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The effect of incentives, work passion and job satisfaction on vocational, secondary school (SMK) teacher work achievement in the city of Medan, Indonesia

Djatmiko Noviantoro

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The Effect Of Incentives, Work Passion And Job Satisfaction On Vocational Secondary School (SMK) Teacher Work Achievement In The City Of Medan, Indonesia

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ABSTRACT

Purpose

This study aims to empirically investigate the direct effect of incentives on job satisfaction, and the extent of direct effect of work passion on job satisfaction, the extent of direct effect job satisfaction on teachers' achievement, the extent of direct effect of incentives on teachers' achievement, and the extent of direct effect of work passion on teacher's achievement, and the effect of incentives on teachers' achievement through job satisfaction, as well as the extent of the effect of work passion on teacher's achievement through job satisfaction.

Design/methodology/approach

This study involved a sample of 183 SMK teachers across the City of Medan. The data were analyzed using "Path Analysis" of IBM SPSS 21.0.

Findings

The study lead to the following results: Incentives has a direct but insignificant effect on job satisfaction with significant path coefficient value of 0.138, and at a significant level of 0.095 with probability sig $\geq \alpha = 0.05$. Work passion directly affects job satisfaction with a path coefficient value of 0.144, at a significant level of 0.081 with probability sig $\geq \alpha = 0.05$. The effect of work passion is not significant. Job satisfaction directly affects teachers' achievement with a path coefficient value of 0.208 and at a significant level of 0.04 with probability sig $\leq \alpha = 0.05$. Incentives directly affect a teacher's achievement with a path coefficient value of 0.138, at a significant level of 0.371 with probability sig $\geq \alpha = 0.05$. However, it's not significant. Work passion directly affects teachers' achievement with path coefficient value of 0.296 path and significant at the probability sig $0.000 \leq \alpha = 0.05$. Incentives has indirect effect on teachers' achievement through job satisfaction and has indirect effect coefficient value of less than (<) direct effect (P31x1x P43X3) = (0.138 x 0.208) = 0.029 or 2.9%. The individual work passion has no indirect effect on achievement through job satisfaction and has a direct effect with a coefficient value bigger than (>) indirect effect (P32X2 x P43X3) = (0.144 x 0.296) = 0.030, or 3 %

Research limitations/implications

Despite the variable of incentives have a nonsignificant direct effect on work achievement and work passion and job satisfaction have a significant effect on improvement of work achievement, this variable, however, must be well implemented and improved on a continuous basis in order to achieve best work achievement so as to maximally achieve the pre-defined goals or objectives.

Originality/value

Researches can add several more variables, both of exogenous variables and endogenous variables for the purpose of improving and expanding the results of this research, so that the expected findings may bring more benefits for the development and advancement of education world especially in the City of Medan. In addition, the municipal Government of Medan can also take strategic steps that may help improve the quality of education in the City of Medan in general and in particular.

Keywords:
Incentives, Work Passion, Job Satisfaction, Achievement

1. INTRODUCTION

The quality of the educational process can be seen from two aspects, namely component quality, and management quality. Both of these aspects are interrelated. Notwithstanding that, the components are good enough such as the availability of facilities and infrastructure and sufficient funding, it comes to no avail if these aspects are not supported with reliable management and in the end, the goal is not optimally fulfilled. Likewise, if the education management is good yet still unsupported with good facilities and infrastructure, the result will not be

