LM t-test statistic for the unit root null hypothesis ( $\phi=0$ ) is given by  $\hat{\tau} = t$ -statistic testing the null hypothesis  $\phi=0$ . The locations of break points are determined by searching a minimum unit root t-test statistic among all possible break points.

In order to eliminate endpoints, as is typical in any unit root tests allowing for endogenous structural breaks, a trimming of % 10 is used such that the searching process is carried out over the region  $(0.10T, 0.90T)$ , where T is the sample size. Besides, a correction for autocorrelated errors is accomplished by adding augmented terms  $\Delta \bar{S}_{t-j}$ ,  $j=1,2,\dots,k$  to the equation (11). The number of augmented terms is selected according to the general to specific procedure

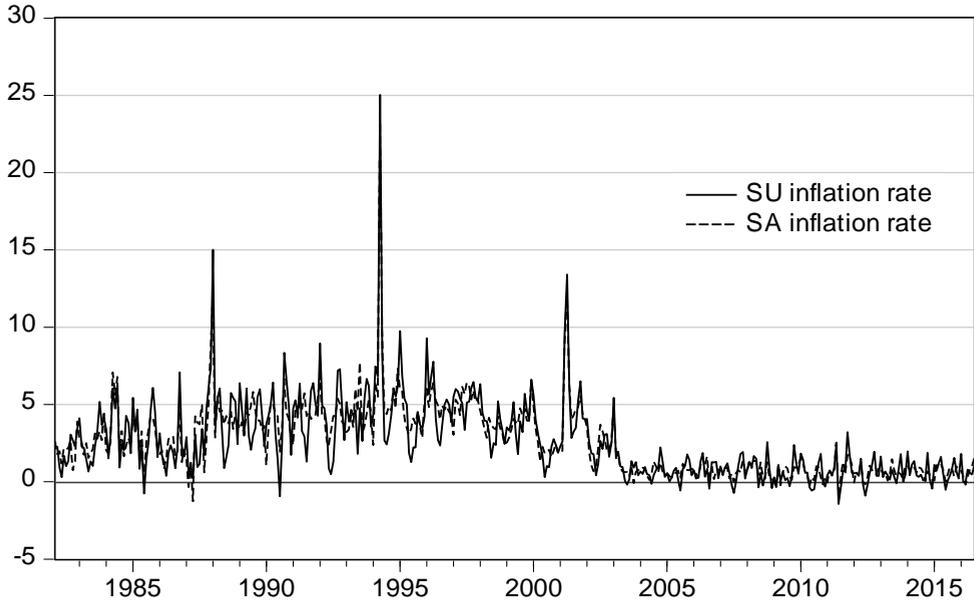
suggested by Ng and Perron (1995).<sup>7</sup> Critical values of the endogenous one break unit root test are tabulated in Lee and Strazicich (2004), while critical values of the endogenous two breaks unit root test are tabulated in Lee and Strazicich (2003). Note that critical values of Model A and Model AA do not depend on the locations of breaks, while critical values of Model C and Model CC depend somewhat.

### 3. DATA AND EMPIRICAL RESULTS

Using monthly CPI data for Turkey, both raw and seasonally adjusted form<sup>8</sup>, the inflation rate is calculated as  $\pi_t = 100 * \ln(CPI_t / CPI_{t-1})$ . Hence, two inflation rate series are analysed throughout the rest of the paper. One is computed from the raw CPI data and called as a seasonally unadjusted (SU) inflation rate and the other is computed from the seasonally adjusted CPI data and called as a seasonally adjusted (SA) inflation rate. Fig. 1 shows the time path and Table 1 reports some summary statistics of the monthly Turkish CPI inflation rate for both forms over the 1982:02-2016:07 period (total of 414 observations). Fig. 1 suggests that there could be some breaks in the data as, for example, recent inflation experience is very different from earlier ones. Besides, there are some observations which denote large increases in the inflation rate such as 1988:1, 1994:4 and 2001:4. Table 1 shows that monthly median inflation rates are 1.93% and 2.11% for the SU and the SA inflation rate, respectively. The standard deviation (SD) for the SU inflation rate (2.582%) is higher than the SA inflation rate (2.313%). Also, both series are skewed to the right, leptokurtic and not normally distributed as shown by highly significant Jargue-Bera statistics. Reported Q-statistics of both series at various lags (only three of them are presented in Table 1) are high and significant at the 1% level, implying that the inflation rate exhibits strong persistence.

<sup>7</sup> Initially k is set equal to 16 and significance of the last term is checked in accordance with % 10 asymptotic normal distribution critical value (1.645). When the last term is insignificant, k is reduced by one, the equation is re-estimated and significance of the last term is checked again. This procedure continues until one significant term is found. If no significant term can be found then k is set equal to zero.

<sup>8</sup> The seasonally adjusted data are computed by using the Census X-12 method to raw CPI data.

**Figure-1** Monthly CPI Inflation Rate of Turkey**Table 1** Some Descriptive Statistics for the CPI Inflation Rate

	SU Inflation Rate	SA Inflation Rate
Mean	2.622	2.626
Median	1.935	2.118
SD	2.582	2.313
Skewness	2.387	2.318
Kurtosis	17.168	18.126
Jargue-Bera	3856.09 ***	4317.97 ***
Q(12)	967.75 ***	1459.4 ***
Q(24)	1735.3 ***	2645.5 ***
Q(36)	2395.1 ***	3627.6 ***

Notes: The Jargue-Bera tests the null hypothesis of a normal distribution and has a  $\chi^2$  distribution with 2 degrees of freedom.

Q(p) is the Ljung-Box (1978) Q-statistic at lag p.

\*\*\* denotes statistical significance at 1% level.

Could the observed persistence in the inflation rate be attributable to the unit root? In order to see that, a battery of the unit root and stationarity tests without structural break are carried out and the results are reported in Table 2.

**Table 2** Results of the Unit Root and Stationarity Tests Without Structural Break

Tests	SU Inflation Rate		SA Inflation Rate		%5 Critical Values	
	Constant	Constant and time trend	Constant	Constant and time trend	Constant	Constant and time trend
ADF	-1.712 (11)	-10.816 (0)***	-3.472 (4)***	-4.693 (4)***	-2.869	-3.421
PP	-9.616 (7)***	-10.775 (5)***	-9.059 (10)***	-11.015 (10)***	-2.869	-3.421
DF-GLS	-1.729 (11)	-1.886 (11)	-3.477 (4)***	-3.815 (4)***	-1.941	-2.890
Point Optimal	6.675 (14)	18.149 (14)	7.649 (17)	19.514 (17)	3.260	5.620
$\overline{MZ}_\alpha^{GLS}$	-3.644 (14)	-4.030 (14)	-3.189 (17)	-3.848 (17)	-8.100	-17.300
$\overline{MSB}^{GLS}$	0.365 (14)	0.351 (14)	0.389 (17)	0.360 (17)	0.233	0.168
$\overline{MZ}_t^{GLS}$	-1.333 (14)	-1.417 (14)	-1.242 (17)	-1.387 (17)	-1.980	-2.910
$\overline{MP}_T^{GLS}$	6.729 (14)	22.584 (14)	7.659 (17)	23.676 (17)	3.170	5.480
KPSS	1.610 (14)***	0.473 (12)***	1.548 (15)***	0.429 (14)***	0.463	0.146

Notes: Reported numbers in parentheses are lag length computed in accordance with the Schwarz information criterion for the ADF and the DF-GLS tests, bandwidth selected in accordance with the Newey and West(1994) procedure with Bartlett weights for the PP and the KPSS tests, lag length in autoregression recommended by the ERS and computed in accordance with the modified Akaike information criterion due to Ng and Perron (2001) for the Point Optimal test, and finally lag length in autoregression recommended by the ERS and computed in the same way as in Point Optimal test with a difference of using GLS detrended data, i.e.  $y_t^d$  in place of  $y_t$ , and no deterministic right-hand-side variables for the  $\overline{M}^{GLS}$  tests.

% 5 Critical values, reported last two columns of Table 2, are in accordance with the number of observations adjusted for lag length used in test regressions for the ADF and the DF-GLS tests. Changes of the lag length, and as a result of this, changes of the number of usable observations can lead to some changes on the associated critical values.

\*\*\* and \*\* denote statistical significance at 1% and 5% levels, respectively.

Table 2 shows that, for the SU inflation rate, irrespective of the trend specification of the tests, the unit root null hypothesis cannot be rejected via the DF-GLS, the Point Optimal and the  $\overline{M}^{GLS}$  tests and the stationarity hypothesis can be rejected via the KPSS test. This finding indicates that the inflation rate contains a unit root and hence is a nonstationary variable. Nevertheless, some test results are contradictory to this finding. According to the PP test, the unit root null hypothesis can be rejected at the 1% significance level, indicating that the inflation rate is a

stationary variable. Also, results of the ADF test with the constant and the time trend are in accordance with the PP test result, while results of the ADF test with the constant are not. For the SA inflation rate, the results are generally the same except that the unit root null hypothesis can be rejected via the DF-GLS and the ADF tests –irrespective of the trend specification- as well as the PP test in this case. Therefore, for this series, there is relatively much evidence against the unit root hypothesis.

Although there is some contradictory evidence, in general test results are in favour of the idea that the inflation rate is a nonstationary variable due to a unit root. However, as shown in Perron (1989), if there is a structural break in the data and this break is ignored when the unit root tests are carried out, then one may falsely conclude that the data contain a unit root. In order to see whether this is the case, the minimum LM unit root test which allows for one endogenous break due to Lee and Strazicich (2004) is carried out and the results are reported in Table 3.

**Table 3** Results of the Unit Root Test with One Structural Break

	SU Inflation Rate		SA Inflation Rate	
	Model A	Model C	Model A	Model C
Lag Length	15	15	14	14
LM Test Statistic	-3.676 **	-4.655 **	-3.796 **	-4.624 **
Break Date	2001:04	1990:08	2001:04	1994:11
B(t)	-3.454 * (-1.810)	6.365 *** (3.440)	-2.335 (-1.470)	3.517 * (1.771)
D(t)	-	-1.474 *** (-3.991)	-	-1.072 *** (-4.098)

Notes: Lag length is the number of augmented terms in equation (11) and selected according to the general to specific procedure suggested by Ng and Perron (1995).

B(t) is the dummy variable for the structural break in the intercept and D(t) is the dummy variable for the structural break in the slope. Critical values for these dummy variables are based on the standard normal distribution (2.576, 1.96 and 1.645 at 1%, 5% and 10% levels, respectively).

Figures in parentheses are t-statistics.

\*\*\*, \*\* and \* denote statistical significance at 1%, 5% and 10% levels, respectively.

Critical values for Model A are -4.239, -3.566 and -3.211 at 1%, 5% and 10% levels, respectively. Critical values for Model C depend somewhat on the location of the break ( $\lambda = T_B / T$ ) and tabulated in Table 1 in Lee and Strazicich (2004, s.12).

Table 3 shows that the unit root null hypothesis can be rejected for both models and series at 5 % significance level. Also, all dummy variables representing structural break in the intercept and the trend slope coefficients, except for one dummy variable representing structural break in the intercept in Model A for the SA inflation rate, are significant at least 10 % significance level. These findings mean that the inflation rate is a trend-stationary when unknown structural breaks are allowed for and the present findings contrast to our earlier findings from various unit root or stationarity tests without structural breaks. According to the results of Model A, the date of structural break is April 2001 for both inflation rates. This date follows 2001 February crisis which formally puts an end to the disinflation program for Year 2000 and corresponds with announcing another programme named as “Strengthening the Turkish Economy: Turkey’s Transition Program”. Selection of this date could be attributable to major structural reforms such as strengthening the banking industry and independence of the central bank of Turkey and policy changes such as adopting to the floating exchange rate regime and the implicit inflation targeting with the final aim of the explicit inflation targeting both of which have been implemented right after February 2001 crisis and especially with beginning of the last programme. According to the results of Model C, dates of structural breaks are August 1990 for the SU inflation rate and November 1994 for the SA inflation rate. August 1990 exactly matches the beginning of the Gulf War which had very adverse effects on the Turkish economy especially through the channels of increasing oil prices and losing some export markets and was one of the main reasons of economic instability during these periods. The other date, November 1994, follows April 1994 in which the inflation rate reached three digit levels annually first time (and last time so far) after year 1980 and corresponds to a crisis year 1994 in which real GDP fell by 5.4%. Rivlin (2003) emphasizes that in 1993, there was a large increase in the current account deficit which was financed by short-term capital inflows and then, in the beginning of 1994, after Turkey’s credit rating was lowered by two international credit rating agencies, foreign capital started to outflow, financing of the balance of payments deficit was got worse and as a result huge devaluation was occurred. In April 1994, as Yilmazkuday and Akay (2008, 887) note, “the government announced a new stabilization programme according to which public sector wages were to be frozen for one year and the planned consolidated government deficit was to be halved.”

The following table shows the results of the unit root test of Lee and Strazicich (2003) which allows for two structural breaks endogenously.

**Table 4** Results of the Unit Root Test with Two Structural Breaks

	SU Inflation Rate		SA Inflation Rate	
	Model AA	Model CC	Model AA	Model CC
Lag Length	15	15	4	11
LM Test Statistic	-4.967 ***	-9.909 ***	-6.552 ***	-9.502 ***
Break Date 1	1999:04	1994:03	1987:12	1994:03
Break Date 2	2003:01	1996:01	2001:05	1995:12
B1(t)	-1.735 (-0.965)	25.232 *** (13.994)	6.714 *** (4.406)	23.166 *** (15.680)
B2(t)	-2.656 (-1.480)	-5.090 *** (-2.992)	-1.069 (-0.690)	0.457 (0.338)
D1(t)	-	-7.777 *** (-10.055)	-	-5.714 *** (-9.693)
D2(t)	-	7.215 *** (9.962)	-	4.709 *** (9.379)

Notes: Lag length is the number of augmented terms in equation (11) and selected according to the general to specific procedure suggested by Ng and Perron (1995).

B1(t) and B2(t) are the dummy variables for the structural breaks in the intercept and D1(t) and D2(t) are the dummy variables for the structural breaks in the slope. Critical values for these dummy variables are based on the standard normal distribution (2.576, 1.96 and 1.645 at 1%, 5% and 10% levels, respectively).

Figures in parentheses are t-statistics.

\*\*\*, \*\* and \* denote statistical significance at 1%, 5% and 10% levels, respectively.

Critical values for Model AA are -4.545, -3.842 and -3.504 at 1%, 5% and 10% levels, respectively. Critical values for Model CC depend somewhat on the location of the breaks ( $\lambda_j$ ) and tabulated in Table 2 in Lee and Strazicich (2003, s.1084).

Table 4 shows that the unit root null hypothesis can be rejected for both series at 1 % significance level irrespective of the model specification. This means that the inflation rate is a trend-stationary variable when two unknown structural breaks are allowed for and supports the results obtained earlier by unit root test which allows for one unknown structural break endogenously. For the SU inflation rate, dummy variables in model AA are insignificant while dummy variables in model CC are significant at 1% level. For model CC, structural break dates are March 1994 and January 1996. The first date corresponds to 1994 crisis and possible reasons of choosing this date as a structural break were discussed above. The other date,

January 1996, corresponds with one of very unstable periods in the political area. Following the December 1995 election, the coalition government was hardly formed in March 1996 but quickly collapsed three months later. Then, the new coalition government was formed in June 1996. In addition to political instability, according to Central Bank of the Republic of Turkey (1996), price increases in the public sector in the beginning of the 1996, which were postponed due to early December 1995 election, made an upward pressure on inflation rate.

For the SA inflation rate, Model AA selects December 1987 and May 2001 as structural break dates, but only one of the dummy variables which correspond to the first break is statistically significant. Yilmazkuday and Akay (2008) classified this date as the end of “success years” of the Turkish economy which had already started in the year of 1980 and they further point out that after this date “populism, capital account liberalization and fiscal imbalances” period begins. Also, Akyüz and Boratav (2003) emphasize two factors. First, contrary to the “success years” which have one characteristic that wage earnings were suppressed under the military rule in the period of 1980-1983 and restricted role of trade unions throughout the whole period, these policies were no longer feasible thereafter because parliamentary democracy was fully restored in 1987. Indeed, as Boratav, Yeldan and Köse (2000) point out, real wages in manufacturing industry were increased by 90% from 1988 to 1991. Second, according to Akyüz and Boratav (2003), some policy changes such as liberalizing financial markets when there is no control on price increases and no fiscal discipline either, deregulating interest rates and changing a policy towards issuing securities for financing budget deficits all contributed to macroeconomic imbalances. Similar to results of Model AA, all dummy variables in Model CC, except for the dummy variable representing the second break in the intercept, are statistically significant at 1 % level. For model CC, structural break dates are March 1994 and December 1995 and nearly the same as the model for the SU inflation rate. The first date corresponds with a crisis year 1994 and is already chosen as the same model for the SU inflation rate. Moreover, the second date is one month earlier than the date which is chosen in the same model for the SU inflation rate.

Taken together, although results of the unit root or stationarity tests without structural breaks generally show that the inflation rate, whether seasonally adjusted or not, is not stationary, allowing for structural breaks changes the results and shows that the inflation rate is a stationary process with breaks. This main finding of the paper has

several implications. First, from the econometric point of view, ignoring structural breaks in the inflation rate may lead to incorrect conclusion about the stationarity properties of the inflation rate. This is in completely accordance with Perron (1989) which analyses and places importance on this point first time. Moreover, as Lee and Wu (2001) note, it may not be suitable for using conventional cointegration analysis when the Fisher effect and the convergence of the inflation rates are investigated. Second, from the policy point of view, shocks do not have permanent effects on the inflation rate. On the contrary, any shocks to inflation rate will only have a transitory effect. Under this circumstance, as Lee and Chang (2008) point out, a macroeconomic policy aimed at stabilizing the economy has long-lasting effects on the inflation rate. Third, stationarity of the inflation rate means that there is no hyperinflation and there is no evidence supporting the accelerationist hypothesis either. Fourth, structural break dates, which are taken from the Lee and Strazicich (2004, 2003) methodology, points to some economic policies as possible candidates for affecting the path of the inflation rate of Turkey in a strong way. Among many structural break dates, which are chosen according to one-break or two-break unit root tests and seasonally adjusted or unadjusted series used, April 2001 is drawn attention the most. April 2001 corresponds to period in which some serious structural reforms and policy changes were implemented in the Turkish economy. One of them might be especially important in this regard: strengthening independence of the central bank of Turkey. With a law passed on April 2001, The Central Bank of Turkey (TCMB) was given instrument independence completely and goal independence partially. Moreover, the same law ruled TCMB out giving advance or credit to the Treasury and public enterprises and buying their securities in primary markets. Thus, an opportunity of financing budget deficits with central bank resources was eliminated. In addition to this, adoption of the inflation targeting regime and strengthening the banking industry were other major policies, which were implemented in this period.

One final remark is for the seasonality feature of prices. After this feature is taken away from prices, the SA inflation rate is calculated and analysed along with the SU inflation rate. However, test results obtained by using the SA inflation rate are qualitatively the same as test results obtained by using the SU inflation rate.

#### 4. CONCLUSION

Given the importance of the stationarity properties of the inflation rate on various areas, this study takes the issue and investigates whether monthly CPI inflation rate of the Turkey contains a unit root or not. In the first step of the application, a number of unit root tests i.e. the ADF, the PP, the DF-GLS, the Point Optimal, and the M Tests and a stationarity test, i.e. the KPSS test, are used. Test results, despite some contradictory evidence, generally show that the inflation rate contains a unit root. However, all the above tests ignore any structural breaks and, since Perron (1989), it has been well known that ignoring structural breaks could be a reason of nonrejection of the unit root hypothesis. Therefore, in the second step of the application, unit root tests which allow for one and two structural breaks due to Lee and Strazicich (2004, 2003) respectively, are used. This time, test results show that the inflation rate does not contain a unit root.

This study shows that the Turkish CPI inflation rate is a stationary process with structural breaks. This finding means that effects of any shocks on the inflation rate are transitory and necessarily short-lived. After the shock, the inflation rate will return to its time path. Based upon this finding, as Lee and Chang (2008) point out, it could be argue that a macroeconomic policy with an aim of stabilizing the economy has long-lasting effects on the inflation rate. Besides, when the Turkish inflation rate is modelled with other macroeconomic variables such as GDP, money supply and interest rates, these stationarity and structural break properties must be accounted for. Specifically, as Lee and Wu (2001) point out, using conventional cointegration analysis when the Fisher effect and the convergence of the inflation rates are investigated may not be suitable.

Although selected break points differ with respect to models and variables to some extent, it is observed that one break occurred around March 1994, and second break occurred around April 2001. These two dates have one common point: in both of these years the Turkish economy experienced a decline in real GDP and an increase in the inflation rate. On the other hand, after the first date, the inflation rate and real GDP fluctuated considerably while after the second date, the inflation rate first declined and then eventually reached and stayed one digit levels except for the years 2008 and 2011. Moreover, real GDP continues to increase annually except for the year 2009 which corresponds to the Great Recession period. These favourable outcomes after the 2001 crisis might be attributable to structural reforms including strengthening independence of the TCMB and establishing and maintaining fiscal discipline and to policy changes such as adopting to the floating exchange rate regime and the implicit inflation targeting.

Finally, as is well known, seasonality is one of the main components of the consumer price index. Based upon this fact, in order to see whether this feature will cause any important differences in the results, both seasonally unadjusted and adjusted price index are used when the inflation rates are calculated. Hence, the two inflation rate series are analysed throughout the paper. However, the results are qualitatively the same.

### **Acknowledgement**

I would like to thank Professor Junsoo Lee for sharing Gauss codes of minimum LM unit root tests which allow for endogenous structural breaks on the Net.

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# U.S. MONETARY POLICY, COMMODITY PRICES AND THE FINANCIALIZATION HYPOTHESIS

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**Abstract:** *Many studies point out the growing correlations within financial markets, while others highlight the financialization of commodity markets. The purpose of this article is to revisit the relationships between various financial assets and commodity markets by taking into account the U.S. monetary policy and therefore the implementation of non-standard measures. In addition to oil, stock and bond markets, U.S. policy rates and a great deal of agricultural prices have been over time considered through a DCC-GARCH model, between 1995-2015. We find that agricultural markets uphold the financialization hypothesis, implying an increase in market-prices' correlations and so raises the question of agricultural prices' drivers. Interestingly, conditional correlations between the U.S. monetary policy and agricultural prices have decreased since 2010, which indicates that the implementation of non-standard monetary policy measures reduces spillover effects on asset prices, especially raw commodities. Such a result in turn highlights changing relationships between monetary, financial and physical markets, in a context of very weak policy rates over a long period.*

**Keywords:** *Agricultural commodities, Financialization, Monetary policy, Volatility; Correlation, DCC-MGARCH; Asymmetric causality.*

**JEL Classification:** *C22; C61; E52; G15; Q02; Q14.*

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## 1. INTRODUCTION

Agricultural commodity prices are mainly driven by fundamental factors over a long period, and notably depend on climatic conditions, growth of emerging countries and structural changes such as the increasing demand for biofuels. After

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historical peaks up to the 2007-2008 global financial crisis, market prices have become more volatile and less synchronized, and sometimes dramatically fall. This new environment also corresponds to the implementation of non-standard monetary-policy measures by major central banks. There are those who understand it as an irreversible call into question of the Jackson Hole consensus and flexible inflation-targeting. Others argue that the paradigm of central banks remains unchanged and that each measure can be classified either as a monetary policy measure or as a financial stability measure, with respect to the Chinese wall that is supposed to favor expectations' anchorage. Whatever the case is, the post-crisis environment is characterized both by erratic fluctuations of commodity prices and financial-stability oriented measures of monetary policies implemented by the major central banks.

From a methodological point of view, many tests allow to dissociate interaction and contagious effects between monetary and financial variables. Further, provided that financial markets' troubles and risk aversion are controlled, historical conditional correlations given by various GARCH processes enable specifying the possible impact of monetary policies on agricultural commodity prices, when monetary policy is simply oriented to consumer prices (before the global crisis) or when monetary policy is largely defined by financial stability matters (after the global financial crisis).

In the literature, such an impact is measured through various channels, with an emphasis on portfolio reallocations and the external value of the U.S. dollar. Portfolio reallocations are focused on the effect of monetary policy changes and asset purchases by central banks, and hence punctual relationships that are time-limited and clearly identified, according to the macro-news following monetary policy committee meetings and eventually auctions and open market operations. The external value of the U.S. dollar raises the difficult question of the drivers of exchange rate and chosen currencies, preventing any general conclusion with regard to possible spillover effects of monetary policies.

In this respect this paper aims at testing the financialization hypothesis that the ongoing financial markets' integration and subsequently the continuous deepening of various markets result in increasing the correlations of market prices over-time. Our study is based on daily spot prices of six agricultural commodities (wheat, corn, soybean, rice, coffee and sugar), VIX and S&P 500 indexes and oil

prices from November 1995 to December 2015, including the Economic Policy Uncertainty [EPU] index and long-term U.S. sovereign bond yields. Then we address the question of possible structural changes with regard to the impact of monetary policy. Indeed, despite official interest rates and reserve requirements, central banks' aim is to stabilize short-term money market interest rates next to the main policy rate. This is especially true if monetary policies shift towards financial stability and if interbank trouble occurs, which is noted during the post-crisis period. Assuming that the Federal Reserve System is the most influential system around the world, the volatility of overnight Fed funds markets offers the additional advantage of providing a data frequency consistent with market prices of agricultural commodities. Therefore, over a long period of time, we seek the relationships between the short-term success of monetary policy (with regard to money market) and asset prices, including raw commodities.

Our findings are consistent with the financialization hypothesis concerning agricultural commodities, oil, sovereign bond markets and stock markets. In other words, conditional correlations increase over time, and this study specifically shows that the finding remains true when considering agricultural returns on physical markets. As a consequence, the financialization of commodity markets is accompanied by changes in commodity returns, which calls into question the role of derivative markets and notably index investment. What's more specific linkages between monetary policy and agricultural markets have changed since the implementation of non-standard monetary measures. More precisely, dynamic conditional correlations between effective Fed funds' volatility and asset prices remain negative but surprisingly have been decreasing since the global crisis. Besides the expected sign, lower correlations show a decrease in spillover effects on asset prices when monetary policy is oriented towards financial stability. In other words, while the "conventional" monetary policy could have favored booms before the crisis, the post-crisis monetary policy reduces adverse effects on agricultural markets. The portfolio diversification is thus affected by changes in correlations over-time, including the implementation of non-standard monetary policies. This finding in turn highlights the growing importance of financial issues for central bankers. The article is organized as follows: section 2 presents related literature, section 3 is related to data and methodology, and section 4 puts forward results and interpretation. Section 5 concludes.

## 2. STATE OF THE ART

The continuous deepening of developed countries' financial markets since the early 2000s may imply structural changes that DCC models are able to account for. Thus, several studies point out the growing correlations between markets and securities, especially stocks and commodities, with a pivotal role for oil prices (Basher and Sadorsky, 2016), and Chkili et al., 2014, over a longer period of time). Oil prices are also related to the exchange rate of oil-exporting countries (Ferraro et al., 2015). Here, the 2007-2008 global crisis may disrupt the analysis as it follows the 2006-2008 food crisis and also represents a structural breakdown with regard to the above-mentioned relationships (Creti et al., 2013; Han et al., 2015; Wang et al., 2014). As a consequence, correlations are specified and causal relationships are identified, for example from 2006 regarding, specifically, corn and soybean (Avalos, 2014) or, more broadly, over thirty years for twenty-four agricultural commodities in a panel setting (Nazlioglu and Soyta, 2012).

Other findings highlight the usefulness of future returns to identify the asymmetry of relationships between stocks and raw materials (Nguyen et al., 2015), and to point out the effects of financialization on commodity prices (Paraschiv et al., 2015). They also show that commodity returns may favor speculation (Andreasson et al., 2016) but speculation might not, in turn, reinforce commodities portfolios' volatility (Miffre and Brooks, 2013). Yet, portfolio management is shaped by changes in markets' and assets' correlations, taking into account that energy prices may drive financial markets before the global crisis but instead support stock-market troubles after mid-2008 (Jebabli et al., 2014). In any case, the 2007-2008 global crisis is accompanied by troubles that also affect emerging-market countries, such as the Indian commodity markets (Shalini and Prasanna, 2016).

Among the studies carried out on this topic, a significant number is related to the link between monetary policies and asset prices, especially commodity prices (Anzuini et al., 2013; Hammoudeh and Nguyen, 2015; Hayo et al., 2012). Some authors focus on the impact of money supply and the Federal Fund interest rate, and show that a very accommodative monetary policy (in response to the financial crisis) tends to increase (weakly but significantly) commodity prices (Anzuini et al., 2013). Again, a historical approach over a long (Frankel and Hardouvelis, 1985; Frankel, 1986; Frankel and Rose, 2010) or a very long (Laopodis, 2013)

period helps to detail recent changes. Moreover, commodity prices notably derive from expected interest rates and consumer prices (Frankel, 2014).

Papers are sometimes focused on standard and non-standard measures of monetary policy (Rosa, 2014), or on the global financial crisis and the sole non-standard measures (Bauer and Neely, 2014; Bowman et al., 2015; Glick and Leduc, 2012). Most of the time, authors put the emphasis on the effect of news related to the expected path of interest rates and open-market operations, including assets purchase. After the zero lower bound, the impact of Fed's actions on domestic stock returns and the impact of US monetary policy surprises on global equities are higher (Eksi and Tas, 2017; Chortareas and Noikokyris, 2017). However, surprises on the federal fund rate already had significant effects on stock returns before 2007 (Jansen and Zervou, 2017). This impact is finally more pronounced when monetary policy surprise is negative (Gallo et al., 2016).

Besides feedback due to credit activity, monetary policy mainly works through the interest rate channel in usual macroeconomic models. However, the relationship between the funds rate and the funds-rate target may be controversial. United States monetary policy makers' ability to influence interest rates may be greatly exaggerated, as the effect of open-market operations on the funds rate is at best weak (Thornton, 2007). Further, the (questioned) ability to control funds rate does not necessarily imply controlling the term structure of interest rates, so the theoretical underestimate of money's essential role has led to non-standard measures that consist of excessive money supply (Thornton, 2014). Yet, the author also states a marked improvement in the relationship between the funds rate and the funds-rate target over a long period, as the latter has become a policy instrument since the late 1980s (so it is no longer an operating instrument).

As indicated above, money supply may be excessive with regard to both monetary and price stability. However, in a context of financial distress and bank troubles, interbank risk premiums appear and concern central banks, whose action is largely conducted towards the stabilization of short-term interest rates, notably through reserve requirements, assets purchase, liquidity funding and forward guidance. In this context, the interest rate volatility represents a suitable (daily) measure of monetary policy success. In other words, Thornton's criticism of non-standard monetary policy measures, macroeconomic models and drivers of funds rate remains intact, and the will power of keeping fund rates around the target is

observed. Further, non-standard monetary policy measures are implemented because the so-called global crisis, but previous years are also well known for huge open market operations that may have influenced the volatility of fund rate.<sup>9</sup>

It might be said that the interest rates that matter are real federal funds rates that sometimes move in the opposite direction from official interest rates (Tatom, 2014). This detail would be necessary for issues on inflation. Real short-term interest rates are also relevant regarding the significant (and asymmetric) effect of monetary policy on uncertainty and risk aversion, measured by the VIX index (Bekaert et al., 2013). Conversely, the aim of this paper is to measure the changes in financial assets' correlation over time, with an emphasis put on the effect of monetary policy. In this context, possible spillover effects may not be found through standard channels but instead through portfolio reallocations, hence focusing on nominal official and effective fund rates. Here we highlight that Thornton (2014) calls into question the ability of central banks to control other interest rates. This is related to policy control and is separated from the question of the effect of monetary policy, for which Hanson and Stein (2015) find a long-term effect (which may not be supported by standard macroeconomic models that state that monetary policy effects cannot last for longer than price adjustments). Even though the changes in the slope of the yield curve are measured through real long-term interest rates, the underlying mechanism relies on portfolio reallocations successive to a demand for high nominal return from "yield-oriented investors". The same reasoning applies to support the "risk-taking channel" hypothesis (Borio and Zhu, 2012; Rajan, 2005).

Through a DCC-GARCH model, the aim of this paper is to highlight substantial changes on correlations between agricultural commodity prices and other asset prices on the one hand, and monetary policy measures and agricultural commodity prices on the other hand, before and since the global financial crisis. In addition to usual control variables (stock market index and volatility, oil price, ten-year sovereign bonds' yields), the U.S. monetary policy takes into account the

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<sup>9</sup> "The Federal Reserve's pattern of providing liquidity to financial markets following market tensions, which became known as the "Greenspan put", has been cited as one of the contributing factors to the build-up of a speculative bubble prior to the 2007-09 financial crisis" (Bekaert et al., 2013, p. 771).

daily spread between effective and official fund rates, indicating the ability of the central bank to stabilize short-term interest rates (for monetary or financial stability purposes). Alternatively, two datasets that measure the volatility of the effective fund rate and the uncertainty around future monetary policy measures act as robustness tests.

### 3. DATA AND METHODOLOGY

This study related to the financialization of commodity markets covers six agricultural commodities' daily spot prices (wheat, corn, soybean, rice, sugar and coffee) over the period from September 9, 1995 to December 22, 2015, with 5249 observations (Figure 1). The data that feature the financialization hypothesis are the S&P 500 stock market index (S&P 500), the related volatility VIX index (vix), oil price (oil), the ten-year U.S. sovereign bond yield (usbond), the U.S. Economic Policy Uncertainty index (EPU), and the spread between U.S. effective and official daily fund rate (minfed), as indicated by Bentoglio and Guidoni (2009). This latter measure is an interest variable that indicates whether the central bank succeeds in reducing fund-rate fluctuations around the main policy rate. Alternatively, relationships are estimated by replacing "minfed" by the volatility of the effective fund rate (volfed), closely related to the former except that it excludes the level of policy rates applied by the Fed.<sup>10</sup>

#### 3.1. Preliminary analysis

Table 1 provides descriptive statistics regarding the various asset prices of the study. We note the high volatility of coffee and oil prices and S&P 500 index comparatively to other series as wheat and corn. The ten-year U.S. sovereign bond yields are characterized by a slight (left) asymmetry. The distribution of wheat prices finally reveals an important leptokurticity in comparison with other agricultural commodities.

