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Journal of Applied Economics and Business

OPEN ACCESS ARTICLE

UK AND SPANISH BANKS PERFORMANCES BEFORE, DURING AND AFTER THE FINANCIAL CRISIS: CONSUMER BEHAVIOR AND ATTITUDES TO PERSONAL RISK

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Abstract

This paper analyzes and compares the UK and Spanish banks performances before, during and after the financial crisis with a focus on the trend of ATMs, payment cards and accepted devices, ROA and ROE. The study results indicate that UK consumers use their bank cards more often than the Spanish consumers even after the financial crisis. Besides, UK banks´ consumers still preferred to use their debit cards at the Point of Sale. In contrast, Spanish consumers will rather use their credit and/or debit delayed cards. The number of ATM withdrawals and the average value of an ATM withdrawal that indicate the use of ATMs have been most negatively affected by the financial crisis in Spain than in the UK. Moreover, while Spanish banks were still profit making, UK banks were wiping a huge loss on ROA and ROE at the peak of the crisis. Nevertheless, all the way through the 5 year period UK banks almost appear to be back to full health, whereas Spanish banks have gradually started experiencing the intense reverberations of the financial crisis. Indeed, the output results of this study increases banks stakeholders' knowledge by providing insight into some determinants of payment instrument use by either consumers or business that are somehow linked to the bank's financial operational decisions as well as the stability and sustainability of the cross-countries banks performances.

Key words

Bank performances; ATM; Debit Ccard; Credit Card; Return on Asset; Return on Equity

INTRODUCTION

The ultimate financial crisis has caused massive upheaval in the global economy and

has led many banks worldwide the challenge to overcome great difficulties. Particularly, the European banking market has witnessed record turmoil as it has suffered a period of sizeable change and uncertainty. With the financial institutions that had benefited from record profits in 2007, now the subject of intense public scrutiny and, in many cases, the beneficiaries of taxpayer-funded support (Saiz and Pilorge, 2010). Moreover, bank´s revenue growth continues to be challenging to achieve due to frail economic conditions, low interest rates and regulatory restrictions (Karr, 2012). Besides, banks are trying to manage costs better, deepen relationships with customers and enhance product mix and pricing decisions (Karr, 2012). Furthermore, to alleviate the impact of the global financial crisis on the banking sector, governments are undertaking drastic restructuring programs in the banking sector which involve recapitalization, foreclosures, mergers and acquisitions, and the privatization of some state-controlled banks (Sufian & Habibullah, 2010; Wilson, 2012; Peachey, 2012).

Across Europe, depending on the country the effects of the financial crisis have differed and as a result the consequences of the crisis on banking performance have varied. For example, according to Tremlett and Treanor, (2012), in 2008 at the peak of the global financial crisis, while UK banks were most negatively impacted with a big loss of net profit (about € 50bn), Spanish banks as a whole were still enjoying some return on investment. At the time, Spaniards were told they had the world's best central bank-one that had banned Spanish banks from buying dubious US mortgage derivatives. Nevertheless, four years after the markets have been alarmed at an intervention by the Spanish government to shore up the country's banks (Loo & Lewis, 2012; Monk, 2012). Noticeably, the need for intervention comes four years after the UK was bailing out its banks loaded with toxic subprime debt.

In addition, each European jurisdiction has been impacted differently by the financial crisis. For example, according to Saiz and Pilorge, (2010) more than half of UK consumers reported a heightened loss of trust in banks compared with those of European countries. The authors further argued that UK customers have opted to have just one product with their main bank, while Spanish customers are most likely to hold between five and six products with their banks. According to Karr, (2012), banks are taking steps to improve their performance capabilities in light of general economic change, market conditions and new management needs. Consequently, the ATM and bank card industry are undergoing significant change (Zinman, 2005). Apparently, as a consequence of the financial crisis, new regulatory strictures are affecting the underlying economics of businesses such as credit card issuing and processing. According to Hayashi et al, (2003); Zinman, (2005); Bikker & Bos (2008), and Saiz & Pilorge (2010), some of the most dramatic changes include:

- Sharp growth in the Point of Sale (POS);
- Debit card transactions;

- Intense competition between online and offline debit cards;
- Heavy consolidation of regional telecommunication networks and third-party service providers;
- Growing importance of nonbank ownership of networks;
- New pricing structures;
- New strategies etc.

Additionally, households that have recently experienced bad financial outcomes are more likely to substitute credit for debit. Besides, consumers with negative expectations about the future are more likely to use debit rather than credit (Borzekowski et al, 2008). Against these backgrounds, there is an obvious opportunity for taking a step back and assess bank´s performances in both Spain and the UK before, during and after the financial crisis.

Undoubtedly, the UK and Spanish cases form an historical argument that can be used to demonstrate how the implementation of a strategy is as important as strategic visioning to achieve competitive advantage in bank markets (Bátiz-Lazo, 2004). In addition, the performance of banks has always been an issue of major interest for various stakeholders such as depositors and regulators as well as customers and investors (Fethi & Pasiouras, 2009). Since, it allows to distinguish the efficient banks from the unproductive ones in addition to obtain valuable insight into some financial dimensions that are by hook or by crook link to the bank's financial operational decisions (Hancock & Humphrey, 1997). Moreover, the extant literature related to banking intake indicates that new channels such as online banking and telephone banking are becoming more and more important. Accordingly, understanding the evolution of the adoption of card payment and other accepted devices and also the banks' net income after the financial turmoil is of paramount importance. Consequently, the main objectives of this study are twofold:

(i) To analyze and compare the bank performances between UK and Spain with the main focus based on the trend of the ATMs, payment cards and accepted devices; and

(ii) To use the Chi-Square tests analyze the bank performances differences based on Return on Asset (ROA) and Return on Equity (ROE) in the period 2007-2011.

After this introduction, in the literature review section, we discuss and present the existing literature related to bank performance assessment in general and in particular the chosen bank performance indicators for this study. Then, the methodology used in the study is presented followed by the results of data analysis. This paper ends with the study's general conclusions.

LITERATURE REVIEW

Measuring bank performance

In general, Bank performance can be expressed in terms of competition, concentration, efficiency, productivity and profitability (Bikker and Bos, 2008). Previous literature indicates that a financial institution is alleged efficient if its bank statement shows cost-effective and profitability improvements in addition to the growing volume of funds flowing from depositors to borrowers, deepened relationships and a better quality of services to customers (Molyneux & Thornton, 1992; Hayashi et al, 2003; Fethi & Pasiouras, 2009; Saiz & Pilorge, 2010). According to Sufian and Habibullah (2010), there is a relation between the well-being of the banking sector and the country's economy growth. Since, the banking sector is the backbone of the economy and plays an important financial intermediary role by keeping the savings of the public and finances the development of business and trade. Therefore, banks´ health is very critical to the health of the general economy at large. This is evidenced by previous studies such as Molyneux and Thornton (1992) that examine the determinants of bank performances across eighteen European countries between 1986 and 1989 and found a statistically significant positive correlation between concentration and bank return. Besides, their study results showed a significant positive relationship between the return on equity, the level of interest rates in each country and the government ownership.

Furthermore, Kosmidou et al, (2005) analyzed the determinants of profitability of the UK domestic commercial banks from 1995 to 2002 and showed that the capital strength represented by the equity to assets ratio is the main determinant of banks' profits. Their study further showed that both cost-to-income ratio and bank size impact negatively on bank profits. In the same vein, Pasiouras and Kosmidou (2007) examined the performance of domestic and foreign commercial banks in the fifteen EU countries during the period 1995–2001. The results of their study indicate that profitability of both domestic and foreign banks is affected not only by bank specific characteristics, but also by the financial market structure and macroeconomic conditions. More recently, Sufian and Habibullah, (2010) examine the impact of financial crises on bank´s performance in Indonesia during the period 1990–2005 and concluded that Indonesian banks seem to have been skimping on their resources, particularly, during the pre-crisis and crisis periods. Besides, their study shows income diversification and capitalization are positively related to bank profitability while size and overhead costs exert negative impacts.

Furthermore, Johnes et al, (2012) examined the efficiency of Islamic and conventional banks´ performance during the period 2004-2009 and concluded that Islamic banks were found to be less cost efficient but more efficient than conventional banks in revenue and profit. Besides, they argued that the average efficiency in Islamic banks is lower than conventional banks. Likewise, Fethi and Pasiouras, (2009) presented a

comprehensive review of some exiting bank performance assessment, by discussing a total of 179 studies published between 1998 and 2008. They recognized that a number of approaches including: applications of data envelopment analysis (DEA) in the estimation of bank efficiency and productivity growth. Moreover, the financial ratios analysis (FRA), operational research (OR) and Artificial Intelligence (AI) techniques were used to assess banks´ performance.

Commonly, banks have their own performance measurements improvement agendas tied to their unique needs and strategies. For some banks, these are continuations of prior efforts and for others they are new initiatives (Karr, 2012). Yet, banks are complex organizations which produce an assortment of outputs from a variety of inputs. Accordingly, Johnes et al, (2012) argued that one approach cannot capture the complete picture of the performance of such an organization over the breadth of its activities. Besides, there is no clear criterion for selecting a bank´s performance assessment method that is appropriate for all interested parties (Fethi & Pasiouras, 2009). Nonetheless, this study acknowledges that the assumption of underlying financial ratios that banks are more likely to be keen on include: cost minimization, profit maximization and revenue maximization. Given that they are the most pressing bank objectives to achieve because the shareholders of a bank are entitled to its profits (Bikker & Bos, 2008). Consequently, financial ratios such as ROE and ROA were chosen as a method of comparative analysis in this study. Since, they are important factors for banks comparison in general and in particular in the context of UK and Spanish.

Undoubtedly, financial ratios such as ROE and ROA are very popular tools because they are effortless to compute and interpret (Fethi & Pasiouras, 2009). They can enable inter-bank comparisons as well as easing the comparisons between banks and the benchmark which is commonly the average of the industry sector (Molyneux & Thornton, 1992). In addition, with the financial ratios ROE and ROA, bank performance evaluation is examined from various perspectives including costs, revenue and profit, which in turn are of prime importance to bank stakeholders especially after the global financial crisis.

Importance of Automated Teller Machine (ATM)

Indisputably, the introduction of automated banking has established numerous opportunities for business professionals to enhance current marketing and accounting practice (Al-Hawari & Ward, 2006). According to the archival research by Batiz-Lazo (2009), the first ATM was originally a British innovation and was manufactured by e.g. Chubb and De La Rue who developed cash dispensers' technology. Throughout the years, the British manufacturers were overtaken by U.S. manufacturers (e.g. NCR) and German (e.g. Siemens-Wincor). From a business

history stance, the author argued that the introduction of ATMs was profitable for banks as well as customers. Given that Information Technology in banking (epitomized by ATMs) led to reduced operating costs, coupled with increased output (number of transactions) that resulted in greater efficiency. Besides, ATMs characterized a shift in bank strategy, namely how applications of computer technology moved from being potential sources of competitive advantage to being a minimum requirement for effective competition in retail finance (Milne, 2006). According to Chen and Zhu (2004), the IT added value activity in the banking industry helps to effectively generate funds from customers in the forms of deposits. Given that ATMs, bank cards and Point of Sale (POS), which constitute a significant portion of IT, are often regarded as weapons used by banks to capture or protect deposit market shares (Snellman, 2006).

Observably, the use of ATM services has become prevalent worldwide. Since, ATMs can be located in various geographical dispersed areas and mainly in places of interest which are nonbank locations such as: stores, petrol stations, shopping centres, train stations, airports, etc. In general, customers can use ATMs for several types of routine transactions such as bill payments, transfers, deposits or withdrawals at their convenience with no limitation on working hours (Yaya et al, 2013). Subsequently, ATMs might reduce the need to expand branch banking facilities by serving as inexpensive substitutes for new branch buildings. According to Santos and Peffer (1993) study, early adopters of ATMs gained competitive advantage because of lower variable on production costs and increase of customer value. Besides, because of extra fee charges customers may consider ATMs availability as a reason for choosing a bank (McAndrews, 2003; White, 2004). Hence, ATM availability and improvement of service offer might help banks to put forth to more customers and provide better service and enhance customers' loyalty (Yaya et al, 2011).

Furthermore, some studies have investigated the influence of ATMs on the pricing structure and fees, cost savings and technology adoption in addition to the use ATMs as an example of banks diffusion and the ATMs adoption network effect (Santos & Peffer, 1993; Saloner & Shepard, 1992; Hawari & Ward 2006). According to Al-Hawari & Ward (2006), ATMs service quality indirectly and positively influence on bank financial performance via the mediators of customer satisfaction and retention which in turn contributed towards improved financial performance of banks. On the other hand, Santos and Peffer (1993) showed that ATM adoption increased bank´s employee efficiency and market share gains.

In addition, Saloner and Shepard (1992), based on banks´ adoption of ATMs over 1972-1979 in the United States, showed that network effect is important for the ATM adoption. Given that the adoption delay decline in the number of branches (a proxy for the expected ATM network size in equilibrium) and the value of deposits (a

proxy for the number of users and hence for production scale economies) (Hancock & Humphrey, 1997). Nevertheless, such a proxy would not be suitable nowadays given that many ATMs are sited in premises other than banks. Likewise, Milne, (2006) study compared payments arrangements in the UK, Norway, Sweden, and Finland. The study also discusses the impact of network effects on incentives to adopt new payments technology and concluded that the network effect is important in the ATMs adoption.

Furthermore, Snellman (2006) investigated the dependence between ATM network market structure and the number of ATMs and concluded that the monopolisation of ATM networks leads to a decreased number of ATMs and hence a lower service level. On the other hand, Olatokun and Igbinedion (2009) investigated the constructs of advantage, complexity, compatibility, and trial-ability and concluded that they were all found to have a significant impact on the customers´ attitude towards the ATMs, which in turn had a significant impact on the intention to use them.

Consumers´ choice of payment device

In the last three decades, the payment system has experienced a period of rapid changes that have gone beyond the traditional ways of using ATMs and POS debit. Banks in general are actively promoting the issue and the use of ATM cards and credit cards as well as debit cards and smart cards. According to Hayashi et al, (2003) there has been substantial innovative activity generating new products and services that use the ATM/debit card infrastructure. Especially, with the intense development of both contact and contactless cards as well as the electronic wallet.

Ultimately, new applications that allow debit cards to be used to make payments on the Internet and to convert paper cheques into electronic payments at the point of sale have being developed and are now been used by customers (White, 2004; Snellman, 2006). Additionally, new players such as supermarkets, insurance companies and football clubs have been allowed to compete in the retail financial market offering financial services such as credit cards, debit delayed cards, unit trusts, etc. (Kosmidou et al, 2005).

According to Borzekowski et al, (2008), ATM cash withdrawals are now declining, while the number of credit card transactions is growing only slightly. As a result, the debit card has surpassed credit and is becoming the dominant form of payment for many consumers in the US. Since, it accounts for nearly 12% of all retail noncash payments and represents a fivefold increase in just five years (Hayashi et al, 2003). Furthermore, Gerdes and Walton (2002) study indicates that debit cards in the USA were used for over $15.5 billion in the POS transactions totaling $700 billion in the year 2002. These figures represent about 35% of electronic payment transaction volume. In addition, their study shows the debit's ascension has been sudden, with

47% of households using it by 2001, up from 18% in 1995.

In general, bank industry observers are now predicting continuous strong growth for debit cards, while forecasting relatively weak growth in credit card charge volume. Nonetheless, with the ultimate economic turmoil, the question still remains of what is customer preference of a specific mode of payment (debit or credit or cheque or e-money) at the POS. Given that the ultimate market research and conventional wisdom suggest that debit cards which draw directly on checking account balance offer no benefits to the neoclassical consumers (Zinman, 2005). In contrast, White (1976) study that analyses the effects of credit cards on households' demand for money argued that increased use of credit cards can be expected to reduce the amount of money needed for transactions. However, credit card payment services are not cheap given that about 5% or more of the value of an average consumer's purchase is eaten up in payment costs (Hancock & Humphrey, 1997). Furthermore, Humphrey et al, (1996) empirically studied the use of cash and five non-cash payment instruments (cheque, paper giro, electronic giro, credit card and debit card). Based on the data from 14 countries and between the years 1987-1993, the authors concluded that countries are actually adopting the increasing use of electronic payment methods even when the mix of payment instruments differs considerably across countries. Evidently, despite the risks of any individual's consumer choice may be small, the varieties of mode of payment and cash withdrawal choices have greatly enriched the possibility of increase competition in the financial services. For example, the POS or ATM network market structure may change depending on consumers' choice. Hence, payment choices might pose great challenges to the banks as the environment in which they operated changed rapidly. Obviously, that rapid change might hardly affect the bank performance in general and especially during and after the financial crisis.

SAMPLE AND DATA COLLECTION

The empirical analysis presented in this study is based on the real data customer usage compiled from UK and Spanish Banks. Data was collected from the European Central Bank (ECB), Bank of England and Banco de España data warehouse. In case there was any confusion on the understanding or the reading of any set of data, an e-mail was sent to the statistical department of the specific entity requesting additional information, orientation and/or further clarification. The data were collected for the time period 2007-2011. This was an encouraging time period over which to carry out this study. Since, the chosen time period allows us to gain insights into the effects of the economic turmoil and the instability of the banks performances before, during and after the financial crisis. Obviously, most of European banks follow the same standardized procedures in publishing financial data. Yet, data from the Bank of England accounting year balance sheet was given in British pounds sterling (£). Nevertheless, all the variables used in this study were computed on the basis of the

year average exchange rate of the pound sterling (£) vis-à-vis the Euro (€) documented in the European Central Bank yearly report.

Data analysis methods

In order to compare and analyzed the performances of UK and Spanish banks before, during and after the period of global economic turmoil, this study adopted the chi-square tests of independence and goodness-of-fit based on the actual functioning of banks outputs account. We first set the null hypotheses $H0_k$, which states that, for each k^{th} bank performance with $k \in$ {1, 2, 3, 4, 5, 6, and 7}; there is no significant difference between UK and Spanish banks. With k related to bank performance issues such as the trend of ATMs, payment cards and accepted devices as well as ROA and ROE between the periods 2007-2011.Thereafter, we computed the chi-square values for each bank performance as follows:

$$\chi^2 = \sum_i \sum_j \frac{(O_{ij} - E_{ij})^2}{E_{ij}} \quad (1)$$

In formula (1), for each k^{th} bank performance (e.g., k=1 for the "ATMs with a cash withdrawal function"), the null hypothesis was assessed based on the overall outputs under that performance (e.g., for k=1, $i \in$ {2007, 2008, 2009, 2010, 2011} and $j \in$ {1, 2}). Moreover, *Oij* represents the observed data output and *Eij* represents the expected output corresponding to the i^{th} bank performance option (e.g., i= 2007) and the j^{th} represents the country (j=1 for UK and j=2 for Spain). Initially, drawing on the banks yearly report we recorded all the observed outputs *Oij* on a basic two-dimensional array of cells. Thereafter, to determine the expected output (*Eij*), we worked through NxM contingency tables to manually compute it based on formula (2) below.

$$E_{ij} = \frac{(\sum_i Oij)(\sum_j Oij)}{\sum_{ij} Oij} \quad (2)$$

In this formula, *Oij* corresponds to the i^{th} yearly option and the j^{th} country category and characterizes the genuine end of the year bank outputs (e.g., k=1 for the "ATMs with a cash withdrawal function", *Oij* = 63476 correspond to i=2007 and j= UK). More importantly, for each banks performance output *(Oij)* in each k^{th} banks' performance we did not set any expected results (*Eij)*. Still, we assumed the total independence of each row and column. In addition, "N" characterized the total number of (i) different options and "M" represented the number of (j) different categories. Additionally, we computed the degrees of freedom for each of the seven banks' performances based on *Df* = (N-1)*(M-1). Thereafter, the p-values were estimated based on the outcome of those results. Finally, the overall results were summarized and presented in Table 1.