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optimal. The management of school units or known as schools with school-based management principle is a national program which is set forth in laws and regulations. This is in line with the efforts of substantiating stability of democracy in Indonesia through decentralization of authority, resources, and funds to school units so that schools can serve as the main independent unit of learning quality improvement (direct policy, budgeting, curriculum, learning materials and evaluation). As of the initiation of Act No. 22 of 1999 which was last amended by Act No. 32 of 2004 on Local Government, the issue of government decentralization has gained a considerable amount of attention. Education is one of the subsections decentralized to Municipal/Regional Government. Through decentralization of education, it is expected that the root causes of education problems such as quality, equality, relevance, efficiency, and management can be solved. One form of education decentralization is the School-Based Management model. In an effort to take advantage of human resources in an effective and efficient manner, it is expected to have good personnel management as people as human beings are born with characteristics, behavior, needs differing with other production factors. The efforts in improving employee quality and work behavior will eventually lead to efforts in raising employee productivity, one of the factors being work passion. Beer, dkk (Suhariadi, 2002) asserts that all forms of productivity increase will not be able to provide maximum results when employees do not have passion in doing the work more diligently, so that the work is completed more quickly and more efficiently. In this case, work passion is a mental condition that reflects a person's feelings to work alone or in a team. The need for this is, in fact, an increase in many qualified human resources. Commonly, each institution or organization expects its teacher to work effectively and produce high performance. This can be achieved when each and every teacher possesses skills and high performance. With high levels of performance, teachers will be encouraged to always work effectively so that the institutional goals will be successfully achieved and accomplished. Qualified human resources and adequate facilities require all components in a school organization that consists of a school principal and teachers as well as school committee to optimize all, so as to produce more work achievement with all the components in the school and in the end the school is able to function better and meet the objectives and targets that have been defined. With larger incentives from the Medan Municipal Government, the performance of school principals and teachers that previously experienced problems in executing the plans of school quality improvement due to the gap between the allocated budgets and the target to be achieved will improve. As a supervising institution, Education Office of Medan needs to give more attention to those schools that have met the criteria of 8 (eight) National Education Standards (SNP) in order for the schools to be able to maintain their status. In carrying out the tasks of learning and teaching at the school, each teacher as an educator must have passion in doing his work tasks and performing his responsibilities. Work passion can be interpreted as a kind of a simple term derived from varied psychological forces that presses someone with their work. This is in line with the definition of work passion which is a work climate or environment within an organization that shows a sense of passion in carrying out work and thus encourages people to work more effective and productive (Darwaman, 2007). The level of job satisfaction, in the end, will somehow affect work achievement of the school principal and teachers during the implementation of school-based management. In achieving optimum work achievement by the school, principal and teachers are supported with a variety of factors; among others, work passion, job satisfaction and also rewards for the accomplished achievements.

2. LITERATURE REVIEW

2.1.Incentives

Keith Davis and William B. Werther (in Wibowo, 2013: 349) put forth *"Incentive system link compensation and performance by rewarding an employee for their actual result, not for seniority or for hours worked"*. While Hani T. Handoko (in Justine T. Sirait, 2005:200) argues that incentives are a stimulant offered to employees so that they can work in accordance with or higher than the standards that have been defined. William B. Werther and Keith Davis (in Justine T. Sirait, 2005:200) puts forward that the system of incentives connects employee work performance as concrete results with compensation, not only offered to those who have worked for a long time but also to those monthly workers. Harsono (2004:21) believes that incentives are a compensation system where the amount given depends on the results achieved, which means that the incentives given to workers are aimed to achieve better results. Justine T. Sirait (2005:200-201) puts forward that incentives provided depending on employee achievement or performance, while wages given by the company is mandatory. Incentives are provided to encourage employees to be more diligent at work and are usually given to employees whose achievements or productivity can be easily measured.

2.2. Work Passion

Hasibuan points out that work passion is the desire and the seriousness of an individual to carry out his work well and to be disciplined in achieving maximum productivity. Thus, it can be concluded that work passion is employee behavior working with more optimal conditions that reflect a situation where the company can achieve its goals. High level of work passion is a positive reaction or in other words, working with better results. Work passion has an effect on the company's activity, making the company or organization to demand for employees who have a high level of work passion (R.Y. Sangki., et al. 2014). Work passion is the desire and the seriousness of an individual to work effectively and to be disciplined in achieving maximum work achievement (Hasibuan, 2008).

2.3 Job satisfaction

Robbins (in Wibowo, 2013: 510) defines job satisfaction as

a general attitude toward someone's work which shows a discrepancy between the number of rewards received by employees and the amount of which they believe they deserve to receive. A similar argument is stated by Gibson (in Wibowo, 2013: 501-502) which says that job satisfaction is employee attitude towards the work. This is a result of their perception of work. Kreitner and Kinicki (in Wibowo, 2013: 502) mention that job satisfaction is an emotional or affective response towards various aspects of someone's work. This definition shows that *job satisfaction* is not a single concept. A person can be relatively satisfied with one aspect of work and not satisfied with one or more other aspects. Handoko (in Sutrisno, 2013: 75) argues that job satisfaction is a happy or unhappy emotional state for employees when they perceive their work. Job satisfaction reflects an individual's feelings towards his work.