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<sup>10</sup> The stock market volatility index (VIX) is provided by Chicago Board Option Exchange (CBOE). Then, the variable denoted oil corresponds to the West Texas Intermediate's crude oil price, which is extruded from Datastream. The EPU index is built from press archives that are available on Access World News Bank service and given by S. Baker, N. Bloom and S. J. Davis on [www.PolicyUncertainty.com](http://www.PolicyUncertainty.com).

The results presented in Tables 2 and 3 confirm the existence of a unit root, so we use the first differences of prices' series logarithm which constitute proxies for financial returns:  $r_t = \ln(P_t/P_{t-1})$  where  $p_t$  denotes the price at time  $t$ . Descriptive statistics for stationary series are given in Table 2. They reveal a strong leptokurticity of corn and rice returns, soybean to a lesser extent, and a strong negative skewness for corn and soybean returns. The Jarque-Bera normality test concludes on an abnormal distribution of returns for all variables. It is interesting to note that coffee, sugar and oil are characterized both by high volatility and low average, and hence a risk/return ratio that is weaker comparatively to S&P 500 index and soybean, wheat and rice returns. Table 5 also provides results for ARCH and Ljung-Box tests, indicating that all the data, respectively, present an ARCH effect and auto-correlation that reveals persistence in the dataset.

The analysis of linear correlation coefficients (Table 6) between returns correlations between agricultural and oil prices, except for coffee. We note that oil prices are positively related to agricultural prices, which bears out usual economic and statistics relationships. Contrary to this, the distance to official interest rate and agricultural returns are negatively related. This result suggests that money markets' troubles correspond to a decrease of returns, while monetary policy successes support price returns.

We then apply the Engle and Sheppard's (2001) null hypothesis test of constancy of conditional correlation in order to check the opportunity of a GARCH model with dynamic conditional correlation (DCC-GARCH). Indeed, results in Table 7 indicate that the conditional correlations that characterize the returns of agricultural and financial variables are dynamic.

### 3.2. Methodology

We propose to resort to a DCC-GARCH model (Engle, 2002) to analyze the dynamic conditional correlations between agricultural prices and financial variables. Let

$r_t = (r_{1t}, r_{2t}, \dots, r_{nt})$ , the vector of returns of the variables taken into account, whose average can be described by a constant denoted  $\mu$ . We note

$e_t = (e_{1t}, e_{2t}, \dots, e_{nt})$ , the vector of error terms.

We also assume that conditional returns are normally distributed with a zero mean and a conditional covariance matrix given by:

$$H_t = D_t R_t D_t \tag{1}$$

where

$$D_t = \text{diag}[\sqrt{h_{1t}}, \dots, \sqrt{h_{nt}}]$$

is a diagonal matrix of standard deviation obtained from the estimation of a GARCH model.

$R_t$  is the matrix of conditional correlation coefficients standardized errors by:

$$\epsilon_t = D_t^{-1} r_t \tag{2}$$

According to Engle (2002),  $R_t$  matrix can be decomposed as follows:

$$R_t = Q_t^{*-1} Q_t Q_t^{*-1} \tag{3}$$

where  $Q_t$  is a positive-definite matrix of conditional variances and covariance of error terms  $\epsilon_t$  and  $Q_t^{*-1}$  is an inverse diagonal matrix of  $Q_t$  defined by:

$$Q_t^{*-1} = \begin{pmatrix} 1/\sqrt{h_{11t}} & 0 & \dots & 0 \\ 0 & 1/\sqrt{h_{22t}} & \dots & 0 \\ \dots & \dots & \dots & \dots \\ 0 & \dots & \dots & 1/\sqrt{h_{nnt}} \end{pmatrix}$$

The DCC-GARCH (1, 1) model is then defined by:

$$Q_t = \Omega + \alpha \epsilon_{t-1} \epsilon'_{t-1} + \beta Q_{t-1} \tag{4}$$

where

$$\Omega = (1 - \alpha - \beta) \bar{Q}$$

$\bar{Q}$  is the matrix of unconditional variances/covariance of standardized errors.

The dynamic conditional correlations are obtained by:

$$\rho_{ijt} = \frac{q_{ijt}}{\sqrt{q_{iit}q_{jtt}}} \tag{5}$$

Using a DCC-GARCH specification allows to both depict dynamic conditional correlations and to consider features of time-series by appropriate GARCH models. In particular, returns of wheat, coffee and financial variables are well described by an asymmetrical non-linear GARCH (NAGARCH) defined by:

$$h_t = \alpha_0 + \alpha_1(\epsilon_{t-1} + \gamma_1\sqrt{h_{t-1}})^2 + \beta_1 h_{t-1}. \quad (6)$$

This model introduced by Engle and Ng (1993) describes leverage effects via the parameter  $\gamma_1$  : a negative value of this parameter indicates a negative correlation between shocks and conditional variance. In the case of financial variables, a negative parameter  $\gamma_1$  indicates that a negative shock will cause more volatility than a positive one.

Regarding sugar and rice returns, the choice of a nonlinear GARCH model seems more suitable. Introduced by Higgins and Bera (1992), this model is defined by:

$$(\sqrt{h_{t-1}})^y = \alpha_0 + \alpha_1(|\epsilon_{t-1}|^2) + \beta_1(\sqrt{h_{t-1}})^y \quad (7).$$

Finally, corn and soybean returns correspond to an exponential GARCH Nelson (1991) defined by:

$$\log(h_t) = \alpha_0 + \alpha_1[|\epsilon_{t-1}| - E(|\epsilon_{t-1}|)] + \gamma_1\epsilon_{t-1} + \beta_1\log(h_{t-1}). \quad (8).$$

This model allows accounting for the asymmetry between volatility and returns.

#### 4. RESULTS AND INTERPRETATION

Before understanding results of estimates, we examine whether there are causal relationships in the sense of Granger (1969) between agricultural prices and monetary and financial data. Results are given in Table 8, and can be summarized as follows: as expected, oil price Granger-causes the whole returns of the sample, except for rice. Then, causal relationships also appear from stock markets through VIX index (rice), S&P 500 index (sugar), both indexes (coffee, soybean), and may also be bidirectional (corn, wheat). Mostly, the distance to the policy rate weakly (and linearly) affects (at 10% level) rice, sugar and wheat prices, while no causality appears for the other commodities. Then, Table 9 provides results for DCC-GARCH estimated models. 11

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<sup>11</sup> We note the strong significance of coefficients and the high persistence of volatility, as the sum of  $\alpha + \beta$  coefficients is near from 1.  $\gamma$  parameters estimated from NAGARCH models are positive, which indicates that a positive shock on oil price, S&P 500 index, the distance to the main policy interest rate and EPU index, leads to higher volatility than a negative shock. A negative correlation appears between shocks and conditional variance with regard to wheat and coffee returns and VIX index. Corn and soybean's volatility also increases after a positive shock.

#### 4.1. Correlations over the entire period

We estimate dynamic conditional correlations between yields of each commodity and various financial variables (figures upon request). Over the period from 1995 to 2015, conditional correlations are very volatile, which may indicate that strong volatility regimes alternate with weak volatility regimes with regard to conditional correlations between agricultural and monetary and financial variables.

Overall, we note common features between the various estimated relationships. Indeed, conditional correlations change after the 2007-2008 crisis, with a sharp fall in 2008 for some agricultural commodities, which could be explained by the safe-haven status of raw commodities in a context of troubled financial and real-estate markets and strong financial instability (Creti et al., 2013). The changes in conditional correlations are very interesting when we consider the spread between overnight interest rates. Indeed, conditional correlations between minfed and the various agricultural yields are dynamic from 1995 to 2010, and then become constant, and weakly weave around 0. In other words, the correlation between money market interest rate and agricultural assets become very stable and weak after the crisis. This change also corresponds to the implementation of non-standard monetary policy measures by the Fed, notably aimed at stabilizing interest rates and money markets. Therefore, when the central bank stabilizes the short-term effective interest rate around its main policy rate through a monetary policy that is explicitly financial stability-oriented, spillover effects on agricultural markets lower.

Other financial asset prices show, to the contrary, increasing correlations over time. Thus after the crisis, sovereign bonds are more correlated with each agricultural commodity. Except for soybean, this is also true with regard to the S&P 500 index, whose conditional correlations with agricultural assets (including rice, as opposed to the results by Creti et al., 2013) become more volatile from 2007. Oil price are also interesting: even-though no result appears during or after the crisis regarding its correlation with corn and soybean, the correlation with coffee and rice increases and it becomes more erratic regarding wheat and sugar. Then, the conditional correlations between VIX index and soybean just remain dynamic, the correlation between VIX index and three agricultural returns (wheat, rice, corn) remains high, becomes almost negative for sugar from 2007 and mostly the correlation between VIX index and coffee rises beginning with 2007. The EPU index does not highlight specific results

other than the strong conditional correlation with agricultural yields over the whole period. We also note a low and negative conditional correlation between EPU and coffee and rice beginning with 2010.

Overall, two points arise. Firstly, and surprisingly enough, the correlations between money market interest rates and agricultural yields lessen over the period. This may be accounted for the implementation of non-standard monetary policy measures, including providing massive liquidity, asset purchases, and the emphasis laid on interest rates, not only through the zero lower bound but also by considering forward guidance by the Fed. Secondly, the rise in conditional correlations between financial and agricultural assets depicts an increase in relationships, and is convenient for the financial hypothesis.

#### **4.2. Subdivision in sub-periods**

The changes in DCC between financial and agricultural assets lead us to additional estimations implemented by sub-periods in order to isolate crisis, pre-crisis and post-crisis periods. Moreover, previous results about monetary policy may be due to a base effect, as interest rates are lowered at a very low level after the crisis (up to the zero lower bound): if so, we can replace  $\text{minfed}$  by the volatility of the effective Fed fund rate ( $\text{volfed}$ ), which includes the level of policy rates.

Three sub-periods are defined: two bullish sub-periods (September 9, 1995 to July 31, 2007 and January 2, 2009 to December 22, 2015) and one bearish sub-period (August 1, 2007 to January 1, 2009). These periods are associated with important changes with regard to the crisis, and also when considering the differences in effective and policy interest rates. The selected GARCH specification for each variable, given in Table 10, shows that the asymmetric component for financial variables vanishes because these sub-periods allow to dissociate bearish and bullish movements. However, the non-linear characteristic of financial variables is verified when using sub-periods.

No change appears regarding rice, sugar and coffee variables. For wheat returns, we note that a non-linear GARCH specification is relevant in the two bullish sub-periods, but a GARCH specification is sufficient for the crisis period. For corn and soybean returns, standard GARCH specifications seem more relevant. Except for corn and soybean (over the recent period), we note that the sum of the coefficients  $\alpha + \beta$  is very close to 1 (except corn before and during the crisis and

soybean before the crisis), which means that the volatility is highly persistent in the three sub-periods, even if it seems more important in the two first sub-periods (Tables 11 to 13).

Then, conditional correlations provide interesting results and notably increasing correlations during the crisis-period. Especially, we find that with the corn, soybean and S&P 500 index, U.S. bond yields are highly and positively correlated with the VIX index (for corn, correlations are stable).<sup>12</sup> The links between rice returns and oil, volfed and EPU were also highly important during the turmoil. Another interesting result relies on more volatile dynamics in bullish periods. Indeed, conditional correlations seem to be more dynamic regarding soybean returns and all financial variables (except for EPU), corn and rice returns with the S&P 500 index and oil price, corn or sugar returns and volfed, rice returns and the VIX index.

Besides some increasing correlations during the turmoil, the variable volfed does not give additional information compared with minfed. As indicated above, relationships between monetary policy and financial and agricultural asset prices decrease when the central bank aims at reducing the gap between money market interest rates and policy rates through non-standard measures of monetary policy. This finding disappears when replacing minfed by the volatility of effective interest rates (volfed, which takes into account the level of policy rate). Therefore, with regard to the interdependence between monetary policy and agricultural market, the most important thing is the ability of the central bank to stabilize the effective interest rate, and not the level of the policy rate.

## 5. CONCLUSION

By implementing DCC-GARCH models over the period 1995-2015 for agricultural, monetary and financial asset prices, we highlight two interesting results. First, the financialization hypothesis seems to be validated, as correlations between various assets increase mainly in the recent period while their dynamics

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<sup>12</sup> Other results (upon request) indicate that the conditional correlations are more dynamic during the after-crisis period than during the crisis period, but the correlations coefficients in the turmoil are more important than the first sub-period.

are less clear-cut. Second, money markets do not seem to be more correlated with financial and agricultural markets, and they escape the financialization hypothesis.

Estimations by sub-periods highlight an increase in correlations and volatility during the financial crisis, which is very intuitive and should be dissociated from the trend. It is also necessary to be careful regarding correlations between oil and food raw materials, as the former is essential in the production of the latter. Our results also put forward growing correlations within financial variables (as stock and bond markets). As indicated in the literature, more and more integrated international capital markets explain growing correlations and then tend to validate the financialization hypothesis, which in turn could entail serious challenges in the future as regards portfolio diversification through weakly or negatively correlated assets. The most singular issue relies on growing correlations between financial and agricultural markets, which highlight the financialization of agricultural markets. In a context of strong instability of agricultural prices, the question of the drivers of commodity prices is raised. It stresses the need to take into account the role for derivative markets, indexed investment and/or financial intermediaries.

Then, monetary markets are considered through the ability of the central banker to stabilize short-term interest rates around policy rates. Surprisingly enough, correlations between monetary and financial variables have decreased over the recent period, so money markets escape the financialization hypothesis. As the post-crisis period also corresponds to the implementation of non-standard measures, a first interpretation is that a financial stability-oriented monetary policy successfully reduces the intensity of spillover effects towards financial markets. So beyond liquidity provided through funding and buyouts, the predictability of the path of interest rates may play a major and positive role with regard to expectations and portfolio reallocations. However, it is difficult to isolate this phenomenon from both the burst of the commodity bubble and the very weak level of policy rates. In this sense, it is still difficult to answer the question of structural changes regarding money, financial and agricultural markets.

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**Table 2** *Dickey-Fuller unit root tests*

Séries	Modèle retenu	D-F. Stat.		V.C	
		Test individual	Test joint		
Coffee	5	-2.191077	-2.86	1.96542941	[4.59;4.61]
Corn	2	-1.733111	-2.86	1.50323893	[4.59;4.61]
Soybean	2	-1.723646	-2.86	1.50360358	[4.59;4.61]
Sugar	5	-1.721789	-2.86	1.49277559	[4.59;4.61]
wheat	5	-2.673552	-2.86	-3.57814156	[4.59;4.61]
E.P.U.	5	-7.831575	-2.86	30.7549798	[4.59;4.61]
Minfed	5	-9.460434	-2.86	44.9485006	[4.59;4.61]
Oil	5	-1.634876	-2.86	1.14826125	[4.59;4.61]
Usbond	5	-1.4189	-2.86	1.4107432	[4.59;4.61]
S&P 500	5	-1.102392	-2.86	1.08040753	[4.59;4.61]
VIX	5	-4,842775	-2.86	-11,7040116	[4.59;4.61]

**Table 3** *ERS and KPSS unit root tests*

Séries	ERS		KPSS	
	cons. and tend.	cons..	cons. and tend	cons
Coffee	9,869548	2,67994	0,990548	2,870264
Corn	13,15441	4,141172	0,753979	4,656139
Soybean	10,24764	5,579009	0,851581	6,133845
Sugar	12,08453	4,425557	0,81234	5,124651
Wheat	5,229878	1,704673	0,469681	4,769529
E.P.U.	0,816947	0,667128	0,31461	1,19113
Minfed	1,351525	0,377521	0,221828	0,44176
Oil	12,3141	13,89454	0,523817	7,021805
Usbond	3,908816	20,20784	0,217768	7,947192
S&P 500	17,02837	48,01884	0,758118	4,232106
VIX	2,753481	1,067603	0,288398	0,507863
Val. critiques	5,62	3,26	0,146	0,463

**Table 4** Summary of descriptive statistics (Returns)

	Rcoffee	Rcorn	Rrice	Rsoybean	Rsugar	Rwheat	
Mean	-2.85E-05	1.99E-05	3.23E-05	5.31E-05	4.31E-05	1.24E-05	
Std. Dev.	0.027421	0.021022	0.016821	0.017204	0.021064	0.017648	
Skewness	0.232038	-0.52024	0.182149	-1.061988	-0.288836	-0.16527	
Kurtosis	11.47113	28.41443	31.21663	18.53002	7.287044	7.512534	
J.-B.	15738.61	141472.0	174126.7	53724.86	4091.789	4476.593	
p-value	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	
	RE.P.U	Rminfed	Roil	Rusbond	RS& P500	RVIX	RVolfed
Mean	0.000279	0.001006	0.000135	-0.000187	0.000235	5.47E-05	-0.00029
Std. Dev.	0.643199	92.81305	0.024246	0.021756	0.011933	0.062316	0.02374
Skewness	0.032530	-0.00084	-0.157710	0.368373	-0.223814	0.582280	-0.58574
Kurtosis	4.047848	10.88187	7.772304	396.3136	11.21601	6.922960	56.036
J.-B.	241.0183	13584.42	5001.863	33826889	14804.42	3661.753	686919
p-value	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.00000

**Table 5** Homoskedasticity and non-autocorrelations tests

	Test ARCH		Test LB	
	Stat	Prob	Stat	Prob
R.coffee	784.89	0.000	43.381	0.000
R.corn	261.73	0.000	46.406	0.000
R.rice	16.555*	0.085	25.281	0.005
R.soybean	185.80	0.000	32.877	0.000
R.sugar	257.42	0.000	61.951	0.000
R.wheat	696.61	0.000	51480	0.000
R.EPU	638.78	0.000	912.56	0.000
R.minfed	1373.9	0.000	1125.3	0.000
R.oil	940.16	0.000	24.515	0.006
R.usbond	1298.9	0.000	201.48	0.000
R.S&P 500	3841.4	0.000	49.815	0.000
R.VIX	841.53	0.000	102.26	0.000
R.Volfed	859.83	0.000	311.01	0.000

LB test is the test of non-autocorrelation of Ljung-Box for 10 lags. The ARCH test detects homoskedasticity of return series. For rice returns, the assumption of homoskedasticity is accepted in 10 lags but rejected in 13 lags, so there is no homoskedasticity.

**Table 6** *Coefficients of linear correlations*

	Coffee	Corn	Rice	Soybean	Sugar	Wheat
E.P.U	0.10	0.28	0.18	0.22	0.26	0.22
Minfed	0.01	0.01	0.04	-0.01	-0.02	0.00
Oil	0.54	0.74	0.77	0.82	0.72	0.80
Usbond	-0.36	-0.64	-0.56	-0.72	-0.61	-0.60
S&P 500	0.19	0.24	0.27	0.37	0.21	0.33
VIX	-0.12	-0.08	-0.03	-0.13	-0.10	-0.06
Volfed	-0.0617	-0.0967	-0.3400	-0.2909	-0.0935	-0.3247

**Table 7** *Engle and Sheppard's (2001) test*

Engle and Sheppard test		
Séries	Statistic	p-value
Coffee	103.9559	0.00000
Corn	140.276	0.00000
Rice	105.6792	0.00000
Soybean	119.2146	0.00000
Sugar	131.2111	0.00000
wheat	98.01624	0.00000

**Table 8** *Granger Causality test*

Séries	E.P.U	Minfed (A)	Oil (B)	Usbond (C)	S&P 500 (D)	VIX (E)	Volfed (F)
Coffee (G)	No Caus.	No Caus.	(B) G-C. (G)	(C) G-C. (G)	(D) G-C.(G)	(G) G-C. (G)	(F) G-C (G)**
Corn (H)	No Caus.	No Caus.	(B) G-C. (H)	(C) G-C. (H)	Interd.	Interd.	No Caus.
Rice (I)	No Caus.	Interd. *	No Caus.	No Caus.	No Caus.	(E) G-C (I)	No Caus.
Soyb (J)	No Caus.	No Caus.	(B) G-C. (J)	(C) G-C. (J)	(D) G-C. (J)	(E) G-C. (J)	No Caus.
Sugar (K)	No Caus.	(A) G-C (K)*	(B) G-C (K)*	No Caus.	(D) G-C (K)	No Caus.	No Caus.
Wheat (L)	No Caus.	(B) G-C (L)*	(C) G-C (L)	(D) G-C (L)	Interd.	Interd.	No Caus.

Note: Caus. = causality; G-C. = Granger Cause; Interd. = Interdependence relationship; \*- \*\* = at 10% - 5%

**Table 9** *Estimations results of DCC-GARCH models 1995-2015*

	$\alpha_0$	$\alpha_1$	$\beta_1$	$\alpha_1 + \beta$	$\gamma$	$dcc_\alpha$	$dcc_\beta$
Coffee	0.0000	0.0473	0.9245	0.9718	-0.5864	0.0100	0.9785
	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>		<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>
Corn	-0.5924	0.0213	0.9220	0.9433	0.1942	0.0106	0.9770
	0.0000	0.3114	0.0000		0.0000	0.0000	0.0000

Rice	0.0001 <b>0.5129</b>	0.0855 <b>0.0002</b>	0.9220 <b>0.0000</b>	1.0075	1.1573 <b>0.0002</b>	0.0113 <b>0.0000</b>	0.9754 <b>0.0000</b>
Soybean	-0.4144 <b>0.0000</b>	0.0367 <b>0.0984</b>	0.9479 <b>0.0000</b>	0.9846	0.1949 <b>0.0000</b>	0.0112 <b>0.0000</b>	0.9757 <b>0.0000</b>
Sugar	0.0000 <b>0.0000</b>	0.0345 <b>0.0000</b>	0.9662 <b>0.0000</b>	1.0007	1.8252 <b>0.0000</b>	0.0096 <b>0.0004</b>	0.9782 <b>0.0000</b>
wheat	0.0000 <b>0.1490</b>	0.0570 <b>0.0000</b>	0.9248 <b>0.0000</b>	0.9818	-0.1831 <b>0.0773</b>	0.0099 <b>0.0000</b>	0.9784 <b>0.0000</b>
EPU	0.0007 <b>0.0218</b>	0.0201 <b>0.0000</b>	0.9480 <b>0.0000</b>	0.9581	1.2413 <b>0.0000</b>		
Minfed	0.0861 <b>0.0000</b>	0.0366 <b>0.0000</b>	0.9258 <b>0.0000</b>	0.9625	0.6437 <b>0.0000</b>		
OIL	0.0000 <b>0.0445</b>	0.0472 <b>0.0000</b>	0.9400 <b>0.0000</b>	0.9872	0.4224 <b>0.0000</b>		
Usbond	0.0000 <b>0.6448</b>	0.0746 <b>0.0002</b>	0.9167 <b>0.0000</b>	0.9913	0.2033 <b>0.0358</b>		
S&P500	0.0000 <b>0.4024</b>	0.0751 <b>0.0017</b>	0.8028 <b>0.0000</b>	0.8779	1.2217 <b>0.0000</b>		
VIX	0.0002 <b>0.0000</b>	0.0641 <b>0.0000</b>	0.7674 <b>0.0000</b>	0.8315	-1.4163 <b>0.0000</b>		
<b>p-values in bold</b>							

**Table 10** Selected GARCH models

Variables	1995-2015	1995-2007	2007-2009	2009-2015
Wheat	NAGARCH	NGARCH	GARCH	NGARCH
Corn	EGARCH	ARCH	ARCH	EGARCH
Soybean	EGARCH	ARCH	GARCH	GARCH
Rice	NGARCH	NGARCH	NGARCH	NGARCH
Sugar	NGARCH	NGARCH	NGARCH	NGARCH
Coffee	NGARCH	NGARCH	NGARCH	NGARCH
S&P 500	NGARCH	NGARCH	NGARCH	NGARCH
Oil	NGARCH	NGARCH	GARCH	NGARCH
VIX	NGARCH	NGARCH	GARCH	NGARCH
USbond	NGARCH	NGARCH	GARCH	NGARCH
Volfed	TGARCH	GARCH	GARCH	GARCH
EPU	NAGARCH	NGARCH	NAGARCH	NGARCH

**Table 11** Estimation results of DCC-GARCH models 1995-2007

	$\alpha_0$	$\alpha_1$	$\beta_1$	$\alpha_1 + \beta$	$\gamma$	$dcc_\alpha$	$dcc_\beta$
Coffee	0,0002 <b>0,1522</b>	0,0722 <b>0,0148</b>	0,9308 <b>0,00000</b>	0,9999	1,3086 <b>0,00000</b>	0,0071 <b>0,00000</b>	0,9764 <b>0,00000</b>
Corn	0,0003 <b>0,00000</b>	0,1253 <b>0,0007</b>	0,007	0,9768		0,0070 <b>0,00000</b>	0,9768 <b>0,00000</b>
Rice	0,0002 <b>0,5874</b>	0,1003 <b>0,00000</b>	0,9176 <b>0,00000</b>	0,999	1,0647 <b>0,0026</b>	0,0082 <b>0,00000</b>	0,9748 <b>0,000</b>
Soybean	0,0002 <b>0,00000</b>	0,1296 <b>0,0122</b>				0,0075 <b>0,00000</b>	0,9762 <b>0,00000</b>
Sugar	0,0000 <b>0,0036</b>	0,0285 <b>0,00000</b>	0,9709 <b>0,00000</b>	0,9994	1,8191 <b>0,00000</b>	0,0072 <b>0,00000</b>	0,9743 <b>0,00000</b>
wheat	0,00000 <b>0,3854</b>	0,0702 <b>0,0006</b>	0,9008 <b>0,00000</b>	0,971	1,6526	0,0063 <b>0,00000</b>	0,9789 <b>0,00000</b>
EPU	0,2692 <b>0,0004</b>	0,235 <b>0,0</b>	0,283 <b>0,0228</b>	0,518	1,9314 <b>0,0001</b>		
Vofed	0,0001 <b>0,5921</b>	0,1428 <b>0,0971</b>	0,8179 <b>0,00000</b>	0,9607			
OIL	0,00000 <b>0,5372</b>	0,0544 <b>0,0845</b>	0,9263 <b>0,00000</b>	0,9806	1,7709 <b>0,00000</b>		
Usbond	0,0001 <b>0,2566</b>	0,0937 <b>0,00000</b>	0,8934 <b>0,00000</b>	0,987	1,2852 <b>0,00000</b>		
S&P 500	0,00000 <b>0,006</b>	0,0766 <b>0,0001</b>	0,9232 <b>0,00000</b>	0,9998	1,5572 <b>0,00000</b>		
VIX	0,0003 <b>0,382</b>	0,0813 <b>0,0001</b>	0,8577 <b>0,00000</b>	0,939	1,8407 <b>0,00000</b>		
<b>p-values in bold</b>							

**Table 12** Estimation results of DCC-GARCH models 2007-2009

	$\alpha_0$	$\alpha_1$	$\beta_1$	$\alpha_1 + \beta$	$\gamma$	$dcc_\alpha$	$dcc_\beta$
Coffee	0,0000 <b>0,0013</b>	0,0000 <b>1,0000</b>	0,9990 <b>0,0000</b>	0,999	1,8501 <b>0,0035</b>	0,0000 <b>0,9999</b>	0,9152 <b>0,00000</b>
Corn	0,0006 <b>0,0000</b>	0,1173 <b>0,0963</b>				0,0000 <b>1,0000</b>	0,9273 <b>0,1069</b>
Rice	0,0008 <b>0,5356</b>	0,064 <b>0,0781</b>	0,9363 <b>0,0000</b>	0,9999	0,7195 <b>0,0461</b>	0,0000 <b>0,9998</b>	0,9121 <b>0,0000</b>

Soybean	0,0000 <b>0,7492</b>	0,0537 <b>0,0381</b>	0,9309 <b>0,0000</b>	0,9846		0,0000 <b>1,0000</b>	0,9237 <b>0,3070</b>
Sugar	0,0019 <b>0,7282</b>	0,0787 <b>0,0156</b>	0,9251 <b>0,0000</b>	0,999	0,5892 <b>0,2884</b>	0,0054 <b>0,1674</b>	0,9401 <b>0,0000</b>
wheat	0,0000 <b>0,3115</b>	0,0636 <b>0,0403</b>	0,914 <b>0,0000</b>	0,9776		0,0000 <b>0,9191</b>	0,9999 <b>0,0000</b>
EPU	0,0000 <b>0,8969</b>	0,0128 <b>0,0000</b>	0,9729 <b>0,0000</b>	0,9857	1,0103 <b>0,0000</b>		
Volfed	0,0003 <b>0,0051</b>	0,7691 <b>0,0429</b>	0,2299 <b>0,0490</b>	0,999			
OIL	0,0000 <b>0,5472</b>	0,142 <b>0,002</b>	0,8570 <b>0,00000</b>	0,9999			
Usbond	0,0000 <b>0,2135</b>	0,1222 <b>0,0011</b>	0,8499 <b>0,00000</b>	0,9721			
S&P 500	0,0000 <b>0,568</b>	0,1186 <b>0,0000</b>	0,8570 <b>0,0000</b>	0,9755	2,0194 <b>0,0000</b>		
VIX	0,0003 <b>0,0250</b>	0,0834 <b>0,0070</b>	0,8667 <b>0,00000</b>	0,9501			
<b>p-values in bold</b>							

**Table 13** Estimation results of DCC-GARCH models 2009-2015

	$\alpha_0$	$\alpha_1$	$\beta_1$	$\alpha_1 + \beta$	$\gamma$	$dcc_\alpha$	$dcc_\beta$
Coffee	0,00000 <b>0,9659</b>	0,0138 <b>0,0526</b>	0,9546 <b>0,00000</b>	0,9684	3,4179 <b>0,00000</b>	0,0083 <b>0,0003</b>	0,9671 <b>0,00000</b>
Corn	-0,4086 <b>0,00000</b>	0,0449 <b>0,1177</b>	0,9463 <b>0,00000</b>	0,9911	0,0879 <b>0,0000</b>	0,0088 <b>0,00000</b>	0,9605 <b>0,00000</b>
Rice	0,0001 <b>0,5787</b>	0,0571 <b>0,0441</b>	0,9258 <b>0,00000</b>	0,9828	1,3044 <b>0,0000</b>	0,0088 <b>0,0005</b>	0,9592 <b>0,00000</b>
Soybean	0,00000 <b>0,00000</b>	0,0851 <b>0,00000</b>	0,8845 <b>0,00000</b>	0,9696		0,0096 <b>0,00000</b>	0,9539 <b>0,00000</b>
Sugar	0,00000 <b>0,003</b>	0,038 <b>0,00000</b>	0,9627 <b>0,00000</b>	0,9999	1,8172 <b>0,00000</b>	0,0096 <b>0,0001</b>	0,9568 <b>0,00000</b>
wheat	0,00000 <b>0,2831</b>	0,0738 <b>0,0002</b>	0,9212 <b>0,00000</b>	0,995	1,5551 <b>0,00000</b>	0,0083 <b>0,00000</b>	0,9619 <b>0,00000</b>
EPU	0,1407 <b>0,0052</b>	0,34 <b>0,00000</b>	0,1837 <b>0,0392</b>	0,5236	1,7718 <b>0,00000</b>		
Volfed	0,00000 <b>0,4397</b>	0,1338 <b>0,00000</b>	0,8652 <b>0,00000</b>	0,999			

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OIL	0,00000	0,042	0,9364	0,9784	2,7138
	<b>0,6892</b>	<b>0,00000</b>	<b>0,00000</b>		<b>0,00000</b>
Usbond	0,00000	0,0496	0,9449	0,9945	1,9114
	<b>0.6448</b>	<b>0.0002</b>	<b>0.0000</b>		<b>0.0358</b>
S&P 500	0,00000	0,0925	0,8409	0,9334	2,8474
	<b>0,9003</b>	<b>0,0004</b>	<b>0,00000</b>		<b>0,00000</b>
VIX	0,0006	0,1648	0,7069	0,8716	2,0285
	<b>0,425</b>	<b>0,00000</b>	<b>0,00000</b>		<b>0,00000</b>

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**p-values in bold**

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# BANK BUSINESS MODELS AND PERFORMANCE DURING CRISIS IN CENTRAL AND EASTERN EUROPE

ALIN MARIUS ANDRIEȘ\*, SIMONA MUTU\*\*

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**Abstract:** *This paper investigates the impact of business models on bank performance during the period 2007-2008 among 156 banks from Central and Eastern European countries. The findings show that banks with higher capitalization perform better and present a lower probability of default. The orientation towards the traditional lending activities as well as a higher degree of income diversification boosts performance. Using a Difference-in-Difference framework we also highlight the importance of bank business strategies for bank performance across different bank characteristics (ownership, size) and macroeconomic conditions (financial crisis, EU membership status, regulatory framework).*

**Keywords:** *Bank performance, Financial stability, Business models, Financial crisis.*

**JEL Classification:** *G01, G21, G28*

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## 1. INTRODUCTION

The global financial crisis of 2007-2008 has been an important test for the banking system in the emerging countries from Central and Eastern Europe (CEE) which is foreign owned in a large proportion. Before 2007 most CEE countries experienced a rapid growth of the lending activities, not just for the corporate sector but also for households and government. But, after the burst of the most recent financial crisis, a new challenge was faced as the capital flows to this region dropped considerably and a number of bank holding companies with international

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presence withdrew their funds from their CEE subsidiaries. While in many emerging countries, financial crisis led to major restructuring of the banking system, banks from CEE resisted this provocation as indicated by Brada and Wachtel (2015). This positive outcome can be linked with the business strategies implemented by the banks from CEE.