TABLE 1. CHI-SQUARE BASED ON BANKS' PERFORMANCES OUTPUT DATA

Banks' performances	Years	UK(*)	Spain(*)	
	i	O_{i1}	O_{i2}	*k*
ATMs with a cash withdrawal function				1
Df =4; χ^2 = 188.415; P= 0.000	2007	63476	60588	
	2008	63916	61714	
	2009	62192	61374	
	2010	63137	59263	
	2011	64369	57243	
Numbers of ATMs per millions of inhabitants				2
Df =4; χ^2 = 2.865; P= 0.580	2007	1040.83	1350.19	
	2008	1041.01	1353.57	
	2009	1006.47	1336.27	
	2010	1014.05	1286.29	
	2011	1026.05	1241.04	
The number of ATM cash withdrawals				3
Df =4; χ^2 = 2.17; P= 0.704	2007	2834.00	970.31	
	2008	2876.00	976.93	
	2009	2916.00	949.69	
	2010	2786.00	947.70	
	2011	2874.00	927.52	
Cards with debit function				4
Df =4; χ^2 = 1680517.673; P= 0.000	2007	71624000	31467441	
	2008	76271000	31574916	
	2009	79270000	30744621	
	2010	84642000	28616895	
	2011	86325000	27078950	
Cards with credit and/or delayed debit function				5
Df =4; χ^2 = 665547.53; P= 0.000	2007	67311000	43491863	
	2008	66163000	44820244	
	2009	58604000	43773586	
	2010	55601000	42963881	
	2011	54483000	41890560	
Return on Assets				6
Df =2; χ^2 =48.467 ; P= 0.000	2007	3.0	8.6	
	2008	-5.1	5.8	
	2009	-4.9	4.2	
	2010	-2.6	3.2	
	2011	-0.1	-4.2	
Return on Equity				7
Df =2; χ^2 = 55.84; P= 0.000	2007	2.0	12.3	
	2008	-6.4	7.8	
	2009	-5.4	5.1	
	2010	-2.8	3.6	
	2011	-0.2	-3.9	

* The data in the table represents the yearly banks outputs account with O_{i1} and O_{i2} are the observed outputs data of the i^{th} option representing the year of the output data for UK (j=1) and Spain (j=2) respectively.

RESULTS

Trend of ATMs Terminals

The first cash dispensers ATMs were installed in the UK in the nineteen sixties and in Spain a decade after. According to the data from the ECB, the number of ATMs has been sharply increasing throughout each year after the nineteen nineties in both countries. However, the question of interest was to know if the number of terminals was still trendy and if there was any significant difference between UK and Spain after the financial crisis. The overall results showed in Table 1 indicate that there is a significant difference between both countries related to the trend of ATMs with cash withdrawal function (Df =4; $\chi 2 = 188.415$; P= 0.000).

The detailed analysis indicates that there were more ATMs with a cash withdrawal function in the UK (64,369) than in Spain (57,243) in the period 2007-2011. However, while the numbers of ATMs in the UK increased by about 1% in 2011 compare to the year 2007, the Spanish banks experienced a sharp decrease of about 6% in the same period. Observably, up to the year 2008 (early stage of the financial crisis) both countries were still expanding their ATM network. Thereafter, both countries adopted an utterly divergent approach to respond to the adverse effects of the global financial turmoil. For example, from 2009 on going, while the number of ATMs increases by about 2% yearly in the UK, the Spanish counterpart number of ATMs decreases by about 3%. One of the main reasons is that before the 90´s Spanish banks were dominated by savings and credit cooperatives with their operations zone imposed and limited to specific regions or provinces. After the barrier was lifted, except two savings banks that have branches all over the country, most of them were still traditionally cramped to a specific region or province.

Moreover, in response to the financial crisis, the Spanish government took bold steps such as to persuade Spanish banks in general and in particular savings banks and credit cooperatives to merge in order to yield Spanish financial holdings that could adequately compete with foreign banks. According to Snellman (2006), there have been three ATM networks in Spain since 1970. In contrast, the UK had only one network since 1999. Evidently, it is more likely that the monopolization of ATM network market structure in the UK may lead to a smaller number of ATMs. On the other hand, the high ratio ATMs in Spain may be the consequence of the various incompatible ATM networks.

Given that both country's population size are different, it was necessary to scale and compared the numbers of ATMs per millions of inhabitants. The results presented in Table 1 show that throughout the 5 year period there was no significant difference in term of ATMs trend per millions of inhabitants (Df =4; $\chi 2 = 2.865$; P= 0.580). Still, after Portugal and Belgium, Spain is the third country in Europe with the highest

number of ATMs per million inhabitants with about 1350 ATMs per million inhabitants. That figure is about 23% higher than in the UK. The results also show that after the financial crisis the worst drop in the number of ATMs in the UK (3%) was in 2009. Nevertheless, the number of ATMs appears to steadily increase yearly thereafter (Figure 1).

Conversely, Spain's number of ATMs has been endlessly decreasing since 2009. All in all, the number of ATMs per million inhabitants compared to 2007, before the financial crisis has decreased by 1% in the UK and 8% in Spain in 2011 and the UK number was still about 18% lower than the Spanish. These findings are consistent with Peachey, (2012) who argued that many of the Spanish smaller and weaker banks have had to merge or have been rescued by larger ones. The author also argued that the number of branches has been cut by 15%, and 11% of the jobs in the industry have gone.

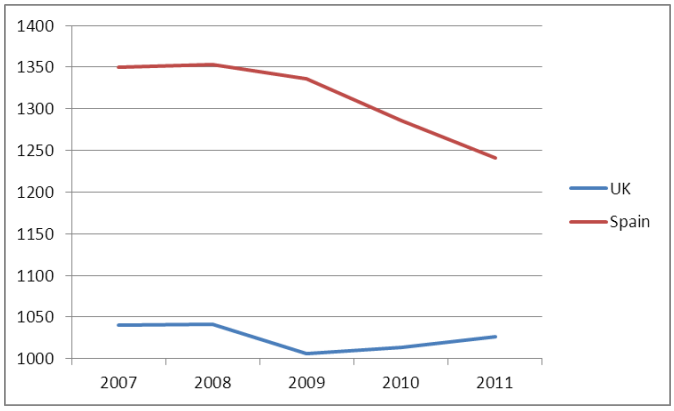

FIG. 1 NUMBER OF ATMs PER MILLION INHABITANTS

Furthermore, solely the number of ATMs per million inhabitants cannot be considered to indicate the availability of ATM services. Given that the proportion may be lofty because of many incompatible ATMs. Besides, even though the number of ATMs per million inhabitants is low, some of the ATMs are incompatible. Therefore, we analyzed the number of ATM cash withdrawals as well as computed the average value of an ATM withdrawal that indicates the usage of ATMs. The overall results presented in Table 1 show that throughout the five year period there was no significant difference between the two countries in term of ATM withdrawal (Df =4; $\chi 2$ = 2.17; P= 0.704). Nevertheless, in the period 2007-2011 the total number of UK cash withdrawals with cards issued in the country was three times the Spanish number. The total in 2007 was about € 2,834 million/year representing an average of € 45,000 per ATM in the UK and the equivalent of €907 million representing about € 16,000 per ATM in Spain.

In addition, before and after the financial crisis the average ATM cash withdrawal remains steady in both countries with some slight increase in the UK (4%) and a slight decrease in Spain (3%) in the year 2009. Nevertheless, the increase in the number of ATMs withdrawals per capita has been quite stable in the UK

(about €46). In contrast, the number ATM withdrawals per capita declined almost as fast as the drop in the number of ATM per capita after the financial crisis in Spain (see Figure 2). For example in 2011, the ratio of ATM withdrawals per capita in Spain was about €20 representing a drop of 8% compared to the 2007 figure. Accordingly, the number of ATM withdrawals and the average value of an ATM withdrawal that indicate the use of ATMs have been most affected negatively by the financial crisis in Spain than in the UK. Overall, these findings are consistent with the study of Snellman (2006), who asserted that the number of ATM withdrawals and the average value of an ATM withdrawal have been quite stable in most European countries, Canada and the U.S. during the gratifying global economy.

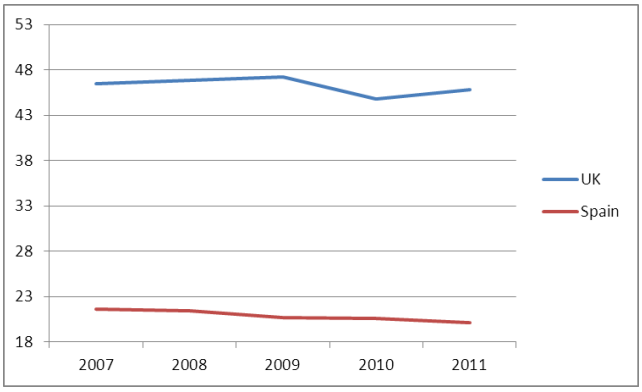

FIG. 2 ATMs WITHDRAWALS PER CAPITA

Trend of payment card functions and accepting devices: Debit vs. Credit

The overall results presented in Table 1 indicate that there were significant differences between UK and Spanish banks in terms of cards with debit function (Df =4; $\chi 2$ = 1680517.673; P<0.001) and cards with credit and/or delayed debit function (Df =4; $\chi 2$ = 665547.53; P<0.001). In the year 2008, the overall numbers of cards with cash function in circulation in both countries (UK= 168 million and Spain = 77 million) grew about 2% from the previous year. Thereafter, while the number of cards in circulation in the UK was stable there was a sharp decline in Spain by about 7 million in 2011. Besides, the trends of the overall numbers of cards with payment function[1] after the financial crisis in both countries were extremely different. For

[1] **Cards with a debit function:** Cards which enable the holder to have purchases directly charged to funds on his/her account at a bank (may sometimes be combined with another function, such as that of a cash card or cheque guarantee card).
Cards with a delayed debit function: Cards enabling the holder to charge his/her account up to an authorized limit. These cards allow holders to make purchases, but do not offer extended credit, the full amount of the debt incurred having to be settled at the end of a specified period.
Cards with a credit function: Cards indicating that the holder has been granted a line of credit. They enable him/her to make purchases and/or draw cash up to a prearranged ceiling. The credit granted may be settled in full by the end of a specific period, or may be settled in part, with the balance taken as extended credit.

example in 2007 the number of credit cards and debit cards in circulation in the UK were almost equal (see Figure 3). In 2011 there was almost 35% more debit than credit cards in circulation.

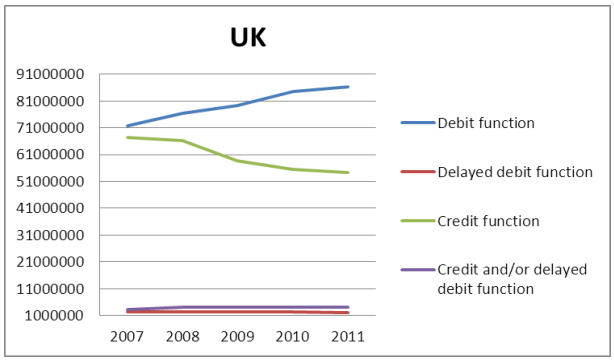

FIG. 3 CARDS AND PAYMENT DEVICE IN THE UK

On the other hand, the credit and/or debit with delayed cards function appears to be the ruling cards in circulation in Spain. Still, the number of cards with payment function as a whole in Spain has experienced a sharp decline after the financial crisis (Figure 4). Overall, the number of card payment transactions per capita in 2011 was about 52 in Spain and 158 in the UK representing a growth of 17% and 25 % respectively compare to 2007. In addition, the number of transactions per card was 79 in Spain and 107 in the UK representing an increase of about 20% in both countries in the same period. These results show that bank customers in the UK use their bank cards more often than the Spanish even after the financial crisis.

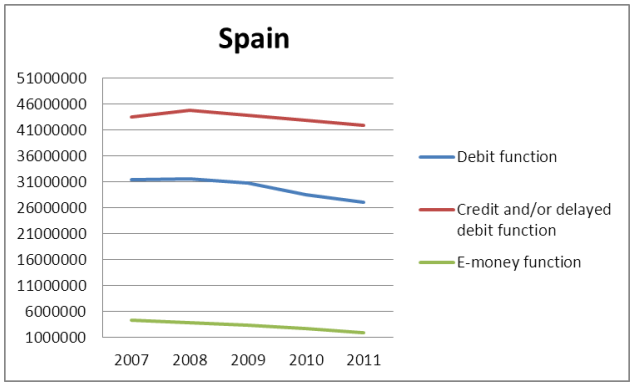

FIG. 4 CARDS AND PAYMENT DEVICE IN SPAIN

Also, we analyzed the overall transaction value of the card payments because card payments are used as substitutes for cash payments. We first checked the overall value of the total card transactions. The results show that while the value of card transactions was increasing in Spain (from 96 to 98 billion Euros) in the period 2007-2009 the UK was beaten hard by the financial crisis with a reduction from 553 to 473 billion Euros. Thereafter, by the end of 2011, both countries managed pretty well

Cards with an e-money function: Reloadable multipurpose prepaid cards which can be used at the sites of several service providers for a wide range of purposes and which have the potential to be used on a national or an international scale, but may sometimes be restricted to a certain area

with an increase of total transactions value (20% in the UK and 10% in Spain). Moreover, the value of the overall transaction per type of payment instrument shows the debit cards displayed a stronger performance than credit cards in the UK with about 70% of total payment done by debit cards. Inversely, about 58% of the total value of card payment were done by credit and/or delayed debit cards in Spain. This paper argued that the growing preference for debit cards over credit cards in the UK reflected the ongoing magnitude of the financial crisis. Observably, antagonistic economic conditions destined that UK consumers continued to tighten their budgets and work towards reducing their debts. Moreover, banks and other financial institutions meanwhile appear to remain very cautious when it comes to issuing credit cards and setting credit limits. Furthermore, the banks prerequisite to stabilize their own funds, restore their profit margins and cover their different costs has pressed most UK banks to increase the credit cards charge fees. One of the consequences is that the credit card products now appear to be less attractive to consumers.

On the other hand, the amount of overall card payments in Spain continues to decline after 2008. The continuous decline of the card payment was may be due to the Spanish unfavorable economic conditions that were driven by: excessive austerity measures, weaker GDP growth and alarming problems with the Spanish banks solvency. Moreover, Spanish consumers' preference for cards with the pay later functions such as credit and/or delayed debit cards was the consequences of the poor prospects of economic recovery that hardly inflict efforts to Spanish households and companies to reduce spending. In addition, it was also a consequence of excessive austerity measures, a disproportionate unemployment rate, lower salary and unsustainable income. The overall findings are consistent with (Borzekowski et al, 2008) who argue that consumers may have an underlying preference for spending from a payment method that draws on a liquid account. The author further argued that for some consumers, credit cards may serve to smooth consumption following adverse financial events.

Return on Assets (ROA) and Return on Equity (ROE) performances

Return on Equity, ROE, and Return on Assets, ROA, can be defined as annualized net income divided by equity and by total assets, respectively (Stiroh and Rumble, 2006). To comprehend how well UK and Spanish banks were performing before and after the financial crisis, we started by checking both countries banks′ income statement, the report of income and expenses that affect the bank's profitability (see Table 1 and 2). Evidently, Table 2 summarizes the trend of the total income that comes from banks' ongoing operations in the period 2007-2011. Table 2 shows that the total operating income was €162 and €65 billion for the UK and Spain respectively in 2007. The year after, while Spanish banks were relishing a 2%

increase in total income, UK banks were experiencing a severe loss of income (about 35%). Nonetheless, by the end 2009, UK banks built up significant buffers to absorb the loss of total income such as: reduction of operating expenses and the recovery process that will yield an improvement by about 30% every subsequent year. In contrast, the Spanish total income has continued to increase in 2009, thereafter, there was a loss of at least 5% each year.

Moreover, as banks face pressure and challenges on top line growth, various cost reduction tactics were employed to increase bottom line profitability. For example, the report on the operating expenses presented in Table 2 shows that the UK banks have drastically reduced their staff operating expenses by 20 %. The UK has also reduced other operating expenses by 15%. All these reductions yielded a reduction in total expenses by about 17% in the period 2007-2009. By the end of 2011 the figure was still lower than in 2007. On the other hand, Spanish banks operating expenses rose in 2008 as they invested in future growth through infrastructure and people by 5% each. Thereafter, although there was some slight reduction every succeeding year, their operating expenses in 2011 was still 2% higher than in 2007.

Table 2 also shows in the year 2007 there was a net profit of € 25 and € 10 billion for the Spanish and UK banks respectively. Thereafter, although there has been some reduction in the net income of approximately 25% annually, Spanish banks were still big profit makers with for example around €10 billion in 2010. Surprisingly, against all odds in 2011 Spanish banks reported a negative net income of € 14 billion representing a decrease of 240% compared to the previous year. Similarly, in 2008, UK banks were brutally affected by the financial crisis with their final year report showing a negative net income of about € 49 billion. Thereafter, the results showed some rebound in profitability by at least 45 % annually. Undoubtedly, this fast recovery exceeded our expectations especially in the year 2011 that shows a report with a net income 95% higher than in the previous year. Evidently, the excessive loss of net income in 2007 was probably due to the higher degree of concentration of the UK banking system. Besides, it can be associated with the unique design of the British banks operating almost exclusively on the shareholder value principles. In contrast to the UK banking system, the stakeholder value business approach is often brought into being in other European countries such as Spain (Kosmidou et al, 2005).

TABLE 2. BANKS NET INCOME

	Total Income		Operating expenses				Profit before tax		Retained Profit	
			Staff costs		Other operating expenses					
Year	UK	SP	UK	SP	UK	SP	UK	SP	UK	SP
2007	162885	65776	48425	17269	55307	28381	59152	29625	10266	25341
2008	105438	67483	38591	18133	57321	29884	9525	20967	-49054	18809
2009	136060	68882	38301	17964	46713	29759	51043	15258	-22230	13634
2010	149572	64601	41206	17911	52454	29847	55912	10585	-12823	10280
2011	147788	58400	39616	17224	58799	28995	49370	-16760	-665	-14201

Note: the UK data information were calculated based on the average exchange rate of the GBP Vis á Vis the Euro: (2007) 0.684 (2008) 0.796 (2009) 0.891 (2010) 0.858 (2011) 0.868

TABLE 2. CONTINUED: BANKS PERFORMANCES ROA AND ROE

	Net		Total Assets		ROA		Total		ROE	
Year	UK	SP	UK	SP	UK	SP	UK	SP	UK	SP
2007	10266	25341	3445560	2946499	3.0	8.6	509579	206284	2.01	12.28
2008	-49054	18809	9583128	3223716	-5.1	5.8	761594	242426	-6.44	7.76
2009	-22230	13634	4581488	3238236	-4.9	4.2	409219	269798	-5.43	5.05
2010	-12823	10280	4944575	3251535	-2.6	3.2	455675	282515	-2.81	3.64
2011	-665	-14201	6237169	3400435	-0.1	-4.2	430668	363348	-0.15	-3.91

Although net income gives us an idea of how well a bank is doing, it suffers from one major downside. It does not adjust to the bank's size. Thus, net income makes it hard to really compare how well one bank is doing compared to another. One of the basic measures of bank profitability that corrects for the size of the bank is the return on assets (ROA). ROA is a useful measure because it indicates how well a bank's assets are being used to generate profits. The overall results depicted in Table 1 and 2 and in Figure 5 show that in the five year period there is significant difference based on ROA (Df =2; $\chi 2$ =48.467 ; P< 0.001) between UK and Spain . The detailed analysis shows that in 2007, Spanish and UK banks received respectively 3 and 9 cents per Euro invested in assets.

After the financial crisis, both countries have had different success in maintaining or improving their bank performance. For example, in 2008 while Spanish banks were still receiving a 5% per Euro invested, UK banks were experiencing a 5% loss on ROA. Thereafter, UK banks showed resilient performance through the financial crisis with their best year performance showing about 95% recovery on ROA in 2011 compared to the year before. In the same year, the Spanish bank´s performance was facing a hollow downfall on ROA with a loss of about 4 % per Euro invested. This figure was about 232% less than the year before. The results of this study are consistent with Sufian and Habibullah, (2010) who also find that the Asian financial crisis exerts a negative and significant impact on the profitability of Indonesian banks. Since, Indonesian banks have been relatively more profitable during the pre-crisis compared to the crisis and the post-crisis periods.

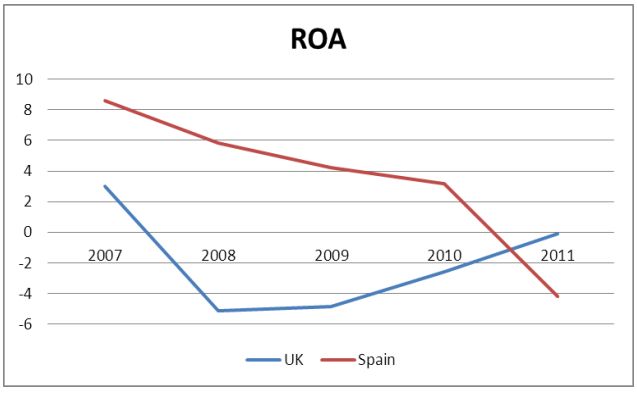

FIG. 5 TREND ON ROA IN THE PERIOD 2007-2011

Even though ROA provides useful information about bank profitability, it is not what the bank's owners (equity holders) care most about. In general, bank's owners are often more concerned about how much the bank is earning on their equity investment which is an amount that is measured by the return on equity (ROE). In in the case of ROA, the study results presented in Table 1 and 2 and Figure 6 also show significant difference between both countries on ROE (Df =2; $\chi 2$ = 55.84; P< 0.000). The detailed analysis indicates that Spanish and UK equity holders received 2 and 12 cents respectively per Euro invested in 2007.