2.4 Work Achievement

According to the Bernardin and Russel (in Sutrisno, 2010:150), work achievement is a note on the results obtained from certain job functions or certain activities during a specific period of time. According to Bryan and Rue (in Sutrisno, 2010:150), work achievement is an individual's level of skill on the tasks covered in his work. The definition shows the weight of work passion in meeting the conditions set forth in his work. Vroom (in Sutrisno, 2010:150) stated that the level of behavior in performing his work is called the level of achievement. Contextually, the word "achievement" when associated with the word "work" will produce a slightly different understanding on previous definitions. *Achievement*, according to Thoha, (in e-journal of Administrative Reform, 2013,1 (2):590-601) is the feeling of ability in completing tasks or work. The definition of achievement is briefly put forward by Gibson (in e-journal of Administrative Reform, 2013,1 (2):590-601) as the desired results of behavior. According to Hasibuan (in e-journal of Administrative Reform, 2013,1 (2):590-601), work achievement is a result of work achieved by an individual in carrying out the duties placed on him based on his skills, experiences, seriousness, and timeliness. While Stoner (in e-journal of Administrative Reform, 2013,1 (2):590-601) said that work achievement is every target specifically defined for his work.

2.5. Research Model

From the above definitions, the conceptual framework of cause-effect research model between the variables is used in this study. As is illustrated in the following figure:

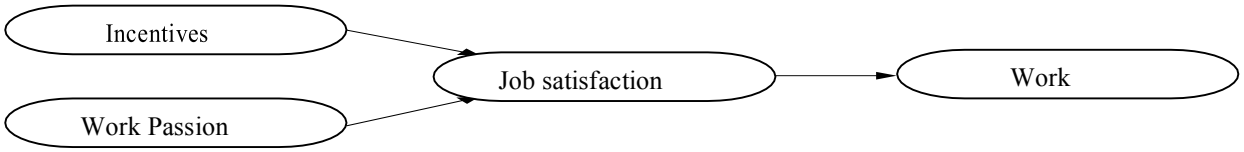

Figure 1. Research Model

3. RESEARCH METHOD

3.1 Population

This research is focused on human resources management, particularly on incentives, work passion, job satisfaction and work achievement. The population of research includes teachers in (SSN) from all levels of education; elementary school, secondary school, upper secondary schools and vocational schools in the City of Medan totaling 336 people.

We used probability sampling techniques, specifically *simple random sampling* since the population in this research is homogeneous (Rumengan, 2013:57). The number of samples was determined using the Slovin formula and the sample size of 183 people from the population of 336 with the level of error (e) = 5%.

3.2 The technique of Data Collection

In order to obtain the data and information needed, a questionnaire was distributed to all SMK teachers in the City of Medan. The Likert scale was used as measurement scale in order to find out each of the variables; exogenous variables X1, X2 (incentives and work passion) and endogenous variables X3, X4 (Job Satisfaction and Work Achievement).

3.3 Variables Operational Definitions with indicators

1. Incentives (X1)

According to Keith Davis and William B. Werther (in Wibowo, 2013: 349) put forth *"Incentive system link compensation and performance by rewarding an employee for their actual result, not for seniority or for hours worked"*. The indicators include ranking, awards, and achievements.

2. Work Passion (X2)

Work Passion is the ability of a group of people to work enthusiastically and consistently applied in fulfilling common goals. (Tohardi, 2001). Work passion can be interpreted as a kind of a simple term derived from a variety of psychological forces that presses someone with their work. Work passion can also be interpreted as a work climate or environment within an organization that shows a sense of passion in carrying out work and thus encourages people to work more effective and more productively. The indicators in work passion include high or low work productivity, the low or high level of absence, a high level of employee turnover, frequent demands by employees, anxieties everywhere.