In this context, the main objective of this paper is to analyze the impact of business models on performance for banks in CEE region. Using a large dataset specific to a sample of 156 banks, we assess within a panel the impact of capital structure, assets structure, liabilities structure and income structure on banks' profitability and stability. Our dependent variable takes alternatively the form of Return on average equity (ROAE), Return on average assets (ROAA), and, Net interest margin (NIM). Also we consider the financial stability of banks expressed through the z-score. To control for differences at the bank level, banking system and macroeconomic environment, a set of control variables is included in the empirical specifications. The main research question is the following: Which is the most appropriate business model that boosts banks' performance in Central and Eastern Europe? Additionally, we focus on the following issues: determine whether the impact was amplified or diminished during the financial crisis by the specific business models of the banks; examine whether large banks experienced less losses and were more stable during the crisis; examine whether banks with foreign ownership performed better than domestic banks; examine whether banks from European Union performed better than banks that are not members of European Union; and, assess the impact of regulation on the link between business strategies and performance.

The findings show that banks with higher capital ratios performed better and present a lower probability of default. Regarding the assets structure, the orientation of banks towards the traditional lending activities is associated with higher ROAA and NIM but has an insignificant effect on ROAE. As for the income structure, results indicate that banks characterized by a higher degree of income diversification perform better. When assessing the influence of different bank characteristics and macro conditions on the relationship between banks' business models and performance several important features have been highlighted. First, the positive effect of the capitalization on Return on average equity was boosted during the crisis. Second, the effects of asset structure on bank

performance improved at the level of foreign banks. Regarding the liabilities structure an increase of the share of non-deposit funding in total liabilities has a negative impact on ROAE, meaning that foreign banks that rely more on non-deposit funding could negatively affect the bank performance. Third, an increase in lending has a significant positive impact on ROA for small banks. Forth, loans granted by banks that operate in countries that are members of European Union have a positive impact on bank performance. Finally, a higher share of non-deposit funding in total liabilities and greater income diversification have a negative impact on performance in countries with a lax regulatory framework.

The study is organized in the following way. Section 2 includes the literature review with regard to bank performance, bank business models and financial crisis. Section 3 describes the data and also the variables used in the empirical exercise. In Section 4 we present the model specification and discuss the empirical results. Section 5 summarizes the findings of the study.

## **2. LITERATURE REVIEW**

Analysis of the bank performance has been the subject of numerous studies, which reveal changes that occurred during the crisis compared to pre-crisis period. Among the first studies that analyzed the determinants of bank profitability are those of Short (1979) and Bourke (1989). In case of the European banking system an important contribution to the literature on profitability is provided by Molyneux and Thornton (1992), Demirgüç-Kunt and Huizinga (2000), Goddard et al. (2004), Micco et al. (2007), and, Pasiouras and Kosmidou (2007). In most of these studies variables like size, capitalization, risk or operational efficiency are found to significantly affect banking profitability.

An increasing number of studies have also concentrated on the link between business model characteristics and bank profitability. The benefits of the business strategies diversification in comparison with specialization in a single area are first highlighted in the theoretical papers of Sharpe (1990) and Diamond (1991). Mergaerts and Vander Venet (2015), who investigate empirically the impact of business models on banks' performance during the financial crisis, found that retail oriented banks register higher profitability and greater stability. Köhler (2015) suggests that income diversification increase the performance of retail focused banks, but lowers the stability in case of investment banks.

Demirgüç-Kunt and Huizinga (2010) show that income diversification and greater wholesale funding enhance bank risk taking behavior, while their contribution to performance is modest. Even though diversification comes with a range of opportunities this benefit may be counterbalanced by the costs generated by an increase exposure to volatility (Stiroh and Rumble, 2006). The increase in non-interest activities was also found to be negatively associated with performance by Busch and Kick (2015), as an increase of the fee based activities in case of commercial banks enhances the volatility of ROA and ROE.

The successful implementation of different business models depend on a series of bank attributes and on the market environment like operating efficiency (Kwan and Eisenbeis, 1997), capital (Baele et al., 2007), securitization (Boot and Thakor, 2010), funding sources (Demirgüç-Kunt and Huizinga, 2010), corporate governance (Laeven and Levine, 2009), central bank liquidity (Altunbas et al., 2011), or, business cycles (Bolt et al., 2010).

The aim of this paper is to contribute to the literature on bank business models and performance in Central and Eastern European countries by investigating several channels that might shape the relationship between bank business models and performance. Firstly, using a Difference-in-Difference framework, we analyze the behavior of this nexus before and after the most recent financial crisis. Secondly, we highlight the heterogeneity of the relationship between business models and performance across the ownership (foreign versus domestic banks) and size (small versus large financial institutions). Finally, we assess the impact of the European Union (EU) membership status and of the regulatory framework (lax versus tight restrictions on banking activities).

### **3. DATA**

#### **3.1. Sample**

Our dataset consists of bank level balance sheet data from Bankscope. The panel includes commercial banks from 17 Central and Eastern European countries (Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Macedonia, Montenegro, Poland, Romania, Serbia, Slovakia, Slovenia and Ukraine). The analyzed period is 2005-2012 in order to assess the pre-crisis and the crisis period. Firstly we consider all commercial banks from Central and Eastern Europe with data available in the BankScope database.

Our focus is only on commercial banks in order to keep the sample homogeneous in terms of bank type. Second, we follow the selection strategy of Andries and Brown (2014) and collect data just for banks with detailed information for at least 5 years, therefore restricting our sample to 260 banks. Third, as in Claessens and van Horen (2012), we consider also mergers and acquisitions, as well as entries and exits during 2005-2012. The final sample includes 156 banks, out of which 39 banks are domestic and 117 are foreign owned banks.

### **3.2. Bank performance data**

In order to investigate the impact of business models on bank performance during the most recent financial crisis we use a set of profitability indicators commonly explored by the literature. First, we employ the Return on Average Equity (ROAE), one of the most popular performance measures of the shareholder value. ROAE can give a more accurate picture of bank's profitability than ROE, especially in situations when the value of equity changes substantially during the fiscal year. Among authors that use this measure are Lepetit et al. (2008), Berger and Bouwman (2013) and Mergaerts and Vander Venet (2015).

Second, we consider the Return on Average Assets (ROAA) to assess the profitability of banks' assets as in Lepetit et al. (2008), Demirgüç-Kunt and Huizinga (2010) or Mergaerts and Vander Venet (2015). This indicator is used to measure banks' performance, showing how efficiently the management used the assets to generate profit.

Third, as in Mergaerts and Vander Venet (2015) we use the Net Interest Margin (NIM), computed as the difference among Investment returns and Interest expenses divided to Average total assets. This performance measure examines how effective are bank's investment decisions, negative values pointing to suboptimal decisions. The indicator is explored in the studies of Demirgüç-Kunt and Huizinga (2010), Altunbas et al. (2011), Beltratti and Stulz (2012), and, Anginer et. al (2014) among others.

Finally, as an alternative measure for the dependent variable we consider the volatility of banks' ROAA and employ a proxy that measures financial stability. Z-score, a commonly used measure in the literature indicates the probability of insolvency (Lepetit et al., 2008; Laeven and Levine, 2009; Köhler, 2015; Mergaerts and Vander Venet, 2015). It is computed as the sum between Equity to Total assets ratio and ROA, divided by the standard deviation of the ROA. A

higher value of this indicator implies a lower probability of insolvency, reflecting the solidity of the bank.

The indicators are computed using data from Bankscope. A detailed description of all variables is provided in Table 1. The overall profitability of CEE banks, in terms of ROE, ROA and NIM was undoubtedly affected by the financial crisis, the values of the indicators being much lower in the crisis period than the pre-crisis period. The highest difference between the pre-crisis period and the crisis period is in the case of ROE indicator, being negative in the crisis period. This fluctuation was caused by the poor operational performance of banks during the turmoil period.

**Table 1** *Variables description*

<b>Variable</b>	<b>Description</b>	<b>Source</b>
ROAE	Net income to Average total equity	Bankscope
ROAA	Net income to Average total assets	Bankscope
NIM	(Investment returns – Interest expenses)/Average total assets	Bankscope
Z-score	(Equity to Total assets + ROA) / Standard deviation of the ROA	Own calculati
Capital Structure	Equity to Total assets	Bankscope
Asset Structure	Total loans to Total assets	Bankscope
Liability Structure	Non-deposit funding to Total liabilities	Bankscope
Income Structure	Non-interest income to Total operating income	Bankscope
Size	Logarithm of total assets	Bankscope
Concentration (HHI)	The Herfindahl-Hirschman index is a measure of bank concentration calculated as the sum of the squares of the market shares of each bank. A higher value of HHI index shows that the bank has a greater market power.	World Bank
System deposits	Banking system deposits to GDP	World Bank
GDPPC	Gross domestic product based on purchasing-power-parity (PPP) per capita	World Bank
Inflation	Consumer price index	World Bank
Unemployment rate	Total unemployment (% of Total labor force)	World Bank

### 3.3. Bank business models data

Emerging from the literature on strategic groups, the business models focus on the creation of profits through different types of products and distribution channels. Since the beginning of financial crisis of 2007/2008 the banking sector in

European countries suffered fundamental changes. Large banking groups with exaggerated risky business models made new regulations necessary to bring back confidence and to secure financial stability. This led to significant restructuring with important implications on the future of European banking sector. Ayadi et al. (2011) was among the firsts who propose the business models analysis in an attempt to assess their impact on banks' performance during periods of financial crisis. They highlight that the retail banking model performed better during the 2006-2009 financial crisis in comparison with other business models, like investment and wholesale banking.

In this paper the bank business models are represented by the capital structure, assets structure, liability structure, and, income structure. The capital structure is expressed through the share of Equity in Total assets. Prior studies showed that a higher capitalization is associated with increased performance during the most recent financial crisis (Demirgüç-Kunt and Huizinga, 2010; Altunbas et al., 2011; Beltratti and Stulz, 2012; Berger and Bouwman, 2013; Lee et al., 2014; Mergaerts and Vander Vennet, 2015). The assets structure expressed by the ratio of Total loans to Total assets reflects the orientation of banks towards traditional lending activities. Financial institutions with high values of this ratio are expected to perform better during crisis, being safer compared to banks with more securities in their portfolio (Laeven and Levine, 2008; Beltratti and Stulz, 2012; Lee et al., 2014). The liability structure is represented by the share of Non-deposit funding in Total liabilities. This type of funding is risky and unstable as it is not covered by deposit insurance funds like the customer deposits (Altunbas et al., 2011; Köhler, 2015; Anginer et al., 2014). Finally, the income structure expressed by the ratio of Non-interest income to Total operating income indicates the orientation of banks towards non-traditional banking activities. Variables description and their data source are provided in Table 1.

### **3.4. Control variables**

A number of control variables that might influence banks profitability are also introduced to capture differences among banks, market conditions as well as the macroeconomic environment. These variables are: size (logarithm of total assets), concentration expressed through the Herfindahl-Hirschman index (HHI), bank deposits to GDP, gross domestic product based on purchasing-power-parity (PPP) per capita, inflation (Consumer price index), and, unemployment (Total

unemployment to Total labor force). Variables description and their source are provided in Table 1.

Descriptive statistics of the bank performance variables, business model variables and control variables are presented in Table 2. On average, the banks analyzed have a Return on Average Equity (ROAE) of 6,53% over the period 2005-2012. The second profitability measure, Return on Average Assets (ROAA) has a mean value of 0,78% for the banks in the sample. The Z-score indicator also known as distance to default has a mean value of 408,48 indicating that in average the banks are considered stable but, on the other side the minimum level of Z-score is -0,06 implying that the probability of insolvency in the case of some banks is large.

**Table 2** *Descriptive statistics*

Variables	Obs.	Mean	Std. Dev.	Min	Max
<b>Bank Performance</b>					
ROAE	1216	6,53	18,88	-82,01	39,67
ROAA	1226	0,78	1,90	-7,60	5,52
Net Interest Margin	1226	4,37	2,42	-0,69	25,35
Z-score indicator	907	408,48	1307,43	-0,06	10443,61
<b>Bank Business Model</b>					
Capital structure	1220	11,67	5,76	3,44	35,73
Asset structure	1225	0,62	0,15	0,17	0,89
Liabilities structure	1206	0,32	0,21	0,02	0,92
Income structure	1226	0,35	0,16	-0,07	0,89
<b>Control variables</b>					
Size	1226	14,37	1,53	10,62	17,37
Banking system concentration (%)	1092	60,79	15,72	26,16	99,64
Banking system deposits to GDP (%)	1072	44,22	11,50	19,88	66,96
GDP per capita	1248	16856,75	6407,93	5845,83	29999,43
Inflation	1248	4,71	3,73	-2,17	22,31
Unemployment rate	1173	13,07	7,87	4,26	37,15

Source: Own calculations using data from Bankscope and World Bank databases

The capital structure measured by bank capitalization has an average value of 11,67% but with large difference from one bank to another. For example the best capitalized bank has a ratio of 35,73% while for the least capitalized bank equity

covers only 3,44% of the total assets. The liability structure measured by the share of non-deposit funding in total liabilities has a mean value of 32% but there are significant differences between banks, the minimum level showing that only 2% of bank activities rely on non-deposit funding while the maximum level is 92%. The average income structure measured by the ratio of non-interest income/total operating income for the sample over the period 2005-2012 is 35%. The maximum value of this variable is 89% meaning that for some banks most revenues come from non-interest activities so that the banks were actively pursuing multiple businesses.

## 4. EMPIRICAL RESULTS

### 4.1. Model specification

We start our empirical investigation by examining the differences of performance and business models in the pre-crisis period (2005-2007) and crisis period (2008-2012) and also among domestic foreign owned banks (Table 3). Banks from CEE countries suffered a significant decrease in the pre-crisis period in comparison with the crisis period. ROAA decreased by 13,65% from a mean value of 13,39% before the crisis to -0,26% in the crisis period. The others profitability measures present a similar trend, ROAE decreased by 1,25% while NIM decreased by 0,59%. The level of the z-score indicator dropped significantly from 521,14 to 353,89 mainly due to increased costs and, consequently, decreased profitability. Comparing the domestic and foreign banks a significant difference is registered at the level of z-score indicator. Foreign banks have a significant higher z-score (467,18) than domestic banks (236,69) being more stable before and during the crisis.

**Table 3: Univariate statistics**

Variables	Pre-crisis	Crisis	Diff	Domestic	Foreign	Diff
<b>Bank Performance</b>						
ROAE	13,39	-0,26	-13,65***	7,56	6,16	-1,40
ROAA	1,41	0,16	-1,25***	1,08	0,66	-0,41***
Net Interest Margin	4,67	4,08	-0,59***	5,01	4,14	-0,87***
Z-score indicator	521,14	353,89	-167,2*	236,69	467,18	230,5***

**Bank Business Model**

Capital structure	11,48	11,86	0,38	13,01	11,18	-1,82***
Asset structure	0,61	0,64	0,03***	0,57	0,64	-0,07***
Liabilities structure	0,32	0,31	-0,01	0,24	0,34	0,10***
Income structure	0,37	0,34	-0,03***	0,37	0,35	-0,02**
Observations	624	624	1248	335	913	1248

Source: Diff represents difference in means between the subsamples

Next we analyze the impact of banks' business models on their performance in the by estimating the following regression model via OLS Fixed Effects:

$$\text{Performance}_{i,j,t} = \beta_0 + \beta_1 \times \text{Performance}_{i,j,t-1} + \beta_2 \times \text{Business Models}_{i,j,t} + \Phi \times \text{Size}_{i,j,t} + \Phi \times \text{BC}_{j,t-1} + \Phi \times \text{M}_{j,t-1} + \delta I + vt + \epsilon_{i,j,t}$$

where  $i$  is for bank,  $j$  is for country, and  $t$  denotes the year. The dependent variable ( $\text{Performance}_{i,j,t}$ ) takes alternatively the form of Return on average equity (ROAE), Return on average assets (ROAA), Net interest margin (NIM), and, z-score.  $\text{Business Models}_{i,j,t}$  includes the capital structure, the asset structure, the liability structure, and the income structure.  $\text{Size}_{i,j,t}$  is the logarithm of total assets (bank level).  $\text{BC}_{j,t-1}$  includes the banking market control variables lagged one year (country level): concentration and banking system deposits to GDP.  $\text{M}_{j,t-1}$  reflects the macroeconomic control variables lagged one period (country level): GDP per capita, inflation rate, and, unemployment rate. The model includes bank fixed effects ( $\delta i$ ) and time effects ( $vt$ ).  $\epsilon_{i,j,t}$  is the error term.

#### 4.2. Main results

Table 4 presents the coefficient estimates of the main empirical specification. The findings show that banks with higher capital ratios performed better in terms of ROAA (Model 1), ROAE (Model 2) and NIM (Model 3). The positive influence can be explained by the fact that capitalized banks, having a higher risk aversion, were not involved in risky investment activities and are able to manage more easily periods of crisis and to reduce the cost of external financing. Similar to us, previous empirical studies (e.g. Dietrich and Wanzenried, 2011 and Beltratti and Stulz, 2012) also showed that banks with higher capital ratios performed better and were less likely to face severe troubles. Mergaerts and

Vander Vennet (2015) attribute the positive effect on bank performance indicators to lower interest expenses. When assessing the impact on banks' probability to default (Model 4) results indicate that banks which rely on higher capital ratios present higher Z-scores, meaning that are considered less vulnerable.

Regarding the assets structure, a higher loan ratio is associated with higher ROAA and NIM but has an insignificant effect on ROAE. Combined with the statistically significant effect on the Z-score, this implies that banks that focus on lending typically exhibit a better risk-return trade-off than those with alternative asset structures. The liability structure (a higher share of non-deposit funding in total liabilities) has a negative impact on ROAE, ROAA and Z-score but significant only in case of ROAE at the 10% level. The results are in line with Kohler (2015) who suggests that banks' funding structure does not have a significant relationship with bank performance.

As for the income structure, results indicate that banks characterized by a higher degree of income diversification perform better. The significantly positive coefficient of non-interest income on Z-score shows that banks will be less risky if they increase the share of non-interest income. Therefore the income structure is an important determinant of bank performance, suggesting that substantial benefits are to be gained from income diversification. The results are consistent with papers that analyze the impact of non-interest income on the profitability and stability of banks during financial crisis. Köhler (2015) find that income diversification improve performance for retail banks. Altunbas et al. (2011) and DeYoung and Torna (2013) proved that banks more dependent on non-interest income were significantly less probable to be in distress during the financial crisis.

The coefficient associated with the control variable bank size exhibits a positive relation between size and profitability. This might be explained by the fact that larger banks in terms of total assets are expected to have a greater diversification among products. The results indicate a negative relation between inflation and ROE meaning that an increase of inflation has a negative impact on bank performance, in line with previous studies of Demirgüç-Kunt and Huizinga (2010), Köhler (2015) or Anginer et al. (2014).

**Table 4** *Business models and performance. Main results*

<i>Dependent Variable</i>	<i>ROAE</i>	<i>ROAA</i>	<i>NIM</i>	<i>Z-Score</i>
	Model 1	Model 2	Model 3	Model 4
Capital structure	1.1246*** (0.3800)	0.2135* (0.1199)	0.0709** (0.0281)	0.0360 (0.0378)
Asset structure	19.2289 (12.3075)	5.4110** (2.2323)	1.8960* (0.9610)	3.9477*** (1.2189)
Liabilities structure	-16.3157* (8.5155)	-0.3616 (1.0872)	0.2272 (0.7255)	-1.2266 (0.9890)
Income structure	7.0033 (6.7426)	3.1619** (1.4636)	-1.9201*** (0.7066)	1.3548* (0.7486)
Lag Dependent variable	0.0771** (0.0343)	0.0471 (0.1725)	0.3203*** (0.0659)	0.2025*** (0.0395)
Size of bank	9.6720** (3.9243)	1.5014 (0.9758)	-0.4964** (0.2184)	0.6782 (0.4594)
Bank concentration (%)	-0.6118* (0.3572)	-0.0235 (0.0309)	-0.0094 (0.0187)	-0.0257 (0.0466)
Bank deposits to GDP (%)	1.0151** (0.4626)	-0.1211** (0.0604)	-0.0388 (0.0278)	-0.1502 (0.1194)
GDP per capita	0.0001 (0.0008)	0.0000 (0.0001)	0.0000 (0.0001)	0.0000 (0.0001)
Inflation	-4.6168*** (1.2936)	-0.0165 (0.0440)	-0.0108 (0.0273)	0.0844 (0.0601)
Unemployment rate	-0.2611 (0.4327)	0.0197 (0.0394)	-0.0040 (0.0271)	-0.0054 (0.0707)
Constant	-127.7305** (59.4015)	-20.9344 (14.1441)	10.6682*** (3.3204)	-2.1261 (12.0918)
R-squared	0.4692	0.4189	0.5513	0.3032
N. of cases	957	959	959	671

Note: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

### 4.3. Further analysis

In the following part of our analysis we assess the influence of different bank characteristics (ownership, size) and macro conditions (financial crisis, EU membership status, regulatory framework) on the relationship between banks' business models and performance using the Difference-in-Difference method. The

aim is to investigate whether these attributes amplify or diminish the effects of business strategies on banks' performance and stability.

To highlight the impact of the crisis, we introduce in the empirical specifications a dummy variables Crisis that takes the value 0 for the pre-crisis period (2005-2008) and 1 for the crisis period (2009-2012). The results obtained using the Difference-in-Difference method are shown in Table 5. The business model characteristics had a significant impact on bank performance during the crisis. The positive effect of the capitalization on Return on equity was boosted during the crisis. This can be explained by the fact that banks were forced to adjust their level of equity due to the difficulties they were facing, to protect depositors and to maintain confidence among the market.

**Table 5** Business models and performance. The effects of crisis

<i>Dependent Variable</i>	<i>ROAE</i>	<i>ROAA</i>	<i>NIM</i>	<i>Z-Score</i>
	Model 1	Model 2	Model 3	Model 4
Capital structure	0.7987** (0.3331)	0.2133** (0.0862)	0.0885** (0.0355)	0.0197 (0.0449)
Capital structure × Crisis	0.9086*** (0.3242)	0.0140 (0.0993)	-0.0430 (0.0287)	0.0293 (0.0378)
Asset structure	17.8569 (12.0217)	4.3403** (2.0788)	1.4824 (0.9563)	3.8242** (1.6820)
Asset structure × Crisis	12.1238 (10.5142)	2.9385* (1.6741)	0.7520 (0.7150)	0.5496 (1.4577)
Liabilities structure	-7.5057 (8.8397)	0.0882 (1.2488)	-0.3712 (0.6753)	0.4658 (1.1790)
Liabilities structure × Crisis	-6.2983 (6.6362)	0.2036 (0.8487)	1.0588*** (0.4027)	-1.8750** (0.7250)
Income structure	0.5800 (9.1549)	1.2884 (1.2060)	-2.3365*** (0.8898)	0.7742 (0.9645)
Income structure × Crisis	13.9627 (11.4256)	3.9738 (2.5678)	1.0385 (1.0898)	0.4380 (1.1241)
Lag Dependent variable	0.0620* (0.0326)	0.0364 (0.1692)	0.3130*** (0.0611)	0.1931*** (0.0377)
Size of bank	9.6477**	1.5150	-0.4521**	0.5209

	(3.9302)	(0.9503)	(0.2066)	(0.4686)
Bank concentration (%)	-0.4821	-0.0385	-0.0236	-0.0696*
	(0.3527)	(0.0323)	(0.0209)	(0.0383)
Bank deposits to GDP (%)	-0.4870	-0.1183*	0.0198	-0.1100
	(0.4992)	(0.0664)	(0.0235)	(0.1552)
GDP per capita	0.0005	0.0001	0.0000	0.0000
	(0.0009)	(0.0001)	(0.0000)	(0.0001)
Inflation	-0.5305	-0.2224***	-0.1078**	0.0688
	(0.4527)	(0.0731)	(0.0529)	(0.0568)
Unemployment rate	0.3722	0.1213	-0.0250	0.0008
	(0.6165)	(0.0775)	(0.0207)	(0.0627)
Constant	-101.8459*	-20.9584*	10.0378***	0.7825
	(58.2041)	(12.4693)	(3.1273)	(11.7485)
R-squared	0.4804	0.4284	0.5680	0.3132
N. of cases	957	959	959	671

Note: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

In all the years of crisis, banks registered an increase of the average ratio of equity to total assets, which is a consequence of the crisis, to support banks. However, in case of ROAA the effect of crisis was diminished being statistically significant only for the institutions with traditional lending activities. Combined with the statistically insignificant effect on the Z-score, this suggests that banks that focus on lending typically exhibit a worse risk-return trade-off than those with alternative asset structures. The results also highlight that the crisis significantly amplify the effect of banks' liability structure on NIM.

As foreign subsidiaries have a large presence in CEE countries we further investigate how foreign ownership affects the link between business models and performance. In emerging markets foreign banks are likely to experience improved performance and stability. Fang et al. (2011) showed that the entry of foreign banks determined an increase of the profitability rates and interest margins in CEE countries while the situation is reversed for developed market. Havrylchyk and Jurzyk (2005) suggest that it is profitable for large banking groups to open branches in countries in transition due to higher levels of ROA that could be obtained in this area. In the same time, financial institutions with foreign ownership

perform better in comparison with the local banks, (Demirguc-Kunt and Huizinga, 1999). To evaluate this hypothesis for our sample of banks from emerging Europe we introduced in the empirical specifications as independent variable the Foreign ownership dummy, a variable which takes the value 1 for banks with foreign capital more than 50%, and 0 otherwise.

Results presented in Table 6 indicate that foreign ownership influences the bank performance through the capital, assets and liabilities structure. In the case of the capital channel, results are significant (slightly) only in terms of ROAA and the impact is negative (Model 2). For the interactions with asset structure we observe a highly significant and positive effect on ROAE (Model 1), as suggested by the coefficient on Asset structure  $\times$  Foreign ownership (63.2590\*\*\*). This can be explained by the fact that foreign owned banks might be more involved in the local retail market. In respect with the liabilities channel results indicate that an increase in non-deposit funding share has a negative impact on ROAE for foreign owned banks as suggested by the coefficient on Liabilities structure  $\times$  Foreign ownership (-41.0654\*\*\*). Thus, foreign banks that rely more on non-deposit funding could negatively affect the return for shareholders measured by ROAE (Model 1).

**Table 6** *Business models and performance. The effects of ownership*

Dependent Variable	ROAE	ROAA	NIM	Z-Score
	Model 1	Model 2	Model 3	Model 4
Foreign ownership	-33.5506** (14.6044)	3.6820 (2.6090)	2.2219* (1.1401)	-7.6872*** (1.5870)
Capital structure	1.4293*** (0.4688)	0.3745** (0.1768)	0.0622 (0.0478)	0.0464 (0.0468)
Capital structure $\times$ Foreign ownership	-0.4636 (0.5526)	-0.2909* (0.1589)	0.0032 (0.0448)	0.0128 (0.0538)
Asset structure	-21.4703 (16.7926)	2.7209 (2.5378)	2.9894** (1.3462)	1.4926 (1.6585)
Asset structure $\times$ Foreign ownership	63.2590*** (21.6272)	2.7510 (2.4485)	-1.7427 (1.1874)	4.0337* (2.1128)
Liabilities structure	11.2959 (10.4877)	1.4573 (2.8915)	1.1329 (1.2467)	-1.7405 (1.4459)
Liabilities structure $\times$ Foreign ownership	-41.0654*** (13.8365)	-4.0844 (3.2992)	-1.2565 (1.3877)	0.4823 (1.6777)

Income structure	2.9644 (14.0211)	5.6660** (2.8559)	-1.5486* (0.8636)	0.3717 (1.1088)
Income structure × Foreign ownership	6.8545 (14.0430)	-4.2771 (2.5991)	-0.5657 (0.9557)	1.5898 (1.1635)
Lag Dependent variable	0.0605 (0.0367)	0.0136 (0.1814)	0.3072*** (0.0650)	0.1890*** (0.0435)
Size of bank	11.1103*** (4.0857)	1.8475* (0.9515)	-0.4836* (0.2461)	0.7624* (0.4584)
Bank concentration (%)	-0.5455 (0.3640)	-0.0418 (0.0347)	-0.0105 (0.0186)	-0.0243 (0.0481)
Bank deposits to GDP (%)	-0.0730 (0.5777)	-0.1110* (0.0608)	-0.0368 (0.0273)	-0.1479 (0.1209)
GDP per capita	0.0006 (0.0010)	0.0001 (0.0001)	0.0000 (0.0001)	0.0000 (0.0001)
Inflation	-1.3834** (0.5959)	0.0051 (0.0474)	-0.0079 (0.0275)	0.0791 (0.0631)
Unemployment rate	1.4786** (0.6791)	0.0311 (0.0442)	-0.0040 (0.0273)	-0.0179 (0.0759)
Constant	-136.7266** (60.3165)	-26.9983* (14.5975)	9.1496** (3.9669)	1.8136 (12.3876)
R-squared	0.4866	0.4492	0.5590	0.3252
N. of cases	957	959	959	671

Note: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

As banks' size is an important determinant of profitability, we introduce a dummy variable for small banks (Small banks) which takes the value 1 for banks with total assets less than 5 billion EUR, and 0 otherwise, following Carter and McNulty (2005). The results presented in Table 7 show that small banks recorded a lower level of performance, which is significant in case of ROAA. A possible explanation might be that smaller banks are inclined to have a reduced degree in terms of loan diversification and products than larger banks. The capital structure for small banks has a negative impact on ROAE and a positive effects on ROAA yet not significant. The results for the asset structure indicate that an increase in lending has a significant positive impact on ROAA for small banks, as suggested by the coefficient on Asset structure × Small banks (6.0535\*\*). An increase in non-deposit funding activities by smaller banks has a negative impact on bank

performance indicators but the results are not statistical significant. Also similar results are observed for the income structure: an increase in non-interest income activities of smaller commercial banks has a negative impact on bank performance indicators yet not statistical significant. Our findings suggest that banks which rely on business models like non-deposit funding or non-interest income activities should have a higher degree of specialization and a larger size in order to increase their profitability.

**Table 7** Business models and performance. The effects of size

<i>Dependent Variable</i>	<i>ROAE</i>	<i>ROAA</i>	<i>NIM</i>	<i>Z-Score</i>
	Model 1	Model 2	Model 3	Model 4
Small banks	-8.0629 (9.8336)	-5.1211** (2.2875)	-0.7085 (0.8390)	2.2089 (1.3779)
Capital structure	1.0622** (0.4685)	0.1804* (0.1068)	0.0245 (0.0293)	0.0363 (0.0424)
Capital structure × Small banks	-0.0080 (0.4396)	0.0067 (0.0752)	0.0775** (0.0325)	0.0065 (0.0475)
Asset structure	11.0413 (12.8722)	2.4921 (2.0002)	1.6248* (0.9251)	5.0730*** (1.7357)
Asset structure × Small banks	15.6946 (17.6466)	6.0535** (3.0166)	0.2127 (1.0880)	-1.9248 (1.8468)
Liabilities structure	-4.4691 (9.5759)	1.7131 (1.6178)	0.6177 (0.6459)	-0.5151 (1.1674)
Liabilities structure × Small banks	-17.8333 (12.7930)	-3.5178 (2.4984)	-0.5533 (0.8158)	-1.2883 (1.3070)
Income structure	9.9160 (7.9486)	0.9942 (1.0104)	-1.5336** (0.6589)	1.5041 (0.9933)
Income structure × Small banks	-6.4066 (10.6448)	3.8424 (2.9472)	-1.1025 (0.7493)	-0.2778 (1.1730)
Lag Dependent variable	0.0689* (0.0351)	0.0332 (0.1775)	0.3188*** (0.0658)	0.1951*** (0.0420)
Size of bank	6.5615 (4.5636)	0.9801 (0.8375)	-0.6037*** (0.1951)	0.7327 (0.5100)
Bank concentration (%)	-0.0411	-0.0415	-0.0034	-0.0289

	(0.3112)	(0.0360)	(0.0176)	(0.0408)
Bank deposits to GDP (%)	-0.8575	0.0406	-0.0306	-0.1758*
	(0.5755)	(0.0373)	(0.0254)	(0.1037)
GDP per capita	0.0006	-0.0000	0.0000	-0.0000
	(0.0006)	(0.0001)	(0.0001)	(0.0001)
Inflation	-6.3631***	-0.3842***	-0.0012	0.0825
	(1.8353)	(0.1023)	(0.0259)	(0.0551)
Unemployment rate	0.3833	-0.0288	0.0027	-0.0090
	(0.4382)	(0.0302)	(0.0258)	(0.0618)
Constant	-59.6060	-13.5210	11.8369***	-2.6452
	(69.3132)	(12.0418)	(3.1221)	(11.3722)
R-squared	0.4744	0.4403	0.5670	0.3096
N. of cases	957	959	959	671

Note: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

As in the last years banking sectors in the new member states of European Union have operated under positive macroeconomic conditions that exceeded that of old EU member countries, we want to observe if the status of EU membership influence the impact of the bank business models on bank performance. We introduce a new dummy variable, EU member country, that takes value 1 for countries that are member of the European Union (Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia), and 0 for countries that are not members of the European Union (Albania, Bosnia and Herzegovina, Croatia, Macedonia, Montenegro, Serbia and Ukraine).

The findings shown in Table 8 indicate that the impact of the capital structure on bank performance is affected by the status of the country where the bank operates (Model 1). A higher capitalization has a negative and significant impact on ROAE for banks from EU member countries, as suggested by the coefficient on Capital structure  $\times$  EU Member Country (-1.2830\*\*). In turn, the EU membership has a positive effect on the relationship between asset structure and performance that is significant in case of ROAE (in Model 1 the coefficient on Asset structure  $\times$  EU Member Country is 68.0340\*\*\*) and ROAA (in Model 2 the coefficient on Asset structure  $\times$  EU Member Country is 10.1471\*\*\*). A possible reason for this positive impact can be linked to the fast growing lending in EU member countries in recent years. We also found that the non-interest income

activities have a significant negative impact on ROAE for banks operating in countries with EU membership (in Model 1 the coefficient on Income structure  $\times$  EU Member Country is -42.0909\*\*\*).