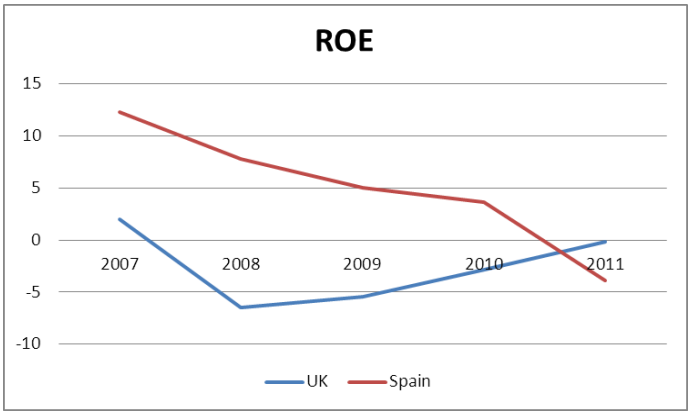

FIG. 6 TREND ON ROE IN THE PERIOD 2007-2011

Thereafter, the ROE follows more or less the same pattern of the profit and loss as ROA. Specifically, after the financial crisis (in 2011), equity holders lost 1 and 4 cents per Euro invested in the UK and Spain respectively. Obviously, the overall results show an improvement in the bank's profitability was partly driven by the harsh costs reductions rather than revenue growth which throughout the year generally remained almost stable in both countries. These findings are consistent with KPMG LLP, (2010) who analyzed the performances of four main UK banks during the first half of 2010 and argued that the results showed across-the-board rebound in profitability determined by sharp impairment reductions rather than the revenue growth. The authors also argued that shares in two banks with significant state ownership continue to flounder around 90% down on their pre credit crunch levels. According to Wilson (2012), UK banks were only underperformed by Italian lenders in 2011, producing an average return on shareholders' equity of less than 4% in 2010. This figure was very low compared to the world's most profitable banking market (Indonesia) that produce 26% return on shareholders' equity (Sufian and Habibullah, 2010).

On the other hand, Loo and Lewis (2012) surveyed 500 banks across Europe in 2012 and their study results show Spanish banks were the least satisfied with their banks′ current performance. Furthermore, Monk (2012) intimated that Spanish banks were told to set aside €30 billion to cover potential losses from bad mortgage loans that were made during the credit boom. Given that the bank values had risen 200% ten years before the financial crisis. The author further argued that in the first semester of 2012, Spanish banks still cannot be sure of the true extent of the losses they face. Consequently, share prices have plunged. These findings are also consistent with Tremlett and Treanor, (2012) who argued that it is now clear that the Spanish banks bubble was imploding even as it was being praised for its handling of the 2008 crisis. The authors further argued that some € 16 bn of public sector funds was used to prop up Spanish banks. Besides, more than € 50 bn was needed in 2012 and the following years as banks recognized losses on a wave of property loans. Finally,

before the credit crunch, Spanish banks had been thriving thanks to the rapid expansion of the property sector. However, its collapse caused a plunge in the value of the assets the loans were based on. Meaning borrowers had trouble making repayments.

CONCLUSIONS

In general, all developed countries have essentially the same set of payment instruments available to them. Nevertheless, the intensity of use is often quite different. Especially, with the world financial crisis that have brought a great bump to the countries financial systems. Besides, the serious economic recession that has resulted in an intense adverse environment for the financial sector and hence in lower levels of banking activity. Yet, the existing literature points toward that the development of retail payments and the usage of payment instruments is a factor of paramount importance for banks and consumers. Since, customer choice of a mode of payment at a POS has implications for modelling and regulating the industrial organization of payments networks. Moreover, a growing theoretical literature indicates that the relative efficiency of alternative pricing practices, merchant acceptance rules, and governance arrangements depends critically on the elasticity of consumer demand for payment services (Zinman, 2005; Bikker & Bos 2008; Saiz & Pilorge, 2010). Drawing on that, this study aims were to analyze and compare between the UK and Spain the trend of some choice of payment instruments as well as the bank performances based on ROE and ROA.

The overall results based on the number of transactions per card, number of card payment transactions per capita and the value of cards transaction indicates that UK consumers use their bank cards more often than the Spanish consumers even after the financial crisis. Besides, UK consumers prefer to use their debit cards at the POS in contrast to Spanish consumers that would rather use their credit or debit delayed cards after the financial crisis. Moreover, although the Spanish number of ATMs has been endlessly decreasing after the crisis, their number of ATM per million inhabitants' remains about 18% higher than the UK in 2011. In addition, the number of ATM withdrawals and the average value of an ATM withdrawal that indicate the use of ATMs have been most affected negatively by the financial crisis in Spain than in the UK.

Furthermore, like most of the countries worldwide, the UK and Spain have experienced negative effects of the impact of the global financial crisis on their bank ROA and ROE performances. However, the effects of the impact of the global financial crisis in both countries have been highly uneven. The overall results indicate that while Spanish banks were still making profit, UK banks were wiping a huge loss on ROA and ROE at the peak of the crisis. Still, all the way through the 5 year period UK banks almost appear to be back to full health, while Spanish banks have gradually started experiencing the intense reverberations of the

financial crisis. The overall results also show both countries adopted an utterly divergent approach to respond to the adverse effects of the global financial turmoil.

Obviously, the output results of this study clarify whether there is a single general pattern of the trends of the UK and Spanish payment systems (suggesting that current differences in payment use across both countries indicates that they are at different stages along a common path) or whether there are truly unique evolutionary paths and why this is so. This question is of some importance to both developing and emerging market economies as they attempt to establish and modernize their payment systems to provide the infrastructure necessary for sustained growth within a market-based economy (Hancock & Humphrey, 1997). Still, it is very important to note that the data used in this study were drawn from the central banks that mirror bank performances as a whole. Evidently, the performance of existing individual banks in each country may be extremely varied. For example, before, during and after the financial crisis some banks were making huge profits while others make huge losses or are still recovering.

ACKNOWLEDGMENT

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REFERENCES

Al-Hawari, M. & Ward, T. (2006). The effect of automated service quality on Australian banks' financial performance and the mediating role of customer satisfaction, Marketing Intelligence & Planning, 24(2), 127-147.

Bernardo, Batiz-Lazo (2009). Emergence and evolution of ATM networks in the UK, 1967-2000, Business History, 51(1), 1-27.

Bikker, J. & Bos, J. W. (2008). Bank Performance: A theoretical and empirical framework for the analysis of profitability, competition and efficiency, Routledge.

Borzekowski, R., Elizabeth, K. K. & Shaista, A. (2008). Consumers' Use of Debit Cards: Patterns, Preferences, and Price Response, Journal of Money, Credit and Banking, 40, 149-172.

Chen, Y. & Zhu, J. (2004). Measuring Information Technology's Indirect Impact on Firm Performance, Information Technology and Management 5, 9-22, Economics, 26(3), 479-501.

Fadzlan, S. & Muzafar, Shah Habibullah. (2010). Assessing the Impact of Financial Crisis on Bank Performance Empirical Evidence from Indonesia, ASEAN Economic

Bulletin, 27(3), 245-262.

Fethi, M. D. & Pasiouras, F. (2009). Assessing bank performance with operational research and artificial intelligence techniques: A survey, Working paper, SSRN eLibrary.

Frame, W. & White, L. (2004). Empirical Studies of Financial Innovation: Lots of Talk, Little Action?, Journal of Economic Literature, XLII, 116-144.

Giles, T. & Treanor, J. (2012). Spain races to shore up troubled banks, The guardian (www.guardian.co.uk, visited 30 October 2012).

Hancock, D. & Humphrey, D. B. (1997). Payment transactions, instruments, and systems: A survey, Journal of Banking & Finance, 21(11), 1573-1624.

Hayashi, F., Sullivan, R. & Weiner, S. E. (2003). A Guide to the ATM and Debit Card Industry, Federal Reserve Bank of Kansas City.

John, K. (2012). Performance Measurement in the Banking Industry, Business Finance Best Practices for Finances Executive.

Johnes, J., Marwan, I. & Pappas, V. (2012). A Comparison of Performance of Islamic and Conventional Banks 2004 to 2009, (http://ssrn.com/abstract=2071615).

Kosmidou, K., Tanna, S., & Pasiouras, F. (2005). Determinants of profitability of domestic UK commercial banks: panel evidence from the period 1995-2002, Money Macro and Finance (MMF) Research Group Conference, 45.

KPMG LLP. (2010). UK Banks: Performance Benchmarking Survey half year 2010, KPMG International Cooperative, a Swiss entity.

Loo, M. Van & Lewis, S. (2012). European Bank Barometer, Pan-European results, Ernst &Young 2012 survey.

McAndrews, J. (2003). Automated Teller Machine Network Pricing - A Review of the Literature, Review of Network Economics, 2(2), 146-158.

Milne, A. (2006). What is in it for us? Network effects and bank payment innovation, Journal of Banking & Finance, 30(6), 1613-1630.

Molyneux, P. & Thornton, J. (1992). Determinants of European bank profitability: A note, Journal of Banking & Finance, 16(6), 1173-1178.

Monk, E. (2012). Are savings at Santander UK safe from the Spanish banking crisis? (www.thisismoney.co.uk , visited on 5 October 2012).

Pasiouras, F. & Kosmidou, K. (2007). Factors influencing the profitability of domestic and foreign commercial banks in the European Union, Research in International Business and Finance, 21(2), 222-237.

Peachey, K. (2012). Eurozone crisis explained, BBC News Business, (http://www.bbc.co.uk/news/business-18287476).

Saiz, B. S. & Pilorge, P. (2010). Understanding customer behavior in retail banking, the impact of credit crisis across Europe, Ernst &Young 2010 report.

Saloner, G. & Shepard, A. (1992). Adoption of technologies with network effects: an empirical examination of the adoption of automated teller machines (No. w4048), National Bureau of Economic Research.

Santos, B. D. & Peffer, K. (1993). The effect of early adoption of information technology: An empirical study, Journal of information Technology Management, IV(1).

Snellman, H. (2006). Automated teller machine network market structure and cash usage, Bank of Finland.

Stiroh, K. J. & Rumble, A. (2006). The dark side of diversification: The case of US financial holding companies, Journal of Banking & Finance, 30(8), 2131-2161.

Wilson, H. (2012). British banks among the most unprofitable in the world, The Telegraph 2nd November 2012.

Yaya, P. L. H, Marimon, F. & Casadesus, M. (2011). Customer's loyalty and perception of ISO 9001 in online banking, Industrial Management & Data Systems, 111(8), 1194-1213.

Yaya, P. L. H, Marimon, F. & Casadesus, M. (2013). The contest determinant of delight and disappointment: the case study of online banking, Total Quality Management and Business Excellence, 24(12), 1376-1389.

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OPEN ACCESS ARTICLE

FINANCIAL-ECONOMIC TIME SERIES MODELING AND PREDICTION TECHNIQUES – REVIEW

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Abstract

Financial-economic time series distinguishes from other time series because they contain a portion of uncertainity. Because of this, statistical theory and methods play important role in their analysis. Moreover, external influence of various parameters on the values in time series makes them non-linear, which on the other hand suggests employment of more complex techniques for ther modeling. To cope with this challenging problem many researchers and scientists have developed various models and techniques for analysis of financial-economic time series and forecasting of the future trends, both linear and non-. This paper aims at reviewing current state-of-the-art techiques for financial-economic time series analysis and forecasting.

Keywords

Prediction; Time Series; Data Mining; Stock Market Prediction; Forecasting Techniques.

INTRODUCTION

Simulation models could be considered as digital prototypes and abstractions of reality to which experiments can be applied to improve our understanding of objects or phenomena in the real world. Simulation models are the basis of various scientific disciplines including economics, engineering, medicine, politics, sociology and data management in general. They also play fundamental role in humans' everyday live. Simulation models are often used to predict the performances in the real world, to predict future events or to organise data in ways that allow information to be extracted from it. More accurate the model is, better the prediction will be.

Creation and application of models to economic and finantial data has gathered

increasing interest in the last two decades. The common approach to construct this kind of model is the inductive one i.e. estimating model from measured data. This estimation process is nothing else but, learning from previously collected (historical) data. In this context, learning implies finding patterns in the data or obtaining a parsimonious representation of data that can then be used for several purposes such as forecasting.

Forecasting a financial series, such as a stock market index or an exchange rate, using created model is very specific task, which aims at supporting key financial decisions such as selling and hedging. Because of the market volatility, market indices are highly fluctuating and they are affecting the investor's belief. Therefore, building an accurate model that will enable effective stock market index prediction is important for stock market investor in order to make more informed and accurate investment decisions. To cope with this challenging problem many researchers and scientists have developed various models and techniques for analysis of financial-economic time series and forecasting of the future trends. This paper aims at reviewing current state-of-the-art techiques and it is organized as follows: section 2 describes the nature of financial time series, section 3 presents various methodologies for prediction from these time series (both linear and non-linear) and the final section presents the conclusions drawn from the previous analysis.

Financial-ecnonomic time series - nature and problems

Analysis of financial-economic systems and prediction of their future behaviour is usually based on historical raw data. This data is usually composed of a series of values influenced by some external factors and collected at regular time intervals. Since the external (exogeneous) influencing factors are usually unknown, the model of financial-economic system is constructed in the form of a mathematical function, taking into account past values of the series, as in (1).

$$x(t+1) = F_{\varphi}(x(t), x(t-1), x(t-2), \ldots\ldots x(t-m+1)) \quad (1)$$

The new forcasted value x(t+1) is estimated from the known current and past values of x (Ljung, 1987; Weigend et al, 1994). The parameter φ of the model F_{φ} is chosen according to the information available, i.e . to all known values of x; this step if called learning.

When other exogeneous information, which is influencing the system, is available, it could be included in the model, usually in the form (2)

$$x(t+1) = F_{\varphi}(x(t), x(t-1), \ldots\ldots x(t-m+1), y_t^1, y_t^2, \ldots, y_t^L) \quad (2)$$

where the values at time t of L external variables are used in the model.

Many reasearchers and practitioners have tried to develop and apply linear models

for capturing certain types of economic behavior, or economic performance. However, due to the nature of these processes non-linear models could be best fitted to model the financial-economic data series.

Given the wide range of nonlinear time series models available and the inherent flexibility of these models, the possibility of getting a spuriously good fit to any time series data set is very high. Therefore it is usually recommended to perform a test of linearity against nonlinearity before building a possibly complex nonlinear model. In this context, one of the most popular tests for non-linearity is the BDS test published by Brock et al, (1996).

The idea behind the BDS test is the correlation integral, which is a measure of the frequency with which temporal patterns are repeated in the data. Consider a time series of financial data defined as in (1), and define its m-history. Than, the correlation integral at embedding dimension *m* can be estimated by (3):

$$C_{m,e} = \frac{2}{T_m(T_m - 1)} \sum \sum_{m=s<t=T} I(x_t^m, x_s^m, \varepsilon) \tag{3}$$

Where Tm=T-m+1 and $I(x_t^m, x_s^m, \varepsilon)$ is an indicator function which is equal to one if $|x_{t-i}-x_{s-i}|<\varepsilon$ for i=0,1,2…, m-1 and zero otherwise.

Intuitively the correlation integral estimates the probability that any two m-dimensional points are within a distance of ε of each other. That is, it estimates the joint probability:

$$P_r(|x_t - x_s|) < \varepsilon, |x_{t-1} - x_{s-1}| < \varepsilon, \ldots, |x_{t-m+1} < x_{s-m+1}| < \varepsilon) \tag{4}$$

If x_t are iid, this probability should be equal to the following in the limiting case:

$$C_{1,\varepsilon}^m = P_r(|x_t - x_s| < \varepsilon)^m \tag{5}$$

Brock, Dechert, Scheinkman and LeBaron (1996) define the BDS statistic as follows:

$$V_{m,\varepsilon} = \sqrt{T} \frac{C_{m,\varepsilon} - C_{1,\varepsilon}^m}{s_{m,\varepsilon}} \tag{6}$$

Under fairly moderate regularity conditions, the BDS statistic converges in distribution to N(0,1):

$$V_{m,\varepsilon} \xrightarrow{d} N(0,1) \tag{7}$$

so the null hupothesis of iid is rejected at the 5% significance level whenever $|V_{m,\varepsilon}|>1.96$.

METHODOLOGIES FOR FINANCIAL-ECONOMIC TIME SERIES

An interesting application of time series modelling and analysis in the field of

finance is the stock market index forecasting. Traditionally, autoregressive integrated moving average (ARIMA) models are considered as one of the most popular linear models in time series forecasting mainly because of their theoretical elaborateness and accuracy in short-term forecasting (Jhee & Shaw, 1996).

Since ARIMA models can't cope with non-linearities in financial markets originating the existence of a bounded rationality assumption (McNelis, 2005), recently the artificial neural networks (ANNs) have gained rising popularity for forecasting and time series prediction (Zhang et al, 1998).

Yao and Tan (2001) used artificial neural networks for classification, prediction and recognition. They have elaborated an approach for neural network training as well as trading based on neural network outputs, or trading strategy. Authors discuss a seven - step neural network prediction model building approach.

Recently, hybrid techniques, which decompose a time series into its linear and nonlinear components, have been shown to be successful for single models, but they show to have many disadvantages. In this context, a novel hybridization of artificial neural networks and ARIMA model has been proposed by Khashei and Bijari (2011) in order to overcome limitation of ANNs and yield more general and more accurate forecasting model than ANNs models. The proposed model uses the unique advantages of ARIMA models in linear modeling in order to identify and magnify the existing linear structure in data, and then a neural network is used in order to determine a model to capture the underlying data generating process and predict, using preprocessed data.

Although various neural network models have been developed and applied to financial time series forcasting, little or no attention has been paid to selecting the input features for training these networks. Wong and Versace (2012) have proposed a novel CARTMAP neural network model based on Adaptive Resonance Theory that incorporates automatic, intuitive, transparent, and parsimonious feature selection with fast learning. The model first clusters all correlated features together and then chooses at most one feature per cluster for training with ARTMAP network, which ensures that the selected features will be uncorrelated. The presence of low-dimensional deterministic chaos increases the complexity of the financial time series behavior. Shahwan and Said (2012) proposed the Generalized Multilayer Perceptron (GMLP), and the Bayesian inference via Markov Chain Monte Carlo (MCMC) method for parameter estimation and one-step-ahead prediction.

Hsieh et al, (2005) used data mining methods i.e. association rule and sequential pattern mining. Association rule was used to analyze the customer consumption behaviors and find the patterns of buying habits in the retailer business. The sequential pattern was used to help web viewers match their needs quickly but it

will not know when to buy or sell and it does not include time interval dimension.

Yu and Huarng (2010) used neural network because of their capabilities in handling nonlinear relationship and also implement a new fu zzy time series model to improve forecasting. In the neural network fuzzy time series model input sample observations are used for training and output sample observations are used for forecasting. The drawback of taking all the degree of membership for training and forecasting may affect the performance of the neural network. To avoid this the difference between observations have been proposed which on the other hand reduces the range of the universe of discourse. They have evaluated the proposed method to forecast the Taiwan stock index, and obtained good results.

Hassan and Nath (2005) used Hidden Markov Models (HMM) approach to forecasting stock price for interrelated markets. HMM was used for pattern recognition and classification problems because of its proven suitability for modeling dynamic system. The authors summarized the advantage of the HMM was strong statistical foundation. It's able to handle new data robustly and computationally efficient to develop and evaluate similar patterns. The author decides to develop hybrid system using AI paradigms with HMM improve the accuracy and efficiency of forecast the stock market.

Cheng et al, (2010) proposed a hybrid forecasting model using multi-technical indicators to predict stock price trends. There are four procedures described such as select the essential technical indicators, the popular indicators based on a correlation matrix and use CDPA to minimize the entropy principle approach. They used RST algorithm to extract linguistic rules and utilized genetic algorithm to refine the extracted rules to get better forecasting accuracy and stock return. Production of more reliable and understandable rules and forecasting rules based on objective stock data rather than subjective human judgments have been considered as a main force point of the proposed method.

CONCLUSIONS

Many reasearchers and practitioners have tried to develop and apply linear models for capturing certain types of economic behavior, or economic performance. However, due to the nature of these processes non-linear models could be a better alternative to model the financial-economic data series and make more accurate forecasting further. However, according to the results of empirical evaluation of various proposed solutions one may draw-out a conclusion that hybrid models are the best fitted ones for making most accurate forcasting.

REFERENCES

Brock, W. A., Dechert, W. D., Scheinkman, J. A. & LeBaron, B. (1996). A Test for Independence Based on the Correlation Dimension, Econometric Reviews, 15, 197-235.

Cheng, C. H., Chen, T. L. & Wei, L. Y. (2010). A hybrid model based on rough sets theory and genetic algorithms for stock price forecasting, Information Sciences, 180(9), 1610-1629.

Hassan, M. R. & Nath, B. (2005). Stock market forecasting using hidden Markov model: a new approach. In: Intelligent Systems Design and Applications, ISDA'05 Proceedings, 192-196.

Hsieh, Y. L., Yang, D. L. & Wu, J. (2005). Using data mining to study upstream and downstream causal relationship in stock market, Computer, 1, F02.