3. Job satisfaction (X3)

Kreitner and Kinicki (in Wibowo, 2013: 502) mentions that job satisfaction is an emotional or affective response towards various aspects of someone's work. This definition shows that *job satisfaction* is not a single concept. A person can be relatively satisfied with one aspect of work and dissatisfied with one or more other aspects. The

indicators include working conditions, the opportunity to develop, freedom of expressing one's opinion and rewards for the good work.

4. Work achievement (X4)

According to the Bernardin and Russel (in Sutrisno, 2010:150), work achievement is a note on the results obtained from certain job functions or certain activities during a specific period of time. According to Bryas and Rue (in Sutrisno, 2010:150), work achievement is an individual's level of skill at the tasks covered in his work. The definition shows the weight of work passion in meeting the conditions set forth in his work. The indicators include quantity, quality, innovation, creativity, cooperation, and budget availability.

5. ANALYSIS AND DISCUSSION

5.1 Instruments Test/Validity and Reliability Tests

The research instruments consist of Incentives (X1), Work Passion (X2), Job Satisfaction (X3), and Work Achievement (X4) in order to facilitate in preparing data measurement tools based on the conceptual framework that has been mentioned in operational limits and each research variable.

From the results of validity and reliability tests for each statement items of the variable, it was found that all items are valid and reliably feasible. The validity and reliability tests of the research instruments were tested using the **version 21.0.**

1. The first structure linearity test was conducted on incentives and work passion as dependent variables and job satisfaction as an independent variable (X3= P31X1 + P32X2 + e1) with the following hypothesis statements: Ho = regression model between incentives (X1), work passion (X2) and job satisfaction (X3) is not linearly formed. Ha = regression model between incentives (X1), work passion (X2) and job satisfaction (X3) is linearly formed.

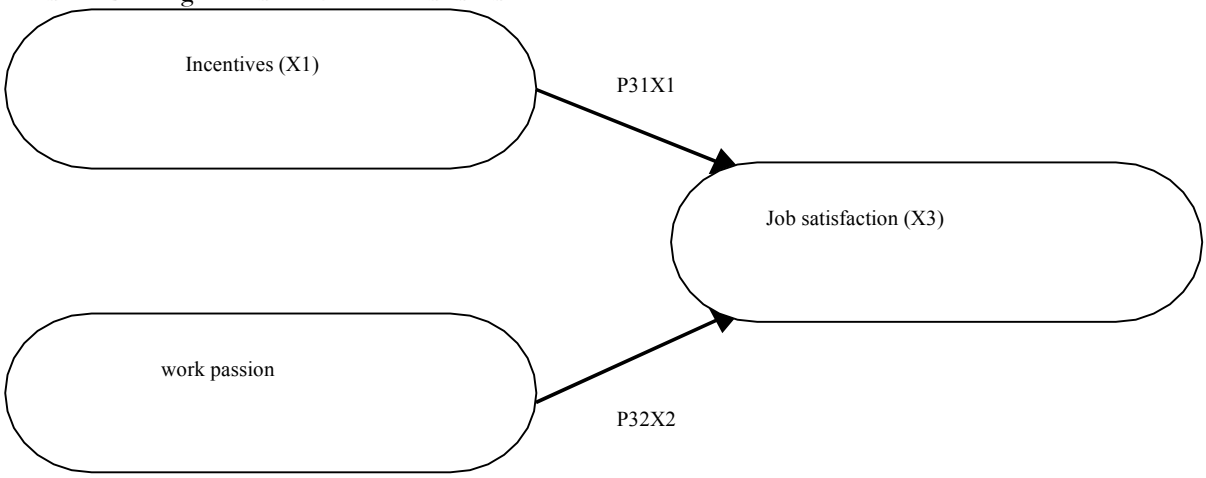

Figure 2. Regression Model of Structure 1 Source: Processed regression model, 2014

To calculate F_{table}, the probability (α) equal to 0.05 is used while the results of the calculation of F value of structure 1 equation uses SPSS 21.0. Based on linearity test results of structure 1 equation (X3=P31X1 + P32X2 + e1) with *predictors (constant)* of incentives and work passion and the *dependent variable* of work achievement, the value of F_{count} is 5.651 while the value of F_{table} is 3.05, as the value of $F_{count} > F_{table}$ or 5.651 > 3.05, then Ho is rejected, as such the regression model between incentives, work passion towards job satisfaction are linear.