**Table 8** Business models and performance. The effects of EU membership status

Dependent Variable	ROAE	ROAA	NIM	Z-Score
	Model 1	Model 2	Model 3	Model 4
Capital structure	1.8453*** (0.4039)	0.2699*** (0.0643)	0.0875** (0.0405)	0.0200 (0.0517)
Capital structure $\times$ EU Member Country	-1.2830** (0.6181)	-0.0873 (0.1908)	-0.0300 (0.0474)	0.0239 (0.0629)
Asset structure	-16.1631 (14.4749)	0.6781 (1.7244)	1.7436* (1.0029)	4.4139** (1.9160)
Asset structure $\times$ EU Member Country	68.0340*** (22.1045)	10.1471*** (3.4730)	0.7232 (1.8712)	-0.9816 (2.6323)
Liabilities structure	-9.9767 (10.8932)	0.7689 (1.2018)	1.5209** (0.7541)	-1.8260 (1.3602)
Liabilities structure $\times$ EU Member Country	-18.2982 (16.1078)	-2.8414 (2.4235)	-2.4451* (1.3520)	1.0690 (2.0198)
Income structure	32.5970*** (9.5483)	4.2730*** (1.5064)	-1.0058** (0.4814)	2.1883* (1.3037)
Income structure $\times$ EU Member Country	-42.0909*** (12.1550)	-1.8970 (2.5000)	-1.5231 (1.1531)	-1.3433 (1.5970)
Lag Dependent variable	0.0640** (0.0322)	0.0008 (0.1866)	0.3095*** (0.0685)	0.2048*** (0.0392)
Size of bank	8.7534** (3.5244)	1.2439 (0.8135)	-0.4758** (0.2392)	0.6757 (0.4919)
Bank concentration (%)	-0.0536 (0.2600)	-0.0411 (0.0351)	-0.0085 (0.0168)	-0.0225 (0.0479)
Bank deposits to GDP (%)	-0.8918 (0.5657)	-0.0765 (0.0758)	-0.0390 (0.0261)	-0.1578 (0.1199)
GDP per capita	0.0006 (0.0006)	-0.0001 (0.0001)	0.0000 (0.0001)	0.0000 (0.0001)
Inflation	-6.3225*** (1.7098)	-0.0364 (0.0861)	-0.0475 (0.0356)	0.0954 (0.0612)

Unemployment rate	0.0836 (0.4175)	0.0286 (0.0748)	0.0119 (0.0246)	-0.0088 (0.0731)
Constant	-86.1260 (55.5377)	-17.2452 (10.7354)	9.9601*** (3.5032)	-1.9426 (12.6817)
R-squared	0.4936	0.4325	0.5617	0.3053
N. of cases	957	959	959	671

Note: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Following Laeven and Levine (2009), we compile for all 17 countries a Regulatory Index measured as a normalized unweighted average index of three regulation and supervision indicators (Restrictions on banking activities index, Capital regulatory index, and Official supervisory power index) that are constructed using the data from the survey of bank regulations conducted by the World Bank. We define a country as a country with a lax regulation if the value of Regulatory index for that country is lower than the median value of Regulatory index for the entire sample of countries, as in Andrieș and Brown (2017).

**Table 9** Business models and performance. The effects of regulatory framework

Dependent Variable	ROAE	ROAA	NIM	Z-Score
	Model 1	Model 2	Model 3	Model 4
Lax regulatory framework	-11.3199 (22.0302)	-2.0222 (2.0600)	-0.8632 (0.5897)	0.8799 (1.3001)
Capital structure	1.1026** (0.5307)	0.1941 (0.1221)	0.0245 (0.0325)	0.0240 (0.0458)
Capital structure × Lax regulation	0.0215 (0.4866)	0.0172 (0.0536)	0.0684* (0.0350)	0.0132 (0.0414)
Asset structure	9.4612 (12.3494)	3.1104 (2.3780)	1.6206* (0.9084)	4.0402*** (1.2770)
Asset structure × Lax regulation	18.9364 (12.8521)	4.4659* (2.2916)	0.6574 (0.6268)	-0.4835 (1.3503)
Liabilities structure	-2.7347 (7.5731)	0.7369 (0.9301)	0.3655 (0.5841)	-0.8781 (1.0637)
Liabilities structure × Lax regulation	-30.7751*** (8.0203)	-3.3493*** (1.0413)	-0.4727 (0.5172)	-0.7835 (1.0210)
Income structure	18.5332**	2.8686**	-1.3046**	1.0978

	(8.8288)	(1.1878)	(0.5915)	(0.9339)
Income structure × Lax regulation	-19.5089*	0.2336	-1.2511*	0.6146
	(11.7796)	(2.2898)	(0.6417)	(1.1294)
Lag Dependent variable	0.0703**	0.0454	0.3070***	0.2056***
	(0.0341)	(0.1726)	(0.0599)	(0.0389)
Size of bank	9.2364**	1.4253	-0.5989***	0.7802*
	(3.8013)	(0.9825)	(0.2193)	(0.4680)
Bank concentration (%)	0.1064	-0.0133	0.0079	-0.0674
	(0.3698)	(0.0269)	(0.0213)	(0.0666)
Bank deposits to GDP (%)	-1.5675*	-0.0696	-0.0715**	-0.1598
	(0.8978)	(0.0482)	(0.0362)	(0.1326)
GDP per capita	0.0013	0.0001	0.0001	-0.0001
	(0.0011)	(0.0001)	(0.0001)	(0.0001)
Inflation	-4.3209***	-0.3523***	-0.0165	0.2625***
	(1.5055)	(0.0946)	(0.0487)	(0.0908)
Unemployment rate	0.6960	-0.0029	-0.0049	0.0273
	(0.6819)	(0.0303)	(0.0294)	(0.0411)
Constant	-94.2079	-20.2331	12.3259***	-0.6744
	(69.2085)	(13.6404)	(3.2687)	(12.0459)
R-squared	0.4829	0.4308	0.5676	0.3074
N. of cases	957	959	959	671

Note: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table 9 shows that regulation can influence the impact of business models on bank performance via the liabilities channel. A large and statistically significant negative coefficient is associated with the interaction between the liability structure and the lax regulation dummy (a impact of -30.7751\*\*\* in case of ROAE in Model 1 and -3.3493\*\*\* in case of ROAA in Model 2). This suggests that a higher share of non-deposit funding in total liabilities has a negative impact on performance in countries with a lax regulatory framework. The same impact (although slightly significant) is observed for the interaction between the income structure and the Lax regulation dummy in case of ROAE (-19.5089\* in Model 1). This result shows that income diversification is negatively correlated with bank performance if banks are located in countries with lax regulation.

## 5. CONCLUSIONS

This paper investigates the impact of business models on bank performance during the period 2007-2008 among 156 banks from Central and Eastern European countries. Using a Difference-in-Difference framework, our empirical results highlight the importance of bank business model characteristics for bank performance during financial crisis across different bank characteristics and macroeconomic conditions. In order to reflect banks' performance our dependent variable takes alternatively the form of Return on average equity (ROAE), Return on average assets (ROAA), and, Net interest margin (NIM). Also we consider the financial stability of banks expressed through the z-score. The business models analyzed includes the capital structure, the asset structure, the liability structure, and the income structure of the banks.

The findings show that banks with higher capital ratios performed better and present a lower probability of default. Regarding the assets structure, the orientation of banks towards the traditional lending activities is associated with higher ROAA and NIM but has an insignificant effect on ROAE. As for the income structure, results indicate that banks characterized by a higher degree of income diversification perform better.

Moreover, we assess the influence of different bank characteristics (ownership, size) and macro conditions (financial crisis, EU membership status, regulatory framework) on the relationship between banks' business models and performance and prove that these attributes amplify or diminish the effects of business strategies on banks' performance and stability. First, the positive effect of the capitalization on Return on average equity was boosted during the crisis. Second, the effects of asset structure on bank performance improved at the level of foreign banks. Regarding the liabilities structure, an increase of the share of non-deposit funding in total liabilities has a negative impact on ROAE, meaning that foreign banks that rely more on non-deposit funding could negatively affect the bank performance. Third, an increase in lending has a significant positive impact on ROA for small banks. Fourth, loans granted by banks that operate in countries that are members of European Union have a positive impact on bank performance. Finally, a higher share of non-deposit funding in total liabilities and greater income diversification have a negative impact on performance in countries with a lax regulatory framework.

## ACKNOWLEDGMENTS

This work was supported by a grant of the Romanian National Authority for Scientific Research and Innovation, BRIDGE GRANT DSS-Direct, project number PN-III-P2-2.1-BG-2016-0447.

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# IS REAL DEPRECIATION AND MORE GOVERNMENT SPENDING EXPANSIONARY? THE CASE OF MONTENEGRO

YU HSING \*

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**Abstract:** *Employing an extended IS-MP-AS model to study the effects of the exchange rate, fiscal policy and other related variables in Montenegro, the paper finds that real depreciation of the Euro, a lower government spending-to-GDP ratio, a lower real lending rate in the Euro area, a lower lagged real oil price, a higher lagged real GDP in Germany, and a lower expected inflation rate would promote economic growth.*

**Keywords:** *Currency depreciation, government spending, interest rates, IS-MP-AS model.*

**JEL Classification:** *F41, E62*

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## 1. INTRODUCTION

Montenegro's economy exhibits both strengths and weaknesses. The 3.88% growth rate of real GDP in 2016 shows that its economy runs better than in many other European countries. The inflation rate declined from a recent high of 12.2% in 2012 to a low of 1.6% in 2016. The average lending rate declined from a recent high of 9.7467% in 2011 to 7.55% in 2016, providing incentives for households and businesses to increase borrowing and spending. The 15.3% unemployment rate in 2016 was much higher than the unemployment rates in the U.S. and the EU, suggesting that there was slack in the labor market.

This paper examines whether currency depreciation or expansionary fiscal policy would be conducive to economic growth in Montenegro for several reasons. Montenegro's trade deficit has deteriorated in recent years, rising from 18.60% of GDP in 2015 to 23.43% of GDP in 2016. The Euro depreciated 24.81% from

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US\$1.4715 per euro in 2008 to US\$1.1066 per euro in 2016. Depreciation of the Euro tends to increase exports, reduce imports and create more job opportunities. On the other hand, a weaker euro tends to increase the cost of imports and domestic prices, cause capital outflows, and reduce foreign investments. Whether Euro depreciation would help or hurt net exports or aggregate output needs to be addressed empirically. Montenegro's fiscal standing has become worse off as evidenced by the statistics that its government borrowing/GDP ratio rose from a recent low of 0.698% in 2014 to a high of 6.029% in 2016 and that its general government gross debt-to-GDP ratio rose from a low of 31.047% in 2007 to a high of 70.048% in 2016. Whether deficit- or debt-financed expansionary fiscal policy would raise aggregate output needs to be examined.

An analysis of the literature indicates that a few previous studies (Bahmani-Oskooee and Kutan, 2009) do not specify a theoretical model and ignore aggregate supply. This paper extends the works of the impacts of real depreciation on imports and exports by Stučka, (2003), Breuer and Klose (2015) and Bouchoucha (2015) and examines the impact of real depreciation on aggregate demand and aggregate output. The contribution of the paper is that the theoretical model extends the IS-MP-AS model (Romer, 2000, 2006) and consists of additional new variables such as the real exchange rate, world real income, the world real interest rate, and the real oil price so that international trade, open economy and supply shocks are considered. In addition, the paper uses the new methodology of the GARCH model in empirical work.

## 2. LITERATURE SURVEY

There have been several articles studying the effect of currency depreciation in Montenegro and other related countries. Stučka (2003) indicates that after real depreciation, the trade balance deteriorates initially in Croatia, but deterioration is short lived and that it would take 2.5 years for the trade balance to improve. The study for Croatia may be relevant for Montenegro as these two countries had a similar economic history under the former Yugoslavia.

Based on a sample of nine Eastern European countries during 1990.M1 – 2005.M6, Bahmani-Oskooee and Kutan (2009) examine the effect of real depreciation on aggregate output and find that in the short run, real depreciation is

contractionary in Czech, Estonia, Hungary and Russia, expansionary in Belarus, Latvia, Poland and Slovakia, and neutral in Lithuania. In the long run, however, real depreciation has little effect on aggregate output.

In examining the impact of Euro depreciation on exports and imports in nine Eurozone countries, Breuer and Klose (2015) find that euro depreciation benefits French and Spanish exports the most, that the exchange rate elasticity of imports is not statistically significant in most cases, that the exchange rate elasticity of exports is statistically significant and has the correct sign in most cases, and that euro depreciation would improve the trade balance because the response of the trade balance to the euro exchange rate is mostly decided by its impact on exports.

In assessing the impact of the Euro exchange rate on exports, Bouchouha (2015) reveals that the effect of the real effective exchange rate of the euro on intra-euro area exports is greater than that on global exports and that the effect of the real effective exchange rate of the euro on exports before and after the EMU also differs. He also indicates that Italy and Spain have more structural problems than price competitiveness due to the insignificance of the real effective exchange rate of the euro.

The Montenegrin government has also applied fiscal policy to increase aggregate demand and output. The government budget deficit-to-GDP ratio rose to a high of 8.035% in 2015 in order to rescue the economy due to the global financial crisis but has declined significantly since then. Whether expansionary fiscal policy would raise real GDP is unclear mainly because the crowding-out effect may cancel out some or all of the increase in real GDP.

Several studies have examined the government debt and deficit and their effects on the economy in Montenegro and other related countries. Barro (1974) maintains that debt- or deficit-financed government spending has a neutral impact whereas Elmendorf and Mankiw (1999) show that the impact of government debt on economic growth is positive in the short run and negative in the medium and long run due to the crowding-out effect. Reinhart and Rogoff (2010) report that the economic growth rate in developed countries with a lower debt-to-GDP ratio (30% or less) would be higher by 2.6 percentage points than those countries with a higher debt-to-GDP ratio (90% or higher) and that the economic growth rate in emerging countries with a lower debt-to-GDP ratio (30% or less) would be higher by 2.10 percentage points than those countries with a higher debt-to-GDP ratio (90% or

higher). Based on a sample of 38 advanced and emerging countries, Kumar and Woo (2015) reveal that if the debt-to-GDP ratio rises by 10 percentage points, GDP growth rate will decrease by 0.2 percentage points due to decrease in labor productivity growth and that the relationship is found to be nonlinear. The negative impact is slightly smaller in advanced countries.

Šehović (2014) shows that due to the adoption of the euro as the national currency, fiscal policy in Montenegro becomes the most important macroeconomic tool. He suggests that the government takes measures to improve productivity and enhance knowledge in the long run and to pursue fiscal sustainability in the short run.

Vučinić (2015) indicates that after the global financial crisis, the Montenegrin government took steps to prevent government deficit and debt from rising. Measures include spending cuts, freeze of pension adjustments, increases in taxes and tax rates, combating the shadow economy and tax evasion, etc.

Koczan (2015) reviews fiscal deficit and public debt in six Western Balkan countries including Montenegro after 15 years of economic transition. He indicates that after the global financial crisis, these countries received less capital inflows, experienced lower economic growth. Facing huge and rising government debt, Montenegro raised VAT tax rates and excises and social contributions and cut spending in capital, public worker wages and transfers, and engaged in pension reforms.

In reviewing public debt in Montenegro, Popović (2016) suggests that the government should reduce the debt level in the long run, that expansionary fiscal policy can be used to stimulate the economy during a recession, that deficit spending should be used in investment projects to compensate for the decrease in investment spending in the private sector, and that fiscal policy should be coordinated with other measures such as the exchange rate and monetary policies.

There are some shortcomings of the current literature. For example, Bahmani-Oskooee and Kutan (2009) do not include supply shocks, world real income and the world real interest rate and choose the money supply as a proxy for monetary policy whereas many countries use the policy rate as a major monetary policy instrument. Therefore, their study ignores the potential impact of a supply shock on aggregate supply, the potential impact of world real income on a country's exports, and the potential response of the Central Bank of Montenegro to monetary policy changes made by the European Central Bank. This paper formulates a simultaneous-equation model consisting of the IS, monetary policy

and aggregate supply functions in order to incorporate the variables not covered by Bahmani-Oskooee and Kutan (2009) and test several hypotheses to be discussed in the following section.

### 3. THEORETICAL MODEL

Suppose that in the IS function, aggregate expenditure is determined by real income or GDP, the real interest rate, government spending, government tax revenue, the real exchange rate of the euro, the real oil price, that the real interest rate in the monetary policy function (Taylor, 1993, 1999) is determined by the inflation rate, real GDP, the real exchange rate and the world real interest rate, and that the inflation rate is a function of the expected inflation rate, real GDP, the real oil price and the real exchange rate. We can express an extended IS-MP-AS model (Romer, 2000, 2006) as:

$$Y = a(Y, R, G, T, E, O, Y^*) \quad (1)$$

$$R = b(\pi - \pi^*, Y - Y^P, E, R^*) \quad (2)$$

$$\pi = c(\pi^e, Y - Y^P, O, E) \quad (3)$$

where

Y = real GDP in Montenegro,

R = the real interest rate,

G = government spending,

T = government tax revenue,

E = the real exchange rate,

O = the real oil price,

Y\* = world real GDP or income,

$\pi$  = the inflation rate,

$\pi^*$  = the inflation target,

Y<sup>P</sup> = potential real GDP,

R\* = world real interest rate, and

$\pi^e$  = the expected inflation rate.

Assume that the inflation target and potential real GDP are constants in the short run. Solving for the three endogenous variables Y, R and  $\pi$  simultaneously, we can find equilibrium real GDP as:

$$\bar{Y} = s(E, G - T, R^*, O, Y^*, \pi^e) \quad (4)$$

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The sign beneath each of the exogenous variables represents the hypothesis to be tested. Specifically, equilibrium real GDP has an unclear relationship with the real exchange rate and the government spending-to-GDP ratio, a negative relationship with the world real interest rate, the real oil price and the expected inflation rate, and a positive relationship with world real output or income. Real depreciation tends to increase exports and shift aggregate demand to the right but also tends to increase import costs and prices and shift aggregate supply to the left, making the net impact on real GDP uncertain. More deficit- or debt-financed government spending would shift aggregate demand to the right but may crowd out private spending partially or completely, shifting aggregate demand to the left. Thus, the net impact is unclear.

An analysis of the data shows that real GDP exhibits patterns of seasonal variations. Hence, three seasonable dummy variables are included in the estimated regression:

$$\bar{Y} = w(E, G - T, R^*, O, Y^*, \pi^e, Q2, Q3, Q4) \quad (5)$$

where Q2, Q3 and Q4 represent the second quarter, the third quarter and the fourth quarter, respectively.

#### 4. EMPIRICAL RESULTS

The data were collected from the Central Bank of Montenegro and the International Financial Statistics published by the International Monetary Fund. Real GDP in Montenegro is measured in million euros. Due to lack of adequate data for the government deficit or debt, government spending as a percent of GDP is used to represent fiscal policy. The real lending rate in the euro area is selected to represent the world real interest rate as monetary policy conducted by the European Central Bank is expected to affect monetary policy of the Central Bank of Montenegro. The real exchange rate is calculated as units of the euro per U.S. dollar times relative prices in the U.S. and Montenegro, respectively. The real oil price is measured as the euro per barrel of crude oil adjusted by the consumer price index. Real GDP in Germany is selected to represent the world real GDP or income and is measured in billion euros. The expected inflation rate is estimated as an average inflation rate in the past four quarters. Real GDP, the government spending-to-GDP ratio and German real GDP are measured on a log scale.

Variables with negative values are measured in the level form. The real exchange rate is measured in the level form because the log of the real exchange rate has negative values. A negative real exchange rate may not be appropriate in interpretation. The lagged real oil price and lagged German real GDP are used due to impact lags. The sample ranges from 2011.Q1 to 2016.Q4. Quarterly data for real GDP are not available before 2011.Q1.

To test whether these variables may have a stable long-term relationship, the ADF test on the regression residual is performed. The value of the test statistic is -6.8068, and the critical value is -4.4163 at the 1% level. Therefore, these variables are cointegrated.

Table 1 reports the estimated regression and related statistics. Approximately 99.16% of the change in real GDP can be explained by the nine right-hand side variables. The coefficients of all the exogenous variables are significant at the 1% or 2.5% level. Real GDP in Montenegro has a positive relationship with the real exchange rate, lagged German real GDP and three seasonal dummy variables and a negative relationship with the government spending as a percent of GDP, the real lending rate in the euro area, the lagged real oil price and the expected inflation rate. A 1 unit increase in the real exchange rate of the euro would cause the log of real GDP to rise by 0.0756, a 1% increase in the government spending-to-GDP ratio would reduce real GDP by 0.1448%, and a 1% increase in lagged German real GDP would raise Montenegro's real GDP by 0.7506%.

**Table 1.** *Estimated Regression of Log(Real GDP) in Montenegro*

Variable	Coefficient	z-Statistic	Probability
C	-2.718065	-637.7061	0.0000
Real exchange rate	0.075577	2.503630	0.0123
Government spending-to-GDP ratio	-0.144793	-5.561328	0.0000
Real lending rate in the euro area	-0.053364	-5.846167	0.0000
Log(lagged real oil price)	-0.020935	-2.294136	0.0218
Log(Lagged German real GDP)	0.750566	63991783	0.0000
Expected inflation rate	-0.061300	-7.336874	0.0000
Second quarter	0.206842	47.74807	0.0000
Third quarter	0.481808	54.98097	0.0000
Fourth quarter	0.256357	34.42956	0.0000
R-squared	0.991601		
Adjusted R-squared	0.986201		
Akaike information criterion	-4.856088		
Schwarz criterion	-4.267061		
Sample period	2011.Q1- 2016.Q4		
Number of observations	24		
Methodology	GARCH		
MAPE	1.3449%		

Notes: MAPE stands for the mean absolute percent error.

According to empirical results, the recent trend of euro depreciation from 0.729 euro per U.S. dollar in 2014.Q2 to 0.927 euro per U.S. dollar in 2016.Q4 may suggest that euro depreciation would help Montenegro's real GDP as the positive impact such as increased exports would dominate negative impacts such as increased import costs and prices and decreased capital net flows. The negative significant coefficient of government spending as a percent of GDP indicates that expansionary fiscal policy such as rising government debt-to-GDP ratios and rising government net lending/borrowing as a percent of GDP would be ineffective and that the negative crowding-out effect seems to cancel out the positive impact. The declining trend of the lending rate in the euro area from a recent high of 8.19% in 2011.Q4 to a recent low of 6.59% in 2016.Q4 would stimulate the application for loans, increase private spending, and raise real GDP. Sharp decline in crude oil

prices from a high of \$107.35 in 2013.Q3 to a low of \$32.77 in 2016.Q1 would reduce the production cost, shift aggregate supply to the right, and raise real GDP. On the other hand, recent gradual rise in the crude oil price to \$49.06 in 2016.Q4 is expected to increase the production cost, shift aggregate supply to the left, and reduce real GDP. The rising trend of Germany's real GDP as a proxy for world real income implies that there would be more demand for Montenegro's exports, shifting aggregate demand to the right and raising real GDP. The declining trend of the inflation rate from a high of 10.8% in 2008.Q2 to 0.6% in 2016.Q4 tends to reduce the expected inflation rate, shift aggregate supply to the right, and increase real GDP.

Several other versions were considered. If the lagged real GDP in the euro area replaces lagged German real GDP, the estimated coefficient of 0.9816 is significant at the 1% level and is greater than the coefficient of lagged German real GDP. However, the negative coefficient of the lagged real oil price becomes insignificant at the 10% level. Other results are similar. If the expected inflation rate is represented by the simple lagged inflation rate, its estimated negative coefficient is insignificant at the 10% level. The coefficients of the real lending rate in the euro area and the lagged real GDP in Germany become insignificant at the 10% level. The result suggests that the expected inflation rate used in Table 1 would be a better estimate.

## 5. CONCLUSIONS

This paper has examined the impacts of exchange rate movements, government spending and other related variables on aggregate output in Montenegro. An extended IS-MP-AS model is employed. The GARCH model is used in estimating regression parameters. Real depreciation of the Euro, less government spending as a percent of GDP, a lower real lending rate in the Euro area, a lower lagged real oil price, more lagged output in Germany or a lower expected inflation rate would raise real GDP in Montenegro.

There are several policy implications. It appears that recent real depreciation of the euro may help Montenegro's real GDP as potential benefits of real depreciation such as more exports dominate potential negative impacts such as higher imports costs, higher domestic inflation, increase in capital outflows, and decrease in foreign investments. Because more government spending as a percent

of GDP would reduce real GDP, fiscal prudence would be needed. The authorities may need to pay more attention to external factors such as world real income, world real interest rates and the real cost of imported oil. A lower world real income, a higher world real interest rate or a higher real crude oil price would shift the aggregate demand curve to the left and the inflation adjustment curve to the left, causing Montenegro's real GDP to decline.

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# HERDING BEHAVIOR OF INSTITUTIONAL INVESTORS IN ROMANIA. AN EMPIRICAL ANALYSIS

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**Abstract:** *During the last decades, institutional investors have been the main players, both in developed as well as in emerging stock markets. Thus, their investment behavior was analyzed at the national or international level, in order to assess if institutional investors herd, increase stock return volatility, affect market efficiency and liquidity, influence the corporate governance, or destabilize stock prices. This paper studies the behavior of the institutional investors on the Romanian stock market, a European frontier market that struggles to attain the status of emerging market. We examine if the disclosure level generates any herding behavior for institutional investors. In emerging markets, the lack of transparency affects the degree of investments in a listed company, as long as insider trading is pushed to the limit of the legal line. For this study, we used financial information from the companies listed on the Bucharest Stock Exchange for the period 2010-2014. The findings highlight that there is a certain herding behavior among institutional investors in Romania.*

**Keywords:** *Institutional investors, herding behavior, emerging markets.*

**JEL Classification:** *G11, G14, G23*

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## 1. INTRODUCTION

Institutional investors have become the subject of numerous studies, due to their influence among the financial market, especially on share prices, returns and liquidity. These studies focus on verifying if the information asymmetry, geographical proximity or the degree of disclosure may affect the level of investment. Since the presence of herding means that investors should repress their

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opinions in favor of majority way of investing, their profitability will be similar to market profitability. Given that the investment strategy is less likely to be copied in real time from other investors, the herd's behavior is most likely to occur over time within the same sub-group of investors or in an industry. Our study aims to discover if there is herd behavior between open-end funds in Romania, as an emerging capital market.

Institutional investors have to cope with the pressure of large losses so they keep the stocks that seem safe, also held by the other managers. They also respond to the same signals and recommendations and they are influenced by past actions, but it is difficult for managers to pursue the fundamental analysis because of the need for short-term gains and avoiding losses so that they choose short-term strategies, based on technical analysis.

For this study, we used the reports which Romanian open-end funds are releasing every semester, containing the structure of their portfolio. We considered the period 2010-2014 and we took into consideration 29 open-end funds for 2010, 32 for 2011 and first quarter of 2012 and 35 for the next years. These open-end funds were the only ones of this type activating at that time on the Romanian market. Our interest in their reports was the level of holdings in the most active issuers listed on Bucharest Stock Exchange therefore we considered 25 companies registered on the premium and standard sections of trading.

The herding concept is a completely new topic in Romanian literature. The added value of our study is given especially because the stock market is at its beginning, there are less than 100 companies listed at Bucharest Stock Exchange nowadays and fewer are traded in an active style. For this reason and due to a small numbers of mutual funds, it is extremely difficult to develop such a research, considering that there is no available database, and data regarding the holdings have been collected manually from their financial reports.

We used the LSV model (Lakonishok, Shleifer, & Vishny, 1992), one of the most popular models which have been used to identify the level of herding among institutional investors. Our findings show an increased level of herding on the sales side, which give us a clear sign that in order to stay on the safe side on this volatile market or to protect their reputation, open-end funds from Romania are more likely to sell the shares which have already been sold by others.

## 2. LITERATURE REVIEW

The effect of herd has drawn interest as it may lead to a change in prices, different levels of balance, and investors are obliged to deal with ineffective prices.

The LSV model (Lakonishok, Shleifer, & Vishny, 1992) was developed using a database of information from 769 funds (especially pension funds) from 1985 to the last quarter of 1989, the effects of their trading on stock prices were evaluated. The results were not strong enough to support the hypothesis of price influence as pension funds copied their strategies to a very low level for large actions, and the herd effect is more obvious for small actions.

The price of shares is calculated as being the average price between the beginning and the end of the quarter, and the funds belonging to the same manager are taken into consideration together.

The LSV model for the assessment of the herd effect in a given quarter is defined as:

$$H(i) = |B(i)/(B(i)+S(i)) - p(t)| - AF(i),$$

H(i)- indicator of herding behavior for stock i

B(i)-Number of buyers for stock i

S(i)-Number of sellers for stock i

P(t)- The expected proportion of investors which will buy the stock, reported to the total number of active investors.

AF(i)-The adjustment factor which will decrease when the number of active investors for stock i is increasing

The herd effect is calculated for each quarter, and then averaged for each subgroup of investors.

The reasons why investors tend to copy how they trade were divided by (Sias, 2002) into five categories:

Informational cascades: when investors ignore their own signals as they draw some conclusions from the trading actions of other participants.

As result of their own investigations, while the other participants interpret the same signals so they invested in the same titles.

The reputation's reason comes as a result of fears about the consequences that could arise to the extent that institutional investors act differently from others.

Transaction of "titles on wave" or "fashion in trading" at a time.

Ultimately, institutional investors can buy the same securities because they are attracted by shares with certain characteristics.

In this study, Sias (2002) obtains solid results that demand from institutional participants is more closely linked to lag demand than lagged returns ("lag returns" and trading on moments).

The data used comes from two sources: the returns, the number of shares and the capitalization level were collected from the CPSP - Equity Research Center, with shares traded on the New York Stock Exchange, the American Stock Exchange and NASDAQ. Holdings for each investor come from CDA Spectrum 13F (Thomson Reuters Institutional Holdings Database). The period considered was March 1983 - December 1997, with a total of 60 quarters.

For each quarter, the ratio of the institutional investors who are buyers for the shares  $k$  and the quarter  $t$  is calculated:

$$\text{Raw}\Delta_{k,t} = \frac{\text{Buyers}_{k,t}}{\text{Buyers} + \text{Sellers}_{k,t}}$$

The ratio of institutions that increase their holdings for a particular stock is strongly related to the ratio of those who increased their shares last quarter. This happens both to institutions that follow their own purchasing trend and to those who copy the tendencies of others. The goal identified by the author for which investors acquire and liquidates positions is to minimize the impact of prices on the trading activity.

Herding behavior of open-end funds can be analyzed using the rate of returns, in time of stress in the market (Christie and Huang, 1995; Frey et al., 2014). In times of market decline, it is expected to increase herd behavior, growth of profitability within the current dispersion is influenced by the increase in yields expected, estimated by a market model.

Applying the method proposed by Lakonishok et al. (1992), Wermers (1999) analyzed American Mutual Fund holdings between 1975-1994, with 400 funds at the beginning of the period and approximately 2,400 at the end of the period. On average, the results show a low level of herd between mutual funds relative to pension funds (Lakonishok et al., 1992)) and fund strategies are similar in both acquisitions and share sales. Herd behavior occurs more severely as the funds and their investments are subdivided into sub-groups, highlighting a larger measure for growth-oriented funds than for income-oriented funds or small shares

compared to large ones. The authors also recognize the importance of positive feedback in investment decisions (buying (selling) shares with high (low) performance in the past).

Using LSV model on data from the German stock market, Kremer and Nautz (2013) found a herding behavior on a daily basis and investigates its causes and consequences. The cause of the herd behavior is represented by the use of the same risk models in the valuation of shares. Its consequences are particularly manifested in the short term by the destabilization of prices. The study was conducted on the German stock market, with shares listed in three major indices: DAX30, MDAX and SDAX, and holdings of the most active 30 institutional, German and foreign institutional investors. Herd effect is particularly evident during crisis (Lin and Lin, 2014; Mobarek et al., 2014) in countries of origin and contagion spreads to neighboring countries, deepening the crisis. Choi and Skiba (2015) concluded that the effect of herd stabilizes prices and can manifest itself in a market with a low degree of information asymmetry. Celiker et al. (2015), investigates whether mutual funds herd in industries and to which extent such herding behavior impacts the industry valuations. Gebka and Wohar (2013) examine the existence of herding in the international equity market and finds evidence of herding in some sectors. Jiao and Ye (2014) examine whether mutual funds and hedge funds herd after each other and it monitors the impact of such behavior on stock prices. Boehmer and Kelley (2009) in a study conducted over a period of 20 years (1983-2004) analyzed the relationship between institutional holdings of shares and price efficiency, measured by deviations from random walk. Dasgupta et al. (2015) tries to evaluate the price impact of institutional herding starting from the hypothesis that institutional herding positively predicts short-term returns but negatively predicts long-term returns.

Open-end funds keep an eye on the future profitability of securities, such as institutional investors tend to move prices towards the expected trading range. Institutional investors are also linked to long-term profitability and large issuers (Gompers and Metrick, 2001, Ko et al., 2007).

More than two-thirds of mutual funds are “investors of the moment” (Grinblatt et al., 1995), buying stocks that have been successful in the past; though not equally sell shares that have been losing in the past.

There are several studies that concentrate on a single market, trying to identify if herding behavior exists in the case of institutional investors. For example, Demirer et al. (2010) and Hsieh (2013) investigate the Taiwanese case, Wermers (1999) analyses the case of American mutual funds, Voronkova and Bohl (2005) focus on the Polish pension funds market, Walter and Moritz (2006) investigate the German mutual funds industry, Wylie (2005) uses U.K. mutual fund data, while Lakhsman et al. (2013) investigate the Indian market.

### **3. DATA AND METHODOLOGY**

The base for analyzing the herding behavior between mutual funds is the model developed by Lakonishok et al. (1992). To identify a relationship between the holdings and daily returns, we used panel techniques, especially least squares technique (OLS).

Log returns are obtained using the closing price of each day of trading for companies traded on the stock market. Herd behavior can be identified by observing the dispersion of returns, particularly in periods of large price fluctuations.