Jhee, W. C. & Shaw, M. J. (1996). Time series prediction using minimally structured neural networks: an empirical test, Neural networks in finance and investing, Revised Edition, Irwin, Chicago.

Khashei, M. & Bijari, M. (2011). A novel hybridization of artificial neural networks and ARIMA models for time series forecasting, Applied Soft Computing, 11(2), 2664-2675.

Ljung, L. (1987). System Identification: Theory for the user, Prentice-Hall, Englewood Cliffs, New Jersey, USA.

McNelis, P. D. (2005). Neural networks in finance: gaining predictive edge in the market, Elsevier Academic Press.

Shahwan, T. & Said, R. (2012). A Comparison of Bayesian Methods and Artificial Neural Networks for Forecasting Chaotic Financial Time Series, Journal of Statistics Applications & Probability, 1(2), 89-100.

Yao, J. & Tan, C. L. (2001). Guidelines for financial forecasting with neural networks. In Proceedings of International Conference on Neural Information Processing, Shanghai, China, November 2001, 757-761.

Yu, T. H. K. & Huarng, K. H. (2010). A neural network-based fuzzy time series model to improve forecasting, Expert Systems with Applications, 37(4), 3366-3372.

Weigend, A. S. & Gershenfeld, N. A. (1994). Time series Prediction: Forecasting the Future and Understanding the Past, Reading, MA: Addison Wesley.

Wong, C. & Versace, M. (2012). CARTMAP: a neural network method for automated feature selection in financial time series forecasting, Neural Computing and Applications, 21(5), 969-977.

Zhang, G., Eddy Patuwo, B. & Y Hu, M. (1998). Forecasting with artificial neural networks - The state of the art, International journal of forecasting, 14(1), 35-62.

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OPEN ACCESS ARTICLE

EMPIRICAL INVESTIGATION ON GASTRONOMY AND WINE TOURISM

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Abstract

Preparation and consumption of food and wine is part of the culture, which emphasizes their importance to be included in all aspects of human life. In this line, the food does not reflect the intrinsic nature, but cultural "exercise" as well. Moreover, the way people prepare the food and wine can be considered as evidence of civilization since there are cultural differences in applying the basic ingredients. The paper presents an overview on the inevitable relationship between food and tourism, putting an accent on the gastronomy tourism. It describes the specific motivation of the gastronomic tourists and wine tourists by clarifying their consumption and experiences. Additionally, the paper investigates the case of Macedonia by elaborating the Macedonian cuisine and wine. Finally, it concludes that Macedonia is rich on exceptionally well produced food products and wine.

Key words

Gastronomy; Wine tourism; Wine routes and destinations; Macedonia.

INTRODUCTION

It is interesting to note that the way food and wine is prepared and stored, as well as the preparation of the quantity and composition of the meal, its flavors, habits and traditions of serving, make the food and wine unique and exceptional for each country. Moreover, they have an important place in promoting the destination as interesting and worth visiting and staying. In this line, the climate, culture and history are integral parts of the surface, shape and character of the food and wine. Therefore, the gastronomy and the oenology are often treated as a sub-sector cultural

tourism or heritage tourism, by emphasizing the wine roads. Moreover, it is argued that the link between the national cuisines and tourism depends on the degree to which they reached the kitchen as part of social culture, and thus the national identity. This relationship between geographical locations, culture and the gastronomy or the oenology in tourism manner, sometimes includes the promotional efforts in creating a distinctive image of typical local, regional, or even national famous food and wine destination.

In this line the food can often be used as a tool to guide passengers or tourists to visit countries and regions. This is the case with the form of thematic brochures, or so-called Culinary books, wine roads etc. The gastronomy and the wine tourism, being named Enogastronomy, involves visiting a destination whose primary goal is to satisfy personal interests in indigenous (ethnic) populations or regional gastronomy and oenology by consuming food and drink, and visit courses. Thanks to the promotion (newspaper articles, television shows and series, etc.). the individual chefs and someliers become known worldwide by attracting huge audience. Nowadays, the tourists re ready to travel just to dine in a famous restaurant where the food is prepared in front of them, or are willing to visit a region which cuisine is spotted to be prepared in a hundred years old cooking technique. This means that the tourists is eager to visit a destination which has completely different culture than the current one. In this sense, it is the same challenge for an Italian tourist to have a dinner and drink wine in a small French restaurant in Nice, in the tavern of Crete Greece or in a traditional restaurant in Bali. Yet, besides the cultural - geographical variables (seat and destination) of gastronomic tourists and influence the behavior of other factors, the primarily demographic characteristics and social status (occupation and education) may have significant influence. It is noticeable that the choice of the food, the wine and the trip (and the amount of consumption for this purpose) may affect the lives of tourists and the appropriate family situation (in case of traveling with children or not). So, it is expected that that married couples are more motivated to visit local restaurants and wineries in a particular tourist destination and enjoy in much greater manner.

RELATIONSHIP: FOOD - TOURISM

The food has a two-fold role in tourism industry. On the one hand, it is a necessary component of any tourist trip, because the participant must satisfy the physiological needs for tourism activities available at the destination. On the other hand, some destinations possess high quality foods according to local characteristics of tourist attraction and decide to declare the location of a tourist destination worth a visit just for the food and specialties (Boniface, 2000; Cohen & Avieli, 2004).

Furthermore, one may argue that the national cuisines are distinctive by setting the foundations of cultural tourism and heritage tourism. They arise and evolve according to the environmental conditions, soil type, social customs, religious conditions and other factors, and reflect cultural values, the struggle with nature, geographical location, historical influences, traditions and various forms of inheritance. Hence, the ratio of the tourists and the trip especially when taking into account its instrumental value may be different. Unlike other destinations and activities associated with them (visiting, shopping, and even sports game), where tourists are willing to try to experience something new and different, with new destinations and there are things completely unknown in the case of tasting different types of food that causes fear for their health. Consequently, the food can be seen as potentially dangerous and risky element, unlike other types of contacts which may be established with an unknown environment.

Typical sensitivity is expressed by Western tourists when traveling to less developed countries, which may be perceived as distant and not safe enough. In such conditions the existence of neophoby becomes dominant. Only few tourists would dare to try to taste unfamiliar foods and learn how to prepare. Yet, "What is this?" will always be the first question that comes to mind upon first contact with unfamiliar food. It can be expected to be a friendly tourist destination that offers local specialties only in cases if the tourists are already previously familiarized with the food. This is usually done by TV shows or books, unless such information is not relevant to the tourists' experience. However, the world-famous national cuisines, despite their global impact and dominance over other cultures, must always be prepared with a different manner tipycal for the national restaurants. But even in the cases of preparing the most well-known dishes, when the taste and smell of foreign cuisines are known and thus attract tourists, some precaution must be undertaken. This implies to meeting the different systems of accepting the food in the line of hygienic standards, safety control correctness of components, technology for the preparation of food, the ambience of the local restaurants, etc. It is therefore not uncommon to meet tourists which often stick to their home habits and ask for a more secure alternative food that looks "touristically".

TYPOLOGY OF A "GASTRONOMIC TOURIST"

The "gastronomic" or "culinary" tourist is a generic term that refers to all those who travel to taste the products of local cuisines specific to a country or region. The food for these types of tourists serves as a tourist attraction, monument or a natural rarity. Generally, one may note some specific motivation for the gastronomic tourists being encouraged for the following reasons:

- Desire;
- Demonstration of diversity, wealth and individualism;
- Interest and desire for knowledge discovery;

- The need to experience, the ground beneath his feet, in the process of globalization directed towards their roots and remind us of the village, or the desire to see where the food originates; and
- The desire for emotional satisfaction and experience the food without special effort.

Like other tourists with special interests in the culinary, the gastronomic tourists are part of the rich and more educated segments of tourism demand. Consequently, they are members of the upper and middle layer and generally travel in couples without children. In this line, it may be mentioned that the gastronomic tourists encompass only 3% of participants in the international tourist movements. Howevere, there are studies noting that there are many passenger that travel being motivated in just enjoying the gastronomy. Despite the fact that the tourists generally consume traditional foods, one may underline that the gastronomic tourists are extremely important segment of the international tourism demand (Scarpato, 1999 and 2000).

OVERVIEW ON GASTRONOMY TOURISM

The attraction of the destination is reflected in its capacity and capabilities to meet the needs of the tourists. It is often stated that the destination may have a gastronomic supply and additionally symbolically to satisfy the physiological needs of visitors by enabling social fun with true divided roles of all actors at the destination (Hall & Mitchell, 2005). It is more than obvious that the tourists choose a gastronomic destination for many different reasons, but with quite dissimilar values. In this line, the satisfaction of such experiences is not only perceived by the sensitive items such as food quality, restaurant, its decoration and accessories, but also is experienced by very different visual effects, like the serving method, location and the atmosphere.

Consuming the food may become a a routine activity when the tourist moves to another location. But the transfer of routine habits of travel includes dimension to stick to the main content of the food being used (eg, potatoes or rice for Asians) with some peripheral accessories for variety and change. If the food is a prolongation of the domestic habits and not the primary purpose of the travel, it may have the status of a food episode and an experience. Sometimes it is known that there are tourists who seek experience outside the ordinary and routine. By searching something new and unknown, one may find the food as one of the motives for tourists' movement. In thid line, the new experience with the food may be expressed in two ways: (i) Through the use of new ingredients and flavors that the tourist has previously tried; and (ii) By a new way of preparing and serving the food differently than the known way. So, the final impression may be an extraordinary experience of the unexpected food that remains in long-lasting memory. The best example for an ultimate

impression and experience with food is the gastronomy tourism. In this case, the food serves to boost the travel as a basic motive, while the tourist attraction is a secondary function i.e. the secondary motive. It may be concluded that the food motivation may make a unique and unforgettable experience in tourism industry.

Furthermore, it may be noted that these modalities reflect and provoke different tourist experiences in terms of the gastronomy, particularly by creating a difference between the 'recreational tourists' and 'tourists with tourists experience in the gastronomy'.

The recreational tourists usually travel by group travel arrangements and are usually open to connect to an unknown gastronomic sphere, expressing so called neophobic tendency. Generally, they recognize the quality of the destination, but only apply the well-known food that can be consumed in larger quantities than at home. Even individuals who are prone to research something new are determined for different types of food if it looks attractive, regardless the origin.

The tourists with the so called 'gastronomic experience' show particular interest in local food. They often visit local markets and malls to find or see, or even buy, unfamiliar vegetables, fruits and spices, and with great curiosity to observe the process of food preparation or street stall. They are willing to try to do something just out of sheer curiosity. Although relatively open to innovation, they can refrain from using local gastronomic offer, because they only teste gastronomic facilities. A smaller number of tourists may seek authentic experience (experimental tourists or existential tourists), by visiting local restaurants. Sometimes they consume a local food by testing the destination in real life or because such foods are their choice at home (experimental tourists), or the local food can become their permanent choice (existential tourists).

WINE TOURISM, WINE ROUTES AND DESTINATIONS

In the past, the wine was used to announce the signing of war and ceasefire, while today we celebrate the birth, various successes and solemn moments. Wine is a complex drink that contains more than 600 chemical compounds. Most of these components are present in small amounts, but each of them drowning their contribution to get the taste, aroma and flavor of the wine. The nutritional value of the wine is known for centuries for people, but they are treated differently, so some believe that wine is an alcoholic drink, while the others think it is a kind of a food or medicine. It is assumed that the roots of winemaking originated from Persia. Ancient peoples such as the Egyptians, Greeks, Romans drank strong and full flavored wine with a high alcohol content, so they diluted with water get softer taste.

The wine tourism means a travel that includes visits to vineyards, wineries, wine festivals, wine shows, with wine tasting and / or experiencing a particular attraction in a wine region that is the primary motivation for the trip. It is a kind of vacation

where tourists combine wine tasting from some vineyards and natural beauty and diversity of cultural - historical monuments in the vicinity of the destination (Charters & Ali-Knight, 2000; Hall et al, 2000; O'Neill et al, 2002; Rabotic, 2012).

The wine tourism in Europe is mainly developed in the form of wine roads. The first such, roads were made in Germany at the end of the second decade of the 20th century, in order to encourage visitors to enjoy the products of the region. In the 60s there was a growing interest particularly for the wine, due to promotion in printed and electronic media (various publications, gastronomy shows on radio and television, etc.).

TABLE 1. BENEFITS OF WINE TOURISM

Wine industry	Destination	Local community
○ Large quantum of sales ○ New markets ○ Testing new products ○ Educated consumers	○ Number of visitors and increased spending ○ Respecting the old and attract new customers ○ Creating an image ○ Provides travel and visit outside the main season	○ Attracting new investment ○ Initiation of new services in the area ○ Fosters the 'local pride'

Source: Rabotic, B. (2012).

The wine route is basically sort of traveling along the route, which connects several wine estates and wineries in the region. Many, wine roads are marked in the official definition of a wine region that has already an image and brand. It is a place with usually certain cultural and natural attractions (and other attractive mountain scenery, castles, fortresses, etc.) and other facilities beside the wineries.

MOTIVES AND EXPERIENCES OF WINE TOURISTS

The visits of the attractions to the wine tourism are guided by different motivations among tourists and only a small number that visit the winery actually buy wine. It is often a case that the main motive is the desire to learn more about the wine (Barthes, 1979; Charters & Ali-Knight, 2002; Gil & Sánchez, 1997; Roberts & Sparks, 2006). Furthermore, one must not forget the social aspect of the wine tourism, as well as the medical recommendation to apply moderate consumption of wine for health issues. Yet, it is a kind of a rule for having a complex motivation, as in the case of gastronomy tourism.

However, the visitors to the winery and the wine region are characterized with a certain exceptional interest in wine. Someone may visit the wineries for a completely

different purpose (eg. to collect labels of wine producers, etc.). It is most often a case to stop and visit the wineries being located along the travel direction in the line of having a tour and visiting the natural or cultural attractions. Frequently, the wine roads are combined with many tourist attractions, like: picturesque villages, local churches and monasteries, castles, archaeological sites, etc. Yet, the main idea of the wine roads is to provide an opportunity to the tourist for unforgettable experiences based on exploration and discovery.

The experience from the wine tourism is often associated with a conjunction with the culinary tourism and enjoying its surroundings and 'acts'. Therefore, it involves the activation of a variety of senses by including a chain in the following order:

- The general picture (an idyllic picture of grape plants, blue skies, traditional architecture, skyline, cellar with barrels stacked neatly, burgundy, etc.);
- Sound (pouring the wine, filling, appropriate music in tasting location, etc.);
- Contact (harvesting the grapes, barrels, bottles, cups);
- Flavor (fresh grapes, wine, bread, local specialties, etc.); and
- Smells (fresh soil, grapes, wine cellar, fermenting wine, etc.).

Since the vineyards are characteristic with rural ambiance, the wine tourism is commonly treated as a segment of rural tourism. Hence, it is impossible to establish a clear distinction between these two activities, because in practice they are intertwined. The fact is that a very appealing and relaxing natural setting in which there are some famous wineries further affect the volume of tourist visits. However, the wine tourists may be surprised with the organization in urban conditions, like wine festivals, exhibitions, etc.

INVESTIGATING THE MACEDONIAN CUISINE

The Macedonian cuisine is part of the Macedonian culture that is synonymous to a typical hospitality. It features a blend of the Balkan and Mediterranean symbols which are quite heterogeneous. At the same time, it is based on fresh ingredients and urges application of herbs and spices thus provoking high quality. A special attention is paid to the cultivation of vegetables since it is healthy and full of taste. A wide selection of dishes from meat and fish meet the most demanding choices. The full picture of the Macedonian cuisine is not just testing specialties and wine, but much more. Namely, the Macedonian gastronomy and oenology offer extraordinary atmosphere that is generated during the preparation and tasting of food and wine.

The pleasant climate in Macedonia mainly influenced by the warm Mediterranean currents in the valleys of the rivers, the exceptionally high quality of water, fertile soil and a large number of sunny days (Ohrid has 2,300 solar hours, while Valandovo even 7,200 solar hours) provide a fruitful harvest and excellent traditional products. The agriculture is an important sector in Macedonia thus being recognized as one of the most important strategic industries in Macedonia. The

production and export of wine takes the second place after the tobacco. In fact, only a few small countries like Macedonia also offer a variety of products that include everything from citrus fruits, grapes, walnuts, almonds, hazelnuts, tobacco, rice and mountain teas.

In addition, Macedonia is rich in meat of exceptional quality and successfully produced beef, chicken and lamb. It is also known for the production of cheese: young white cheese similar to Greek feta, golden cheese similar to Lokatelo Romano, as well as an excellent yoghurt and milk. Any Macedonian village has unique and special kind of delicious homemade cheese. Furthermore, different kind of vegetables grow in Macedonia, among which the red pepper is famous being dried during the summer and added to almost all Macedonian dishes cooked during the winter. Additionally, the Macedonians like to prepare the local specialty named Ajver out of red peppers, which is a favorite delicacy on the Balkans. Different types of delicious traditional dishes in Macedonia offer unforgettable enjoyment that may be experienced, like: turli tava, lutenica, banica, tarator, Ohrid trout, stuffed peppers, pastrmajlija, musaka etc. Nevertheless, it may be noted that the Macedonian specialty "paned beans" is fully comparable to truffles, oysters and caviar.

MACEDONIA - A COUNTRY OF YOUNG WINE

There are wineries in Macedonia, which produce mainly bulk wine. In the same line, thare are more than 30,000 families who own vineyards. The quality of the wine depends on the quality of the grapes, equipment and skilles of the producers. While the equipment can be purchased and the manufacturer may be trained how to use it, the quality of grapes is still mostly depends on the climate and territory. These conditions are met in Macedonia due to a favourable Mediterranean to continental climate. The summers are hot and dry, while the winters are moderately cold. The average annual rainfall is from 500 mm in the eastern parts, to 1,700 mm in the mountainous western parts.

Macedonia has an average of almost 260 sunny days per year, which helps in the long process of maturation of the grapes, thus concentrating the sugars and acids enabling rich color and complex flavors in the wine. The intense aroma of Macedonian wines is the result of the combined influence of Mediterranean and continental climate with warm days and cooler nights and territory rich in carbonates and minerals. Up-to-date, the vines are grown in approximately 24,000 hectares, out of which 70% are planted with wine grapes and 30% with table varieties. Generally, there are three wine regions, which are divided into 16 plots and vineyards (Fig. 1):

- Povardarie Valley - Central wine region that covers 83% of total production and includes seven vine parcels: Skopje, Veles, Gevgelija-Valandovo, Strumica-Radovish, Ovce Pole, Vinica, Vinica-Kocani;

- Pelagonisko-Poloski - Western wine region that covers 13% of total production and includes six vine plots: Prilep, Bitola, Ohrid, Prespa, Kicevo, Tetovo; and

- Pchinja-Osogovski - East wine region that covers 4% of total production and consists of three vine plots: Kumanovo, Kratovo and Pijanec.

FIG 1. WINE REGIONS IN MACEDONIA

CONCLUSION

The paper gives an overview on the inevitable relationship between food and tourism, putting an accent on the gastronomy tourism. It describes the specific motivation of the gastronomic tourists and wine tourists by clarifying their consumption and experiences. By investigating the case of Macedonia, it may be concluded that the Macedonian cuisine and wine are unique and offer extraordinary atmosphere that is generated during the preparation and tasting of food and wine.

The variety of traditional dishes complemented by tasteful wine, presents an interesting tourism supply for a certain type of gastronomic tourists. Yet, the paper concludes that the potentials for gastronomy tourism and wine tourism are present in Macedonia, but the economic effects and tourism valorization is still missing.

REFERENCES

Barthes, R. (1979). Toward a psychosociology of contemporary food consumption', In: Forster, R. and Ranum, O. (eds) Food and drink in history, Baltimore: John Hopkins University Press.

Boniface, P. (2000). Tasting tourism: Travelling for food and drink, Aldershot: Ashgate.

Cohen, E. & Avieli (2004). Food in tourism - Attraction and impediment, Annals of Tourism Research, 31(4), 755- 778.

Charters, S. & Ali-Knight, J. (2000). Wine Tourism - A Thirst for Knowledge?, International Journal of Wine Marketing, 12(3), 70-80.

Charters, S. & Ali-Knight, J. (2002). Who is the wine tourist?, Tourism Management, 23(3), 311-319.

Gil, J. M. & Sánchez, M. (1997). Consumer preferences for wine attributes: A conjoint approach, British Food Journal, 99(1), 3-11.

Hall, C. M., Johnson, G. & Mitchell, R. (2000). Wine Tourism and Regional Development, In: C. M. Hall, L. Sharples, B. Cambourne, N. Macionis (Eds.), Wine Tourism around the World: Development, management and markets. Oxford: Elsevier Science, 196-225.

Hall, C. M. & Mitchell, R. (2005). Gastronomic tourism – Comparing food and wine tourism experiences, Oxford.