2. The second structure linearity test was conducted on job satisfaction as a dependent variable and work achievement as an independent variable (X4= P42X2 + P43X3 + e2) with the following hypothesis statements: Ho = regression model between job satisfaction (X3) and work achievement (X4) is not linearly formed. Ha = regression model between job satisfaction (X3) and work achievement (X4) is not linearly formed.

SPSS 21.0 software. The research instrument is declared valid when the correlation coefficient of each item is ≥ 0.3, while for it to be declared reliable, the value of *Cronbach's Alpha* should be 0.6 (Rumengan, 2013: 86). Below are the results of validity and reliability tests for each variable:

1. Incentives are *reliable* or can be trusted.
2. Work passion is *reliable* or can be trusted.
3. Job satisfaction is *reliable* or can be trusted.
4. Work achievement is *reliable* or can be trusted.

5.2 Normality Test

To determine the normality test, the *one-sample Kolmogorov-Smirnov* Test of Asyim value was used. *Sig* (2-tailed). Based on normality test results using *one-sample Kolmogorov-Smirnov Test Asyim. Sig* (2-tailed), it was obtained that each of the variables such as incentives is 0.125 > critical value (P) of 0.05, work passion is 0.142 > critical value (P) of 0.05, job satisfaction is 0.197 > critical value (P) of 0.05, work achievement is 0.124 > critical value (P) of 0.05. Thus, it can be concluded that the sample data in this research is derived from a normally distributed population.

5.3 Linearity Test

Linearity test was conducted by comparing the Fcount value with Ftable with the help of SPSS program

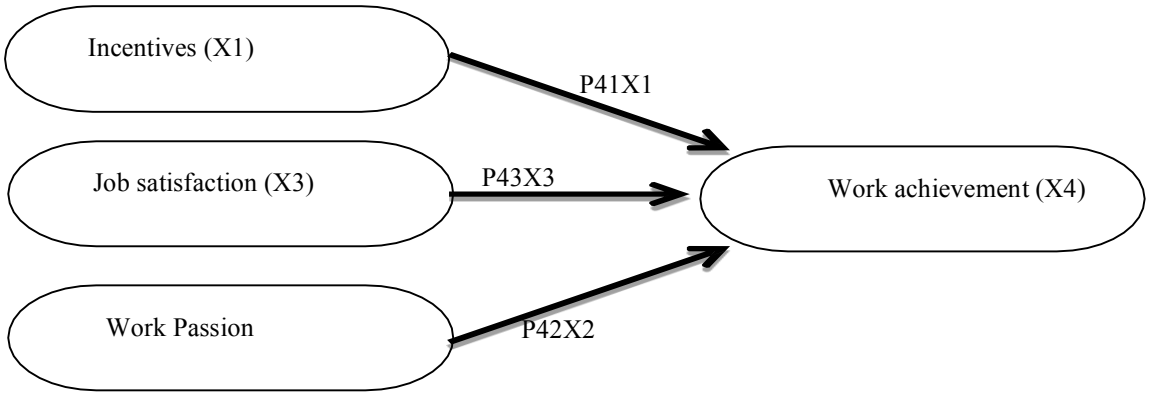

Figure 3 Regression Model of Structure 2 Source: Processed regression model, 2014

To calculate F_{table}, the probability (α) equal to 0.05 is used, while the calculation of the F value of structure 2 equation used SPSS 21.0. Based on the results of linearity test of structure 2 (X4 = P41X1 + P42X2 + P43X3 + e2) with *predictors (constant)* of incentives, work passion and job satisfaction with *dependent variable of* work achievement, it is known that the value of F_{count} is 9.375 while the value of F_{table} is 2.66, since the value of F_{count} > F_{table} or 9.375 > 2.66, then Ho is rejected. As such a regression model between incentives, work passion and job satisfaction towards work achievement are linear.

5.4 Multicollinearity Test Results

Multicollinearity is used to test whether there is a strong correlation between independent variables in the regression model. The method used to draw the conclusion is by observing the value of *Variant of Inflation factor* (VIF), which is not more than 5 (Rumengan, 2013: 240).