For this study, we analyzed the prices for 25 companies listed on the Bucharest Stock Exchange (BVB) during the 2010- 2014 period.

Bucharest Stock Exchange is still nowadays an emerging stock market. Its activity started in 1995, during a period when the market economy was still in its infancy. Nowadays, BVB is still expanding and the number of open companies is increasing, however, the main source for financing activities for Romanian companies is the banking system.

An overview of the yearly market capitalization, volume of transactions, number of transactions, the number of listed companies, and the number of intermediaries is shown in Table 1.

**Table 1** Yearly overview of BVB trading activity in the 1995-2014 period

Year	Trades	Volume	Value	Market Capitalization	Listed Companies	Intermediaries
1995	379	42,761	250,000	25,900,000	9	28
1996	17,768	1,141,648	1,520,000	23,100,000	17	62
1997	609,951	593,893,605	194,590,000	505,600,000	76	133
1998	512,705	986,804,827	184,650,000	392,200,000	126	173
1999	415,045	1,057,558,616	138,915,000	572,500,000	127	150
2000	496,887	1,806,587,265	184,292,000	1,072,800,000	114	120
2001	357,577	2,277,454,017	381,277,000	3,857,300,000	65	110
2002	689,184	4,085,123,289	709,800,000	9,158,000,000	65	75
2003	440,084	4,106,381,895	1,006,271,130	12,186,600,000	62	73
2004	644,839	13,007,587,776	2,415,043,850	34,147,400,000	60	67
2005	1,159,060	16,934,865,957	7,809,734,452	56,065,586,985	64	70
2006	1,444,398	13,677,505,261	9,894,294,097	73,341,789,546	58	73
2007	1,544,891	14,234,962,355	13,802,680,644	85,962,389,149	59	73
2008	1,341,297	12,847,992,164	6,950,399,787	45,701,492,619	68	76
2009	1,314,526	14,431,359,301	5,092,691,411	80,074,496,090	69	71
2010	889,486	13,339,282,639	5,600,619,918	102,442,620,945	74	65
2011	900,114	16,623,747,907	9,936,957,505	70,782,200,350	79	61
2012	647,974	12,533,192,975	7,436,052,589	97,720,863,603	79	54
2013	636,405	13,087,904,925	11,243,500,680	133,829,707,066	83	43
2014	787,753	11,615,242,311	12,990,643,873	129,958,141,655	83	40

Source: <http://www.bvb.ro/>

The first trading session took place in 1995, and some of the most important companies in Romania were listed a few years later. As a result, the BVB market capitalization grew almost 4 times and the turnover doubled. Launched in 1997, Bucharest Exchange Index (BET) has become the reference index for the local market. This is a blue chip index and it is tracking the performance of the 10 most traded companies at BVB.

Even if BVB started its activity in 1995, the first open-end fund was founded in 1993, the Mutual Fund of Businessmen, and this was followed closely by other ones. The problem for these mutual funds was the lack of regulations and the fact that it was almost impossible to compare the value of different titles, considering that the titles were not evaluated using the same algorithm. In the next years, there

was a high increase in the number of mutual funds and their profitability was unimaginable. In fact, the investors were misinformed; thus, in 2000, the most popular mutual fund, the National Fund of Investments, collapsed, the main problem being that the percentage of investments in unlisted companies was 84.48%, even if legally it should not have exceeded 10%. Nowadays, the mutual funds market is stable and there is a variety of funds, with many options for all types of investors.

Table 2 presents the evolution of the number of open-end funds in Romania for the 2005-2014 period.

**Table 2** *The number of open-end funds in the 2005-2014 period*

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Multi-active	11	15	17	23	24	23	24	24	21	23
Bonds	5	6	7	6	5	6	8	9	10	11
Currencies	0	1	2	3	3	3	2	2	1	1
Stocks	4	6	7	10	10	17	17	18	17	16
Capital guarantee	0	0	1	1	1	1	1	1	2	2
Absolute yield	0	0	0	0	0	1	1	1	4	7
Others	2	2	4	7	6	6	9	10	11	12
	<b>22</b>	<b>30</b>	<b>38</b>	<b>50</b>	<b>49</b>	<b>57</b>	<b>62</b>	<b>65</b>	<b>66</b>	<b>72</b>

Source: <http://www.aaf.ro/en/fonduri-deschise/>

We analyzed the activity of the open-end funds, which are investing their capital on the stock market, in equities traded on BVB. We analyzed 29 funds for 2010 and first half of 2011, and 35 funds for the second half of 2011, 2012, 2013 and 2014. The data on the level of investment was obtained from financial semestrial reports. A synthesis can be found in Table 3.

**Table 3** Investments in the BVB blue chips for the top 5 mutual funds in Romania

	S1 2010	S2 2010	S1 2011	S2 2011	S1 2012	S2 2012	S1 2013	S2 2013	S1 2014	S2 2014
Active Dinamic	11.51	11.51	11.10	7.83	6.89	7.57	7.17	6.92	7.22	6.74
% Blue Chips	22.63%	25.24%	13.15%	9.19%	11.05%	3.10%	3.27%	5.77%	44.68%	13.16%
Certinvest XT Index	74.97	84.72	92.59	73.48	79.69	91.64	94.17	113.57	120.7	118.76
% Blue Chips	56.63%	61.08%	54.95%	38.76%	53.58%	54.39%	57.28%	64.98%	67.94%	63.96%
Certinvest BET Index		102.46	108.18	84.28	90.48	100.21	108.92	128.14	138.91	132.98
% Blue Chips		93.90%	79.99%	78.67%	77.15%	80.92%	80.43%	80.26%	80.72%	80.91%
BCR Expert (Erste Equity)	54.80	60.89	66.13	55.63	59.54	68.75	69.23	82.17	86.06	89.13
% Blue Chips	37.47%	39.96%	40.33%	38.29%	38.07%	29.52%	43.06%	52.11%	52.61%	54.02%
BRD Actiuni	113.09	120.28	127.43	102.86	109.75	123.50	121.22	139.29	142.63	122.90
% Blue Chips	66.40%	66.53%	52.49%	50.24%	53.45%	51.98%	54.56%	60.94%	69.28%	71.32%
BET	4,743.86	5,268.61	5,508.70	4,336.95	4,528.16	5,149.56	5,261.77	6,493.79	7,013.74	7,083.00

Source: Open-end funds reports

We made an analysis for the first 5 mutual funds with the highest exposure on the stock market: Active Dinamic, Certinvest XT Index, Certinvest BET Index, BCR Expert (Erste Equity) and BRD Actiuni. These funds were also chosen because they have a higher title value. We calculated the degree of exposure against the most popular 12 listed companies: BIO, BRD, BRK, BVB, ELMA, SNP, TEL, TGN, TLV, SNG, SNN and EL.

During 2010-2014, the investors with a higher exposure on the stock market were usually following the BET index composition. For this reason, every time there was an increase in BET price, for these funds there was also an increase of titles value (Unit Value of Net Asset - UVNA). This is the case of Certinvest BET Index and BRD Actiuni: these funds had an increase for UVNA in the second semester of 2010, and the first semester of 2011. In the second semester of 2011 and the first semester of 2012, there was a decrease in BET index price, which was also sensed by any portfolio which followed its structure. The funds which were not investing their money in these stocks had also a decrease, but this was the trend for the entire market.

After the second semester of 2012, there was an increase in the market, for BET index and also for titles from BRD Actiuni, BCR Expert (Erste Equity), and

Certinvest BET Index. During this period, Active Dinamic has decreased its exposure on blue chips and it registered a decrease value for its title.

For this study, we will use the technique of estimation for panel models, both with fixed and random effects. First point of interest is to discover if there is a positive relation between the level of institutional holdings and the returns, considering this period of time.

We will start using the general model:

$$y_{it} = \alpha + \beta X_{it} + u_{it}, i = 1, \dots, N; t = 1, \dots, T$$

Where:

y is the return as a dependent variable,

X is the independent variable. In this case the independent variables are the level of institutional holdings and the actual number of open-end funds.

Index i represents the cross-sectional dimension, the companies listed on BVB

And t represents the period of time.

The estimation is constructed in EViews. Due to restriction of variables (our data being semestrial), we calculated the average return for each period, using closing prices.

The fixed Effect or LSDV Model allows for heterogeneity and any company will have its own intercept value, which will remain fixed over time. In the case of the Random effect model, the companies have a common mean value for the intercept. After estimating, we will use Hausman test to check which model is suitable for the study.

For Hausman test we checked the following hypothesis:

- Null Hypothesis: Random effects model is suitable;
- Alternative Hypothesis: Fixed- effects model is suitable.

First step was to estimate the pooled regression model:

Dependent Variable: RENTAB

Method: Panel Least Squares

Sample: 2010S1 2014S2

Periods included: 10

Cross-sections included: 74

Total panel (unbalanced) observations: 644

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.177439	0.075335	-2.355327	0.0188
PROC	0.266053	4.283800	0.062107	0.9505
NR	0.008934	0.007602	1.175242	0.2403
R-squared	0.002294	Mean dependent var		-0.126490
Adjusted R-squared	-0.000819	S.D. dependent var		1.480895
S.E. of regression	1.481501	Akaike info criterion		3.628637
Sum squared resid	1406.897	Schwarz criterion		3.649449
Log likelihood	-1165.421	Hannan-Quinn criter.		3.636713
F-statistic	0.736967	Durbin-Watson stat		1.537774
Prob(F-statistic)	0.478968			

The result shows that none of our two variables can be considered consistent. Further, we use Fixed-effects Model:

Dependent Variable: RENTAB

Method: Panel Least Squares

Sample: 2010S1 2014S2

Periods included: 10

Cross-sections included: 74

Total panel (unbalanced) observations: 644

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.041742	0.195974	-0.212998	0.8314
PROC	0.559669	7.956493	0.070341	0.9439
NR	-0.016270	0.034756	-0.468126	0.6399

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.237686	Mean dependent var	-0.126490
Adjusted R-squared	0.137029	S.D. dependent var	1.480895
S.E. of regression	1.375696	Akaike info criterion	3.586245
Sum squared resid	1074.963	Schwarz criterion	4.113488
Log likelihood	-1078.771	Hannan-Quinn criter.	3.790836
F-statistic	2.361333	Durbin-Watson stat	2.045851
Prob(F-statistic)	0.000000		

Secondly, we run the Random effects Model:

Dependent Variable: RENTAB

Method: Panel EGLS (Cross-section random effects)

Sample: 2010S1 2014S2

Periods included: 10

Cross-sections included: 74

Total panel (unbalanced) observations: 644

Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.173674	0.108632	-1.598739	0.1104
PROC	0.089734	5.333060	0.016826	0.9866
NR	0.007798	0.010739	0.726127	0.4680

#### Effects Specification

	S.D.	Rho
Cross-section random	0.564660	0.1442
Idiosyncratic random	1.375696	0.8558

#### Weighted Statistics

R-squared	0.000845	Mean dependent var	-0.080302
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Adjusted R-squared	-0.002272	S.D. dependent var	1.381765
S.E. of regression	1.383255	Sum squared resid	1226.486
F-statistic	0.271130	Durbin-Watson stat	1.764488
Prob(F-statistic)	0.762605		
Unweighted Statistics			
R-squared	0.002245	Mean dependent var	-0.126490
Sum squared resid	1406.967	Durbin-Watson stat	1.537531

After running the Hausman test, we accepted the null hypothesis that the Random Effect model is appropriate for this estimation.

Test Summary	Chi-Sq.		
	Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	0.537132	2	0.7645

In conclusion, considering the different types of companies, some of them being small and other very large and widely known, the individual effects are uncorrelated with independent variables.

Additionally, we use the Lakonishok et al. model (1992) to evaluate the level of herding. The measure of herding  $H(i)$ , in a given quarter for a given stock, is defined as:

$$H(i) = |B(i)/(B(i)+S(i)) - p(t)| - AF(i),$$

Where:

$B(i)$  is the number of the investors which are buying the stock,

$S(i)$  is the number of investors which are selling the stock,

$p(t)$  is the expected proportion of investors which are buying the stock related to the number of active investors,

and  $AF(i)$  is an adjustment factor for each stock, is the expected value of  $|B/(B+S) - p|$  under the null hypothesis of no herding, which declines as the number

of buyers active in that stock rises. AF is following a binomial distribution and it can be calculated as a Bernoulli distribution, identifying in a certain number of active investors, buyers and sellers, what is the probability to be a buyer, considering also that there is a chance of 50% to be on a side or in the other.

After we calculated the herding measure for each stock in each quarter using the LSV model, we calculated the mean herding measure, for the entire period and for all our issuers,

-0.2258, which is extremely high and shows a significant behavior of imitation especially when the players on the market are starting to sell the stocks.

Our result is -0.2258 which means that the level of herding is very high and taking into consideration that this is added to a probability of 0.5 that the stocks will be sold, the findings show that 72.58% of investors are selling the stocks, when these are listed, while a difference of 24.42% is buying. This finding is predictable because the financial environment is not as safe as in other countries and even if there are some years of experience, the capital market is still developing and mostly, it is trying to conquer the trust of investors. Romanian market is not yet a very strong market, and it is easy for investors to change the options of investment if there is any possibility for their earnings to fall. Money managers, aware of this situation, are always keeping the safe side even if this would mean a lot of changes in their portfolio.

The investors are using their own techniques to estimate the increase of possible return or a decrease, in order to buy or sell a certain stock, but considering the dimension of the market, there are not so many possibilities. Also, the panic can very easily affect the holdings of stocks and this could be the reason of the high degree of herding in sells. The acquisitions are concentrating mostly on blue chips. The result was expected, considering the heterogeneity of issuers.

#### 4. CONCLUSIONS

Our findings reveal a high degree of herding between open-end funds in Romania. The number of listed companies is quite low, so there are no many possibilities for investing.

For further studies, we will check the level of herding by calculating the indicators for different subgroups as sector of activity and stock size. We can conclude that a high percent of investors choose to buy stocks considered blue chips, calculating the past results for these companies. Considering our results, in most of the cases, if an issuer would be on the position that most of his investors would sell its shares, then a higher number of open-end funds will follow this trend, even if not all the signals would follow to this attitude. Also, these companies are considered much safer than others due to the economic environment in Romania, and we can say that they are “too big to fail”. The state still has a level of interest in some issuers, especially in the case of natural resources exploitation and energy.

Another direction for future studies would be the impact on prices and returns, considering this level of herding which we identified for the Romanian market.

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## RESILIENT SMES, INSTITUTIONS AND JUSTICE. EVIDENCE IN ITALY

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**Abstract:** *The recent financial crisis (2008) seriously affected the credibility of European and Italian institutions. It was also characterized by a general pessimism and low expectations of economic operators, especially firms. In literature, relationships between the quality of institutions and economic activities have been widely investigated. They show how the judicial system, the regulatory authorities and governance are important aspects for the quality of institutions.*

*The main conclusion of existing literature, or the necessity of a reform of judicial system, is the basis of this work. Thus, here there is an attempt to investigate the performances of the judicial system, considering the low and poor level of its effects on firms' performances. In particular, in this work, there is a simple empirical analysis (data paucity is the big limit) in order to investigate the consequences of an efficient, long-time justice on resilient firms' confidence and perspective. Those resilient firms, able to overcome the financial crisis, show their ability in surviving, even if justice doesn't help them.*

**Keywords:** *Resilient Firms; Institutions; Judicial System.*

**JEL Classification:** *K00; K10; P47*

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### 1. INTRODUCTION

In the literature, relationships between the quality of institutions and economic activities have been widely investigated. They show how the judicial system, the regulatory authorities and governance are important aspects for the quality of institutions. By proposing a further aspect of the judiciary system, the literature's conclusions represent a principal input into the current question about

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the effects of poor judicial performance as well as the suitable development of a necessary judicial reform.

The perception that families and firms hold about future economic conditions had a strong impact on private consumption and investment. Also during the crisis, many Italian firms continued production, thus supporting Italian export activity. In fact, they showed an appreciable resilience to the crisis, which is interesting to investigate, although the crisis had profoundly affected their trust in institutions and justice.

In this paper, we contribute to the current literature on justice's effects by presenting an empirical search about the consequences of an inefficient, long-time justice on a confidence and perspective of firms. In particular, the analysis refers to a sample of resilient firms, who demonstrated the capacity to overcome recent financial crisis.

Previous studies on these consequences in Italy were mainly concentrated on the choice of firm's dimensions and on credit markets. To provide a further perspective, this paper verifies how these long times affect the expectations and confidence by firms in justice, with a strong consequence on the future of the productive system.

At the present stage, at our knowledge, this is one of the first works that studies the link between the duration of judicial deliberation and the confidence of firms, both at institutions level, and in a wide perspective. The results show that inefficiency of justice has a negative impact on firms confidence and, consequently, on their decisions about the future.

The paper is organized as follows: paragraph 1 (The International crisis and the productive system) describes the effects that the recent economic crisis produces on different Economies; paragraph 2 (SME's and resilience in the economic literature) contemplates the concept of resilience in economic literature; paragraph 3 (Justice performances and firms) represents the relation between justice performance and firms. A case study is in paragraph 4 (The case study) and paragraph 5 concludes.

## **2. THE INTERNATIONAL CRISIS AND THE PRODUCTIVE SYSTEM**

The European crisis has revealed many insufficiencies in the institutional structure of the euro area as well as the inadequacy of the policy reaction. Many

have argued that the origin of these problems lies in the fact that the monetary union was not complemented by sufficient financial and economic cooperation among the euro area countries. The crisis has generated an awareness of the need for European institutional harmony, even if the necessary conditions to achieve this imply a progressive and difficult convergence in behavior and expectations and the spread of optimism. This would appear to be difficult since the crisis has frustrated the growth performance of the global economy. Subsequent restrictive policies which have rarely aimed at long-term solutions have had a negative impact on the expectations of households and firms. There was a sharp decrease in confidence especially when the global recession caused a liquidity shock after the collapse of Lehman Brothers. This decline in confidence also occurred in Italy, where the crisis caused a rapid fall in consumption and investment, as in the rest of the Europe (Banca d'Italia, 2007). In the debate arising from the effects of the crisis in Italy, it was argued that the country would have suffered less damage than the economies in which the crisis originated, due to the greater solidity of its banking system, low levels of household debt and the scarcity of overvaluation of real estate activities. Despite this, the recession following the crisis has created a climate of pervasive uncertainty among firms and families. This has led to greater prudence in their investment and consumption decisions, not captured by the "key variables". In Italy most of the effects of the crisis are linked to the evolution of the international context. In fact, the Italian economy officially went into recession in the second half of 2011, at the beginning of the second phase of the crisis characterized by the intensification in risk aversion, decreasing asset prices and a considerable decline in growth expectations for many countries. These negative expectations may have amplified the subtraction of taxable income, the recourse to the underground labor market, and finally, may have expanded the illegal economy. The deterioration of financing conditions of firms has further expanded the consequences, producing a crisis of confidence that has characterized the recession. The "distrust effect", common among economic agents (families, firms) has contributed to the cyclical weakening. Initially this mistrust was considered as not being consistent with the variation in the fundamental determinants, however it then created more anxiety about future aggravation of economic conditions which was not completely confirmed by their actual performance. Indeed, the increased uncertainty and the associated decrease in confidence experienced during the crisis, have caused a

considerable slowdown in economic activity. The related and continuous deterioration in demand prospects has in turn deterred the accumulation of capital. Overall, the effect of the crisis of confidence on the GDP would be close to -1.5 percentage points. To date, the Italian economy is among those most affected by the global recession. This has caused a decline in our exports, significantly higher than that of international trade. Moreover, despite the relative stability of the national banking system, the increase in the cost of credit and the scarcity of funding floods towards firms have seriously contributed to the deterioration in the economic performance of the country. The perception that families and firms hold about future economic conditions has had a strong impact on private consumption and investment. Their expectations evolved in a similar way during the crisis. Confidence and uncertainty indicators for both firms and households indicate that: consumer confidence collapsed in 2008-2009, as in almost all other countries in Europe; the confidence of firms showed a somewhat parallel trend, while changes in uncertainty were less clear. Distrust presented alternating patterns: it reached dramatic levels immediately after the outbreak of the crisis, then it grew little but fell again after the start of the recession of 2011/12. Confidence improved from that point on, but was persistently low. Despite this, the uncertainty of firms remains, even if it seems not to have reached dramatic levels. Nevertheless, many Italian firms have continued production and have supported the Italian export activity during the crisis. In fact, they have shown an appreciable resilience to the crisis, which is interesting to investigate.

### **3. SME'S AND RESILIENCE IN THE ECONOMIC LITERATURE**

Compared to larger firms, it has always been more difficult for SMEs to access credit, due to their size and to the asymmetric information which characterizes credit markets (Stiglitz and Weiss, 1992; Storey, 1994). In Europe, the banking system (BCE, Fed and Deutsche Bank Research data) still provides 80% of firms loans while, in the USA, small firms can access external financial resources more easily. In this respect, Italy is a particular case: the Italian manufacturing system has historically been characterized by small size firms. On average they are 40 per cent smaller than in other European countries. However, Italian industrial firms are sufficiently globalised to secure an advantageous position in EU manufacturing exports. The small size of firms is often considered a

weak point in the Italian productive system and explains the problems of low productivity and growth in the Italian economy (Brandolini and Bugamelli, 2009). However, this is often a conscious choice made by these firms and seems to be linked not only to economic factors but also to cultural and institutional ones. Some studies have considered (Giacomelli and Menon 2013; Gurrieri and Lorizio, 2014) the institutional factors linked to this choice which can be identified as the weak contract enforcement in the Italian institutional environment, and the poor performance of the Italian justice system. According to the World Bank's "Doing Business" report, Italy ranks 160<sup>th</sup>, out of 185 countries in the enforcing contracts indicator. This low judicial efficiency is mostly due to the excessive length of judicial proceedings. The World Bank data show that, in Italy, it takes an average 1,210 days to resolve a commercial dispute through the courts, compared to 300 days in the USA and about 400 days in the UK and Germany. This is a negative factor for Italy on the whole but it is particularly dangerous for firms, especially small firms, as it affects their expectations and their level of trust. In fact many studies (Cingano and Pinotti 2011, Jappelli, et al, 2005; Fabbri, 2010; Magri, 2010) have shown that the poor judicial efficiency in Italy negatively affects the functioning of credit markets and reduces access to bank loans for small firms. The financial crisis was a critical hurdle for the expectations, trust and decisions of firms. However, it has highlighted the unexpected ability of some Italian firms to react and show remarkable resilience. This performance of SMEs is often determined by different features of a firm, such as relational factors (social and production networks), entrepreneurship and the firms milieu culture (Nichter and Goldmark 2009). These circumstances could explain why, despite their small size, many Italian firms showed significant resilience and performed well even during the most difficult phase of the crisis. First, a fraction of Italian industrial firms works exclusively as intermediate firms, and this is an important factor in explaining their resilience to the crisis. Furthermore, often the small size was more than counterbalanced by the benefits associated with the district organization of the Italian SMEs. Italy can boast many excellent manufacturing firms which, though often very small, are part of a strategic supply chain which favors renewed production and enables them to deal with foreign markets. The Italian districts produced about two-thirds of the whole Italian manufacturing surplus. These districts are made up of high technology value firms which provide high-end

products to advanced countries, especially Germany and France. The financial profile of these firms, even during the crisis, is characterized by increasing revenues and decreasing debt. The best firms, the top 25%, recorded a significant growth. Common features of these firms are their ability to develop new business in all market conditions, together with professional management - which is not exclusively assigned to the family - as well as high levels of interpersonal trust. These aspects have favored a consistent resilience for many Italian and European small firms. In the last few years, the theme of resilience has been widely discussed in the literature. In economic theory, there is still no consensus on the definition of resilience, but three different definitions may be considered. The first, deriving from the field of engineering (Hotelling, 1973; Pimm 1984; Walker et al., 2006), defines resilience as the ability of a system to return to its initial state of equilibrium after a shock. The resilience identifies the resistance to shocks of the system and the speed at which this equilibrium is regained after a shock. Therefore, the system shows a stable balance and has the ability to self-equilibrate. This definition can be applied to the so-called 'plucking model' (Friedman, 1993), characterized by temporary shocks which do not affect long-term growth. This version of resilience focusses on the concept of equilibrium and not on the consequences that the shock can produce to the economic system, which can return to the pre-shock equilibrium thanks to social and economic reforms.

The second definition, deriving from ecology, considers resilience as the ability of a system to sustain a certain level of disorder without changing its status and structure. Resilience is measured by the size of the shock that the system is able to tolerate and absorb before changing its equilibrium. This definition of resilience focusses on the system (made up of individuals, organizations and territory) but some studies related to this approach (Hotelling 1973, 1996, 2001; McGlade et al., 2006; Walker et al., 2006) consider the hypothesis of multiple equilibrium, and the possibility that the system can evolve in different states to those preceding the disorder. The focus is not on the factor of disorder, but on the relationship between this factor and the system (in its complexity), a relationship which can be explained by analysing the state variables and the control variables. The socio-ecological approach to resilience, the evolution of the ecological version, analyzes the relationship between system and environment, focusing on the system's adaptability, triggered by the uncertainty caused by the factor of disorder.

In this way, the concept of resilience expands to include not only the ability to tolerate a disturbance, but also the concept of self-renewal capability.

The third definition belongs to the evolutionary theory and derives from the theory of complex and adaptive systems. It claims that, after a shock, the system has adaptive capabilities that allow it to spontaneously re-order its structure (Martin and Sunley, 2007) in the economic, institutional and social sense, and to find new growth paths. Adaptive resilience is therefore a dynamic process represented by the system's ability to bounce forward, rather than to return to a previous situation (Martin and Sunley, 2014). However, the response of a territory to a shock is determined not only by its economic resilience, but also by the reaction of individuals and the community, therefore social resilience is defined in economic literature as the ability of a community to resist external shocks due to the social infrastructures. These are the capacities of individuals, organizations and communities to adapt, tolerate, absorb, cope and adjust in response to change and to various threats (Adger, 2000). This definition derives from the literature on the dynamics of complex, adaptive, socio-ecological systems -SES - (Carpenter et al., 2005; Walker and Mayers, 2004; Hotelling and Gunderson, 2002; Hotelling 2001, 1973, 1996; Gunderson et al., 1995). It focuses on the dynamics of the resilience characteristics, which consists in a process (Pendall et al, 2010), capable of activating the capacities of resisting, responding, recovering and creating new alternatives after a shock (Cutter et al., 2008). Some particular features of this process are adaptability and transformability, through which the system is able to absorb the disturbances and reorganize itself while retaining the same functions, the same identity and the same structure (Walker and Mayers 2004). Economic resilience is measured in terms of GDP. According to Hill et al. (2008), resilient economies are those which, after an economic shock, return to the previous rate of growth, possibly through a change in their growth path. Therefore, shock resistant economies are those on which a shock has no economic impact, while non-resilient economies are those which are not able to react to a shock and continue to operate within the changing situation provoked by the shock. Although the literature has not yet suggested a way to define and measure resilience, it is nevertheless possible to identify features which are common to the resilient Italian firms. Most of them appear to be characterized by the acquisition, spread and development of technology, by the strengthening of ties with the territory in which they operate

while simultaneously strengthening productive performance and by the creation of a close relationship with the institutional context. To this end, the role of institutions in the process of economic growth is historically recognized (Baumol, 1990); studies on the socio-economic context and the influence it exerts on entrepreneurship have already stressed the importance of the relationship between the entrepreneur and the institutional environment (Putnam, 1993). More recently it has been demonstrated that a positive institutional environment can positively affect levels of resilience in firms.

#### **4. THE QUALITY OF INSTITUTIONS AND THE ROLE OF SOCIAL CAPITAL**

Institutions are often defined as those constraints that shape political, economic and social interactions (North 1990). Their aim is to moderate the uncertainty deriving from asymmetric information. Rulers, parliaments and bureaucracies usually impose formal institutions. They represent the governance of a country, which can be described as the outcome (good or bad) of institutions. Various studies have shown that institutional quality is decisive for economic and social development. Yet Adam Smith (1776) observed that private contracting (institutional quality) is a crucial condition for the reciprocally favourable exchanges that stimulate specialization, innovation and growth, the principal requisites to obtain profits from trade. Several classical scholars considered the legal and market institutions as the pillars of the market economy. The principal ones are: the rule of law (Hayek, 1973), the protection of property rights (Coase 1960), and pro-competition policies (Friedman 1962). Each of these institutions participates in the concept of economic freedom (Gwartney and Lawson, 2003). In the 1990s, a large part of the literature illustrated that the factors of development were institutions, political systems, laws, social capital, culture and other factors (Levine 1999, La Porta et al. 1998, Allen and Gale 2001; Chinn and Ito 2006). Although it is widely recognized (Olson, 1982; North, 1991; Rodrik, 2003; Acemoglu, 2006) that institutions make a difference to economic growth, how they can favour economic growth is still ambiguous. In these studies, fundamental institutions for growth are property rights, the quality and independence of the judiciary, regulatory organizations, and bureaucratic aptitude (Rodrik, 2003). The latest studies have shown that, among other factors, institutional quality is also

connected with: \* higher economic growth income (Lee and Kim, 2009; Acemoglu and Robinson, 2012; Barro, 1999; Campos and Nugent, 1998); \* higher public and private investment (Alfaro et al., 2005; Rodrik, 2003; Knak and Keefer, 2005); \* enhancements in human capital (Arimah, 2004); \* a more efficient justice (Beenstock, and Haitovsky, 2004; Bianco et al., 2007); \* improved administration of ethnic conflicts (Easterly, 2001); \* reduction of income inequality (Chong and Gradstein, 2004); and \* better financial development ( Beck et al., 2001). Rodrik, et al. (2004) explain how institutional quality can influence income levels. They identify three channels: the reduction of information asymmetries; the decline of risk, through the definition and enforcement of property rights; the limitation of the power of politicians and interest groups, which are rendered more answerable to citizens by the institutions (World Trade Organization 2004). While it is recognized that institutions are central for growth, several studies examined the role of different kinds of institutions. La Porta et al (1997, 1998) argued that the quality of a country's legal institutions could modify the level of the rent-seeking by corporate insiders and, in that way, stimulate financial development. Knack and Keefer (1997) demonstrate that institutions that safeguard property rights and contract enforcement sustain the development of social capital, which is associated to reliable economic performance. Indeed, more highly developed countries present high quality institutions, a better protection of property rights and a more efficient legal and judicial framework. Therefore, the level of growth depends on the institutional, social, legal and financial framework. Fundamental public services, such as health, education, civil justice and local public services, support the stock of human capital, increase the labor supply and produce a positive environment for the creation and development of firms. In particular, institutional quality can strongly influence investment decisions by firms. Given the central role of institutions in the growth of economies, a solid culture of the rule of law, government reliability and efficient legal and judicial frameworks is crucial for the formation of institutional capital. The rule of law index from Kaufmann et al (2009) is an important indicator for institutional capital; it measures the confidence of agents in the rules of society, and their respect of them. In particular, it measures the quality of contract enforcement, the credibility of the courts, property rights and the efficiency of the police force. In a World Bank (2006) analysis this indicator is mainly used to measure the components of a country's social capital, in particular

trust, which is one of the principal components of the so-called social capital. It is considered as important as the institutions for the growth of a country. Many studies underline the relevance of social capital, described as the collective advantage derived from the reciprocal cooperation among individuals, and from their reciprocal trust. In the publication "Making Democracy Work" (1993) Putnam already attributed the delay in southern Italy to its low endowment of social capital; this inadequacy undermined confidence in local institutions, limited their efficiency and consequently reduced the growth potential of the southern territorial systems. However, this study also highlights the difficulty in measuring social capital due to its intrinsic multidimensionality. It is, in fact, a mix of "norms, trust and association" that reflects the values, perceptions and individual and collective conduct, which is difficult to measure empirically. The first scholars of the subject have therefore focused on the objective characteristics of social capital, consisting in civiness (measured by voter turnout, fiscal and economic legality, cultural involvement) and trust (in particular trust in others and in institutions, measured through participation in voluntary and associative activities). When scholars of social capital, such as Fukuyama (2000), Bagnasco (2004) and Trigilia (2001) consider the role of trust, the measurements become inevitably subjective: trust is in fact derived from polls and surveys regarding the perceptions of subjects, the sharing of values and ethical priority. The literature on the subject can be divided into four areas of research. Putnam explains the birth of the institutions as a result of the rebalancing of the different socio-economic and political performances between northern and southern areas, with particular attention paid to the economic consequences of the relationships between the various individuals. Social capital, therefore, has a territorial and regional explanation; it represents a social resource at a local level. A second school of thought, represented mainly by Coleman (1990), studies social capital from the micro economic perspective, focusing on the behavior of economic agents, where social capital is set up as a "relational situational good" (Piselli, 2001). The third line of investigation (Glaeser et al, 2000) focuses on managerial theories and their efficiency, and studies on the role of trust, considered the only intangible asset that can affect economic performance. Finally, the institutional approach considers social capital as an externality. In particular, its frequency determines a mechanism by which the frequent use of social capital determines its progressive strengthening (Nooteboom, 1999, 2002).

In this way, the research distinguishes four types of social capital: "values" capital, represented by the significance which people attribute to personal values (family, religion); "relational" capital, represented by the importance of interaction and participation in social networks; "institutional" capital, expressing trust in collective institutions; and "cooperative" capital, exemplified by participation in voluntary associations and organizations. Social capital is very unstable, it can be constructed - or demolished - by the private actors in the market, consumers and firms (Baron, 2001; Besley and Chatal, 2007). For firms, the most important factor of social capital is trust. Indeed, trust plays a decisive role in their decision-making. In general, the role of trust is more important than the role of rationality for economic efficiency and growth, contrary to what the classical theory of the market affirms. Even in the presence of market failure, trust may offset these failures and lead to results that would not be achievable otherwise. Scholars stress how trust is associated to low corruption and efficient bureaucracies (La Porta et al., 1997), financial development (Guiso et al., 2004) and higher economic development (Knack and Keefer, 1997; Zak and Knack, 2001; Dearmon and Grier, 2011). One probable explanation for the present stagnation is that it is produced by a broad lack of trust on the part of economic agents, and principally on the part of firms. A good relationship of trust between the parties and with the institutions is essential to the resilience and the competitiveness of firms. In addition to various other economic activities, justice is the public service that is more dependent on trust.