O'Neill, M., Palmer, A. & Charters, S. (2002). Wine production as a service experience – the effects of service quality on wine sales, Journal of Services Marketing, 16(4), 342-362.

Scarpato, R. (1999). Food globalisation, New Global Cuisine and the quest for a definition, In: Dare, R. (ed) Cuisines: Regional, national or global?, Adelaide: Research Centre for the History of Food and Drink.

Scarpato, R. (2000). New Global Cuisine: The Perspective of Postmodern Gastronomy Studies. Unpublished MA thesis, Melbourne: RMIT University.

Rabotic, B. (2012). Selective tourism (in Serbian). Belgrade.

Roberts, L. & Sparks, B. (2006). Enhancing the wine tourism experience: the customers' viewpoint, In: J. Carlsen & S. Charters (Eds.), Global Wine tourism research management and marketing Wallingford, UK: CAB International, 47-66.

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PROFITABILITY ASSESSMENT OF LATVIAN COMPANIES: EMPHASIS ON ROE

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Abstract

This paper examines the financial position of Latvian companies. The data set consists of 450 non-listed companies in Latvia over the period from 2004 to 2012 and covers three industries – agriculture, food production and retail. This study puts emphasis on profitability and in particular on return on equity (ROE). Firstly, the authors discuss the theoretical aspects of the return on equity. In the second step, empirical analysis of profitability is done by using correlation and regression analyses. Finally, the paper concludes with the summary and recommendations. Results show that the main driver of the increase in ROE in 2011 and 2012, compared to 2010, is the return on sales, which has become positive from negative. It means that companies were able to add a larger premium to the price of products. These trends have to be viewed in positive light since the increase in ROE has not happened due to borrowing but instead due to improvements in profitability and activity.

Key words

DuPont Analysis; Profitability; Return on equity; Return on sales; Return on assets.

INTRODUCTION

The business environment in Latvia is undergoing a strong transformation in recent years. On the one hand, it is slowly being put in order, while on the other hand, an ever more stark increase in competition is emerging. The market becomes more saturated, and there is an increasing difficulty to operate a company without the regard of the competition, and the activity and profitability of company operations. After the accession of Latvia to the EU, the competition has significantly increased in several sectors of industry. The stronger competition has had a larger impact on small and medium-sized enterprises. Due to the fact that these companies have the

most difficulty in stabilizing their market positions and have the possibility to quickly become insolvent, more attention has to be turned towards the investigation and analysis of their financial activities, because financial analysis is one of the most important functions of financial management, which provides the assessment of company's financial position and competitiveness that has a special importance in successful functioning of the enterprises. At this moment, when the impact of knowledge-based and innovative business on the economic development of the country is ever increasing, financial statements are playing the role of the source of information on company financial indicators. The insertion of these indicators into different prediction models allows to evaluate the financial position of a company, as well as the prospects of future development.

Financial management as a science has a complicated structure. The main parts are financial accounting and analysis that is based on data from accounting and the probable estimate of future operating activity. From the perspective of the outlook, it is becoming more important to turn greater attention to the use of the results of financial analysis in the decision-making process, to the raising of its quality and to the economic interpretation of analytical data. In the changeable conditions of market conjuncture, it is topical to evaluate the profitability of Latvian companies with the emphasis on the ratio, which is the main indicator that company owners are interested in – the return on equity (ROE).

The aim of the paper is to assess the profitability and provide recommendations on the improvement of prediction of the return on equity in Latvian companies. The paper contains the financial analysis of Latvian companies with an emphasis on the profitability ratios (return on sales, return on assets, return on equity) because they provide the information on the earnings-generating ability of the company. For more detailed analysis of the influencing factors, the ROE ratio was selected. The paper also deals with the subject of regression and prediction of the return on equity.

The paper uses the database information of the Central Statistics Bureau of the Republic of Latvia on the financial indicators at the end of the respective year, as well as sales and earnings of non-finance companies for the period of 1995 to 2012, and the 'Lursoft' database on the financial position of Latvian companies. The paper has used the following general methods of scientific research: information analysis and synthesis, logical constructive methods, the grouping of data, and the methods of graphical description. Correlation and regression analyses are performed in SPSS software. The hypothesis of the research: the return on equity for the coming (current) financial period (year) can be predicted most precisely by using the return on equity of the previous (base) period (year).

THEORETICAL ASPECTS OF ANALYSIS OF THE RETURN ON EQUITY

There are several studies on the subject of the optimal level of company equity and the proportion of financing sources. Barton and Gordon (1988) have inferred that

companies with higher level of diversification have a higher level of debt. Kochhar and Hitt (1988) have arrived at the conclusion that company's internal development usually happens thanks to the equity, and it is easier to predict and plan. Low et al, (1994) conducted research on the debt ratio, and inferred there is no regularity between the size of debt and the structure of enterprise. It is mainly the question of corporate management and business environment.

Booth et al, (2001) have studied the debt ratio and its impact on management decision-making. They stated that there is a relationship between debt maturity and management decisions. Allayannis et al, (2003) write in their paper that equity impacts the ability to raise foreign capital. Balakrishnan and Fox (1993) have discovered that the type and specific properties of business activity are able to impact the financial leverage of a company, while Berger and diPatti (2006) showed that the leverage has an impact on the size and efficiency of earnings, as a result of which it can be used in the planning process.

Often, financing sources in particular are the reason for shareholder discord. Morellec (2004) proves that shareholder discord has a correlation with the level of debt in companies. Kochhar (1996) substantiates that capital financing is an important resource of management and planning.

Braun and Larrain (2005) have investigated the determinative factors of capital structure, and they have found a material relationship between company strategy and sources of financing. They have ascertained that capital has a decisive impact on company development.

Profitability of companies is a major objective the managers set, and is particularly watched by company stakeholders. That's why the rates of return are among the most important measures the companies target during a financial year. Profitability is influenced by a lot of factors, both internal and external. Simply by watching the dynamics of profitability, one cannot say for sure, which factors had a major impact on the return and in what proportion. Yet, by studying the levels of some important rates of return during a period of several consecutive years marked by a severe downturn in the economy, one can draw some useful conclusions regarding the impact of the crisis on the return of enterprises. The authors agree with the opinion of Berman et al, (2013) that ROE can be used to compare the company with its competitors. However, high level of ROE can also be in cases when the company is taking on more debt. Then, risk must be taken into consideration.

Warren Buffett points to the usage of ROE in investment decision-making. For example, in his annual letters to the shareholders, he mentions ROE 32 times during the last 20 years. At the same time, he states that ROE on its own is not sufficient for investment decision-making. Warren Buffett indicates that he is looking for

companies with good return on capital, at the same time with small or non-existent debt (Price, 2012).

Circiumaru et al, (2010) have analysed the 2008 data from 73 manufacturing companies, and dealt with the impact of three factors – return on sales (ROS), asset activity ratio, and financial leverage – on ROE, using univariate regression analysis. A correlation was found between ROS and ROE, however, the impact of ROS on ROE was not identified. A linear relationship was not found between asset activity ratio, financial leverage and ROE.

Kabajeh et al, (2012) have looked at a small sample of companies (28 enterprises) in the period of 2002-2007. The results revealed a positive relationship between return on assets, ROE, return on investment and market price of shares. Kasilingam and Jayabal (2012), using the example of one company (time period 1996-2009), have analysed profitability and solvency. They have discovered that there is a positive relationship between ROE and assets-to-equity ratio, as well as the assets activity ratio.

Stocker (2005), by analysing ROE of companies in different countries, have concluded that return on equity is directly related with economic freedom. A recommendation was put forward that in order to receive a higher return on investment one must choose countries, where an increase in economic freedom is expected. As pointed out by Liesz (2002), the DuPont model is significant in order to illustrate the relationship of balance sheet and profit or loss account items, as a result of which it is possible to work out strategies for improvement of ROE.

Most authors agree that enterprise performance can be the best described by profitability ratios. In empirical research are used such profitability ratios as ROA (Berman et al, 1999; Choi & Wang, 2009), ROE (Preston & O'Bannon, 1997; Agle et al, 1999), ROS (Graves et al, 1999; Callan & Thomas, 2009).

Even though for the last couple decades there is a paradigm shift towards growth and value indicators as the best ones to use in order to describe the enterprise performance (Matsumoto et al, 1995), some studies still show the frequent use of profit and profitability ratios (Graham et al, 2005). The use of profitability ratios is justified using several arguments. Firstly, there are tremendous number of different ratios and indicators, however shareholders need a simple and clear ratio, which shows the enterprise performance and is easy to interpret and compare with other enterprises. Profitability ratios, in particular ROE, comply with the afore mentioned. Secondly, profitability ratios are widely covered in media. Thirdly, since the whole enterprise performance is described by one number, then it is relatively simple to perform forecasting.

EMPIRICAL ANALYSIS OF THE RETURN ON EQUITY

By using the database of the Central Statistics Bureau of Latvia (2013) one can

calculate that the average level of the return on sales (ROS) in Latvian companies in 2012 was 2.89%, which means that a typical Latvian enterprise has earned 2.89 centimes from one lats of sales. Compared to other profitability ratios, in the majority of years, the return on sales has the lowest level of the ratio. The exception is three last years (2010-2012), when return on sales is higher than the return on assets. As an explanation one must mention the fact that the asset activity had fallen below 1. The only year when ROS was negative is 2009, when a typical Latvian company did lose 2.23 centimes from one lats of sales.

The return on assets ratio of an average Latvian company in 2012 was 2.84%, which testifies that a typical Latvian company has earned 2.84 centimes from one lats invested in assets. This ratio also was negative in 2009, when Latvian companies lost 1.63 centimes from one lats invested in assets. The lowest point of the crisis was reached in 2009.

In a typical Latvian enterprise, return on equity in 2012 was 6.78%, which means that the owners of an average Latvian company earned 6.78 centimes from one lats invested. The volume of this ratio has varied to a greater degree than the other two profitability ratios. As a reason one must mention the fact that companies use debt to increase their financial leverage, and in the years of economic growth, it gives a positive effect for ROE compared to ROA and ROS. In turn, during crisis, financial leverage inflicts a negative influence on ROE in comparison to the other profitability ratios. In 2009 and 2010, as well as in 1996, the return on equity was negative, which testified that company owners had suffered losses from the capital invested.

In 2012, all three profitability ratios have increased.

It is possible to analyse the factors influencing ROE using the instrument of DuPont analysis. It expresses the return on equity as a multiple of return on sales (calculated by the use of net profits), asset activity and an indicator of capital structure (equity multiplier).

ROE = (net profit/sales) * (sales/average assets) * (average assets/average equity) (1)

ROE_{2012} = (758.1/35898.7)*(35898.7/((35768.4+37213.3)/2))*(((35768.4+37213.3)/2)/((10580.8+11780.6)/2)) = 2.1% * 0.984 * 3.264 = 6.8%.

ROE_{2011} = (673/31971.3)*(31971.3/((34878.9+35768.4)/2))*(((34878.9+35768.4)/2)/((9623.3+10580.8)/2)) = 2.1% * 0.905 * 3.497 = 6.6%.

ROE_{2010} = -0.01% * 0.816 * 3.758 = -0.03%.

The main driver of the increase in ROE in 2011 and 2012, compared to 2010, is the return on sales, which has become positive from negative. It means that companies were able to add a larger premium to the price of products. Also, the asset activity

has improved in 2012 and 2011. The equity multiplier has continued to decrease, both in 2011 and 2012. These trends has to be viewed in positive light because the increase in ROE has not happened because of borrowing but instead because of improvements in profitability and activity.

The following data in this section have been obtained from the 'Lursoft' database of Latvian companies (2013) in the following three sectors of industry: agriculture, food production, and retail sector. Each sector is represented by 150 companies (total number 450) for the time period 2004-2012. The pooled correlation coefficient were calculated of all three industries for the return on equity with the factors influencing it. Out of the ten analysed years, in nine a significant correlation was detected with (net profit/sales) ratio, while in seven – with (sales/assets) ratio, as well as with (assets/equity) ratio. In the concluding year of the study, 2012, the only significant correlation is with the ratio of (sales/assets) (correlation coefficient of 0.141).

If one conducts the analysis for separate industries in 2012, the return on equity in agriculture has a significant correlation with all three ratios of the DuPont system of analysis. The opposite is true in food production, where none of the variables has a correlation with the return on equity. It means that, in food production, it is harder to predict ROE. Like in agriculture, in retail sector ROE has a significant correlation with all three variables in the DuPont system. From the three coefficients, the highest correlation is observed for the ratio of (net profit/sales) – 0.716 in agriculture and 0.334 in retail.

REGRESSION AND PREDICTION OF THE RETURN ON EQUITY

In addition it is necessary to examine, which indicator can serve as the best predictor of the return on equity. The hypothesis of the research is that the best predictor of the return on equity one year ahead is the return on equity itself.

In order to examine the hypothesis, the correlation coefficients were calculated that show the strength of the relationship between the return on equity in year 1 (ROE_1) and return on equity in year 0 (ROE_0), return on assets in year 0 (ROA_0), financial leverage at the beginning of year 1 (FL_b), return on sales in year 0 (ROS_0), assets activity in year 0 (AA_0), current ratio at the beginning of year 1 (CR_b), as well as sales growth rate in year 0 (SGR_0). The results of correlation analysis are displayed in Table 1.

The results of the correlation analysis are really surprising. Contrary to the expected and to the hypothesis that the ROE of year 1 can be best predicted by ROE_0. The highest correlation coefficient by absolute value is with ROA of the previous year (0.617). The strength of the relationship with asset activity in year 0 (0.592) is also stronger than with return on equity in year 0 (0.583). Therefore, the hypothesis of the research must be rejected.

TABLE 1. THE RELATIONSHIP OF THE RETURN ON EQUITY (ROE_1) OF LATVIAN COMPANIES WITH OTHER FINANCIAL INDICATORS

	ROE_0	ROA_0	FL_b	ROS_0	AA_0	CR_b	SGR_0
Correlation coefficient	0.583	0.617	-0.095	0.537	0.592	0.123	0.583
Regression coefficient	0.557	1.634	-0.011	1.813	0.210	0.055	0.304

Note: Database of the Central Statistics Bureau of the Republic of Latvia

Then, seven regression coefficients were calculated (Table 1). For a model with ROA_0 as the independent variable and ROE_1 as the dependent variable (the closest relationship), regression coefficient is 1.634, which means that when the return on assets increases by one unit the return on equity will grow by 1.634 units. The only relationship, which is negative, is with the financial leverage at the start of year 1. This means that if financial leverage (debt to equity ratio) increases by 1 unit, the return on equity will decrease by 0.011 units. Next, it is topical to conduct the analysis of equity, as well as balance sheet assets and liabilities, since they influence the level of the return on equity.

By analysing the assets structure data from the 'Lursoft' database on Latvian companies one can conclude that in all years of the study (2004-2012) the proportion of long-term investments to assets is the lowest in retail companies, compared to other branches of industry. This testifies that the risk of assets is the lowest in the retail industry from, the three analysed sectors. In most of the periods, the highest proportion of long-term investments and the highest assets risk is in the agricultural sector, while the proportion in food production industry is an average one among these three sectors. At the end of 2012, the average proportion of long-term investments in agricultural enterprises is 63.1% of assets, while in food production industry it is 48.95%, and in retail – 43.45% (Fig.1). During the last four years, substantial changes in agricultural and food production industries can be observed with regard to the proportion of the long-term investments. It has significantly increased in agriculture, while in food production it has substantially decreased.

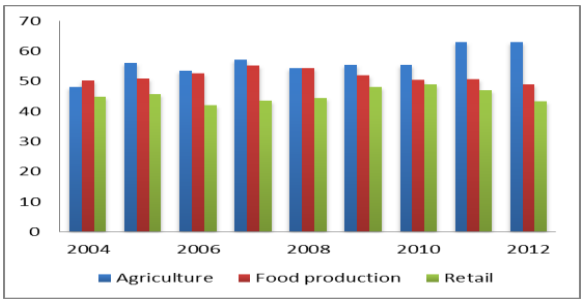

FIG. 1. THE PROPORTION OF LONG-TERM INVESTMENTS TO ASSETS IN THREE INDUSTRIES OF LATVIAN ECONOMY, 2004-2012,%

Source: 'Lursoft' database of Latvian companies

Next, after analysing the structure of assets, one must turn the attention to the

opposite side of the balance sheet. Therefore, the proportion of debt will be investigated in more detail (Fig.2).

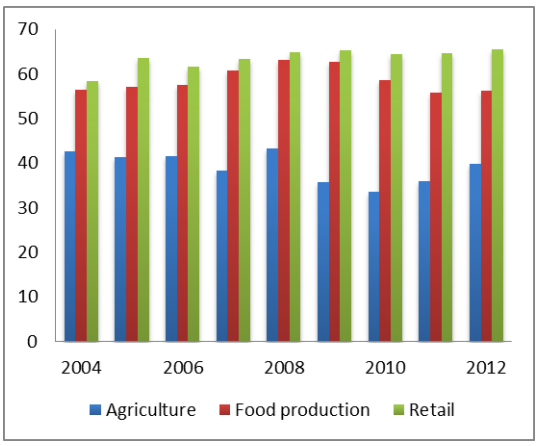

FIG. 2. THE PROPORTION OF DEBT TO ASSETS IN THREE INDUSTRIES OF LATVIAN ECONOMY, 2004-2012,%

Source: 'Lursoft' database of Latvian companies

In all years of the study, the highest proportion of debt is in the retail sector, while the lowest – in agriculture. Therefore, one can conclude that the highest risk of the right side of the balance sheet is in retail, while the lowest risk is in the agriculture industry. The proportion of debt to assets and the risk of the right side of the balance sheet of the food production industry is between two afore mentioned industries.

One can conclude that the recommendation in the theory of financial management is almost completely fulfilled. It states that if the risk of assets is high, then the company can afford to work only with a low risk of the opposite side of the balance sheet, and reversely, if the risk of the right side of the balance sheet is high, the risk of assets must be low. There is a comparatively low risk of assets (the proportion of long-term investments) in the retail industry, and that is why it can operate with a comparatively high risk of the right side of the balance sheet (the proportion of debt). On the contrary, the agriculture industry operates with a low level of debt and high proportion of long-term assets, which it can afford.

FIG. 3. THE RETURN ON EQUITY IN THREE INDUSTRIES OF LATVIAN ECONOMY, 2004-2012,%

Source: 'Lursoft' database of Latvian companies

By analysing the dynamics of the return on equity of the three industries (2004-2012) in Figure 3, it can be inferred that the most stable indicator was in agriculture enterprises – it even did not suffer during the recent financial crisis. However, one must note that the ROE of agricultural companies before crisis was in third place among the three sectors. During the crisis it took the lead but slipped to second place in 2012. As a result of the financial crisis, the return on equity of retail and food production industries was reduced significantly, even becoming negative. In the majority of years of the study, one can observe that the changes of ROE of the retail industry lag behind the return on equity of the food production.

In 2012, the owners of a typical agricultural enterprise in Latvia earned 11.94 centimes from one invested lats. In turn, the shareholders of a company in the food production sector earned 4.85 centimes, while in retail owners earned 17.43 centimes from one invested lats. It points out the fact the food production provides the lowest profitability among these three sectors of industry.

As shown in Figure 4, in the last three years, the ratio of return on sales (ROS) is bigger than the return on assets (ROA) and even the return on equity (ROE). It means that, despite the high premium on the produce, there is a low asset activity, as well as low proportion of debt. In 2006 and 2007, the ROS is negative, which attests that prices of agricultural produce have fallen in these years. Beginning from 2008, the profitability of agriculture has remained high. In 2012, a typical agricultural enterprise has earned 6.94 centimes from one invested lats in assets, while earnings were 16.94 centimes out of one lats of revenues.

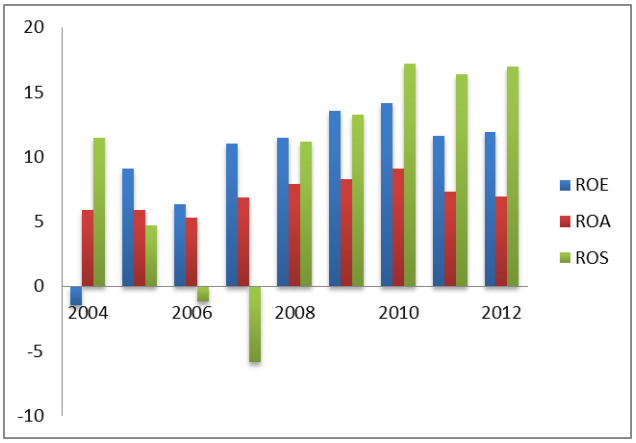

FIG. 4. THE PROFITABILITY RATIOS OF AGRICULTURE INDUSTRY IN LATVIA, 2004-2012,%

Source: 'Lursoft' database of Latvian companies

In 2012, the food industry still has not recovered from its experience in the years of the financial crisis (Fig.5). In the last year of study, a typical food production enterprise has earned 4.99 centimes of profit from one lats invested in assets. In turn, the ROS is -5.7%, which means that, in 2012, a typical food production company has

lost 5.7 centimes from one lats of sales.