Based on multicollinearity test results for both independent variables including incentives (X1) and work passion (X2) as structure 1 equation (X3=P31X1 + P32X2 + e1), the VIF is within tolerance limit that has been pre-determined (not more than 5), thus there is no multicollinearity in this research variables. Additionally, the test results for the three independent variables such as incentives (X1), work passion (X2) and job satisfaction (X3) as structure 2 equation (X4 = P41X1 + P42X2 + P43X3 + e2), the VIF value is within tolerance limit that has been pre-determined (not more than 5), thus there is no multicollinearity in this research variable.

5.5 Hypothesis Testing

This research uses path analysis to test the pattern of relationship which reveals the effect of a set of variables on other variables, be it direct effect or indirect effect.This hypothesis aims to see whether there are a direct effect and indirect effect amongst the variables which can be seen from the results of the calculation of path coefficient, whilst to know the significant level, we compared Sig.count with 0.05. After the count is obtained, the following terms are used to interpret the results:

- If Sig value. < 0.05, then Ho is rejected and it leaves a significant effect.
- If Sig value. > 0.05 then Ho is accepted and it leaves a nonsignificant effect.

Based on the results of the calculation of Path Analysis of Equation 1 and Equation 2, it is discovered that the results of calculation of path analysis and a significant level of direct effect amongst the variables as follows:

a) The results of path analysis of incentives (X1) on job satisfaction (X3) revealed a path coefficient of 0,138 with Sig. of 0,095>0.05; hence, it can be concluded that the path coefficient is ***nonsignificant***;

b) The results of path analysis of work passion (X2) on job satisfaction (X3) revealed a path coefficient of 0,144 with Sig. of 0,081<0.05; hence, it can be concluded that the path coefficient is ***nonsignificant***;

c) The results of path analysis of incentives (X1) on work achievement (X4) revealed a path coefficient of -0,072 with Sig. of 0,371<0.05; hence, it can be concluded that the path coefficient is ***nonsignificant***.

d) The results of path analysis of work passion (X2) on work achievement (X4) revealed a path coefficient of 0,296 with Sig. of 0,000<0.05, thus, it can be concluded that the path coefficient is ***significant***;

e) The results of path analysis of job satisfaction (X3) on work achievement (X4) revealed a path coefficient of 0,208 with Sig. of 0,004<0.05; hence, it can be concluded that the path coefficient is ***significant***;

Based on the direct effect of each variable above, the indirect effect between exogenous variables and endogenous variables can be calculated through the intervening variable with the following calculation:

1) The effect of incentives (X1) on work achievement (X4) through job satisfaction (X3) is obtained from the results of the multiplication between the X1 regression coefficient and X3 regression coefficient. The direct effect *of* incentives (X1) on work achievement (X4) is obtained from regression coefficient of X1 value on X4 ($P_{41}X_1$) which is -0,072, while the indirect *effect* of X1 on X4 through X3 is obtained from the multiplication of X1 regression coefficient with X3 regression coefficient on X4, as follows:

($P_{31}X_1$ x $P_{43}X_3$) = (0,138 x 0,208)
= 0,029

The *total effect of* X1 on X4 is seen from direct effect plus (+) indirect effect = -0.072 + 0,029 = -0,043 Criteria for drawing conclusions:

a. If the coefficient value of indirect effect > direct effect, then the variable of X3 is an intervening variable, which the real effect is indirect.

b. If the coefficient value of indirect effect <

direct effect, then the variable of X3 is not an intervening variable, which the effect is direct.
Conclusion: The value of 0,029 > -0,072, meaning that the coefficient value of indirect effect > direct effect, then X1 affects X4 indirectly or in other words, X3 is an intervening variable or the real effect is direct.