## **5. JUSTICE PERFORMANCES AND FIRMS**

A prosperous economy is based on an efficient system to enforce contracts and property rights (North 1981). The importance of having an efficient institutional structure for economic performance has been highlighted by North (North and Thomas, 1973), while Acemoglu and Robinson (2012) stress the importance of the justice and law institutions for economic growth. In fact, a solid and inclusive regulatory framework and a quick and efficient enforcement system improve competition, facilitate the entry and exit of firms from the market, support investment and have a positive effect on productivity (Scarpetta et al., 2002; Klapper, Laeven e Rajan, 2006). The World Bank (2003) describes the rule of law as the situation when "the government itself is bound by the law" and access to justice is regularly specified. The principle is simple: a better justice system and, in

general, better political institutions have the ability to inhibit system failures and reduce the probability of a crisis of trust. To this end, the judiciary must have the necessary resources to respond to a large number of demands for justice and to resolve disputes efficiently. If, for various reasons, the judiciary is not efficient in defending civil rights, then citizens and firms will not trust in the rule of law.

Economic literature highlights three suitable features of a judicial system. The first describes efficiency as the competence, rich of financial resources, able to decide disputes in an acceptable time. The second highlights the quality of judgments, ie a precise and accredited decision, and the third introduces the independence of judgment. Several studies (Diankov et al., 2008; Bae and Goyal, 2009; Qian and Strahan, 2007) empirically support the idea that systems for enforcement debt's contracts, are efficacious if the credit markets is developed. This result also influenced researches on single country in examining territorial differences within a Country. In a study on Italy, Jappelli et al, (2005), utilizing data on provincial basis, show that in more efficient judicial districts the restriction of credit for firms is lower, and bank credit is higher. The same conclusion is in the case of Spain (Fabbri, 2010) and Russia (Shvets, 2012). However, the restriction of credit, in an inefficient judicial system, may be also extended to families (Fabbri and Padula, 2004).

Moreover, a study on 15 European Countries (Kumar, b. et al, 2001), examining firms at level data, highlights that an efficient judicial system is the great firms dimension. Furthermore, a more efficient justice system can improve both the defense of intangible assets, and firms' reputation and customer relationships. Other studies on Mexico (Laeven, and Woodruff, 2007), Spain (García-Posada and Mora-Sanguinetti, 2013), and Italy (Giacomelli e Menon, 2013) empirically investigate the relation between justice's good performance and firm's dimension. Giacomelli e Menon (2013) observe that in Italy the reduction of the length of judicial proceedings positively affects the average dimension of Italian firms.

Also Nunn (2007) shows that a reduced length of proceedings promotes specialization in Regions characterized by specific relation investments (i.e. firm's investments adopted to enjoy the particular requirements of its customers). The danger of post-contractual opportunism (hold-up risk), in a situation of modest

performance of the judicial system, can negatively shape investment-decisions of firms and lead to an under-investment.

During a crisis, low confidence together with growing uncertainty can lead to an extremely serious situation. The judicial system can only reduce uncertainty if families and firms can plausibly expect the law to be applied. Numerous empirical studies have shown that inefficient judicial systems produce negative effects on the economy (Kumar et al. 2001; Laeven e Woodruff, 2007). The crucial role of the judicial systems for economic development has led many scholars (Posner, 1993 and 1998; Feld and Voigt 2003; Stephenson 2009; Chemin 2012 ) to analyze the working of courts and judicial decision-making. Scholars in law and economics in particular have empirically investigated a broad variety of court and judicial decisions. These studies are related to court performance (Deyneli 2012, Ippoliti et al., 2014), the productivity of judges (Choi et al. 2009, Ramseyer 2012, Lorizio-Stramaglia 2016), the length of trials (Spurr 1997, Djankov et al. 2003, Di Vita 2012, Boyd and Hoffman 2013, Bielen et al. 2014, Gurrieri-Lorizio 2015) and the organization of the court (Beenstock and Haitovsky 2004, Rosales-López 2008; Dimitrova- Grajzl et al. 2012a, 2014; El Bialy 2016, Galanter 2004). This literature has triggered a relevant and ongoing debate about suitable judicial reform (Botero et al. 2003). In Italy, the most obvious problems in the justice system are the court delays (Sobbrio et al, 2009; Bianco et al., 2007). Therefore, the time that judges take to decide on cases has become the theme of policy discussions and polemics (Di Vita, 2012; Cohen et al, 2013). In this respect, many studies (Giacomelli and Menon, 2013) have examined the relationship between growth and the difficulties of the Italian justice system. A series of studies based on provincial data show that low performance in the justice system is associated with a decrease in the birth rate and in the size of firms (Bianco e Giacomelli, 2004) and in a reduced availability of credit (Jappelli et al. 2005). The excessive length of proceedings is one of the main problems characterizing the Italian judicial system. Studies on this topic indicate that the time required to conclude disputes in Italy is much higher - by dimension and degree - than the equivalent in more economically developed countries. This has serious economic repercussions as the excessive length of the processes increases uncertainty, discourages direct foreign investment - making Italy less attractive than its competitors - and paralyses the decisions of firms. According to the Bank of Italy, justice is a "powerful friction factor in the functioning of the

economy," which could result in an annual loss of GDP of around one percentage point. Frequent judicial reforms have been made but the system is still inadequate. The principal problems are the organisations of resources, which are the same amount as in other European countries, and the disproportionate litigation (Banca d'Italia, 2007). Many of measures have been sought in order to improve the functioning of the courts and to accelerate the judicial process. These reforms deal with the institution of obligatory conciliation procedures, the creation of courts specialized in the legal disputes of companies, the reorganization of judicial districts and procedures to reduce the backlog of work in courts. The effects of these reforms on the economic system will be seen in the medium to long term. The OECD simulations in 2013 and other analogous studies (Lusinyan and Muir, 2013) estimate that the complete application of the measures formulated would improve GDP growth by about 5 percentage points in a ten-year period. Nowadays, additional measures are necessary and should be aimed at reducing the administrative burdens on firms and simplifying procedures for starting firms activities. In fact, companies perform well if they have confidence in the rules of society, in the police, in the courts and in the quality of protection of contracts and property rights. In particular, the perception of the defence of contractual and property rights of companies is crucial for their confidence (Acemouglu et al. 2006). Their perception of the efficiency and speed with which their defence is implemented is especially relevant. Virtuous jurisdictional institutions should, in theory, moderate transaction costs among firms and decrease the connected risks, improving the agents' confidence. The levels of confidence of a country are carefully observed by the media and are also strictly analyzed by economic analysts and policy makers, particularly when the economy is frail. It is thought that a decline in an agent's confidence may induce more cautious behavior, which could negatively affect growth. A global fall in firms and consumer confidence was a principal characteristic of the recent recession. Confidence affects many factors such as income, employment and wages, which are very significant for medium-term economic development. After the 2008 financial crisis, there was a widespread fall in firms and consumers confidence in developed economies. In the euro area, firms also suffered a consequent intensification of uncertainty, which lead to deferring investment projects. Families also showed greater caution in their choices, expressed by an impressive increase in their savings. As regards the Italian

economy, the so-called “debt crisis” increased uncertainty among families and firms. This produced an excessive caution in spending which was not justified by the trend in the “fundamental variables”. In fact, the ISTAT survey on the confidence of families and firms indicates a decline in the second half of 2011, which persisted into the following year, with modest improvements in the summer of 2013. In particular, it is said that consumers have experienced the so-called “phase after the trust”, the “post-trusted phase”, even though an analysis by Eurisko (2013) indicates that recently optimism is not increasing but pessimism is decreasing. Above all, the recent crisis has shown that confidence levels may offer significant information about the perceptions of the private sector and their level of uncertainty and that it may have considerable repercussions for economic growth. Indeed, “... firms may reduce investment and households consumption. Banks may in turn respond to this situation with stricter credit standards, which reinforces disinflationary pressure and hence worsens debt burdens. This is fertile ground for a pernicious negative spiral, which then also affects expectations” (Mario Draghi, President of the ECB, Monetary policy in a prolonged period of low inflation”, speech by Mario Draghi, President of the ECB, at the ECB Forum on Central Banking, Sintra, 26 May 2014). Expectations also have a significant role in shaping economic dynamics, as considered by many macroeconomic studies (Lucas, 1972; Lorenzoni, 2009; Jaimovich and Rebelo, 2009; Eusepi and Preston, 2011; Barsky and Sims, 2012; Schmitt-Grohe and Uribe, 2012; Beaudry and Portier, 2004, 2006) illustrating how economic cycle oscillations are largely due to modifications in agents' expectations about future of economic scenarios. Changes in agents' expectations about future technological growth seems to be an important source of business cycle fluctuations. The positive expectations of firms trigger a phase of optimism in the country which can support growth, while unexpected and news shocks can modify agents' expectations on the economic future. The firms' expectations on their future conditions affect the allocation of capital stock and labor supply. The literature has tried to empirically analyze how firms' expectations are formed: accounting literature (McDonald, 1973, Firth and Smith, 1992) observes that managers tend to modify the forecasts on their gains and dividend upwards, probably to strategically attract more investors. Malmendier and Tate (2005), investigate the relationship between excess confidence of firms - analyzing the risks associated with their investment strategies - and the

investments. On the other hand, Anderson et al. (1954) studied the qualitative expectation mistakes; Nerlove (1983) studied the expectations of German and French firms on some variables (prices, demand...), Tompkinson and Common (1983) analyzed expectations of firm variables in the U.K. manufacturing sector and examined whether firms are rational about the trend of the market prices of their own commodities. In Italy, the expectations of firms are "historically" associated with the awareness of the slowness of justice. This factor, together with the effects of the crisis, structurally and intensely modify the expectations of firms, which then worsen and lead to a downward revision of production plans which are considered "normal" and to a persistent reduction in production compared to potential levels. Indeed, during the crisis the decline in effective GDP in Italy prevailed over the decline in potential output. It corresponded to -3.8%, -5.9%, -6.7% in 2012, 2013, 2014, respectively. These excessive levels could be caused also by a dramatic collapse in confidence, which deeply compressed consumption and investment. Firms, alarmed by the rising unsold production, would not be confident about the future and the positive consequences of the recovery policies. Therefore, the expectations, which easily change from optimism to pessimism - but hardly vice versa - play a crucial role. A recession severely depresses the expectations of firms and reduces their confidence in the recovery prospects. The deterioration of expectations also occurs in families and the consequential distrust about job prospects reduces consumption spending in order to increase precautionary saving. In circumstances characterized by the persistence of negative expectations, the stimulus policies will be ineffective.

## **6. THE CASE STUDY**

In a previous study (Gurrieri-Lorizio, 2016) we highlighted how the performance of justice in particular implicitly influences the relationship of mutual trust "between" firms, especially in Italy, and dramatically reduces confidence in the judicial system. The recent financial crisis decreased expectations and trust and negatively affected relationships between Italian firms and institutions, especially with regard to the judicial system. However, a large part of the national production system has been resilient to the crisis and continued to operate and produce. In a subsequent study in 2015, we found that resilient firms generally have the following features: adoption of specific forms of innovation; strategies of

diversification of markets and customers; improved quality of their products; investments in r & d and commercial and productive re-organization aimed at reinforcing their international market position. More specifically, we studied the resilient firms located in the south of Italy and verified how: the functioning of the judicial system interacts with all the variables which are the principal features of resilient firms; the performance of justice also affects entrepreneurship and the growth prospects of firms. In the same study, we tried to ascertain whether the course of justice affects the level of confidence of firms and if trust had undergone relevant changes as a result of the recent financial crisis. This level of trust is both an important element in the social capital of a country and a relevant input of a macroeconomic production function. Therefore, we analyzed whether and how the crisis worsened the confidence of firms, and their perception of the effectiveness of the national judicial system. In that study, we concentrated on small firms located in the Apulia region operating in the textile sector which we had previously analyzed (Gurrieri- Lorizio, 2008).

In this paper, the analysis is extended and a national sample of resilient firms, distributed geographically (north-center-south) and operating in the same textile industry is observed. The sample has been created through the elaboration of data from the Chambers of Commerce and INPS. On this basis, we identified the resilient firms and we sent a questionnaire by mail in the first months of 2015. Approximately 400 firms answered, almost 67% of the total questionnaires sent. Those firms which were already operating before the crisis, continued working without interruption during the crisis at the same size were defined as resilient. The definition used here is the economic resilience definition of Hill (2008). Our goal is to check their confidence in institutions and justice. The selected variables are chosen for each category: age, gender and relations among firms (firm characteristics); average days credit recovery and loans rate (relations with banks, which could lead to a “contact” with the justice system); failures and judicial contacts (relations with justice). We performed a regression model relating the selected variables to the trust-index elaborated by Istat. The R<sup>2</sup> is positive.

**Table 1** *Firms' confidence*

<b>North</b>		
<b>Dependent variables</b>	<b>cEfficient</b>	<b>Standard errors</b>
Age	1.109307	0.0212858
Gender	1.279704	0.0143372
Average days credit recovery	0.861252	0.0523422
Loans rate	1.235773	0.0132837
Failures	0.7676599	0.0752687
Judicial Contacts	1.311854	0.0243197
Relations	0.9528364	0.0780349
<b>Center</b>		
Dependent variables	Coefficient	Standard errors
Age	0.3933144	0.0394951
Gender	0.0814635	0.0650986
Average days credit recovery	0.7703814	0.0818211
Loans rate	0.9037072	.1084972
Failures	- 0.0144138	0.02409230
Judicial Contacts	-0.0015529	0.0302072
Relations	0.6255768	0.1334098
<b>South</b>		
Dependent variables	Coefficient	Standard errors
Age	0.0498086	0.0262119
Gender	0.2549367	0.063969
Average days credit recovery	- 0.0361152	0.0171049
Loans rate	-0.0165154	0.0150306
Failures	0.2154382	0.0799183
Judicial Contacts	-0.0506847	0.0319137
Relations	0.3457828	0.1113804

Source: own elaboration

Small and resilient national firms have a male entrepreneur, are innovative and customer oriented but show some difficulties towards institutions – banks and justice – especially (but not exclusively) in the South of Italy. The resilient firms of Northern Italy show the best performances. In fact, all the selected variables are positive and significant. The situation changes slightly in the center of Italy. From the questionnaires of the resilient firms it emerges that only failures and judicial contacts are negative, thus confirming our hypothesis. We believe that also resilient firms suffer the territorial limits (lower GDP, more violence, bureaucracy, banking relations and, especially, slow justice). Those limits are more evident in the South of Italy, where the average days credit recovery, loan rate and judicial contacts negatively influence the trust of firms. These results are in line with our expectations.

## 7. CONCLUSIONS

An important element of an economic system is represented by those that Douglass North defines as institutions, i.e. the set of formal and informal rules and sanction mechanisms, which express the "rules of the game" influencing the behavior of members of a community. General trust is often positively associated with the quality of economic institutions, and trust has a positive impact on the willingness to perform efficiency-enhancing reforms. The spread of a general sentiment of trust in institutions and among economic actors appears to influence firms and the performance of the system.

In this work, the effects of judicial are explored (in)efficiency on firms' trust. Since theory didn't offer an inquiry about this relation and its consequences, we conducted an empirical research to shed light on it.

Justice's bad performance negatively affects firms' trust in all institutional set-up, and this is a new aspect in addition to the existing literature.

More specifically, our interest is to check out if the factor "trust" is important also for strong firms, identified, in the current economic scenario, as resilient firms.

Results show that, also for resilient firms, trust in institutions and in particular in justice, represents a fundamental element for their expectations and their "animal spirits". The results are cheering, indicating that the negative effects of justice on firms' trust prevail over the incentive linked to favorable perspectives on the future and on the productive decisions of firms.

The international crisis may give cause for authorities to adopt additional reforms for their institutional frameworks and for the control and stability of their system; these reforms should also include an intervention on the time and efficiency of justice. Only in recent months, after a prolonged period of slow growth and a severe crisis in confidence, Italy has embarked on an ambitious reform package aimed at increasing supply potential, improving competitiveness, ensuring fiscal sustainability and – most importantly - enhancing the confidence of citizens and firms in government and institutions, especially in justice. Such reforms would instill more confidence among firms and in the institutions, encourage innovative small- and medium-size firms to operate in the market, and facilitate their competitiveness.

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# NEGATIVE WORD-OF-MOUTH: EXPLORING THE IMPACT OF ADVERSE MESSAGES ON CONSUMERS' REACTIONS ON FACEBOOK

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**Abstract:** *Nowadays, with the major role that social media is playing in our life, people have found an easy way to utter negative word-of-mouth (NWOM). A self-administrated questionnaire with a visual stimulus was used to collect data from 108 Romanian Facebook users, between the ages of 18 and 26 years. This research aimed to determine the impact of adverse messages on brand attitude and a series of others consumer reactions.*

*The results indicate that negative messages may change brand perception and generate negative word-of-mouth, with significant impact on future purchase intentions. They also indicate that identity avoidance is a more relevant electronic word-of-mouth (eWOM) antecedent than negative emotions, strongly and positively influencing brand hate. The findings show that negative events or actions can seriously affect consumer behavior, triggering brand rejection that eventually may translate into brand image deterioration and sales decline.*

**Keywords:** *negative word-of-mouth, negative emotions, brand hate, identity avoidance, switching intentions.*

**JEL Classification:** *M31*

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## 1. INTRODUCTION

Word-of-mouth (WOM) is an informal advice passed between consumers, usually interactive, swift, and lacking in commercial bias, having a powerful influence on consumer behavior (East et al., 2008). Recent studies have paid increasing attention to this topic, some of the main conclusions being that emotional response to product or service performance evokes WOM directly

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(Engel et al., 1969) and WOM spreading intention is correlated with the customer's perceptions of value and quality (Hartline and Jones, 1996). Berger and Iyengar (2013) have conducted laboratory experiments to find out how the medium shapes word-of-mouth and they concluded that written communication leads people to mention more interesting products and brands, but also gives them time to construct and refine what to write. Advertising can also generate WOM, if it shows uncertainty about the product, so it's vital to create advertisement high in conversational value (Buttle, 1998).

Electronic word-of-mouth (eWOM) is consumer-generated information and opinion about products and brands shared online (through social media, online communities etc). Cheung and Lee (2008) try to answer the following question: is negative eWOM more convincing than positive eWOM? In their paper, they present the results of an online experiment that investigated the influence of both positive and negative eWOM on the customer buying decision. In essence, Cheung and Lee show that the connection between the customers' emotional trust for an online vendor and their intention to purchase from that vendor is moderated by an exogenous variable – eWOM. Their study revealed that participants used online reviews to evaluate the vendor's credibility. Furthermore, the impact of the negative reviews (in terms of emotional trust and intention to buy) proved to be stronger than the impact of the positive reviews.

Considering the major role that social media is playing in our life, people have found an easy way to utter negative word-of-mouth (NWOM). Negative consumer generated social media messages can damage the company's brand image, as this medium permits less control over the message (Thomas et al., 2012). As Audrain-Pontevia and Kimmel's research (2008) shows, managers view two redress strategies as significantly more effective in countering NWOM: increasing trust in the company, product or service that serves as the target of NWOM, and denying NWOM through a company official or an outside source. According to Williams and Buttle's findings (2014), organizations allocate more resources to the management of NWOM than they do to the promotion of positive word-of-mouth (PWOM), so authors have recommended three steps for the better management of NWOM: leadership, organizational readiness and public relations management.

## 2. CONCEPTUAL FRAMEWORK

### 2.1. Negative word-of-mouth (NWOM)

Negative word-of-mouth (NWOM) is a consumer response to dissatisfaction (Richins, 1984). It has a more powerful impact than positive WOM (Arndt, 1967) and the impact of negative information persists even when it has been refuted (Weinberger et al., 1981). Buttle (1998) described an inclusive model of WOM containing two sets of variables: intrapersonal variables, where negative WOM is an outcome of the unsatisfactory imbalance between expectations and perceptions, and extrapersonal variables including culture, which impacts WOM behavior, through its influence on individual values and group norms (Lin, 2013).

Hartman, Hunt and Childers (2013) have examined the consumer choice for educational services (more exactly, course offers) and concluded that the attitude towards a course, the intention to take a course as well as the intention to recommend the course to others are significantly more strongly influenced by negative online reviews as compared to a mix of positive and negative reviews. The authors have also studied the respondents' perceived value of the reviews and got an interesting result: the perceived value of the reviews is lower in case of mixed reviews than in case of either positive or negative reviews. Therefore, if the potential customer comes across both negative and positive reviews, their trust in reviews (and, as a consequence, the effect of the online WOM) decreases.

### 2.2. Negative emotions

There are four basic emotions for negative affect: anger, fear, sadness, and shamefulness (Laros and Steenkamp, 2005). Many other researchers investigated the effect of NWOM, especially compared with the effect of PWOM, which is considered to include recommendations to others, conspicuous display, and interpersonal discussions relating pleasant, vivid or novel experiences (Anderson, 1998). Sweeney, Soutar and Mazzarol (2005) explored the differences in the content and style of positive and negative WOM and found that NWOM is more emotional, being associated with dissatisfaction and almost twice as likely to influence the receiver's opinion. The study also showed that consumers who had a negative experience were more driven to "vent" their emotion, offering WOM sooner after the incident than those who had positive experiences.

### **2.3. Brand hate**

Emotions are evoked by specific stimuli and unwanted consumer behaviour can be triggered by consumers' negative experiences. Negative emotions that consumers have towards brands can vary in intensity (for example, dislike, rejection or hate). Scholars consider that consumer brand hate could be a distinct and measurable subtype of consumer dissatisfaction (Kucuk, 2016). Brand hate is an attitude often resulting from accumulated negative feelings (Delzen, 2014), an intense negative emotion towards a brand that is stable and enduring (Ben-Ze'ev, 2000). Others consider brand hate as a constellation of negative emotions which is significantly associated with different negative behavioral outcomes, including complaining, negative WOM, protest and patronage reduction (Zarantonello et al., 2016). According to Grégoire, Tripp and Legoux (2009), brand hate is customers' need to punish and cause harm to firms for the damages they have caused, while Romani, Grappi and Dalli (2012) described brand hate as an emotion descriptor of negative emotions toward brands and an extreme form of dislike of the brand.

### **2.4. Identity avoidance**

Dissatisfaction or unmet expectations impact customers, who may choose to end the relationship or talk about it (Hirschman, 1970). Koenderink (2014) mentioned in his paper that brand avoidance is when consumers reject certain brands because it could add undesired meaning (Thompson and Arsel, 2004), while identity avoidance occurs when consumers don't want to be seen with a brand they perceive as being negative in either meanings or values (Lee et al., 2009). According to Grégoire, Tripp and Legoux (2009), brand avoidance includes three types of avoidance: identity (when the brand image does not fit individuals' identity), experiential (when one experienced a negative consumption) and moral (when consumers' beliefs don't match the brand values).

### **2.5. Buying intentions**

Bachleda and Berrada-Fathi (2014) considered several possible sources of NWOM like negative testimonials on review sites, negative comments or posts from Facebook friends or negative testimonials on a competitor's web site. The most influential source of NWOM turned out to be the negative testimonials on the review sites. As it was expected, the negative impact grows with the number of

testimonials: 30 testimonials have stronger effect than 10 testimonials. The authors highlighted the damaging effect of NWOM on the customer purchasing intention and recommend encouraging the unsatisfied customers to complain directly to the company instead of writing negative posts on the review sites or on social media.

Beneke, de Sousa, Mbuyu and Wickham (2015) revealed that the presence of NWOM has a significant adverse impact on brand equity and purchase intention, this impact being even more detrimental for customers with a high product involvement as compared to customers with a low product involvement. The quality of reviews also counts, as these authors show: high quality reviews are more influential than low quality reviews. It is believed that low levels of switching intention would be an indicator of loyalty (Martins et al., 2013).

### **3. RESEARCH MODEL AND HYPOTHESES**

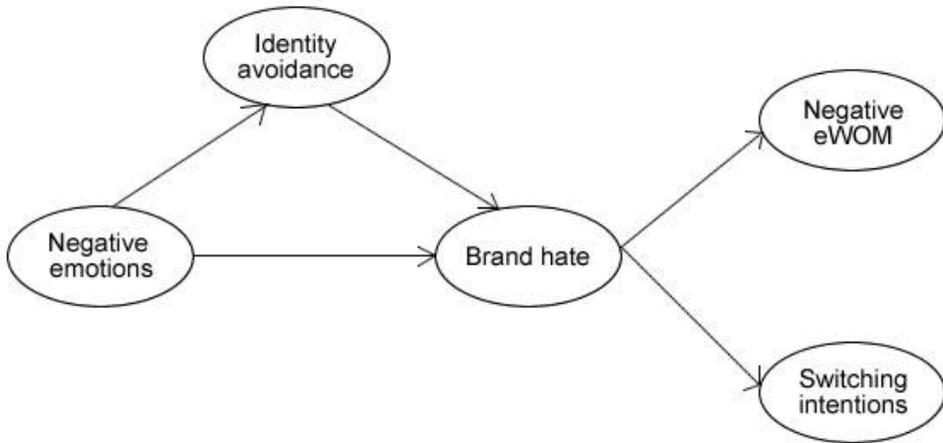
#### **3.1. Research aim**

No company is immune to a PR crisis. The impact of the image crisis can lead the organization to credibility diminishing and reputation deterioration. For the present research, we assumed that the Romanian chocolate brand "ROM" (a classic product created in 1964, with strong national values attached) might face a PR crisis – a case of food poisoning caused by an ingredient contained by the chocolate – which was communicated through its Facebook page (titled ROM authentic). The aim was to investigate if posting news of this kind would change Facebook users' attitude towards the product or company (more precisely, engender brand hate), making them generate negative word-of-mouth and modify their purchase intention.

Based on the above literature review, the following hypotheses were formulated:

- H1: Negative emotions generate brand hate.
- H2: Negative emotions generate identity avoidance.
- H3: Identity avoidance generates brand hate.
- H4: Brand hate determines a negative eWOM.
- H5: Brand hate makes people switch their buying intentions.

The model that we have elaborated in order to test these hypotheses can be seen in Figure 1:

**Figure-1** *Structural model of NWOM*

### 3.2. Procedure and participants

A self-administrated questionnaire with a visual stimulus was used to collect data from Romanian Facebook users (convenience sample). The stimulus was a fake Facebook post for the ‘ROM authentic’ page, containing the status “*We apologize for any inconvenience! The lot in question was withdrawn. Thank you for understanding!*” and the link from an article, having as title “*42 children from Bucharest were hospitalized because of a substance contained by Rom chocolate*”. The poster article link (seemingly posted online on *adevarul.ro*, the website of a prominent Romanian newspaper) mentioned that “*too much sorbitol, contained in the Rom chocolate bars, can cause hives, rhinitis, asthma, retinopathy, cataracts and peripheral neuropathy, swelling of the lips, Porphyria and even anaphylactic shock*”. The Facebook post also included fake negative comments from users (see *Figure 2*). In the end, the subjects were informed that both Facebook post and users’ comments were fictional.

**Figure-2** Facebook post with comments from users



**ROM Autentic**

June 30 at 6:00pm · 🌐



Ne cerem scuze pentru inconvenientul creat! Lotul cu pricina a fost retras de pe piață. Mulțumim de înțelegere!



✔ 42 de copii din Bucuresti au ajuns la spital, din cauza unei substante continute de ciocolata Rom

O cantitate prea mare de sorbitol poate produce urticarie, rinite, astm, retinopatie, cataracta si...

ADEVARUL.RO

Like · Comment · Share

👍 38 people like this. Most Relevant ▾

↪ 15 shares



**Mihai Donea** Cei care au gresit trebuie sa plateasca de urgenta!!!

June 30 at 6:24 pm · Like



**Eva Voicu** Bietul copilas ...

June 30 at 6:26 pm · Like



**Rojni Nicol** Doamne fereste! Saracii copilasi, nu sunt vinovati cu nimic!

June 30 at 6:26 pm · Like



**Florin Pricop** Parintii trebuie sa dea in judecata compania! Neaparati!

June 30 at 6:28 pm · Like



**Catalin BlackSkin** Scuze?? Isi cer doar scuze? Ce tupeu! Atat pot face, dupa ce baga copii in spital??

June 30 at 6:29 pm · Like



**Elena Carmen** Ofi Printre acei copii este si nepotelul meu ... mare durere!

June 30 at 6:29 pm · Like



**Delia Sabo** Doamne fereste de asa ceva! Pui viata copiilor in pericol pentru o ciocolata? :(

June 30 at 6:32 pm · Like



**Mia Olariu** Sa plateasca, nenoroditi! Ei nu verifica ce ingrediente pun?!

June 30 at 6:34 pm · Like



**Adam Razvan** V-ati tampiti!! Nici ciocolata nu mai poate manca omul? Protectia Consumatorului ce face, doarme?

June 30 at 6:37 pm · Like



**Ursache Alexandru** Cred ca si ROM face parte din acele organizatii care urmaresc reducerea populatiei prin ingrediente toxice ... Rusine! Nu mai cumpar niciodata de la voi!

June 30 at 6:40 pm · Like

### 3.3. Measures

We have measured five variables after the exposure to the stimulus: negative emotions, identity avoidance, brand hate, NWOM and switching intentions. All the variables were measured on a 7-point Likert-type scale ranging from ‘strongly disagree’ to ‘strongly agree’. Details of the scales used to measure the constructs can be found in Table 1.

**Table 1** Scales and items

Variables	Items	Author(s)
Negative emotions	When I read this post in ROM Facebook page I feel frustrated.	Grappi and Montanari (2011)
	When I read this post in ROM Facebook page I feel stressed.	
	When I read this post in ROM Facebook page I feel fearful.	
	When I read this post in ROM Facebook page I feel scared.	
	When I read this post in ROM Facebook page I feel disgusted.	
Identity avoidance	The products of brand ROM do not reflect who I am.	Lee et al. (2009)
	The products of brand ROM do not fit my personality.	
	I don't want to be seen with brand ROM.	
	ROM symbolizes the kind of person I would never wanted to be.	
Brand hate	I don't want anything to do with ROM.	Zeki and Romaya (2008)
	I cannot control my hatred for ROM.	
	I would like to do something to hurt ROM.	
	I have violent thoughts about ROM.	
	ROM is awful.	Salvatori (2007)
	I do not like ROM.	
	I hate ROM.	
	I'm disgusted by ROM.	
I don't tolerate ROM and its company.		
Negative eWOM	I would write negative things online about ROM in social media.	Bougie et al. (2003)
	I would discourage people I interact with online from purchasing ROM chocolate bars.	
	I would advise against ROM when someone sought my advice online.	
Switching intentions	I will not buy ROM in the future.	Jamieson and Bass (1989)
	I will probably not buy ROM in the future.	
	I will definitely not purchase again ROM in the future.	

### 3.4. Data analysis and results

#### *Sample description*

Most of our subjects (60.2%) are aged between 18 and 26 years, while 37% are aged between 26 and 48 year. The average respondent age is 28.5 years and the median age is 25 years.

The items that compose each scale (construct) were aggregated by average. For each construct, the mean, standard error and 95% confidence interval were computed. The main statistics for the concepts measured after the exposure to the stimulus are presented in *Table 2*.

**Table 2** *Summary statistics*

<b>Constructs</b>	<b>Mean</b>	<b>Std. error</b>	<b>Confidence interval (95%)</b>
Negative emotions	3.84	0.15	3.53 – 4.15
Identity avoidance	2.96	0.13	2.70 – 3.23
Brand hate	1.82	0.11	1.59 – 2.04
Negative WOM	1.48	0.11	1.26 – 1.70
Purchase intention	1.99	0.13	1.72 – 2.26

The stimulus has elicited pretty high negative emotions to the respondents (3.84 out of 7). However, the levels of identity avoidance and brand hate due to the stimulus are not very high (2.96 and 1.82 out of 7, respectively). So the stimulus has not provoked very strong feelings of hatred and disgust towards ROM, as was expected. Furthermore, the average intention to give ROM a negative word-of-mouth is very low (1.48 out of 7). As for the purchase intention, its average score is 1.99 (out of 7), which reflects a rather high purchase intention, given that the statements of this construct are expressed negatively (e.g. “I will probably not buy ROM in the future”). Therefore, it seems that the negative stimulus has not triggered intense reactions of rejection towards the brand ROM.

#### *The measurement model*

To build our measurement model we have conducted a confirmatory factor analysis in the SPSS Amos software, with a view to build our measurement model. In this model we included five latent factors (brand hate, negative emotions, identity avoidance, negative eWOM and switching intentions) and 24 observed variables. The cutoff values used to evaluate the goodness-of-fit for the confirmatory factor analysis model were: for the root mean square error of approximation (RMSEA) – 0.08, for the comparative fit index (CFI) – 0.900, for the Tucker-Lewis Index (TLI) – 0.900, for the  $\chi^2/df$  ratio – between 1 and 5.

Our measurement model resulted to be reliable – all the goodness-of-fit indicators were within the cutoff limits: RMSEA=0.072, CFI=0.960, TLI=0.951,  $\chi^2/df=1.547$ . The model factors and items are summarized in *Table 3*.