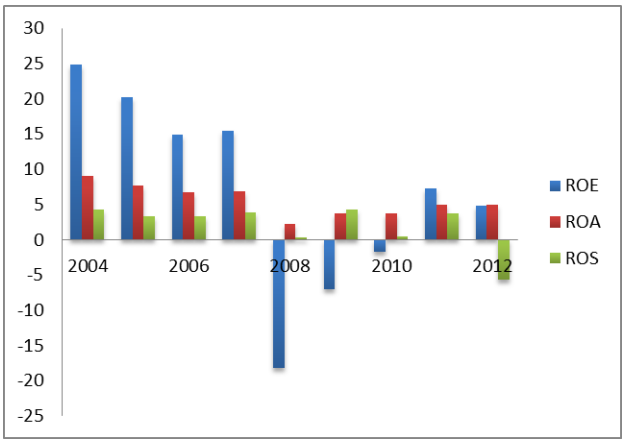

FIG. 5. PROFITABILITY RATIOS OF FOOD PRODUCTION INDUSTRY IN LATVIA, 2004-2012,%

Source: 'Lursoft' database of Latvian companies

It is the return on equity that has the most variation in dynamics. It is logical and can be expected because it is the owners, who are taking on the highest risk (and are hoping to earn the most profits) in a company. This kind of dynamics has been set by the financial leverage, when utilisation of debt in the years of economic growth provides high returns to owners, but during crisis it causes substantial losses.

In 2012, for the first time in the period of study, the average return on sales of food production companies has become negative, which testifies that the food producers did not want or were unable to raise the premium on their produce in the changing market conditions.

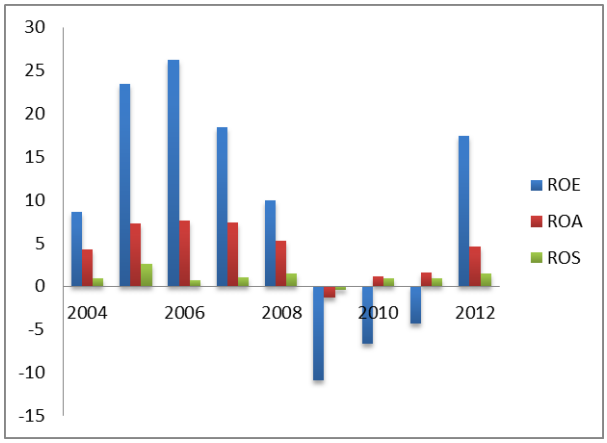

FIG. 6. THE PROFITABILITY RATIOS OF RETAIL INDUSTRY IN LATVIA, 2004-2012,%

Source: 'Lursoft' database of Latvian companies

Figure 6 shows the financial leverage in action. If in 2004-2008, as well as 2012 it is the ROE that is the highest (and positive) of the profitability ratios, ROE is the largest in absolute terms (while being negative) in 2009-2011. This once again affirms the fact that there is correlation between high earnings and large losses. Historically, the highest profitability in retail sector was in 2006. In the other two industries of the

study, years with the highest profitability were different (in agriculture companies it was 2010, while in food production 2004).

CONCLUSIONS

The paper contains the financial analysis of non-financial Latvian companies with an emphasis on return on equity because this ratio is of most interest to company shareholders. The authors agree with the opinion that ROE can be used to compare the company with its competitors. However, high level of ROE can also be in cases when the company is taking on more debt. Then, risk must be taken into consideration.

The volume of the return on equity has varied to a greater degree than the other two profitability ratios – return on assets and return on sales. As a reason one must mention the fact that companies use debt to increase their financial leverage, and in the years of economic growth, it gives a positive effect for ROE compared to ROA and ROS. In turn, during crisis, financial leverage inflicts a negative influence on ROE in comparison to the other profitability ratios. In 2012, the owners of an average Latvian company earned 6.78 centimes from one lats invested.

A typical Latvian enterprise has earned 2.89 centimes from one lats of sales. The return on assets of an average Latvian company in 2012 testifies that a typical Latvian company has earned 2.84 centimes from one lats invested in assets.

In 2012, all three profitability ratios (ROS, ROA, and ROE) have increased. The main driver of the increase in ROE in 2011 and 2012, compared to 2010, is the return on sales, which has become positive from negative. It means that companies were able to add a larger premium to the price of products. These trends has to be viewed in positive light because the increase in ROE has not happened because of borrowing but instead because of improvements in profitability and activity.

In order to conduct the regression and correlation analysis, a particular and specific attention has been turned to three very important industries of the Latvian economy – agriculture, food production and retail (the total number of observations is 450). It is harder to predict ROE in food production industry because none of the variables has a correlation with the return on equity.

In the agriculture and retail sector, the impact of all factors of the DuPont system on the return on equity is significant. The ratio of net profit to sales has the strongest impact on ROE. However, a significant impact on the ROE is generated also by the ratio of sales to assets, as well as the ratio of assets to equity.

Analysing the pooled data of the three sectors of industry, one must conclude that the only driver, whose influence on ROE has an adequate level of validity, is the sales to assets ratio. The fact that net profit to sales has the most significant

correlation observations with the return on equity is not a surprise, since both ratios are part of one group of financial analysis ratios.

Contrary to the expected and to the hypothesis that the ROE of the next year can be best predicted by ROE of the base year, the highest correlation coefficient by absolute value is with return on assets of the previous year. It means that it is recommended to conduct the prediction of the return on equity by using the return on assets. When the return on assets increases by one unit, the return on equity will grow by 1.634 units.

One can conclude that the recommendation is the theory of financial management is almost completely fulfilled. It states that if the risk of assets is high, then the company can afford to work only with a low risk of the opposite side of the balance sheet, and reversely, if the risk of the right side of the balance sheet is high, the risk of assets must be low. There is a comparatively low risk of assets (the proportion of long-term investments) in the retail industry, and that is why it can operate with a comparatively high risk of the righ side of the balance sheet (the proportion of debt). On the contrary, the agriculture industry operates with a low level of debt and high proportion of long-term assets, which it can afford.

As a result of the financial crisis, the return on equity of retail and food production industries was reduced significantly, even becoming negative. In the majority of years of the study, one can observe that the changes of ROE of the retail industry lag behind the return on equity of the food production. The food production provides the lowest profitability among the three sectors of industry.

REFERENCES

Agle, B., Mitchell, R. & Sonnnenfeld, J. (1999). Who Matters to CEOs? An Investigation Stakeholder Attributes and Salience, Corporate Performance and CEO values, Academy of Management Journal, 42(5), 507-525.

Allayannis, G., Brown, G. W. & Klapper, L. F. (2003). Capital structure and financial risk: evidence from foreign debt use, Journal of Finance, 58(6), 2667-2710.

Balakrishnan, S. & Fox, I. (1993). Asset specificity, firm heterogeneity and capital structure, Strategic Management Journal, 14(1), 3-16.

Barton, S. L. & Gordon, P. J. (1988). Corporate strategy and capital structure, Strategic Management Journal, 9(6), 623-632.

Berger, A. N. & di Patti, E. B. (2006). Capital structure and firm performance: a new approach to testing agency theory and an application to the banking industry, Journal of Banking and Finance, 30, 1065-1102.

Berger, P. G., Ofek, E. & Yermack, D. L. (1997). Managerial entrenchment and capital structure decisions, Journal of Finance, 52(4), 1411-1438.

Berman, S. L, Wicks, A. C. Kotha & S. Jones, T. M. (1999). Does Stakeholder Orientation Matter? The Relationship between Stakeholder Models and Firms Financial Performance, Academy of Management Journal, 42(5), 488-506.

Berman, K., Knight, J. & Case, J. (2013). Financial Intelligence: A Manager's Guide to Knowing What the Numbers Really Mean, Business Literacy Institute, Inc. USA.

Booth, L., Aivazian, V., Demirguc-Kunt, A. & Maksimovic, V. (2001). Capital structure in developing countries, Journal of Finance, 56, 87-120.

Braun, M. & Larrain, B. (2005). Finance and the Business Cycle: International, Interindustry Evidence, Journal of Finance, 60(3), 1097-1128.

Callan, S. & Thomas, J. (2009). Corporate Financial Performance and Corporate Social Performance: An Update and Reinvestigation, Corporate Social Responsibility & Environmental Management.

Central Statistics Bureau of the Republic of Latvia. (2013). Database on the financial indicators of companies in Latvia.

Circiumaru, D., Siminica, M. & Marcu, N. (2010). A Study on the Return on Equity for the Romanian Industrial Companies, Annals of University of Craiova – Economic Science Series, 2(38).

Choi, J. & Wang, H. (2009). Stakeholder Relations and the Persistence of Corporate Financial Performance, Strategic Management Journal, 30, 895-907.

Graham, J. R. & Harvey, C. R. (2005). How Do CFOs Make Capital Budgeting and Capital Structure Decisions? (http://ssrn.papers.com)

Graves, et al. (1999). Look at the Financial – Social Performance Nexus when Quality of Management is Held Constant, International Journal of Value – Based Models.

Kabajeh, M. A. M., Al Nu'aimat, S. M. A. & Dahmash, F. N. (2012). The Relationship between the ROA, ROE and ROI Ratios with Jordanian Insurance Public Companies Market Share Prices, International Journal of Humanities and Social Science, 2(11), 115-120.

Kasilingam, R. & Jayabal, G. (2012). Profitability and Solvency Analysis of A Manufacturing Company Using DuPont and Altman Model, BVIMR Management Edge, 5(2), 53-64.

Kim, S. & Kim, Y. (2010). Nonlinear Dynamic Relations Between Equity Return and Equity Fund Flow: Korean Market Empirical Evidence, Asia-Pacific Journal of Financial Studies, 39(2), 139-170.

Kochhar, R. (1996). Explaining Firm Capital Structure: the Role of Agency Theory vs. Transaction Cost Economics, Strategic Management Journal, 17(9), 713-728.

Kochhar, R. & Hitt, M. A. (1998). Linking Corporate Strategy to Capital Structure: Diversification Strategy, Type and Source of Financing, Strategic Management Journal, 19(6), 601-610.

Liesz, T. (2002). Really Modified DuPont Analysis: Five Ways to Improve Return on Equity, Proceedings of the SBIDA Conference.

Low, P. Y. & Chen, K. H. (2004). Diversification and Capital Structure: Some International Evidence, Review of Quantitative Finance and Accounting, 23, 55-71.

Low, J. A., Naughton, A. & Taylor, P. (1994). The Impact of Corporate Strategy on the Capital Structure of Australian Companies, Managerial and Decision Economics, 15, 245-257.

Lursoft. (2013). Database on the financial indicators of companies in Latvia.

Matsumoto, K., Shivaswamy, K. & Hoban, J. P. (1995). Security Analysts' View of the Financial Ratios of Manufacturers and Retailers, Financial Practice & Education, 5(2), 44-55.

Morellec, E. (2004). Can Managerial Discretion Explain Observed Leverage Ratios? Review of Financial Studies, 17(1), 257-294.

Preston, L. & O'Bannon, D. (1997). The Corporate Social-financial Performance Relationship, Business and Society, 36(4), 419-429.

Price, J. (2012). Return on Equity Traps (and how to avoid them), Australian Shareholders' Association.

Stocker, M. L. (2005). Equity Returns and Economic Freedom, CATO Journal, 25(3), 583-594.

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OPEN ACCESS ARTICLE

TAX DEBT AS AN INDICATOR OF COMPANIES' DEFAULT: THE CASE OF SLOVAKIA

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Abstract

Scientific literature has proposed a number of indicators that are successful in predicted future of company's default. Our study is focused to enrich of the literature by presenting data on the potential tax liability as a warning sign of future company's default. Using the Receiver Operating Characteristic of curves and the values of Area Under Curve we measure and compare the resolution of the twelve ratio indicators that have in numerator the accounting data on income tax. From the twelve indicators, we have used three with the best-resolution as independent variables in the hazard multi-period logit model of prediction of company's default. The research was done on the data of failed and healthy companies that are included in the financial statements from 82,572 companies in the Slovak Republic for the period 2003-2012. We found that although the best ratio indicators with income tax were ranked in terms of their distinctive capabilities in the first half of selected 49 benchmark indicators, they does not include the best under this criterion. However in terms of accuracy of prediction model, fiscal indicators came through better than indicators with the best resolution. Therefore, it is not possible to say that which model is better. It depends on what criterion is evaluated. The possibility of using tax indicators is thus a matter of the required characteristics of the model.

Key words:

Bankruptcy prediction; Tax accounting variables; Ability of resolution; ROC curves; Hazard multi-period logit model

INTRODUCTION

For internal and external clients of a company, the important objective information on the financial health of the company are important in the current period. Furthermore, information is important about the likely development of the financial health of the company in the future, as well as information on the likelihood of company's default in the future. It was due to the failure of business partners during the crisis that the phenomenon of secondary insolvency has led to increased demand for qualified information and methods of prediction company's default. Efforts to correct

prediction of company's default led also in the past to the fact that the researchers on the basis of empirical research of financially healthy and failed companies constructed indicators, methods and ways of evaluation of the financial health of the company as well as the methods and models of company's default prediction. Let us brief overview of currently known indicators and models of business default prediction.

In the beginnings of examination of methods and ways prediction of company's default was most frequently applied method of the one-dimensional discriminant analysis that was represented by Beaver (1966) and Zmijewski (1983) models. The largest expansion of modeling of the financial health of firms and prediction of company's default occurred using multidimensional discriminant analysis. It is carried out for example by Altman Z-Score (Altman, 1968 and 1993) and Altman et al, (1995), Springate model (Sands et al, 1983), Fulmer model (Fulmer, 1984), Beermann test (Beerman, 1976), CH index (Chrastinová, 1998), Taffler model (Taffler & Tisshaw, 1997; Taffler, 1983), Credit Index (Kralicek, 1993), indicator IN 95 (Neumaier & Neumaierová, 1995; Kotulič et al, 2010), IN 99 (Kotulič et al, 2010), IN 01 (Kotulič et al, 2010), IN 05 (Kotulič et al, 2010), Analysis by Doucha I and II (Doucha, 1995). A similar method is represented by Tamari scoring model (1978), Quick test (27 Kralicek, 1993), and by A score (Argenti, 1976). In a further development of modeling of the probability of company's default were applied logit and probit models. This approach is represented for example by O score (Ohlson, 1980) and through Zmijewski model (Zmijewski, 1984). Shumway (1999) represents the method by its model of business failure prediction through hazard models. Separate category of models of failure prediction is represented by a nonlinear model Moody's RiskCalc, which is intended for private companies (Falkenstein & Boral, 2000). Since models based solely on market indicators are not the subject of this paper, in the literature review we do not present the models.

Models of the failure prediction of the companies work with various independent variables. The first group of the variables represent accounting variables which include independent variables of Altman model - working capital to total assets (WC/TA), retained earnings to TA (RE/TA), earnings before interest and taxes to TA (EBIT/TA), market equity to total liabilities (ME/TA), and sales to TA (S/TA) (Altman, 1993), and also the ratio indicators of the Zmijewski model – ratio of net income to total assets (NI/TA), the ratio of total liabilities to TA (TL/TA), and the ratio of current assets to current liabilities (CA/CL) (Shumway, 1999; Zmijewski, 1984). The second group of independent variables in the models of prediction of company's failures is market-driven variables and they include market size, past stock returns, or the idiosyncratic standard deviation of stock returns. Shumway later showed that the estimates of the parameters of independent variables, which were different accounting variables reveal that half of these variables has no statistical correlation with the probability of bankruptcy of companies (Shumway, 1999: 23).

However, in the literature no research exists that could to examine the ability of resolution and predictive capability of models with independent variables represented by ratio indicators that could be based on accounting data on *income tax* (tax derived indicators). Therefore, in this paper, we aim to empirical data obtained from the financial statements of companies in the Slovak Republic to testing the ability of resolution of the ratio indicators based on income tax and also to determine the predictive accuracy of the model of prediction of failures of companies which act as independent variables selected ratio indicators based on tax income, which demonstrate in our research the best ability of the resolution. Our aim is testing whether and how accurate it is possible to predict the failure of companies in the Slovak Republic on the basis of accounting data on the amount of income tax of companies in one of the five years that preceding the failure of the company. The ambition is to contribute to filling gap in the empirical literature, which is concerned with the subject of the ways and methods of predicting of failure of companies and enrich the empirical literature on knowledge, whether the financial information on income tax are such independent variables, which are statistically significantly related to the probability of failure of the company in the future.

The motivation for our research is that data on corporate income taxes are available to external business clients and in particular for tax authorities. If the amount of income tax was sufficiently precise indicator of the failure of the company could be the following information useful for public authorities, in particular for the financial authority for the prediction of failure of companies, but also as a means to distinguish the real, the expected failure from an intentionally caused failure of the company.

The remainder of the paper is organized as follows: In the second part we briefly explain the background of hypothesis, intuition for this hypothesis in the particular reasons for which we consider to be appropriate to consider a resolution of the ratio indicators containing income tax. In the third section, we describe empirical methodology, explaining the process, methodology and data. In the fourth part, we present the results of testing the ability of resolution of ratio indicators containing income tax and testing of the predictive ability of the model prediction of bankruptcy as independent variables contains just such indicators. Conclusion follows, and it summarizes the results of our research.

HYPOTHESIS DEVELOPMENT

Income tax is in terms of double-entry bookkeeping for contractors a part of the cost of an entity. In case of income tax is separately charged current tax and deferred tax (Ministry of Finance of the Slovak Republic, 2002). Current income tax is charged from the tax base, which is in the meaning of the Income Tax Act determined by the trading

income of increasing or decreasing about certain amounts that fall or not fall into the income tax base. Deferred tax is charged in:

a) Temporary differences between the accounting value of assets and liabilities showed in the balance sheet and their tax base;
b) For the possibility to carry forward tax loss into the future;
c) Possibility to transfer the unused tax deductions into the future periods (Ministry of Finance of the Slovak Republic, 2002).

Deferred tax is an accounting category, which displays the increasing or decreasing the tax base in future periods and will be due in the next financial periods (Gašpárová, 2004a and 2014b). Profit after income tax is one of the important own resources and thus a prerequisite for increasing its performance in future periods that may restrict the company's default in future. Profit after income tax is also one of the key performance indicators of the company.

May be mentioned the extensive review of the literature that presents research results of the relationship of income tax and corporate finances. The question of whether there is an optimal capital structure that would be a subject to the way of taxation of interests and dividends as is peculiar to so-called classical bilayer system of taxation, belongs to the most famous themes in the relationship between income tax and corporate finances. It examines whether the tax advantages in financing through debt affects the value of the company. Empirical research was undertaken and presented by Miller and Modigliani (1958 and 1963) and Miller (1977) and Miller and Schloes (1978). Following this, it examines whether the non-debt tax shields, for, example based on depreciation, are in the negative relationship to debt financing arrangement because they substitute the interests as a tax-deductible expenditure (Bradley et al, 1984). Under examination is also the fact whether the income tax has an impact on the option of organizational form and motivation to reorganization of the companies (Alford & Berger, 1998), on the dividend policy and on the form of the payment of revenues from investments into company (Allen & Michaely, 2001).

In this research, we want to verify the hypothetical assumption whether it is possible to predict the company's default through ratio indicators that are based on income tax. To clarify the intuition behind this assumption in this section, we want to show the channels through which income tax affects the return of investment of enterprise.

Income tax, in this the profit tax on dividends also from the interests affects rate of return on shareholders' investments into the equity of the company, therefore, the return on equity (ROE below). ROE is ratio indicator, which is one of the most important indicators, which are used in fundamental financial analysis of a company. We assume that the return on investments and overall financial situation of the company affects the company's default in the future. If income tax through several channels affects return of investments measured by ROE indicator and financial

situation, then we conclude that the income tax also affects the failure of the company in the future.

For explanation of the main channels through which income tax affects ROE, and implicitly also the financial situation of the company, we use DuPont system of decomposition of ROE, which has been for a long time applied for fundamental financial analysis of a company. ROE is affected by profitability, which is measured by profit margin *(PM)*, operating efficiency, which is measured by asset turnover *(AT)*, and financial leverage, which is measured by the equity multiplier *(EqM)*. Then ROE is calculated using the formula (Groppelli & Nikbakht, 2000):

$$ROE = PM * AT * EqM \tag{1}$$

The aim of fundamental financial analysis is to identify the sources of success or company's default that is measured by ROE. For it is used DuPont system of ROE decomposition by that

$$ROE = \frac{NP}{S} * \frac{S}{A} * \frac{A}{E} \tag{2}$$

where *NP* is net profit; *S* is sales; *A* is assets; *E* is equity. Expression (2) after adjustment has the form

$$ROE = \frac{NP}{E} \tag{3}$$

The ROE indicator can be further by decomposition also decomposed as this (Zane, 2004: 458):

$$ROE = \frac{NI}{EBT} * \frac{EBT}{EBIT} * \frac{EBIT}{S} * \frac{S}{A} * \frac{A}{E} \tag{4}$$

where *NI* is net income, i.e. income after income tax; *EBT* is pretax profit; *EBIT* states for earnings before interest and taxes.