2) The effect of work passion (X2) on work achievement (X4) through job satisfaction (X3) is obtained from the results of the multiplication between the X2 regression coefficient and X3 regression coefficient.
The direct effect *of work passion* (X2) on work achievement (X4) is seen from X2 regression coefficient value on X4 (P42X2), which is 0,296; while *indirect effect* of X2 on X4 through X3 can be seen from the multiplication of X2 regression coefficient on X3 regression coefficient towards X4 as follows:
(P32X2 x P43X3) = (0,144 x 0,296)
= 0.030
The *total effect of* X2 on X4 is seen from direct effect added with (+) indirect effect = 0.296 + 0,030 = 0,326 Criteria for drawing conclusions:

a. If the coefficient value of indirect effect > direct effect, then the variable of X3 is an intervening variable, in which case, the real effect is indirect.

b. If the coefficient value of indirect effect < direct effect, then the variable of X3 is not an intervening variable, in which case, the effect is direct.

Conclusion: The value of 0,030 < 0,296, meaning that the coefficient value of indirect effect < direct effect, then X2 affects X4 directly or in other words, X3 is non intervening variable or the real effect is direct.

In order to discover the significance of indirect effect, we must first calculate error *1* (e1) and *error2* (e2) values with the help of *Adjusted R Square* value for equations of structure 1 and structure 2. The calculation results of Adjusted *R Square* for equations of structure 1 obtained a value of 0.049, and to determine the value of the path coefficient with its residuals (e1) the following calculation is used:

$$e2 = \sqrt{1 - R^2}$$
$$e1 = \sqrt{1 - 0{,}049}$$
$$e1 = 0{,}975$$

While the value *of Adjusted R Square* for structure 2 equation obtained a value of 0.121, then to determine the value of path coefficient with its residuals (e2), the following the calculation is used:

$$e2 = \sqrt{1 - R^2}$$
$$e2 = \sqrt{1 - 0.121^2}$$
$$e2 = 0{,}938$$

Based on the results of the calculation of path coefficient the following figure 4 model is presented

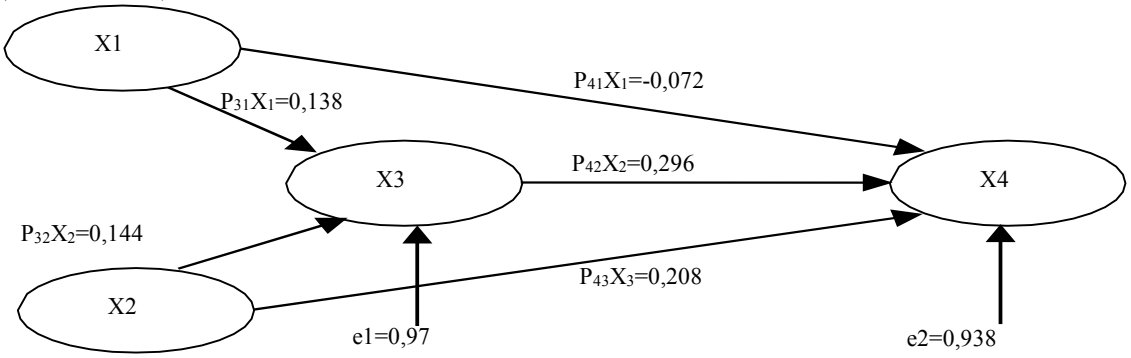

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Figure 4 Model of path analysis resulted from hypothesis Testing Source: Processed model analysis, 2014

5.6. Discussion of Hypothesis Testing Results

Based on the results of the current study, there is seven hypothesis that can be studied. Below are discussed the results of the seven hypotheses testing:

1. The effect of incentives on job satisfaction

The results of path analysis of incentives (X1) on job satisfaction (X3) revealed a path coefficient of 0,138 with Sig. of 0,095>0.05; thus, we can conclude that the path coefficient is nonsignificant where;
H0: X1 has a nonsignificant effect on X3 H1: X1 has a significant effect on X3 Criteria for testing the hypothesis:
H0 is rejected if the value of sig<0.05
H0 is accepted if the value of sig>0.05
The conclusion: The value of Sig. 0.095>0.05, then H0 is accepted thus leaving X1 (incentives) has a nonsignificant effect on X3 (job satisfaction).
With the first hypothesis proved that there is no significant direct effect between incentives on job satisfaction, it indicates that incentives in an organization or institution where the research is conducted have not been able to significantly improve employee/teacher work satisfaction.