**Table 3**

Constructs and items	Loading	CR (t-value)	SE	$\alpha$	AVE
<b>Brand hate</b>	-	-	-	0.978	0.790
I would like to do something to hurt ROM.	1.000	-	-	-	-
I cannot control my hatred for ROM.	1.020	17.835	0.057	-	-
I have violent thoughts about ROM.	1.033	25.634	0.040	-	-
ROM is horrible.	1.016	16.184	0.063	-	-
I do not like ROM.	1.142	15.963	0.072	-	-
I hate ROM.	1.086	23.250	0.047	-	-
ROM annoys me.	1.055	21.979	0.048	-	-
I'm disgusted by ROM.	0.933	13.261	0.070	-	-
I don't tolerate ROM and its company.	1.002	13.764	0.073	-	-
<b>Negative emotions</b>	-	-	-	0.902	0.380
I feel scarred.	1.000	-	-	-	-
I feel stressed.	0.851	10.837	0.078	-	-
I feel frustrated.	0.837	7.996	0.105	-	-
I feel unhappy.	1.045	11.874	0.088	-	-
I feel annoyed.	1.064	11.167	0.095	-	-
<b>Negative eWOM</b>	-	-	-	0.984	0.937
I would discourage people I interact with online from purchasing ROM chocolate bars.	1.000	-	-	-	-
I would write negative things online about ROM in social media.	0.999	32.089	0.031	-	-
I would advise against ROM when someone sought my advice online.	0.962	32.151	0.027	-	-
<b>Identity avoidance</b>	-	-	-	0.789	0.540
The products of brand ROM do not reflect who I am.	1.000	-	-	-	-
The products of brand ROM do not fit my personality.	1.388	4.983	0.279	-	-
I don't want to be seen with brand ROM.	1.684	3.874	0.435	-	-
ROM symbolizes that kind of person I would never wanted to be.	1.610	3.800	0.424	-	-
<b>Switching intentions</b>	-	-	-	0.900	0.607
I will probably not buy ROM in the future.	1.000	-	-	-	-
I will not buy ROM in the future.	1.040	13.737	0.076	-	-
I will definitely not purchase again ROM in the future.	0.710	13.261	0.066	-	-

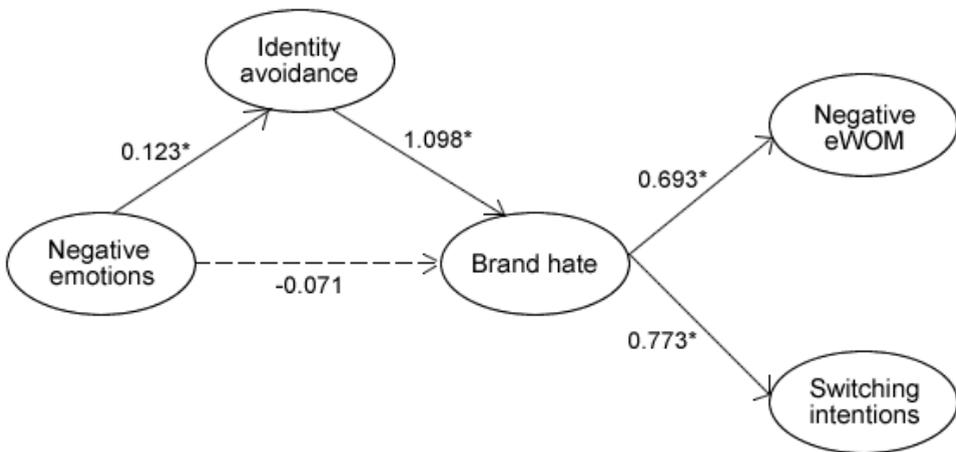
All the latent factors have good internal consistencies (Cronbach's alphas are greater than 0.700). As for the average variance extracted it is higher than 0.500 for

almost all factors (except the negative emotions), indicating a satisfactory convergent validity for our model. Furthermore, all the path coefficients are statistically significant ( $CR > 1.960$ ); therefore, the individual items are well explained by their corresponding latent factors.

*The structural model*

In the final stage we created our structural (causal) model, based on the hypothesized model presented in Figure 1. The goodness-of-fit indicators for the structural model (Figure 3) are as follows: RMSEA=0.076, CFI=0.954, TLI=0.945,  $\chi^2/df=1.613$ . These figures show a very good fit – all the indicators fall within the cutoff margins. In consequence, our theoretical model exposed at the beginning of this article is proved to be valid.

**Figure 3** Path coefficients for the structural model



The path loadings (or path coefficients) of the causal model are presented in Table 4.

**Table 4** Path coefficients

Hypothesis	Path	Loading	P
H1	Negative emotions → Brand hate	-0.071	0.171
H2	Negative emotions → Identity avoidance	0.123	0.021
H3	Identity avoidance → Brand hate	1.098	<0.001
H4	Brand hate → Negative eWOM	0.693	<0.001
H5	Brand hate → Switching intentions	0.773	<0.001

The only hypothesis that is not confirmed is H1, concerning the relationship between negative emotions and brand hate. For this path, the coefficient is not statistically significant ( $p=0.171$ ). The other four hypotheses are confirmed.

#### 4. CONCLUSION AND DISCUSSIONS

The results indicate that negative messages may change the brand perception and generate negative word-of-mouth, with significant impact on switching intentions of purchasing the brand products in the future. The most interesting finding is the *indirect* effect of the negative emotions on brand hate. This effect is completely mediated by a third variable, identity avoidance. That means that consumers who repeatedly experience negative emotions towards a brand (due to negative events or actions taken by it) may have the tendency to dissociate from that brand. They will declare that the brand does not reflect their character and will also refuse to be perceived as being connected to the brand products (in the case of the ROM chocolate, they will avoid to be seen eating it in public). The relationship between negative emotions and identity avoidance seems to be positive – the stronger the emotions, the higher the level of avoidance ( $B=0.123$ ,  $p=0.021$ ).

In turn, identity avoidance strongly and positively influences brand hate ( $B=1.098$ ,  $p<0.01$ ). Someone who rejects any association with a certain brand will naturally develop negative feelings for the brand. Many of them will end up detesting the brand, feeling disgusted by it and even fostering the desire to hurt the brand in some way.

Furthermore, a subject with high brand hate scores could present present two types of behavior. On the one hand they would write negative comments about the brand and its products on social media, and on the other hand they would decide not to buy the products any longer. As Zarantonello, Romani, Grappi, and Bagozzi (2016) showed, brand hate is highly associated with negative behavior like complaining, protesting, spreading negative WOM. It is worth noting than the influence of brand hate on switching intention is greater than the influence on negative eWOM ( $B=0.773$  and  $B=0.693$ ). In consequence, the probability to stop buying the products in the future is stronger than the probability to spread negative word-of-mouth. Many consumers will not bother to talk about the brand online, instead they will switch it to another one. This finding is consistent with the results obtained by Gelbrich (2009), who showed that negative emotions towards brands affect especially the customer loyalty, purchase decisions and the frequency of using the brand products.

In summary, the present model seems to indicate that identity avoidance is a more important eWOM antecedent than negative emotions. In order to produce a

change in the consumer behavior, the emotions must be strong enough to elicit a substantial identity avoidance effect. This identity avoidance will cause brand hate, negative word-of-mouth and brand switching. If the negative emotions are not strong enough, this process may not take place.

## **5. LIMITATIONS AND FURTHER RESEARCH**

This research suffers from a few limitations. First of all, we surveyed Romanian subjects only (since we studied a Romanian brand, the ROM chocolate). This may affect the generalizability of our results. Second, our sample size was 108 people only. Third, the convenience sampling method was used, which may result in skewed data and biased results. Finally, we did not consider the subjects demographic and behavioral characteristics (gender, age, time spent daily on Facebook, attitude towards Facebook, brand engagement etc.). Further studies could focus on other brands and use greater samples (maybe surveying people from several countries).

We could distinguish two possible directions for a future research. One of them would consist in further studying the relationship between negative emotions, brand hate and identity avoidance, the other one would consider the influence of the previous brand engagement level (expressed through variables like brand love and brand trust, for example) in this relationship. This would help establish if the negative stimuli have the same effect on the people who used to love and trust the brand as on the people who were indifferent towards it.

## **6. MANAGERIAL IMPLICATIONS**

The paper tried to answer the question: can negative online messages engender brand hate and make customers switch their buying intention (i.e. decide that they don't want to purchase the brand anymore)? The answer is important because any company can be exposed, at any time, to the risk of negative word-of-mouth (either genuine or fake), with bad consequences for its reputation. The obtained results demonstrate that negative events or actions can possibly affect consumer behavior, trigger a mechanism of brand rejection that eventually may translate into brand image deterioration (due to bad word-of-mouth) and sales decline. The brand communication managers should be aware of this mechanism and find effective ways to counteract it. Whatever the problem, an official response issued by the company is essential. For this to be possible, the company should actively monitor its online presence, in order to find out what the customers are saying and where they are saying it.

There are a few strategies that can reduce the damaging effect of the negative online word-of-mouth. First of all, a prompt answer to negative reviews is always necessary. A fast response will show customers that the company cares about them and values their opinion, which could lead to a diminution of hate and animosity from the customers' part. Furthermore, it is advisable that the company takes the problem offline, whenever possible, contacting the dissatisfied customers. A direct contact offers better opportunities to resolve the issue to the customer's satisfaction. Afterwards, the company representatives can leave a public message to let the public know how the problem was solved. This strategy could tremendously repair the company's reputation, convincing the customers to give it a second chance.

At the same time, the company representatives should not neglect to ask the review websites to remove defamatory and slandering reviews, written with the only goal of hurting the firm. If unfounded and libelous reviews are taken down within a short time, their adverse impact on customer behavior will be limited. However, when the reviewers are sincere, when *it is* the company's fault, admitting the drawback and facing its consequences can help keep consumers' trust, prevent an outburst of aversion towards the brand and avoid the possible negative effects in terms of sales and profit reduction.

**Note:** This research was independent from Kandia Dulce company.

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CASE STUDY

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## THE QWERTY PHENOMENON: ITS RELEVANCE IN A WORLD WITH CREATIVE DESTRUCTION<sup>1</sup>

JENS WEGHAKE \*, FABIAN GRABICKI \*\*

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**Abstract:** *Does quality always win? Looking at the critical drivers of success in and efficiency of high-tech markets, two contrasting perspectives exist in the academic sector. One camp argues that the higher quality of a product or service exerts a major influence on its market success. Consequently, an inferior market player should not persist. The opposite group emphasises the importance of network effects, which can lead to lock-ins in inferior situations or being stuck in a bad equilibria accordingly, also known as the QWERTY phenomenon. In this paper, we investigate this debate. We demonstrate that the missing consideration of the status quo bias in previous studies leads to the rejection of the QWERTY phenomenon, which means that independent of the quality offered by a business or service the pure moment of who reaches the customer first, establishes a status quo from which it is hardly possible to escape. We give several examples with inferior market leaders. We suggest that this phenomenon causes only temporary harm, and lock-ins could be overcome by Schumpeterian creative destruction. Therefore, we claim that even if lock-ins exist, they pose no problems as innovative market participants have the opportunity to introduce new business models.*

**Keywords:** *platform selection, two-sided markets, status quo bias, QWERTY phenomenon, creative destruction*

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<sup>1</sup>We thank Ulrich Schwalbe, Janis Kesten-Kühne, the participants of the 47<sup>th</sup> Hohenheimer Oberseminar and the anonymous reviewers of the Review of Economic and Business Studies for their insightful criticism and help.

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## 1. INTRODUCTION AND RELEVANT LITERATURE

Using a software with low user-friendliness. Typing with a hard-to-learn keyboard. Buying a computer with an expensive operating system although there are free alternatives. There are many situations in which you may ask yourself: How could it happen that such a product or service became the standard and everyone uses it even if more user-friendly, cheaper or general better alternatives exist or existed? And from a social point of view, it is actually inefficient if a standard evolve that is inferior compared to superior products or services of (defeated) competitors. However, subjective and individual experiences with products and services are of course not representative. Rather, the question is if decisions of market participants regularly lead to inferior equilibria.

This question and the above examples are closely related to the so-called QWERTY phenomenon introduced by Paul A. David (1985). In the original context, the reason for ending in an inferior state lies in direct network effects and self-fulfilling expectations. However, the theoretical mechanism that suggests tipping to a single dominant player is comparable. In a market with direct network effects, customers benefit more from a product when other individuals of the same type purchase it as well. The newer two-sided market theory suggests that indirect network effects can also be the reason for a lock-in. In a setting with indirect network effects, there are at least two types of individuals. In such a case, the value of the product (i.e., platform) for one individual increases when individuals of the opposite type choose or purchase it. In both cases (with only positive network effects), coordination on a single platform is a state of equilibrium (Ellison & Fudenberg, 2003; Katz & Shapiro, 1985). If an ex ante inferior platform achieves its lead in the installed base over the superior platform, the externalities can outweigh the inefficiency of this inferior platform. This edge over competitors may be attained by a first-mover advantage (Arthur, 1989) or by chance (Herman, 2001). However, choosing the ex ante superior alternative would be better for society in terms of efficiency. Accordingly, the core question of the debate about the QWERTY phenomenon is how realistic or relevant the possibility of being locked-in in an inferior equilibrium is in real-world situations.

In re-examining David's (1985) case of the QWERTY phenomenon, Liebowitz and Margolis (1990, 1994) find evidence in favour of a possible

superiority of the QWERTY keyboard (Kay, 2013). This means that it is at least questionable whether this eponymous example of this kind of market convergence into inferior solutions describes this phenomenon at all. Liebowitz and Margolis arrive at similar conclusions about other prominent examples of the QWERTY phenomenon (e.g., VHS vs. Betamax).

Tellis, Yin, and Niraj's (2009) study also suggests a limited relevance of the QWERTY phenomenon. In their empirical study of competition in software and operating system markets, they demonstrate that temporarily, there are single dominant players, but no market leader can hold this position over the long term. Thus, in these markets, there are seemingly no lock-in effects. The quality indicators that Tellis and colleagues use suggest that the new market leaders always offer higher quality, which is even more important regarding the QWERTY controversy.

To investigate the case with indirect network effects, Hossain and Morgan (2009) and Hossain, Minor, and Morgan (2011) conducted laboratory experiments. Their participants repeatedly had to choose between two platforms. In all tested settings, the subjects managed to coordinate on the superior platform – even when the inferior platform had a first-mover advantage. Considering their own experimental results, Tellis and colleagues' (2009) empirical study and Liebowitz and Margolis' (1990, 1994) findings, Hossain and Morgan (2009) conclude that the QWERTY phenomenon “lies more in the minds of theorists than in the reality of the marketplace” (p. 440).

However, by reproducing Hossain and Morgan's (2009) experiment with slightly different out-of-equilibrium payoffs, Heggedal and Helland (2014) show that coordination on the superior platform frequently fails under these modified conditions. More recently, using a theoretical model with dynamic competition and customer expectations, Halaburda, Jullien, and Yehezkel (2016) demonstrate that an inferior platform can dominate the market.

In a simulation study of a two-sided market setting, Meyer (2012) also demonstrates that a lock-in in inferior situations may arise under diverse circumstances. He identifies the relative strength of the indirect network effect compared to the difference in quality as important factors for the probability of coordination failure. Strong network effects and small quality differences increase the probability of choosing an inferior platform. Further factors affecting the

probability of an inferior lock-in are (i) the information level of agents (lower or more incomplete information levels increase the probability), (ii) rationality (greater rationality corresponds to a higher probability because in his study, bounded rationality counteracts the indirect network effect) and (iii) successive market entries (coordination on the first mover is likely). Particularly, the last point is driven by the simulation design; the simulated agents (individuals of both market sides) differ in market entry timing. Furthermore, agents do not reconsider their platform choice in each period of the simulation but only after fixed periods of time. In checking this “decision horizon”, Meyer finds that if agents choose their platform in every period, no inferior lock-in occurs (Meyer, 2012).

We highlight this aspect because it reveals a shortcoming regarding the external validity of the experimental studies conducted by Hossain and Morgan (2009), Hossain and colleagues (2011) and Heggedal and Helland (2014). In the context of platform selection, numerous switching between platforms seems to be quite untypical (Lam, 2015). Therefore, to account for this market characteristic, we introduce the status quo bias as a reason why individuals may keep their initial self-selected status quo. We scrutinise how the experimental findings and conclusions may be affected by this bias in favour of the QWERTY phenomenon.

However, Liebowitz and Margolis (1994) and Tellis and colleagues (2009) show that there are hardly any examples for the QWERTY phenomenon over the long term. It seems that a lock-in in an inferior equilibrium causes at least temporary harm. Liebowitz and Margolis suggest that through market dynamics, sooner or later, an inferior product will be displaced by a better one. Beyond these established market-dynamics arguments, we contend that the replacement of one market leader may also follow from “creative destruction”, as described by Schumpeter (2008).<sup>2</sup> In our case, a product is replaced by a more or less similar one that is integrated in a superior business model. In this setting, the higher quality of the examined product is not a necessary condition, but the whole business model of the successor has to be superior. We explain this aspect of superior business models, which is largely absent from the discussion so far, in section 3.

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<sup>2</sup> A second possible view is Christensen’s concept of disruptive technologies (Christensen, 1997). However, we prefer Schumpeter’s broader approach of business development.

The paper extends the prior literature on the debate of the drivers of success in and efficiency of high-tech markets in three dimensions. First, building up on the idea that the business or the service that offers the highest quality will eventually take over the entire market, the QWERTY phenomenon as an academically established concept against this idea is introduced. Strengthening the QWERTY phenomenon by the status quo bias increases the leverage of this alternative concept. According to the status quo bias rather not the highest quality but behavioral and cognitive barriers hinders the superior platform to emerge as the winner. In a second dimension we take Schumpeter's theory of "creative destruction" into consideration. In agreement with his idea we suggest that in the long run new technologies will supersede lock-ins in bad equilibria. This approach offers a reflection of the entire debate and a considerable solution how disruptive forces break up established structures and industries and reshape the economy. Thirdly, the key idea of our approach is the finding that often superior business models are determining the success of new products and rather not the product itself.

In the remainder of this paper, we explain the status quo bias in the context of platform selection. We demonstrate how this bias favours the QWERTY phenomenon and how it could influence the results of the mentioned experimental studies if the authors had designed their treatments in consideration of this bias. By taking this aspect into account, we show that part of the literature is based on an (inadmissible) simplification, so that some of the above mentioned results have no external validity. We then present the Schumpeterian interpretation of breaking up lock-in effects. For this purpose, we give an alternative interpretation of the results of Tellis and colleagues' (2009) study and two further examples that suggest this idea as well. Finally, we draw brief conclusions from our arguments.

## 2. STATUS QUO BIAS

Since it was introduced by Samuelson and Zeckhauser (1988), the status quo bias has received considerable interest from economic, marketing, psychology and political science literature. Substantial research on decision making has repeatedly demonstrated that economic agents do not always choose among alternatives in accordance with well-defined preferences. They extensively use simplifying heuristics and thus often experience a cognitive bias. We suggest that such effects

may also apply when consumers are faced with the decision to choose among different platforms. One of these biases – the status quo bias – describes decision makers' tendency to stick with a given default option when confronted with new options choices (Kahneman, Knetsch, & Thaler, 1991; Ritov & Baron, 1992; Samuelson & Zeckhauser, 1988). This status quo alternative can be set exogenously or as the individual's choice in a previous decision situation (Kempf & Ruenzi, 2006). Evidence from subsequent research reveals that status quo bias can be observed in numerous cases of economic decision making. The methodology that underlies this investigation is quite straightforward.

To arrive at the basic idea of this methodology, we refer to Samuelson and Zeckhauser (1988), who used an experimental setup to test subjects for status quo bias in a sequence of decision scenarios. Using a questionnaire in which subjects faced a set of hypothetical choice tasks, the authors conducted an experiment in the following pattern. In the neutral framing scenario, random subjects were given a set of alternatives, with no alternative labelled as the status quo. These subjects were presented with the following written hypothetical scenario: "You are a serious reader of the financial pages but until recently have had few funds to invest. That is when you inherited a large sum of money from your great uncle. You are considering different portfolios. Your choices are to invest in: a moderate-risk company, a high-risk company, treasury bills, municipal bonds" (Samuelson & Zeckhauser, 1988). In the status quo framing scenario, other subjects were given the same set of alternatives, but one alternative was exogenously labelled as the status quo. In this case, after the same opening sentence, the passage continued: "That is when you inherited a portfolio of cash and securities from your great-uncle. A significant portion of this portfolio is invested in a moderate-risk company [...]. [T]he tax and broker commission consequences of any change are insignificant" (Samuelson & Zeckhauser, 1988). In the investigation of different scenarios, all using the same basic experimental design, the results implied that an alternative became significantly more popular when it was labelled as the status quo. A significant status quo bias was demonstrated in 31 out of 54 cases (Samuelson & Zeckhauser, 1988).

Similar findings can be observed in the decisions about which electricity contract to choose from several options (Hartman, Doane, & Woo, 1991), which car insurance to select (Johnson, Hershey, Meszaros, & Kunreuther, 1993), being an

organ donor or not (Johnson & Goldstein, 2003) and which one to pick among different retirement plans (Madrian & Shea, 2001). Existing studies of status quo bias have proposed numerous explanations for how the status quo affects choice. For instance, the loss aversion theory (Tversky & Kahneman, 1991) assumes that the status quo serves as a reference point, and losses relative to the reference point have greater impact on preferences than gains. The inertia theory (Ritov & Baron, 1992) presupposes people's preference for inaction; maintaining the status quo requires no additional effort and is the easy option. The decision avoidance theory (Anderson, 2003) assumes that people are inclined to make no decision, especially when they have to choose from many options. The incomplete preference theory (Mandler, 2004) combines the status quo bias with the traditional consumer theory by proposing that people with an unchanging but incomplete preference tend to keep the status quo because to their knowledge, their choice is currently the best. Boxall, Adamowicz, and Moon (2009) conducted two separate choice experiments to examine the respondents' tendency to choose the status quo when faced with high complexity (increasing number of alternatives per choice task) in choice. They demonstrated that increasing complexity leads to increased choice of the status quo.

Taking all these explanations into account, the status quo bias could be categorised as the consequence of (1) rational decision making in the presence of transition costs and uncertainty, (2) cognitive misperceptions and (3) psychological and emotional commitment (Camerer, Issacharoff, Loewenstein, O'Donoghue, & Rabin, 2003; Samuelson & Zeckhauser, 1988). Our study focuses on the first category and takes up Samuelson and Zeckhauser's brief mention of the QWERTY phenomenon – "more efficient alternatives seem to have little chance of replacing the classic typewriter keyboard" (p. 34). The results of Hossain and Morgan's (2009) study about the dynamic platform competition led them to conclude that the subjects did not get stuck on the inferior platform, stating that "the quest for QWERTY in the lab proved utterly fruitless" (Hossain & Morgan, 2009). Somehow referring to the phenomenon of the status quo bias and not considering any existence of it, their conclusion strongly contrasted with previous research findings about the status quo bias. Using Hossain and Morgan's (2009) 60 iterations of somewhat rudimentary binary choice tasks between a superior and an inferior platform in the absence of any transaction and/or opportunity costs would produce such outcomes.

In a recent study, Geng (2016) designed a series of laboratory experiments in which the subjects chose among objects of fixed monetary value, expressed in addition and subtraction operations. The subjects were incentivised to seek the alternative that had the greatest value within a given time frame. Building on the work of Caplin, Dean, and Martin (2011), as well as of Gabaix, Laibson, Moloche, and Weinberg (2006), Geng's experiments tried to make evaluating alternatives more cognitively costly, and the subjects must expend their efforts to do so. Geng reports that decision makers fail to select an object that is better than the default 28% of the time. Geng's (2016) findings, the modified experimental settings from Heggedal and Helland (2014) and Meyer (2012) challenges the results of Hossain and Morgan's (2009) study. These results show that following technological developments, the leadership changes that are observed in numerous markets for platforms (e.g., software and operating systems, Internet browsers and video game consoles) may not inevitably produce outcomes in which higher-quality platforms win. A systematic implementation of the considerations mentioned above might have led to different results. Given all this evidence, the assumption that decision makers exhibit a significant status quo bias when faced with a series of simple hypothetical choice tasks is quite likely. According to the rational choice model, subjects should simply select their most preferred alternative when facing a decision. However, the presented findings suggest that subjects are somewhat biased by an exogenously pre-existing status quo option and do not act in a completely rational manner in choice situations. Based on all this empirical evidence, we conclude with Kahneman and colleagues' (1991) statement, as follows: "We have become convinced that [...] status quo bias [...] [is] both robust and important" (p. 205). Having established that status quo bias could be present when consumers are confronted with platform selection decisions, we want to more closely examine the Schumpeterian interpretation of market development and how lock-in effects might be broken up.

### **3. SCHUMPETERIAN INTERPRETATION OF MARKET DEVELOPMENT**

In the previous section, we have offered arguments favouring the QWERTY phenomenon. Despite these considerations, permanent lock-ins are hardly found in markets (in neither inferior nor superior situations). According to Liebowitz and Margolis (1990, 1994), retaining an inferior platform in the presence of a better

alternative means not using profit opportunities. These profit opportunities should offer the owner of the superior platform an incentive to capture the market, even if the owner had to share some switching costs that the customers of the incumbent would have to incur (Liebowitz & Margolis, 1994). Obviously, the higher the quality differences are, the higher the incentives are for a potential newcomer. Tellis and colleagues' (2009) findings about software and operating system markets apparently echo this "quality-wins argument". Gretz (2010) analyses the home video game market with a similar scientific problem formulation. In his paper, he also finds evidence for the major significance of quality. Based on Gretz's (2010) study, Gretz and Basuroy (2013) investigate this question once again, considering the home video game console's life cycle. With this more sophisticated approach, they identify periods in the product life cycle (growth and maturity phase) in which network effects are more important than quality.

Besides these conflicting results, the quality measurement poses another more fundamental problem. For the 32–64-bit era in the home video game market, Liu (2010) suggests that the Nintendo 64 is of higher quality compared to PlayStation. In contrast, Dubé, Hitsch, and Chintagunta (2010) find evidence in favour of PlayStation's quality superiority. Gretz (2010) and Gretz and Basuroy (2013) use a quality measure solely based on hardware components (e.g., central processing unit speed). For their study, Tellis and colleagues (2009) include these hardware aspects in their quality definition, too. Furthermore, they use some "softer" indicators such as "ease of use", collecting this information from consumer and computer magazines. This approach comes with two restrictions. On one hand, the subjective evaluation by the writers of these magazines may be problematic; on the other hand, a measure of quality may not consider all relevant factors.

For any empirical study in this field, it is obviously necessary to choose a useful measure of quality, but inconsistent or subjective measures may lead to conflicting conclusions in the "quality-wins" debate. However, an *ex post* analysis, as applied by Liebowitz and Margolis (1990, 1994), which suggests coordination towards superior outcomes, depends on a correct measure of quality. Otherwise, the main findings could change with every improvement in empirical methods or accuracy.

Our understanding of competition, in which "creative destruction" breaks up lock-ins, does not involve higher product or platform quality as a necessary

condition (even though the products might have higher quality). The most important point is to recognise that an isolated view on a single product of a multi-product company is misleading when such a company operates an overall strategy.

Following (Schumpeter, 2004) argument, “real” economic development only arises when economic players develop “new combinations” of production factors in a novel manner. These discontinuously appearing incidents of economic activities fundamentally affect equilibria and lead to structural changes. Incumbent providers of goods and services may exit the market due to their lost competitiveness. Schumpeter (2008) coined the term “creative destruction” for this process. The following examples emphasise that such a process might be the reason for breaking up lock-ins although the original product remains. Our argument’s main point is that innovative business models can eliminate the old ones and fundamentally change the equilibrium position. Surprisingly, hardly any attention has been paid to the importance of business models in the academic discussion on the lock-in effect and the QWERTY phenomenon. The following examples show that there are prominent cases where our business model approach is helpful to better understand the relevance of the QWERTY phenomenon.

### **3.1. Software and operating system market**

Table 4 of Tellis and colleagues’ (2009, p. 143) article presents an overview of the switches in the market share leadership of the objects under investigation. It is striking that nine of the 17 analysed examples are Microsoft products or services, with Microsoft replacing the market leader in each case. Apart from the personal finance software market, Microsoft is absent in the remaining eight investigated markets, which are therefore not in the main scope of Microsoft’s business model. Tellis and colleagues (2009) argue that the higher quality of every single product is the main driver for the market share leadership switches in the corresponding partial markets.

Following our approach to creative destruction, these findings suggest that it is Microsoft’s complete package – comprising its operating system and complementary, mutually compatible software – that has been able to break up a potential lock-in. This has resulted in Microsoft becoming the new market share leader. Selling PCs with the Windows operating system and frequently preinstalled software has helped penetrate the market. With every sold PC with Windows,

Microsoft creates a default option (status quo) for each customer. It could be assumed that Microsoft uses this hardware–software bundle in a targeted manner, thereby eliminating the time-consuming search for alternative software. Beyond this, increasing diffusion leads to stronger network effects. In summary, this bundling strategy has become a competitive advantage over rivals that focus on their stand-alone software. Obviously, Microsoft’s superior overall strategy has overcome other established business models. At least for the affected markets, this bundling strategy represents a new combination of already existing factors, with a huge impact on the market structure and possible business models. Hence, Microsoft’s successful activities in its targeted markets can be called acts of creative destruction.

However, Tellis and colleagues (2009) highlight the counterexample of the unsuccessful software Microsoft Money and deduce that the leadership of the other Microsoft products and services does not result from embedding them in the overarching Windows platform. They conclude, “The failure of Microsoft Money to dominate Quicken shows that even such bundling power fails to swamp the effect of quality” (p. 148). Certainly, Microsoft Money does not seem to fit in our approach. The same holds true in the case of Google Chrome overtaking the market share of Microsoft’s Internet Explorer in 2012 (StatCounter, 2016). Nevertheless, Microsoft has redefined the business, and the failure of Microsoft Money has obviously not been crucial for its overall corporate success. Microsoft Office retains a vast market share, and we doubt that Word, Excel, PowerPoint and Co. would have reached this position as stand-alone software without Microsoft’s overall strategy. This does not mean that Microsoft will inevitably hold this position permanently. The development in the Internet browser market demonstrates that another innovative company with a good (or even superior) concept may in turn replace the market leader. We discuss this example, *inter alia*, in the next subsection.

### **3.2. The rise of Google**

Founded in 1998, Google is another example of a company that has captured several markets through a revolutionary new business model. We do not present Google’s whole history but highlight some aspects that echo our interpretation of competition. Google began solely as a search engine with high quality (PC-

Magazine, 1999). Due to its quality and cooperation with strategic partners,<sup>3</sup> Google gained the market share leadership, defeating Yahoo!, AltaVista and others (Wall, 2015). Shortly after its market launch, Google built up its business on advertisements, essentially based on the combination of Google AdWords (launched in 2000) and Google AdSense (launched in 2003) (Wall, 2015). These two tools allow advertisers to place content-targeted advertisements. Furthermore, since 2009, Google has offered preference-targeted ads on partner websites and their own websites, such as YouTube (Google, 2016a). In summary, Google does not depend on selling a particular product or service to consumers but offers an attractive platform for advertisers; Google's attractiveness depends on the number of users, specifically, large target groups for the advertisers. This is a typical case of indirect network effects; the platform value for one group (the advertisers) increases with the number of other platform participants (the search engine users). Considering Google's further activities, offering several free products and services, it seems that it has been aware of such effects. Some examples that demonstrate Google's efforts to bind consumers to become attractive for advertisers are Gmail (email service since 2004), Google Maps (map and satellite images, route planning and GPS Navigation since 2005), YouTube (video content platform since 2006), Android (mobile operating system since 2007) and Chrome (web browser since 2008) (Google, 2016b). The list could be continued, but it is important to note that in Google's business strategy, these initiatives are necessary to earn revenues from advertisers. Further examples are Yellow Books' (independent Yellow Pages publisher) policy of offering advertisement for free in the first year it enters into a new city and Adobe's free distribution of Reader. Both strategies have established a technological standard that will generate usage, which companies can capitalise on in the future (Rysman, 2009).

However, we have already mentioned that Google Chrome became the market share leader in the web browsing market in 2012. To understand how Google broke up this lock-in, its overall strategy should be examined once again, comprising the following aspects: (1) Its market share leadership in the search

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<sup>3</sup>Google became AOL's search partner in 1999 and paid several million dollars to Mozilla and Adobe, for example, to be their default search engine or to implement the Google Toolbar in their software (Wall, 2015).

engine platform enables Google the opportunity to advertise for Google Chrome. (2) Chrome is preinstalled and the default web browser on most Android devices (smartphones, tablets and notebooks). (3) Chrome is optimised for other Google web products (e.g., Google Docs). Furthermore, Chrome regularly reaches high positions in web browser rankings (Tripp, 2016). Chrome's high quality likely follows from Google's financial and human resource capacities and programming knowhow. Therefore, Google's browser should not be viewed in isolation from Google's other products or from the overall strategy. In summary, Google's position in this partial market can be explained with its efficiently performing business concept.

Microsoft's Internet Explorer and other web browsers have survived the emergence of Chrome. Google's activities have larger impacts on other markets. For example, since Google Maps' launch, it has become difficult for traditional commercial map providers to sell their products. Google offers maps to consumers for free.<sup>4</sup> Consequently, for many users, fee-based cartographical materials have become obsolete or may be worse alternatives in the view of many customers. Google's free services such as Google Maps are possible because of their advertisement-financed approach; at the same time, these services are necessary to earn revenues from advertisers. Google's success suggests that this innovative approach works better than the business models established until then. There are competitors of Google Maps, but most of them pursue a similar strategy – offer a free service to earn money from something different. In our opinion, this example demonstrates once again how creative destruction works and reshapes complete branches.