From DuPont decomposition of ROE, formula is clear that the return on equity has a direct impact to the tax burden. We measure it through the ratio *NI*/*EBT*, therefore, as a share of income after taxation (net income, *NI*) to the income of company before taxation (*EBT*). The higher of the income tax, the lower the net income (*NI*) and the lower the share of net income to income of company before taxation.

Income of the company after taxation is allocated at the decision of the General Assembly into the reserve fund and statutory fund, for the redemption of shares for shareholders, the remuneration of members of statutory bodies, to an increasing of the basic capital or to account of undivided profit (Hudecová, 2013: 100). The channel, that has an effect of income tax on the financial situation and performance of the company is an income after taxation by income tax (net income); it is one of the important own

source of financing when it is not distributed among the partners, because it serves for increasing of the basic capital and equity. The higher income tax and the tax burden, the smaller is the net income which remains in the company for financing of its needs from its own resources and from undivided earnings from former periods. Net income as its own source of financing of the needs of the company has an indirect effect on the increasing of assets, which has in accordance with DuPont decomposition also affect the level of ROE.

Withholding tax levied from interests on their payments to creditors increases the cost of foreign capital and has an impact on another compositional element in calculating of ROE - the interest burden of the company, which is in decomposition of ROE (Altman, 1968) expressed by the ratio of EBT/EBIT.

Another channel by that an income tax impacts to the financial situation in the company to financing from its own resources, which is also retained profit, is the income tax levied at taxation of profit shares that are paid to the partners or shareholders. It is an effect of taxation of dividends. In the case that paid and received dividends are not burdened by the income tax, the company has a higher motivation to the distribution of profit after taxation and less motivation to detention of the profit after taxation as its own source of financing.

Assessment of income tax in terms of its impact on the financial situation of the company may also be expressed as follows:

1. Higher tax due means that it had been assessed from a higher tax base. As the tax base is assessed by modifications of profit, deductible and non-deductible items, it can be concluded that the higher the tax due, the higher profit and therefore also performance of the company was higher. It can be in terms of a company's health assessed positively as a sign that the company does not send signals of probable bankruptcy.
2. The higher the tax due from income, the lower is the income of the company after taxation (net income), which is own source of financing of needs of the company and its assets. From this point of view, the higher tax due generates, the higher risk that the company will not have sufficient own financing sources, solvency, liquidity or financing of equity investments. It means that the company probably will use other means – the outside sources of financing, although during period of crisis they have the reduced availability.

EMPIRICAL METHODOLOGY

Procedure

When assessing the distinctive ability of the ratio indicators that include income tax and during testing of the predictive ability of the bankruptcy model with the independent variables based on income tax we proceeded in two stages. The first stage

of the research that preceded our analysis described in this paper was done by Faltus in his earlier research (2014). He for the failed (defaulted) company indicated such company, which in the relevant year showed lower total assets than total liabilities. Faltus chosen 49 ratio indicators of the financial analysis, as they were indicated for example by Groppelli and Nikbakht (2000: 444-445) and he identified their distinctive ability, default detection and zero prediction horizon. These 49 indicators is a set of indicators, by which in the second stage of matching a resolution of ratio indicators based on income tax - therefore we indicate them hereinafter as the benchmark indicators.

To the results of the first stage (Faltus, 2014) are followed by a second stage of research, the results of which we present in this paper, and we divided the second stage into two phases. In the first phase we verify resolution of the twelve ratio indicators that include income tax. The aims are two: firstly, to test the resolution of these distinctive indicators, and compare it with the resolution of three benchmark indicators with the absolute best resolution, and secondly, to choose three ratio indicators based on income tax that have the best resolution and use them in the second phase as independent variables in the hazard model of prediction of company's default in the Slovak Republic. Twelve ratio indicators based on income tax we construct the following: in the numerator of the indicator is income tax in any of its accounting manifestations:

1) Total income tax;
2) Tax due from income;
3) Deferred income tax; or
4) Deferred tax claim and deferred tax obligation.

Into the denominator, we insert one of the three of accounting indicators, namely own capital (equity), revenue from sales or total assets.

Ability of ratio indicators based on income tax to distinguish between firms that failed in the prediction horizon and firms that stay healthy and survived, we measure by the size of the area under curves Receiver Operating Characteristic – we indicate as AUC ROC (12). We proceed by calculating of the AUC ROC for prediction horizons of 1-5 years, 1-5 unfailing years and detection of first year of default (zero prediction horizon). We compare these values with values of the AUC ROC that have reached benchmark indicators in the first stage of research (Faltus, 2014).

The results of the first phase we will use in the second phase of research. Its aim is to estimate the parameters of independent variables of hazard model of prediction company's default and identify its prediction accuracy. In hazard model of prediction company's default as independent variables, we use three ratio indicators based on income tax, which show the best ability of resolution.

Methodology

In the first phase we for determination of the predictive ability of indicators based on income tax used the method Receiver Operating Characteristic curves (ROC). It is a method that is used for evaluation of the resolution of the various tests in the analysis of survival (survival analysis) and to compare them not only in financial science, but also in medicine, astrology and other research areas (Gonen, 2007). Details on the method of ROC curves, are presented for example in Metz (1978), Pepe (2004) and Zhou et al, (2011).

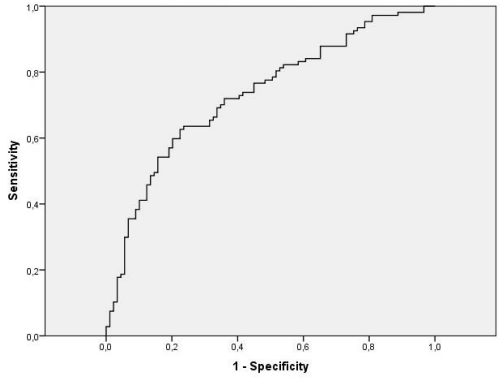
For each of the twelve indicators based on income tax, we constructed an ROC curve. It is a set of points whose coordinates on the x-axis is 1 - specificity and on the axis y is the value of the indicator of sensitivity. ROC curve shows the cumulative number of correctly determined values for the prediction of company's' default and the cumulative number of incorrectly determined values for different values so-called cut-off values (Wilson, 2013). The values can be either 0 or 1 whereas they may be positive or negative. When we have values of the resolution of each of the twelve ratio indicators and their representation through individual ROC curves, we can compare each of their resolution. Comparison we do through comparison method of values that represent the size of area under individual ROC curves, it is comparison of the values of the Area Under Curve (below AUC). The size of the area under the ROC curve we calculate by using the formula for calculating the Gini coefficient. We will use these formulas:

$$AUC = \frac{1}{2}(G + 1) \tag{5}$$

$$G = \frac{B}{A+B} \tag{6}$$

where *AUC* is area under ROC curve; *G* is Gini coefficient. The larger area under the ROC curve, the better specific ratio indicator distinguishes between companies that have failed in the prediction horizon and of the healthy companies. Figure 1 illustratively depicts the ROC curve (panel A) and the area bounded by the curve (panel B).

Panel A



Panel B

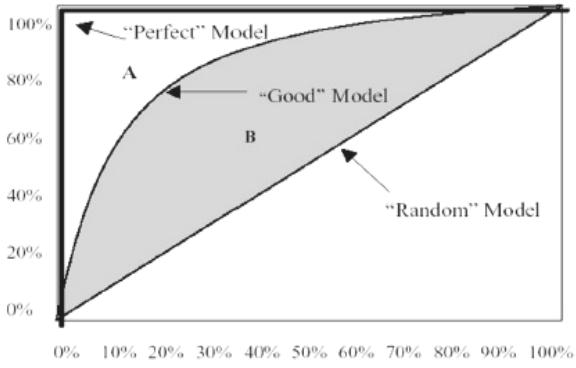


FIGURE 1. RECEIVER OPERATING CURVE (ROC) AND AREA UNDER CURVE (AUC)

Source: Panel A: own processing; Panel B: (Wilson, 2013: 44)

In *the second* phase, we estimated the parameters of the independent variables in the model of prediction of company's default and its predictive ability. Historically the several approaches were developed to modeling of prediction of company's default. The first group consists of models based on discriminant analysis and static logit model. Their representative is the Altman model (Altman, 1968). Using of the logit models for prediction of default are subject of criticism because they have a static character. The advantage of hazard models is that in contrast of the logit models they take into account the time before the company's' default. According to the Shumway, hazard models take into account that the risk of bankruptcy of the company is changed over time and its financial health is a function of its most recent financial data and age of the firm. Shumway also states three reasons for favoring of hazard models of prediction of default:

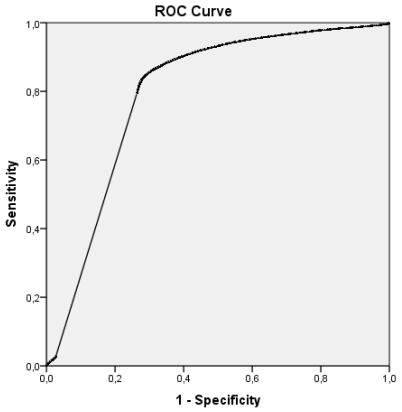
1) Static models are failing for make provision of individual periods in which the company faces to the risk of default;
2) Hazard models include covariates that varies with time;
3) Hazard models have better prediction capability because they use a lot more data (Shumway, 1999: 2).

Therefore the second group of prediction models is represented by the hazard models. Method hazard multi-period logit model we use for estimation of parameters of three independent variables and through likelihood ratios we estimate predictive ability of the whole model. For this model, on the base of the criterion AUC ROC (an average of all the prediction horizons) we selected three variables, X1, X2, X3, which are represented by those indicators based on income tax that we selected in the first phase from the original twelve indicators. Due to variable choice based on maximum AUC ROC, the model is also referred to as the compromise model (Faltus, 2014; Shumway, 1999). Further we tested the accuracy of the model for prediction horizons 0 up to 5.

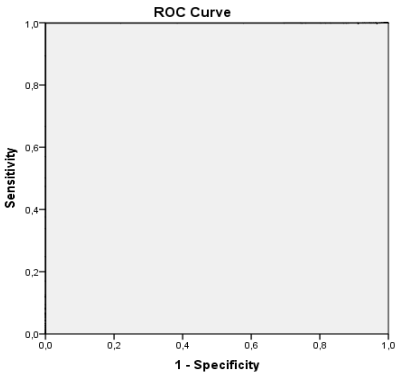
Data

The estimation of the predictive ability of indicators based on income tax we performed on the example of enterprises in the Slovak Republic for the period 2003-2012. We started from the accounting information contained in the financial statements of enterprises in the Slovak Republic. The data source is a commercial database called Albertina, and the producer is a company Bisnode, edition from August 2013. Our research uses data from the accounts of 82,572 companies. In the relevant years, there are also missing data. Quotient of available accounting statements for each of the years is: in year 2003 is available 0.5 % of financial statements, in year 2004 it is 3.1 %, in year 2005 it is 8.1 %, in year 2006 it is 11.5 %, in year 2007 it is 13.6 %, in year 2008 it is 14.4 %, in year 2009 it is 17.6 %, in year 2010 it is 18.1 %, in year 2011 it is 11.3 % and in year 2012 it is 1.8 %.

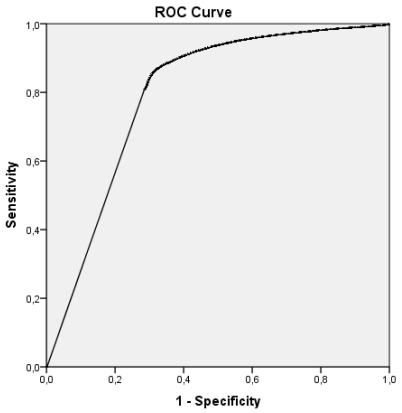
EMPIRICAL RESULTS



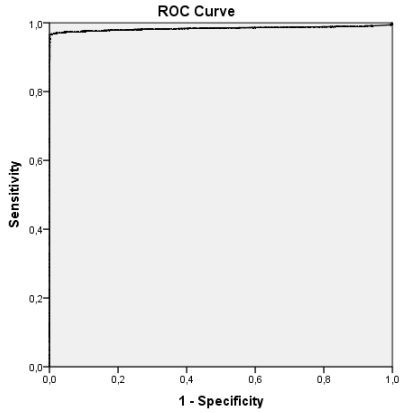
TAX/SALES



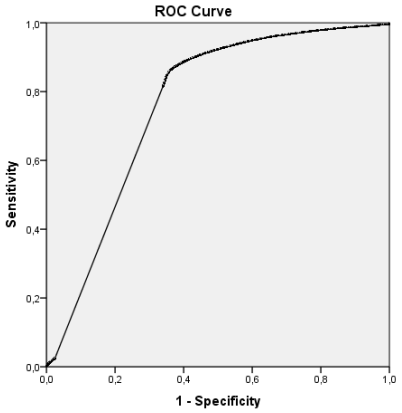
(Own Capital/Sales).365



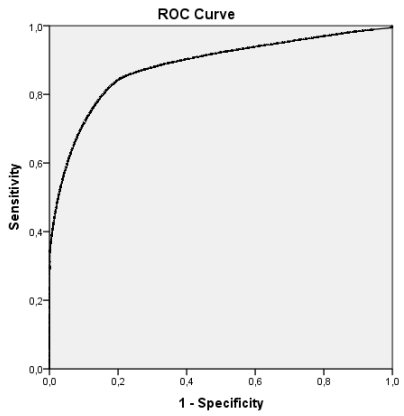
PAYABLE TAX/SALES



Total Liabilities/Total Assets



TAX/TOTAL ASSETS



Working Capital/Total Assets

FIGURE 2: RECEIVER OPERATING CURVES (ROC) AND AREAS UNDER CURVES (AUC) FOR BEST INDIVIDUAL INDICATORS;

Figure 2 and Table 1 presents the results of the first phase of our research. Specifically, Figure 2 shows in the three panels under themselves ROC curves of the three indicators based on income tax with the best resolution in average of all the prediction horizons for default detection (zero prediction horizon). In the three panels on the right are showed ROC curves of the three indicators for comparison with the best

resolution of all for default detection (zero prediction horizon), so as they were found in previous research by Faltus (2014). The best indicator is own capital/sales.

In the Table 1 in columns 1 up to 3 are values of AUC ROC for the three indicators based on income tax. We show the values for the three of the twelve ratio indicators based on income tax that achieve the highest value of AUC ROC in average from all prediction horizons. In columns 4 up to 6 there are values of AUC ROC for the three benchmark indicators with the highest AUC ROC in default detection. The variations in values of the AUC ROC for prediction horizons of 0 up to 5 years on the one hand, and the detection of the first year of default (zero prediction horizon) and for the prediction horizons 1 to 5 unfailing years on the other hand, are negligible (most 0.2). Therefore, in Table 1 the values of the AUC ROC are referred for the first option only. For the values of AUC ROC in each year of prediction horizon is also showed the number of observations from which we have done the calculation, whereas the number is specified as the ratio of positive /negative.

TABLE 1. AUC ROC VALUES FOR SELECTED INDICATORS OF COMPANY'S DEFAULT PREDICTION

	1	2	3	4	5	6
PH (yrs.)	tax/ sales (S)	payable tax/ sales (S)	tax/ total assets (S)	(own capital/ sales). 365 (S)	total liabilities/ tot. assets (L)	working capital/ total assets (S)
	N, positive/neg.	N, positive/neg.	N, positive/neg.	N, positive/neg.	N, positive/neg.	N, positive/neg.
0	0.793	0.794	0.76	0.999	0.983	0.884
	46918/226110	46918/226110	54884/254731	46918/226110	55008/253838	54880/254684
1	0.767	0.765	0.741	0.901	0.897	0.813
	34829/167491	34829/167491	41067/186660	34829/167491	41020/186028	41062/186630
2	0.744	0.739	0.725	0.843	0.839	0.763
	23065/117513	23065/117513	27150/129415	23065/117513	27042/128938	27149/129396
3	0.725	0.718	0.711	0.805	0.8	0.727
	14982/80498	14982/80498	17642/88058	14982/80498	17557/87666	17641/88048
4	0.71	0.701	0.698	0.779	0.776	0.704
	9002/51830	9002/51830	10563/56315	9002/51830	10510/56036	10563/56307
5	0.695	0.685	0.683	0.764	0.759	0.685
	4886/30725	4886/30725	5687/33243	4886/30725	5651/33064	5687/33236

Notes: N – number of observations; PH – prediction horizon; L – larger values of the test result variable indicate stronger evidence for a positive actual state; S – smaller values of the test result variable indicate stronger evidence for a positive actual state. The positive actual state is 1 (default).
Source: authors' calculations

Indicators, which included deferred tax or deferred tax claim and deferred tax obligation don't reached value of AUC ROC greater than 0.55. In contradistinction to all other tested indicators, each of them presented with increasing predictive period more or less pronounced trend of the improved resolution ability.

In *the second* phase, we estimated the bankruptcy model by hazard method multi-period logit model with using three indicators based on income tax that we identified in the first phase. Whereas that between the indicators tax/sales and payable tax/sales is the high measure of collinearity, the variable payable tax/sales for purpose of estimation of the model we replaced by the indicator with the fourth best-resolution ability, specifically by indicator of payable tax/own capital. The number of observations included into the regression is 270,815, including 46,757 defaults. The estimated model including the coefficients that we estimated by logistic regression has this form and parameter values:

$$y = \frac{1}{1+e^{-(-0.812-0.004.X_1+3.689.X_2-86.45.X_3)}} \quad (7)$$

where: X_1 = *tax/sales;* X_2 = *tax/total assets*; X_3 = *payable tax/own capital*. The positive sign of the coefficient indicates the relationship, which shows that the higher the value of the variable, the higher probability of default, and vice versa. The model's accuracy is measured by the likelihood ratio (LR). LR value for the estimated model is 65 572.888. Resolution ability of the model for prediction horizons of 0 up to 5 years is shown in Table 3.

TABLE 2. VARIANCE INFLATION FACTORS

Indicator	Variance Inflation Factor (VIF)
tax/sales	1.000
tax/total assets	1.008
payable tax/own capital	1.008

TABLE 3. AUC ROC OF THE MODEL FOR PREDICTION HORIZONS

Prediction horizon (years)	AUC ROC	Number of observations (positive/negative)
0	0.871	46757/224058
1	0.791	34552/166019
2	0.745	22813/116419
3	0.713	14804/79687
4	0.689	8880/51259
5	0.672	4812/30372

CONCLUSION

Prediction of company's default through scientific methods has gained a well-deserved interest of external clients in undertaking, financial managers, bankers and public administration institutions in the time of financial crisis, but also in subsequent periods. The subject of our research was testing of the resolution ability of the financial indicators with incorporated elements of income tax and testing of the predictive ability of the prediction model of bankruptcy on data of Slovak companies for the time period 2003-2012. In our research, we proceeded in two phases.

In the first phase we through ROC curves and the areas under these curves tested the resolution ability of the ratio indicators based on accounting data, namely on the income tax and its accounting variants. In the empirical literature, results are about the resolution ability of the accounting variables there lacking empirical analysis of the resolution ability of the accounting variables containing income tax. Therefore, we decided in this research at least partially fill this gap by an empirical research of data about default (failed) and healthy companies in the Slovak Republic. We had constructed twelve ratio indicators that have in the numerator the total income tax, the payable tax, deferred tax or deferred tax claim and deferred tax obligation, and in the denominator they have either sales, total assets or own capital. We found that the ratio indicators including deferred tax and deferred tax claim and deferred tax obligation in combination with sales, total assets or own capital have very little ability to distinguish between default and unfailing companies. While comparing of the ability of the indicators containing the income tax to distinguish between default (failed) and healthy companies, we found that the best ratio indicators that containing in the numerator the income tax are placed between all 49 benchmark indicators on the eighteenth, nineteenth and twenty-second place (default detection, zero prediction horizon). On this basis, we concluded that the ratio indicators that containing accounting data about the income tax are not suitable indicators for prediction of company's default in the Slovak Republic.

In the second stage, we estimated the hazard multi-period logit model for prediction of Slovak company's default. In our model, we had chosen three financial variables as independent variables that showed the best resolution ability in the first phase of the research. We had selected the three best indicators based on income tax detected by the AUC ROC method in average from the all prediction periods, but from the econometric reasons, we had exchanged variable payable tax/sales for variable payable tax/own capital. The resolution ability of the hazard multi-period logit model with the three independent variables we were measured by means of AUC ROC, while this statistics reached in the prediction horizon of the year zero the value 0.871 only. For comparison with the results of our previous research, the model constructed by the same method from overall the three best benchmark indicators, it has the value of this statistics 0.996, while the fact of collinearity problem we solved so that the third best overall benchmark indicator we replaced by the fourth in the order (Faltus, 2014).