### **3.3. Competition among home video game platforms**

The history of home video games in the US comprises numerous interesting events and developments for our investigation. First, the market for portable systems (handheld devices) demonstrates that a superior system can be defeated by a worse rival product. Nintendo and Atari released their handhelds, Gameboy and Atari Lynx, respectively, at almost the same time (Herman, 2001). The original Gameboy featured an under two-inch square monochromatic screen without a

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<sup>4</sup>The limitations are stated in its terms of service (Google, 2016a).

backlight. On the other hand, Atari Lynx had a backlit, slightly larger colour screen; thus, its users were able to play games without an extra light source required to play games on Gameboy. Moreover, Atari Lynx was powered by a 16-bit processor, way faster than Gameboy's 8-bit processor. Although Atari Lynx had a higher introductory price (\$149 vs. Gameboy's \$109), needed two more AA batteries and weighed a bit heavier, it seemed superior to Gameboy. However, due to a delivery shortage, Atari Lynx missed the 1989 Christmas season (Herman, 2001). Gameboy thus captured the market share leadership and held this unchallenged position for several years despite its technical inferiority. The main reasons were the large number of available games (especially some very popular blockbuster games such as Mario Bros. and Pokémon) and the huge user base, in other words, the indirect network effects (Herman, 2001). Numerous competitors tried to establish a portable system besides Gameboy. Many of these had higher quality (e.g., Atari Lynx, Atari Lynx II, Sega Game Gear and SNK NEO Geo Pocket), but all failed to break up Nintendo's dominance in the handheld market. It required remarkable technical progress (Nintendo Gameboy Advance, Sony PSP) or an innovation that introduced consumers to a new kind of game play experience (Nintendo DS) to overcome Gameboy's market position (Forster, 2013).

The market for home video game consoles is a more turbulent case. This market has experienced enormous technical development, from processing eight bits of information in the mid-1980s to 128 bits at a time in the most recent systems. Developments in the processing speed of video game consoles and the associated programming techniques explain the improvements in graphic quality and play experience (Rysman, 2009). However, our study shows that it is not quality or network effects that inevitably lead to success but superior business concepts that include these points. Besides, timing and luck can be important factors as well. In a brief overview of part of this history, we highlight incidents and developments that echo the significance of our holistic business concept approach.

The first generation of home video game consoles in the 1970s had a fixed number of built-in games (Herman, 2001). Typically, these games were the popular ones known from arcade centres. Magnavox's Odyssey, the first home video game console, featured several hard-coded games. Users had to switch circuit boards and plastic overlays for the TV screen to choose which game to play and to display the graphics. Other manufacturers offered video game consoles that had only one

game. Atari's Pong was particularly popular; hence, various Pong clones by different manufacturers entered the market. Among these clones, Coleco's Telstar was quite successful for two reasons. First, its low retail price and second, a chip shortage led to Coleco being the only manufacturer that was able to produce its planned supply (Herman 2001). This incident is comparable to the case of Gameboy vs. Atari Lynx. However, in 1976, Fairchild introduced its Video Entertainment System (VES, later renamed Channel F), the first console that used game cartridges. This innovation enabled owners to just buy these cartridges instead of new consoles if they wanted other games. This superior system rendered the dedicated systems obsolete and initiated the second generation of video game consoles that lasted till 1983.

Not long after, several companies (Atari, RCA, Fairchild, Magnavox, Coleco, Bally and Mattel) offered cartridge-based consoles. Between 1977 and 1980, Bally's Arcade was considered the console that delivered the best graphics. However, it suffered from two disadvantages; it cost \$100 more than Atari's VCS (in 1982, renamed Atari 2600) and only had a few games available (Herman, 2001). In contrast, Atari offered the largest number of games and strived to include some popular titles in its portfolio. For this reason, Atari licensed and ported Taito's arcade blockbuster "Space Invaders" for home use, the first time that a third-party game had been made available for home video consoles (Herman, 2001). In 1980, Mattel released Intellivision, a console that convinced customers for two reasons. First, it had outstanding graphics. Second, Mattel licensed trademarks such as NFL and NBA to give games some kind of "official touch" (Herman, 2001). With these two new aspects, Mattel gained the second highest market share behind Atari despite its comparatively small library of games.

However, up to that time, Atari had sold approximately two million VCS units (Herman, 2001). Since all companies earned most of their revenues from the sale of cartridges, a new company, Activision, decided to offer games for VCS to earn some money, too (Herman, 2001). Because of its much smaller installed base, Activision did not offer games for Intellivision. Activision's games were innovative, challenging and had better graphics than Atari's games because Activision optimally used the VCS capabilities. Atari's VCS sales volume profited from Activision, while Mattel's Intellivision lost market share. However, the superiority of the Activision games also meant that Atari itself sold fewer

cartridges. Therefore, Atari unsuccessfully tried to forbid Activision from selling VCS-compatible cartridges through an injunction (Herman, 2001). Motivated by Activision's success, other software-only companies were founded to offer games. With the market entries of the game developers, a textbook example of a two-sided market emerged. Due to the indirect network effects, most third-party game developers limited themselves to games for VCS. Just a few third-party games were developed for other consoles. Consequently, VCS became more attractive for customers and became the unchallenged market share leader. Mattel and Coleco introduced two new consoles, Intellivision II and Colecovision, respectively. Compared to Atari's VCS, both were technically superior. However, Mattel and Coleco recognised their inability to defeat the VCS-favouring network effects. Therefore, they offered adapters so that all VCS cartridges could be played on their respective consoles (Herman, 2001). For its part, Atari released the Atari 5200, which offered technical quality comparable to those of Intellivision II and Colecovision and was able to play VCS games as well.

Despite these new superior consoles, Atari's VCS was still the bestseller. Its success obviously lay in the importance of the game availability, in other words, the indirect network effects. However, Atari failed to internalise the network effects properly. A misunderstanding of the new market structure could explain why it tried to rule out third-party developers such as Activision. In any case, Atari did not manage to profit from these new market participants. Quite the contrary, Atari lost revenues due to the new competitors in the software market. Although this competition boosted the VCS sales volume, it was also the reason why the game console market collapsed in 1983–1984. The market was oversaturated with video games; customers could not distinguish the good from the bad ones. On the other hand, many companies left the market because they were no longer able to earn enough profits. It seems that the indirect network effect from game developers to console users became negative.<sup>5</sup> Moreover, there was a congestion effect on the developer side. Overall, these factors suggest that Atari's business model was not suitable to handle the new environment.

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<sup>5</sup>More games decrease players' overall platform utility. In another context this phenomenon could be found with similar results (Iyengar & Lepper, 2000; Schwartz, 2004)

This was Nintendo's time to break up Atari's dominance. When Nintendo entered the US console market with its Nintendo Entertainment System (NES) in 1985–1986, it was well aware of the developments that caused the market collapse and adjusted its business model to avoid similar problems (Herman, 2001). Obviously, Nintendo knew that the value of its console significantly depended on the number of available games and that third-party developers constituted the fastest way to acquire games for the console. Therefore, Nintendo allowed third-party companies to produce games for the NES. However, to avoid a renewed flood of (inferior) games, third-party companies needed a licence from Nintendo to produce games for it. Furthermore, all game cartridges were produced by Nintendo itself and had a lockout chip inside, which ensured that solely original, licensed cartridges could be played on the NES. Additionally, Nintendo raised the royalty per sold cartridge from the third-party companies. Nintendo put its seal of quality on each cartridge box to show customers that Nintendo games had to meet quality standards. In summary, it seems that Nintendo's strategy involved a conscious decision with regard to the network effects. In 1986, other consoles were released in the US (e.g., Sega Master System, Atari 7800). Critics insisted that the Sega Master System was superior in terms of graphics and playability (Herman, 2001), but the sales volumes of all Nintendo competitors were small. Therefore, hardly any third-party companies developed games for these rival consoles. Even the 16-bit systems, which were introduced in 1989 (e.g., NEC TurboGrafx, Sega Genesis) and offered much better graphics and speed, were outsold by Nintendo's 8-bit NES (Herman, 2001).

In the Christmas season of 1993, Sega gained a small victory in the 16-bit market against Nintendo's 16-bit successor of the NES (the Super NES) and sold more consoles than the competitors. However, it took some time, until the 32–64-bit era, to really overcome Nintendo's dominant position. To shorten this phase, we only highlight some of the main reasons why a new competitor, Sony's PlayStation, captured the market share leadership during this period. First, Sony seemed to be the first company that really took the structure of the indirect network into account. Sony pursued the so-called "divide-and-conquer strategy", selling consoles at a cheap price (at a loss) to earn profits from the software side (Herman, 2001). Sony's second advantage was in making it easy for third-party companies to develop games for the PlayStation. Sony allowed developers to use its huge library

of codes and routines, reducing the development time for a PlayStation game, much shorter than the necessary time for a comparable Saturn (Sega) or N64 (Nintendo) game (Herman, 2001). In addition to the user base, this was an incentive for third-party companies to develop games for Sony. Thus, the PlayStation became the console with the largest number of available games. However, Sony used Nintendo's approach. Each third-party company needed a licence to release a game for the PlayStation. This restriction was supposed to ensure Sony's standards of quality. Another strategic move by Sony was the Yaroze, a special version of the PlayStation for non-professional game developers. This console was delivered with a toolkit that allowed the owners to develop their own games, play these on their consoles and upload them on a special website. Other Yaroze owners were allowed to play the uploaded games, too, increasing the amount of available games in a controlled manner (Herman, 2001) and binding users to Sony's console. Furthermore, Sony obtained the first right of refusal for the uploaded games so that it was able to monetise any innovative game that a Yaroze owner created.

Although Nintendo's N64 was released about one year after the PlayStation, it earned respectable sales figures and overcame Sega's market share (Herman, 2001). One main reason for Nintendo's success involved some very popular games, especially Super Mario 64. However, the N64 lacked third-party games because developers preferred Sony's larger installed base and the cheaper production costs of PlayStation games.<sup>6</sup> Ultimately, Nintendo failed to prevail against Sony's superior strategy to profit from the two-sided market structure.

We briefly summarise the preceding discussion to clarify our point. The first generation of home video games showed that good games (Atari Pong) or luck (Coleco's Telstar) were reasons for success, but (as Fairchild and others demonstrated) it was easy to replace these companies with the superior, cartridge-based consoles. Atari's market share leadership indicated that quality was not the most important aspect in the market of the second-generation consoles. Otherwise, Bally should have won until Intellivision II and Colecovision were introduced. However, Atari's strategy to profit from the importance of available games seemed superior. Obviously, Atari's business model could not prevent the market collapse

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<sup>6</sup>The PlayStation used CDs, which were much cheaper than the N64 cartridges (Herman, 2001).

in 1983–1984, but this shakeout enabled Nintendo to capture the market share leadership. Nintendo’s approach was a clear advancement because it considered both sides of the market simultaneously. Consequently, Nintendo was able to protect its leadership over the competitors’ superior consoles. Significant technological progress was necessary for Sony to break up the “Nintendo lock-in”. Sony’s strategy simply internalised the network effects better. It is questionable if the lock-ins would have been broken up without the market collapse and technical progress. Nevertheless, Nintendo’s and Sony’s high-performing business concepts were at least necessary to initiate a new generation of video game consoles.

#### 4. CONCLUSION

Are Hossain and Morgan’s (2009) and Liebowitz and Margolis’ (1990, 1994) conclusions right? Does the QWERTY phenomenon just lie “in the minds of theorists”, and will superior products, platforms or standards always win? We do not think so. In general the laws of demand and supply work. However, our examples suggest many markets with (at least) temporary lock-in situations. The status quo bias is a well-known phenomenon that can explain why these lock-ins may evolve. Of course, there might be further reasons, but the missing consideration of the status quo bias could be responsible for the definite results and conclusions presented in the experimental studies conducted by Hossain and Morgan (2009) and Hossain and colleagues (2011). In line with both results from field and laboratory experiments we demonstrate that research on the QWERTY phenomenon and possible lock-ins in bad equilibria expands the scope of inquiry and adds more empirical explanation by introducing the status quo bias.

Furthermore, the case of the home video game market clearly demonstrates that quality does not inevitably win. It is also important to mention that an inferior winner is not necessarily associated with a first-mover advantage. For example, Sega’s Dreamcast was considered the superior console in the sixth generation, and it entered the market first. Nonetheless, it was defeated by Sony’s PlayStation II and Microsoft’s Xbox (Herman, 2001). The case of the home video game suggests that network effects are important. Inferior situations with dominant market share leaders in the presence of better alternatives are possible.

The three examples we have cited also demonstrate the innovative or superior business concepts’ ability to break up lock-ins, which is compatible with a

Schumpeterian interpretation of market development. In the case of the home video game consoles, technological progress or market shakeouts seem to be important. However, the market shakeout after the second-generation console appeared unavoidable; Atari's business strategy failed to manage the new circumstances after Activision entered the market. Nintendo's strategy was necessary to account for the two-sided market structure. Microsoft and Google overcame the leaders due to their superior business models and high or at least sufficient quality. The question remains open whether the QWERTY phenomenon is a problem in reality. Our answer is that it depends on the context: In the short term, people may observe a superior platform losing to an inferior one. Given such a short-term view, it is reasonable to call this a market failure. If a longer period of observation is considered, the situation changes. First-mover advantages and/or network effects and/or luck can lead to inferior lock-ins, but these can be overcome with innovative ideas. That means, while in the past due to a lack of available information or barriers to overcome the transaction costs of the given status quo, first movers' were protected from possibly better competition, these shelters are increasingly repealed due to global digitalisation. In the age of digitalisation, these established structures and industries are breaking up and are reshaped by disruptive forces so that only one or a few best providers will remain.

Superior products constitute the essential reason in Liebowitz and Margolis' (1990, 1994) argument. However, the experimental and empirical studies favouring their contention are not entirely convincing. We think that the experimental studies lack essential factors. We have introduced the status quo bias as one example of an important but untested factor. Consequently, these studies seem to have no external validity. The empirical studies suffer from contradicting results and a problematic measurement of quality. Moreover, the anecdotal evidence offered in our examples depicts another picture – quality does not always win.

Undoubtedly, there are switches in market share leaderships. We argue that some kind of Schumpeterian creative destruction – focusing on the superiority of the new market share leaders' business strategies – may have caused the switches in our examples. We do not see an alternative to ex post analyses to check this interpretation, and we are aware of the shortcomings of anecdotal evidence.

Breaking up an inferior market share leadership regulation could be one possibility. However, in a regulated market, potential innovators can be negatively

affected as well. The decision-making scope is limited. It is possible that innovations do not occur at all because companies cannot implement new strategies. For instance, if the price-setting freedom is restricted on at least one side of a two-sided market, a divide-and-conquer strategy is not possible. Nintendo's and Sony's market entries would not have been possible in the way these have been described in the previous section. Furthermore, this restriction typically leads to less profits of the market share leader. Market entrance incentives are missing. Consequently, potential innovators are confronted with high risks and low profits and forego the opportunity to participate in the market. A new superior product may be unavailable to customers, and persistence in the current state can be caused. Therefore, a broader view of competition should be considered before market interventions are implemented.

If we are interested in efficiency, it may be wrong to dispute whether the better or worse product or service is the current standard. As we have shown, measuring quality is problematic. A valid judgement could often only be reached when the problem no longer existed. Certainly, there are frequently comparatively poor solutions as standard. However, already several years ago Schumpeter argued how entrepreneur-spirit can shake up equilibria. In line with his idea, we suggest that having an innovation-friendly environment should be one of the most appropriate ways to break up lock-ins. And this innovation-friendliness must explicitly include business model innovations, because innovative business models can facilitate profit opportunities that superior products alone do not necessarily have.

Given the fact that digitalisation in general and platform markets in particular have tendencies for monopolisation or "QWERTY situations" respectively, our study gives insights for question how to deal with these cases.

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## CULTURAL STEREOTYPES – A REVIVAL OF BOSCHE’ S VIEW

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*In memoriam Marc Bosche (1959-2008)*

**Abstract:** *The analysis of cultural stereotypes is important for different areas of knowledge. It is usually considered that psychology is concerned about these issues, but this subject is also of interest for some economic subdomains. One of these sub-domains is intercultural management, which attempts to provide intercultural diagnostic models to highlight cultural specific elements and cultural differences and to provide recommendations to valorize them in management. There are even intercultural diagnostic models that are based on the analysis of cultural stereotypes due to their connection with attitudes, values, social norms, therefore of their ability to capture cultural specific aspects. The Bosche approach presented in this article is part of this category. Although the results were not very edifying in terms of cultural specificity, the author noticing the differences between self-stereotypes and hetero-stereotypes, the highlighted conceptual, methodological and epistemological aspects have of special importance allowing their valorization in future intercultural studies.*

**Keywords:** *Culture, cultural stereotypes, intercultural diagnosis, intercultural management, cultural specificity.*

**JEL Classification:** *F15, F36, F63*

### 1. INTRODUCTION

Stereotypes, as constitutive elements of social representations, are important in intercultural knowledge because of the beliefs and knowledge they reflect, but also because they are emotional investments; therefore they cannot have a neutral character (Seca, in Ferréol, Jucquois, 2005). Due to lack of neutrality and also their approximate character, the national or ethnic stereotypes (of which we are

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particularly interested in those involved in intercultural management – A/N), positive or negative ones, can lead to conflicting situations (*idem*).

The intercultural situation is often reduced to the comparison of general cultural features (Bosche, 1991). Stereotypes are often erroneous generalizations or even misinterpretations of the values of another group; but at the same time, they bring additional knowledge about the elements of cultural specificity. There have been and there are preoccupations on analyzing and providing solutions, in order to improve interactions in intercultural situations through knowledge and intercultural formation (Durand *et al.*, 2000).

Amongst the efforts to highlight cultural stereotypes and their analysis, we particularly note the research undertaken by Bosche (1991, 2007), an author with intercultural experience and multidisciplinary competences. In his Doctoral Thesis, *The Problematic of Intercultural Management / La problématique du management interculturel* (1991), he makes an inventory of self-stereotypes (South Korean executives) and stereotypes (French expatriates in South Korea); he concludes that the respondents regard them as certainties, with influence on communication, training and managerial practices. His intercultural diagnosis model is remarkable by its complexity, but also by the interpretative nuances and valuable insights for the knowledge in the field of intercultural management; that is the reason we chose to have it as an example.

Following the analysis of literature, we aimed to present in this article the general aspects related to stereotypes (definition, characteristics, functions, classification and methods of emphasis) and their capacity to reflect the elements of cultural specificity, but also a model of their investigation and an analysis of methodological and epistemological problems claimed by an attempt in this respect. We believe that the presented theoretical and methodological elements can form the basis of future research approaches in the field of intercultural management, rigorously motivated ones.

## **2. STEREOTYPES AND CULTURAL SPECIFICITY**

Stereotypes are sets of features assigned to the members of a social group. They include not only the features considered characteristically to the considered groups' members, but also explanations that allow understanding of those traits (Yzerbyt, Rocher, Schadron, 1997).

Walter Lippman is the one who defines for the first time the stereotypes, giving them a similar meaning to the typographic language and considering them "pictures in our mind" (Chelcea, 2002). He sees the stereotype as an element of the central tendency to regroup events and objects, based on a similarity. For Lippman, the stereotype is a guarantee of our own love, shield against the world, sense of our own value, of our own position and our own rights. At the same time, it is an open expression of the feelings attached to it (Bosche, 1993a).

Other authors sharpen Lippman's definition, relativizing the importance of categorization in the elaboration of the stereotype. A stereotype does not identify with a category; it is a fixed idea that accompanies a category. For example, the "black" category can be spiritually perceived as a neutral, factual, non-evaluative concept, applicable fairly to the racial area. The stereotype enters into action when, and surely if, the category is enriched with "images" and "judgments" about the black man, as being a musician, a lazy and superstitious person (Allport, 1954, Bosche, 1993a).

The stereotype is associated with a syllogistic reasoning because, through it, the characteristics of a group are assigned to any belonging individual (Bosche, 1993 b).

Stereotypes are generally negative, inaccurate, rigid and socially shared (Yzerbyt, Schadron, 1996; Brauer, 2009). Although the rigidity of images in our minds is highlighted, stereotypes are considered indispensable in our daily life orientation, because they help us manage the large information that comes from the social and natural environment (Lippman, 1922, *apud* Chelcea, 2002). In other words, stereotypes function as "information's reduction mechanisms", through which real information gaps are filled (Iluț, 2000). Analyzing stereotypes also takes into account the role of the context: "Stereotypes ease information's processing, allowing the observer to use previously stored knowledge, in a combined way or replacing the recent ones. Stereotypes can also occur as reactions to contextual factors such as social roles [...], group conflicts [...] and power differences [...]. Stereotypes appear in different contexts to fulfill specific functions required by these contexts" (Iacob, 2003). Although they are resistant to change, stereotypes are not so rigid that to be activated regardless of the situation. Their selection by the individual is adaptive. They can also change over time. For example, studies on

the variation of stereotypes indicate that the stereotypes regarding the Germans, Jews and Blacks have changed after the Second World War (Gilbert, 1951).

The literature refers to three theoretical approaches that explain the origin of stereotypes (Brauer, 2009):

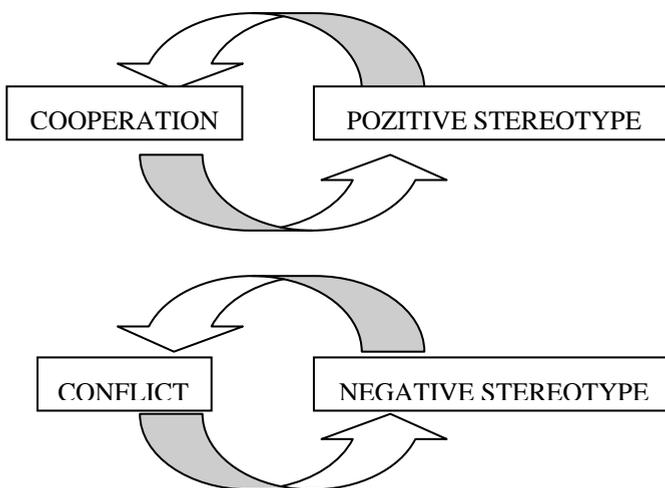
- The *psycho-analytical* approach understands the stereotype as a defense mechanism by which negative feelings towards one's own person are assigned to the members of another group;

- The *socio-cultural* approach considers stereotypes as a result of conflicts between groups, following the struggle for resources. In this case, they justify the existence and perpetuation of social inequalities;

- The *socio-cognitive* approach regards stereotypes as mental representations of initial orientation of knowledge, with an adaptive function, simplifying the social environment by classification.

The attributes assigned to stereotypes can induce conflicting or cooperative behavior to individuals. The interest of individuals may also lead to assignments that can support and justify the cooperation or the conflict (see *Figure 1*). Moreover, stronger psycho-moral features are assigned to the members of groups with whom cooperation is not desired, than of those whom they cooperated with (Avidor,1953).

**Figure 1** Interest – stereotype relationship



The categories according to which individuals create stereotypes are race, gender, ethnicity, social class, occupation, age, religion (Johns, 1998).

Ethnic stereotypes acquire the status of *labels of "self-" and "hetero-identity constructions* (Iacob, 2003). Generally, there is a tendency that stereotypes describe their own group in positive terms (self-stereotypes) and the other groups in negative terms (hetero-stereotypes). It also demonstrated the lack of congruence between individuals' perception of their own behaviors (self-stereotypes) and the view of other groups about them (hetero-stereotypes), which led to the question "what is myth and what reality is?" (Stening, Everett, 1979). Obviously, a general answer cannot be given, because both self-stereotypes and hetero-stereotypes lie between myth and reality, the distance from reality varying from case to case (and if we take into account that cultural reality is revealed to us only by comparison, we realize that we will have different realities, depending on the terms of the comparison).

Stereotypes are influenced by the level of economic and social development of a country or region, by political relations between countries, educational level, religion or dominant political ideology (Zait, 2002).

In most cases, the technique of questioning was used in highlighting stereotypes. In terms of ethnic stereotypes, the checklist method has been often used, in line with the "all or nothing" principle, according to the dichotomist rule promoted by the specific culture school (Chelcea, 2002; Zait, 2002). The analysis of cultural specificity for some ethnic groups recommends further this method. Another method that can be used when respondents have a higher level of education is the one of nuancing the answers (ethical approach), a method which involves the construction of intervals for possible answers (Zait, 2002, 2013).

In the field of business, negative stereotypes act as barriers to intercultural communication and intercultural management. Intercultural training attempts to overcome them through various exercises developed in this purpose (see Bosche, 1993 b).

### **3. A MODEL OF ANALYSIS OF STEREOTYPES**

Starting from the idea that the analysis of stereotypes may provide answers to questions about the nature of intercultural knowledge and they are even ways of access to this knowledge, Bosche (1991, 2007) suggests a model for the analysis of

cultural stereotypes, from the perspective of intercultural and situational anthropology. His attention focused on South Korean culture, the intercultural situation being described by the French – South Korean business. The choice is justified methodologically and practically (South Korean culture is well outlined, South Korea has an increased involvement in the business world, and South Korea's culture points are not well known in France), but we appreciate it was also about author's connections and maybe even his affinity with this part of the world.

In order to describe and situate the South Korean culture, he uses the mixed approach, proposing five research axes (*idem*):

- The analysis of self-stereotypes to obtain an image from within of South Korea, by studying documents that present the popular and academic view regarding the "national character";

- The analysis of stereotypes regarding the vision on female condition, in order to achieve two issues: the one of gender stereotypes and the one of "machismo" and Confucianism, features projected on South Korean society;

- The analysis of hetero-stereotypes provided by French expatriates, to trace what a western businessman should do or do not within the work / business with South Korean partners; presentation of Franco - South Korean comparisons regarding: thinking patterns, ways of presenting feelings and sensitivities, differences in terms of introversion / extroversion, other specific aspects;

- Inventory of stereotypes in both cases, French and South Korean ones;

- Synthesis of results using the factorial analysis of correspondences and highlighting four dimensions of French hetero-stereotypes and South Korean self-stereotypes regarding the "South Korean personality" and the assigned behaviors.

The used instrument to collect data from respondents is the stereotypes' inventory questionnaire, with a version translated for the South Korean population. The author makes important notices about this translation: it was done by a Korean doctorate in French structural linguistics. In addition, the questionnaire was adapted with the help of two native translators, who noted the difficulty of rendering some terms (such as "le sens de l'humour" – sense of humor, "vivre à

cent à l'heure” - live to the fullest, “sexualité” - sexuality), then rendered in the *hangul*<sup>1</sup> alphabet.

The investigated topics regarding the perception of South Korean behaviors were the following: cultural values, relation to time (from the perspective of monochronism - polychronism cultural dimension), habits, cognitive and mental processes, emotional expression and emotional processes, volitional processes and nonverbal communication. We present below examples of items from the questionnaire, to understand the simplicity and clarity of the way of expression (Bosche, 1991, 1993 a, 2007):

**Table 1** *Examples of stereotypes inventory items*

<b>Dimensions/themes</b>	<b>Items (examples)</b>
Values	The Koreans know how to take advantage of the joys of life. The Koreans believe that women are subjugated to men. The Koreans show compassion to the people in difficulty. The Koreans accept that others are different from them.
Habits	The Koreans prefer the social label rather than personal considerations. The Koreans know how to behave at the table.
Relation to time	The Koreans do more things at a time. The Koreans set clear work priorities. The Koreans are committed to their commitments. The Koreans are punctual to meetings.
Cognitive models	The Koreans have a deeply logical thinking. The Koreans notice little details. The Koreans anticipate the facts logically. Koreans have more the sense of abstract than the concrete one.
Emotional Expression	The Koreans know how to listen to people. The Koreans are emotionally fragile. The Koreans read on the faces of others as in an open book. The Koreans control their gestures in stressful situations.
Volitional models	The Koreans are concerned, above all, about effectiveness. The Koreans are starting a new task with enthusiasm. The Koreans lack the will. The Koreans are easily discouraged.

<sup>1</sup> *Hangul* is the South Korean name of the South Korean language alphabet. It is appreciated by linguists as one of the most advanced phonetic systems (see <https://ro.wikipedia.org/wiki/Hangul>).

Dimensions/themes	Items (examples)
Nonverbal communication	The Koreans have an expressive mimic. The Koreans are smiling. The Koreans do demonstration gestures when they talk. The Koreans look straight to the discussion partner.

Source: translation, adaptation, processing (A.N.N.) *apud* Bosche (1991, 1993 a, 2007)

The results of the study highlighted, among others (Bosche, 1991, 1993 a, 2007):

- Strong divergences between self-stereotypes and hetero-stereotypes, in some cases: The Koreans validate statements such as “The Koreans are good on alcohol”, “The Koreans live their lives to the fullest”, “The Koreans have a deeply logical thinking”, while the French invalidate them;
- Strong agreements in other cases: “The Koreans know how to take advantage of the joys of life”;
- Four axes of semantic interpretation, using the factorial analysis: certainty (factor 1), valence assigned for behaviors (factor 2), understanding / complicity (factor 3), meta-communication (factor 4).

The grids for interpreting and typing answers as well as the analysis of stereotypes’ functions deduced by the mentioned factors (see Table-2) are extremely useful in intercultural communication and they can form the basis for the formation of intercultural competences required in international business relations.

**Table 2** *Functions of stereotypes in intercultural practice*

Factor	Name of factor	Polarity	Mode
4	Meta-communication	-	The critique of practices <i>The honesty of stereotypes</i>
3	Understanding (complicity)	Understanding / indifference	Observing the particular <i>The limits of the stereotype</i>
2	Assignment	Chauvinism / devaluation	Emotional anchoring <i>The effectiveness of the stereotype</i>
1	Certainty	Uncertainty / certainty	Acceptance of a generality <i>Activating the stereotype</i>

Source: Bosche, 2007

To understand the functions of stereotypes in intercultural practice, Bosche (2007) provides the following explanations:

- At a first level, we may talk about the uncertainty or the certainty experienced by an individual while facing a stereotype. Understanding and accepting a generality lead to the activation of the stereotype;
- The second level is represented by the individual's projections. He tries to protect himself from devaluing or chauvinistic intentions. It is an emotional level at which the self- or hetero- stereotype is accepted or rejected, hence its efficacy;
- The third level is the one of understanding. The individual can get involved observing the subtle nuances of a particular culture, and analyzing what is revealed by comparison, or he can remain indifferent to the dominant stereotypical suggestions. He will let them circulate (and thereby he validates them) by his lack of interest in the culture that reveals to him, or by his lack of ability to notice the characteristics of the evaluated culture;
- The fourth level, the meta-communication one, involves overcoming the barriers generated by stereotypes. The individual's attitude is a critical one; he refuses to accept and convey a positive or negative judgment, an assessment, criticizing even the support that leads to its engendering.

After explaining the functions of stereotypes in developing individual representations based on the content of the factors that define the levels of analysis, Bosche draws, by analogy, hypotheses and consequences needed in intercultural management, a field for which collective representations matter. The author asserts that the whole knowledge developed in the field of intercultural management is profoundly stereotyped; as well, intercultural representations are also elaborated based on the transmission of dominant visions, due to specific contextual factors (the prestige offered by the specialists in the field, the academic language, the written communication that becomes inspirational for managers, etc.). The explanations given in this case are the following (Bosche, 2007):

- Level 1: The dominant vision in intercultural management is that there are stable differences between cultures and specific features can describe them; therefore, by "knowledge", there are proposed certainties regarding the cultural features, which are undertaken later;

- Level 2: intercultural knowledge influences the dominant social practices. They will be marked by intercultural stereotypes spread through "knowledge", contributing further to their dissemination and consolidation. The "projection" acquired by accepting the knowledge does not confer importance to the roles of observer and co-creator of individual's reality. Thus, the emotional part and the personal valorizing or de-valorizing assumptions are shaded;

- Level 3: the stereotyped cultural descriptions can act as barriers to the diversity of observations and nuances that might result from personal experiences derived from the complicity with a new culture. The particular underlines real situations; the interpretation varies depending on subject and context, while the imposed, creditable vision can provide us a general, coarse, frozen and false framework;

- Level 4: knowledge disseminated in intercultural management can be a tool of power that presents itself as a communication tool, being dominated by certain ideologies. This knowledge can also be seen as an internal social control tool. The first step towards a satisfactory cultural knowledge would be the initiation of some researches from a critical perspective, by questioning the data that appear in a stereotyped manner in the intercultural knowledge.

#### **4. CONSEQUENCES AND CONCLUSIONS**

The importance of knowledge of cultural stereotypes has been highlighted in the field of intercultural management, with at least three arguments:

- Sometimes, stereotypes can transmit elements of cultural specificity; therefore, by careful inventorying and careful analysis of self- and hetero-stereotypes we can come closer to national / ethnic cultural features;

- Stereotypes influence intercultural relationships, and their negative character can act as intercultural barriers and may generate different forms of reaction to other (discrimination, xenophobia, etc.). Knowing the role of stereotypes and becoming aware they are only perfunctory judgments that do not reflect necessarily the features of a class of individuals, can lead to attitude changes and different approaching ways when relationships with people from other cultures are developed. This situation is possible through the formation and development of intercultural competences.

- Even the knowledge of intercultural management (and not only) is profoundly stereotyped. Many cultural traits and even the way they have been highlighted reflect visions / ideologies of the researchers who were influenced by their own preconceived ideas. Later, these ideas benefited from a wide spread due to a favorable context. That is why critical analysis of meta-communication is recommended; even the basis that generates stereotypes should be evaluated. This requires more attention to the context, to the particular, in the detriment of simplistic and sometimes un-conforming generalizations of reality.

The emphasis on cultural stereotypes, considered as elements that can transmit features related to the way of thinking, feeling and acting of individuals belonging to a particular group (national, ethnic, etc.), requires a careful methodological approach. Some recommendations result from the research model presented in this article:

- Collecting data from multiple sources, using mixed, qualitative and quantitative approaches (complementary research axes);

- Analysis and interpretation of data using a complex methodological tool (we are talking, in fact, about triangulation at all stages of the research);

- Use through adaptation of data collection tools (round-way translations, realized with the help of natives, to ensure the conditions of equivalence);

- Critical analysis and interpretation of data, surprising all aspects that, in a way or another, could lead us to simplified generalizations: understanding the causes of significant differences that arise between some self-stereotypes and hetero-stereotypes; awareness of the influence of even some preconceived ideas of the researcher that make him (her) privilege certain theories and directions of research; objectivity on stereotyped knowledge, imposed by a favorable context (also possible as an effect of the concordance with a certain scientific paradigm, accepted at a certain time), etc.

It is important that, based on the knowledge of stereotypes and the analysis of their functions, training programs be created to help individuals to overcome the consideration of stereotypes as certainties about groups' specificities, to abandon devaluing projections, to accept the "complicity" needed to observe and understand a new culture and to adopt the critical perspective in cultural assessments.

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