The accuracy of prediction of company's default through hazard multi-period logit model, we measured through statistics likelihood ratio. We found that in the accuracy of the prediction, the model of prediction of default reaches better results with the accounting variables that contain in the numerator the data about the income tax. This model has likelihood ratio 65,572. Conversely, model of company's default, which estimates the probability of default of companies with three independent variables

that have the best overall resolution ability, has accuracy of prediction measured through likelihood ratio equal to only 15,434 (Faltus, 2014). From a comparison of both models we can deduce conclusion that the resolution ability and accuracy of prediction of hazard multi-period logit model may not be proportionally dependent. Therefore, it is not possible to say that which model is better. It depends on what criterion is evaluated. The possibility of using tax indicators is thus a matter of the required characteristics of the model.

As a whole we can evaluate that our empirical research has confirmed the results of previous empirical research according to which the estimates through hazard models with accounting variables, for example, that have been made with Altman (1968) and Zmijewski (1984) variables, reveal that half of these variables has no statistical correlation with the probability of company's bankruptcy (Shumway: 23).

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REFERENCES

Alford, A. & Berger, P. (1998). The Role of Taxes, Financial Reporting, and Other Market Imperfections in Structuring Divisive Reorganizations, University of Pennsylvania Working Papers.

Allen, F. & Michaely, R. (2001). Payout Policy, Cornell University Working paper.

Altman, E. I. (1968). Financial Ratios, Discriminant Analysis and the Prediction of Corporate Bankruptcy, Journal of Finance, 23(4), 589-609.

Altman, E. I. (1993). Corporate Financial Distress and Bankruptcy: A Complete Guide to Predicting and Avoiding Distress and Profiting from Bankruptcy, New York: John Wiley and Sons Inc.

Altman, E. I., Hartzell, J. & Peck, M. (1995). Emerging Markets Corporate Bonds: A Scoring System, Salomon Brothers Working Paper.

Argenti, J. (1976). Corporate Collapse: the Causes and Symptoms, New York: John Wiley and Sons.

Beaver, W. H. (1966). Financial Ratios as Predictors of Failure, Journal of Accounting Research, Empirical research in accounting: selected studies, 4, 71-111.

Beerman, K. (1976). Possible Ways to Predict Capital Losses with Annual Financial Statements, University of Düsseldorf Working Paper.

Bisnode, Albertina, s.l. (2013). Bisnode, 08.

Bradley, M. G., Jarrel, G. & Kim, E. H. (1984). On the Existence of an Optimal Capital Structure: Theory and Evidence, Journal of Finance, 39, 857-878.

Chrastinová, Z. (1998). Methods of evaluation of economic value and prediction of financial situation of farms (original: Metódy hodnotenia ekonomickej bonity a predikcie finančnej situácie poľnohospodárskych podnikov), VÚEPP Working Paper.

Doucha, R. (1995). Balance analysis (original : Bilanční analýza), Prague: Grada Publishing.

Falkenstein, E., Boral, A. & Carty, L. V. (2000). RiskCalcTM for Private Companies: Moody´s Default Model, Moody´s Investors Service, Working Paper.

Faltus, S. (2014). Firm Default Prediction Model for Slovak Companies, The European Financial Systems 2014 Conference Proceedings, Lednice, 12-13 June, 2014.

Fulmer, J. G. (1984). A Bankruptcy Classification Model for Small Firms, The Journal of commercial bank lending, 66(11), 25-37.

Gašpárová, E. (2014a). Deferred Income Tax (original: Odložená daň z príjmov), Dane a účtovníctvo, XIX, 7-8.

Gašpárová, E. (2014b). Accounting and reporting of deferred income tax (original: Účtovanie a vykazovanie odloženej dane z príjmov), Dane a účtovníctvo, Mesačník s bezkonkurenčným počtom aktualít, XI, 7.

Gonen, M. (2007). Analyzing Receiver Operating Characteristic Curves Using SAS, Cary, NC: SAS Press.

Groppelli, A. A. & Nikbakht, E. (2000). Finance, 4th ed. Barron´s Educational Series, Inc.

Hudecová, H. (2013). Approval and distribution of profit - Accounting view (original: Schválenie a rozdelenie výsledku hospodárenia - účtovný pohľad), Dane a účtovníctvo, Vzory a prípady, 2.

Kotulič, R., Király, P. & Rajčániová, M. (2010). Financial Analysis of Company (original: Finančná analýza podniku), Bratislava: Iura Edition.

Kralicek, P. (1993). Fundamentals of financial management (original: Základy finančního hospodaření), Prague: Linde.

Metz, C. E. (1978). Basic Principles of ROC Analysis, Seminars in Nuclear Medicine, 8, 283-298.

Miller, M. H. & Schloes, M. (1978). Dividends and Taxes, Journal of Financial Economics, 6, 333-364.

Miller, M. H. (1977). Debt and Taxes, Journal of Finance, 32, 261-275.

Ministry of Finance of the Slovak Republic. (2002). Details of Accounting Procedures and Framework Chart of Accounts for Entrepreneurs Using Double Entry Bookkeeping (original: Provision of MF SR, Podrobnosti o postupoch účtovania a rámcovej účtovej osnove pre podnikateľov účtujúcich v sústave podvojného účtovníctva), Bratislava, No. 23054/2002-92.

Modigliani, F. & Miller, M. H. (1963). Corporate Income Taxes and Cost of Capital: a Correction (in Communications), American Economic Review, 53, 433-443.

Modigliani, F. & Miller, M. H. (1958). The Cost of Capital, Corporation Finance and the Theory of Investment, American Economic Review, 48, 261-297.

Neumaier, I. & Neumaierová, I. (1995). Try to calculate your INDEX IN 95 (original: Zkuste spočítat svůj INDEX IN 95), Terno, 5, 7-10.

Ohlson, J. A. (1980). Financial Ratios and Probabilistic Prediction of Bankruptcy, Journal of Accounting Research, 18, 109-131.

Pepe, M. S. (2004). The Statistical Evaluation of Medical Tests for Classification and Prediction, Oxford: Oxford University Press.

Sands, E. G., Springate, G. L. & Peck, M. (1983). Predicting Business Failures, CGA Magazine, 17, 24-27.

Shumway, T. (1999). Forecasting Bankruptcy More Accurately: A Simple Hazard Model, [Date: 1st August, 2014. http://www-personal.umich.edu/-shumway].

Taffler, R. J. & Tisshaw, H. (1997). Going, Going, Gone - Four Factors which Predict, Accountancy, 88, 50-54.

Taffler, R. J. (1983). The Assessment of Company Solvency and Performance Using a Statistical Model, Accounting and Business Research, 15(52), 295-308.

Tamari, M. (1978). Financial Ratios: Analysis and Prediction, London: P. Elek.

Wilson, N. (2013). Multivariate Regression and Limited Dependent Variables: research report, Leeds: Credit Management Research Center.

Zane, B., Alex, K. & Marcus, A. J. (2004). Essentials of Investments, 5th ed. McGraw-Hill Irwin.

Zhou, X., Obuchowski, N. & McClish, D. K. (2011). Statistical Methods in Diagnostic Medicine, John Wiley and Sons, Inc.

Zmijewski, M. E. (1983). Essays on Corporate Bankruptcy, State University of New York Dissertation.

Zmijewski, M. E. (1984). Methodological Issues Related to the Estimation of Financial Distress Prediction Models, Journal of Accounting Research, 252, 59-82.

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OPEN ACCESS ARTICLE

THERE SHOULD BE NO CAP ON THE AMOUNT OF SUBORDINATED DEBT: WILLIAM POOLE IS RIGHT!

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Abstract

Market discipline in the context of regulatory supervision of banks could be achieved by mandating banks to issue a minimum amount of subordinated debt to the public. Recent studies, however, argue that increased levels of subordinated debt may lead to increased risk-taking by banks, thus undermining the disciplinary function of such debt instruments. These studies, then, call for imposing an upper limit on the amount of subordinated debt that can be held. So, should there be such an upper limit? This paper lays out and analyzes a model that addresses this question. The analysis reveals that subordinated debt as an instrument of market discipline is only useful under relatively large amounts of debt. This finding furnishes theoretical support for a recent proposal by William Poole (former chief executive of the Federal Reserve Bank of St. Louis) on how subordinated debt can be made to serve as a 'disciplinary device.'

Key words

Subordinated Debt; Market Discipline; Bank Supervision; Risk Exposure

INTRODUCTION

In the context of regulatory supervision of banks, the Basel Accord II, established in 2001 emphasizes three major pillars: minimum capital requirements; regulatory supervisory review; and rules for disclosure (market/investor discipline). The disclosure-pillar stresses the need for banks to more frequently divulge information regarding their risk exposure and capital adequacy to investors in order to foster transparency and better market discipline. As such, it is recommended that larger banks issue subordinated debt, which has a lower priority claim than the more senior debt on bank assets. This incentivizes creditors to more closely monitor the risk-exposure of banks. Thus, the incentives of subordinated debt holders and the incentives of regulators become aligned. This rationale for mandating banks to issue a minimum amount of debt has found voice in what is a large chorus of researchers

(Benston et al, 1986; Shadow Financial Regulatory Committee, 2000; Evanoff & Wall, 2000; Lang & Robertson, 2002).

The above-described rationale has, however, been recently questioned. For instance, the tendency of bank managers to disclose favorable information as well as the tendency of the government to bail out troubled larger banks ("too big to fail") may distort the information content of subordinated bond prices and hamper the supervisory role of such debt. In addition, it is argued that subordinated creditors, unlike unsecured depositors, may gain significantly under favorable conditions (that is, on the upside of risk).This makes increased risk-taking by banks a desirable condition for subordinated debt holders. As a result, the incentives of creditors and those of regulators are thrown out of sync. In fact, Gorton and Santomero (1990) and Bigus and Prigge (2005) find evidence that subordinated bond prices rise with the level of bank risk. Therefore, they maintain that it may be worthwhile for regulators to impose a limit on the amount of subordinated debt issued by banks (in addition to requiring the issue of a minimum amount of subordinated debt). It is worth noting here than Niu (2008) theoretically establishes an upper limit that is not "too large."

So, should there be such an upper limit? This paper analyzes a standard-type, simple model (Brigus & Prigge, 2005) that captures the connections between the size of subordinated debt and risk-taking by bank to address this question. The analysis reveals that subordinated debt as an instrument of market discipline is only useful under relatively large amounts of debt. This finding, lends theoretical legs to Poole's (Moore, 2009) recent proposal requiring banks to hold at least 10% of their liabilities in the form of subordinated debt (with no cap on this debt), which has been argued to be a rather large proportion (Roblaragh, 2009).

The rest of the paper is organized as follows: Section 2 lays out the Model and conducts a careful examination of the links between the size of subordinated debt and risk–taking by banks. Section 3 concludes the paper.

A MODEL AND AN ANALYSIS OF SUBORDINATED DEBT AND BANK RISK

Bigus and Prigge (2005) – henceforth, B&G - compute the default risk of subordinated debt when the bank has low risk, DR^{s}_{Sub} , and when the bank is taking higher risk, DR^{r}_{Sub}, by drawing in standard-fashion on two cumulative asymmetric positively skewed density functions; G_s (for safe) and G_r (for risky), as depicted in Fig.1.

If the difference in default risk (DR^{s}_{Sub} - DR^{r}_{Sub}) is positive then subordinated debt holders benefit from risk taking by the bank.

$$DR^{r}_{Sub} - DR^{s}_{Sub} = \int_{D_{Dep}}^{D_{Dep}+D_{Sub}} [G_r(z) - G_s(z)]\, dz = \int_{\underline{v}}^{D_{Dep}+D_{Sub}} [G_r(z) - G_s(z)]\, dz - \int_{\underline{v}}^{D_{Dep}} [G_r(z) - G_s(z)]\, dz \quad (1)$$

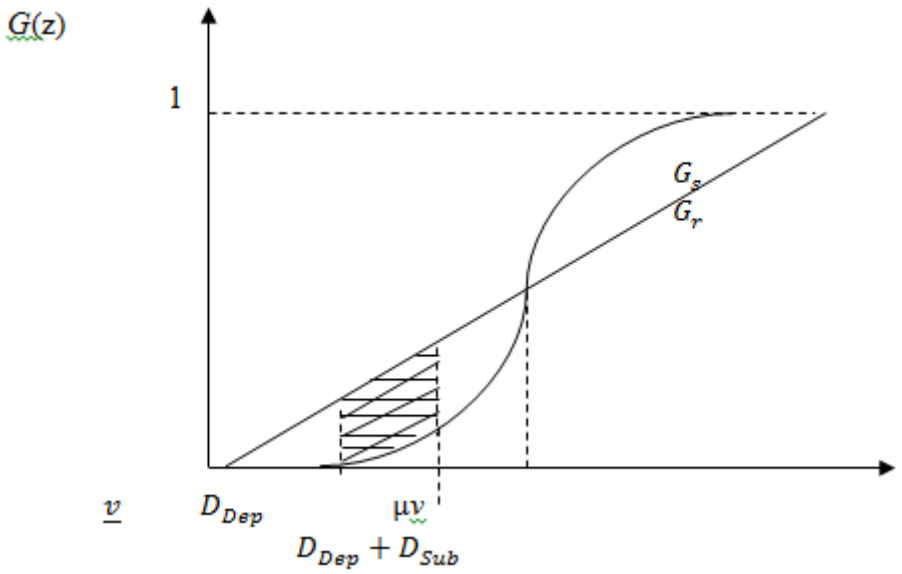

FIG 1. HIGH RISK (G_r) VS LOW RISK (G_s) CUMULATIVE ASYMMETRIC DENSITY FUNCTIONS

Where $\underline{v}$ is the lower bound of the bank's asset value$v$, while D_{Dep} and D_{Sub} represent the claim on the bank assets by depositors and subordinated debt-holders respectively. To estimate the above default risk difference, B&G construct two discrete, positively skewed density functions representing bank asset values under the two different scenarios; when bank risk is low and when it is relatively high.

TABLE 1. DISCRETE ASYMMETRIC DENSITY FUNCTIONS (LOW AND HIGH RISK)

Value of Bank assets	$v-2d$	$v-d$	v	$v+d$
Pr. of Asset Value (low risk)	p_1	p_2	p_3	p_4
Pr. of Asset Value (high risk)	p_1+2p^*	p_2-3p^*	p_3	p_4+p^*

p^* represents the degree of higher risk compared to the low risk density function while d is the standard deviation of bank asset values representing the risk level.

The degree of increased risk is represented by the probability value p^*while d is the standard deviation of the bank's asset values, representing the general risk level. Here, two different cases are considered: Case 1 where deposits are small and Case 2 where deposits are large. In Case 1, where the following condition holds:

$$v-2d < D_{Dep} \leq v-d \tag{2}$$

the difference in default risk is estimated as follows:

$$DR^s_{Sub} - DR^r_{Sub} = -2p^* D_{Sub} + 3p^*[D_{Sub} + D_{Dep} - (v-d)] \tag{3}$$

when $D_{Dep} \leq v - d < D_{Dep} + D_{Sub} \leq v$

It is argued that this default risk difference could be positive (there are benefits to debt-holders if the bank takes more risk) in case the following three conditions are met:

$$D_{Sub} > 3\left(v - d - D_{Dep}\right)$$

$$D_{Dep} > v - d - \frac{D_{Sub}}{3}$$

$$d > v - D_{Dep} - \frac{D_{Sub}}{3} \quad (4)$$

The above conditions imply that if deposits, subordinated debt, and the bank's risk are "large enough", then debt-holders may have risk incentives. However, in what follows, we show that the above statement is not correct and there seem to be no benefits to debt-holders (from increased risk-taking by the bank) under this Case 1, where deposits are small.

The above three conditions are interchangeable so we will focus on the first one. Consider the bank's asset value $v = D_{Dep} + D_{Sub} + E$ where E stands for stockholders equity. Therefore, replacing $v - D_{Dep}$ with $D_{Sub} + E$ in the above condition yields the following:

$$D_{Sub} > 3\left(v - d - D_{Dep}\right) > 3(D_{Sub} + E - d) \quad (5)$$

Therefore, the default risk difference could be positive only if:

$$D_{Sub} < \frac{3}{2}(d - E) \quad (6)$$

This condition may not hold in most cases. Given the recent emphasis that bank regulators have placed on capital adequacy requirements under Basel I and II, shareholders' equity E is likely to be large enough to absorb any possible loss resulting from increased risk d. Also, given that ample stockholders' equity is established, there is a lot at stake for shareholders (in terms of potential losses), leading bank-managers to take on less risk. Given that the expression on the right-hand side of (6) is negative, the only scenario where debt holders may benefit from risk taking is when $D_{Sub}$is negative, which of course is not plausible. Therefore, the difference in default risk (DR^{s}_{Sub} - DR^{r}_{Sub}) is unlikely to be positive under Case 1 (small amount of deposits). Hence, we contend that subordinated bond prices (and yields) do offer accurate signals to regulators under this condition; while bank-managers may have the incentive to increase risk in order to defray some of the increased cost of subordinated debt, debt holders may resist such an attempt leading to lower bond prices as the bank's risk rises. Therefore, the capital adequacy

requirements stipulated by the Basel accord, though costly, yield additional, important benefits.

Now, we turn to the discussion of Case 2 offered by B&G, where the amount of deposits is large, that is, when the following condition holds:

$$v - d < D_{Dep} \leq v \quad (7)$$

Here the difference in default risk is computed as follows:

$$DR^{s}_{Sub} - DR^{r}_{Sub} = p^{*}D_{Sub} \quad (8)$$

The difference is positive, suggesting that benefits exist for bond holders under conditions of increased risk. In this case, as the bank's risk increases, bond prices (and yields) rise (fall). This in turn, gives distorted information to regulators on the financial condition of the bank. Therefore, we contend that the use of subordinated debt as an instrument of market discipline is useful only under relatively large amounts of debt, which is supportive of Poole's proposal mentioned earlier. This implies having no cap on the amount of subordinated, which runs counter to the received wisdom.

CONCLUDING REMARKS

This paper analyzes a simple, standard-type model for capturing the relationship between the size of subordinated debt and risk-taking by banks, as in Bigus and Prigge (2005), and argues that the possible increase in a bank's risk as a result of subordinated debt issuance may be associated with conflicting incentives of bank-managers and creditors. That is, when small amounts of subordinated debt are issued, the increased cost of debt may not be significant enough to encourage bank managers to invest in riskier assets in order to defray this incremental cost. However, under this condition, since risk incentives do exist for subordinated debt holders, bond prices (and yields) may be higher (lower) when the bank's risk increases, giving distorted information to regulators.

On the other hand, when large amounts of subordinated debt are issued, the analysis uncovers that subordinated debt holders would not benefit from increased risk. As a result, subordinated bond prices (and yields) would still offer accurate signals to regulators on the financial condition of the bank. Therefore, the use of subordinated debt as an instrument of market discipline may only be useful under relatively large amounts of debt, implying that there, in fact, ought not to be a ceiling on the size of a bank's subordinated debt.

The discussion thus far has focused on the size dimension of subordinated debt, in terms of its implications for risk-taking on the part of banks. One avenue for future work is to examine the interest-rates dimension, in terms of the effectiveness of capping interest rates on subordinated debt.

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REFERENCES

Benston, G. J., Eisenbeis, R. A., Horvitz, P. M., Kane, E. J. & Kaufman, G. G. (1986). Perspectives on safe and sound banking, Cambridge, MA: MIT Press.

Bigus, J. & Prigge, S. (2005). When Risk Premiums Decrease as the Bank's Risk Increases- A Caveat on the Use of Subordinated Bonds as an Instrument of Banking Supervision, Journal of International Financial Markets, Institutions and Money, 15, 369-390.

Evanoff, D. D. & Wall, L. D. (2000). A Subordinated Debt as Bank Capital: A Proposal for Regulatory Reform, Economic Perspectives, Federal Reserve Bank of Chicago, 40-53.

Gorton, G .B. & Santomero, A. M. (1990). Market Discipline and Subordinated Debt: A Note, Journal of Money, Credit and Banking, 22, 119-128.

Lang, W. W. & Robertson, D. D. (2002). Analysis of Proposals for a Minimum Subordinated Debt Requirement. Journal of Economics and Business, 54, 115-136.

Moore, H. (2009). Jumping into the Regulatory Poole for Banks, [http://blogs.wsj.com/deals/2009/04/03/jumping-into-the-regulatory-poole-for-banks/].

Niu, J. (2008). Can Subordinated Debt Constrain Banks' Risk Taking?, Journal of Banking and Finance, 32, 1110-1119.

Roblaragh, (2009). Bill Poole: subdebt as a substitute for regulators 2009-05-21, [http://robertlaragh.blogspot.com/2009/05/bill-poole-sub-debt-as-substitute-for.html]

US Shadow Financial Regulatory Committee. (2000). Reforming bank capital regulation: A Proposal by the US Shadow Regulatory Committee.