2. The effect of Work Passion on Job Satisfaction

The results of path analysis of work passion (X2) on job satisfaction (X3) revealed a path coefficient of 0,144 with Sig. of 0,081>0.05; hence, we can conclude that the path coefficient is nonsignificant where;
H0: X2 has a nonsignificant effect on X3 H1: X2 has a significant effect on X3 Criteria for testing the hypothesis:
H0 is rejected if the value of sig<0.05 H0 is accepted if the value of sig>0.05
The conclusion: The value of Sig. 0.081>0.05, then H0 is accepted thus leaving X2 (work passion) has a nonsignificant effect on X3 (job satisfaction).
With the second hypothesis proved that there is no significant direct effect between work passion and job satisfaction, it indicates that work passion in an organization or institution where the research is conducted has not been able to significantly improve employee/teacher satisfaction.

3. The effect of incentives on work achievement

The results of path analysis of incentives (X1) on work achievement (X4) revealed a path coefficient of -0,072 with Sig. of 0.371>0.05; thus, we can conclude that the

path coefficient is nonsignificant where;
H0: X1 has a nonsignificant effect on X4 H1: X1 has a significant effect on X4 Criteria for testing the hypothesis: H0 is rejected if the value of sig<0.05 H0 is accepted if the value of sig>0.05
The conclusion: The value of Sig. 0.371>0.05, then H0 is accepted thus leaving X1 (incentives) has a nonsignificant effect on X4 (work achievement).
With the third hypothesis proved that there is no significant direct effect between incentives and work achievement, it indicates that incentives in an organization or institution where the research is conducted have not been able to significantly improve employee/teacher work achievement.

4. The effect of Work Passion on Work Achievement

The results of path analysis of work passion (X2) on work achievement (X4) revealed a path coefficient of 0,296 with Sig. of 0,000>0.05; hence, we can conclude that the path coefficient is nonsignificant where;
H0: X2 has a nonsignificant effect on X4 H1: X2 has a significant effect on X4 Criteria for testing the hypothesis: H0 is rejected if the value of sig<0.05 H0 is accepted if the value of sig>0.05
The conclusion: The value of Sig. 0.000>0.05, then H0 is rejected thus leaving X2 (work passion) has a nonsignificant effect on X4 (job satisfaction).
With the fourth hypothesis proved that there is significant direct effect between work passion and work achievement, it indicates that teacher work passion in an organization or institution where the research is conducted has been able to significantly improve employee/teacher work achievement.

5. The effect of Job Satisfaction on Work Achievement

The results of path analysis of job satisfaction (X3) on work achievement (X4) revealed a path coefficient of 0,208 with Sig. of 0.004<0.05; hence, it can be concluded that the path coefficient is significant where;
H0: X3 has a nonsignificant effect on X4 H1: X3 has a significant effect on X4 Criteria for testing the hypothesis: H0 is rejected if the value of sig<0.05 H0 is accepted if the value of sig>0.05
The conclusion: The value of Sig. 0.004>0.05, then H0 is rejected thus leaving X3 (work passion) has a nonsignificant effect on X4 (job satisfaction).
With the fourth hypothesis proved that there is significant direct effect between job satisfaction and work achievement, it indicates that teachers' job satisfaction in an organization or institution where the research is conducted has been able to significantly improve employee/teacher achievement at work.

6. The effect of incentives on work achievement through job satisfaction

The results of path analysis of incentives (X1) on work achievement (X4) through job satisfaction (X3) are obtained from the results of multiplication between the X1 regression coefficient and X4 regression coefficient. The direct effect *of* incentives (X1) on work achievement (X4) is obtained from regression coefficient of X1 value on X4 ($P_{41}X_1$) which is -0,072, while the indirect *effect* of X1 on X4 through X3 is obtained from the multiplication of X1 regression coefficient with X3 regression coefficient on X4, as follows:
($P_{31}X_1$ x $P_{43}X_3$) = (0,138 x 0,208) = 0,029
The *total effect of* X1 on X4 is seen from direct effect plus (+) indirect effect = -0.072 + 0,029 = -0,043 Criteria for drawing conclusions:

a. If the coefficient value of indirect effect > direct effect, then the variable of X3 is an intervening variable, which the real effect is indirect.

b. If the coefficient value of indirect effect < direct effect, then the variable of X3 is not an intervening variable, which the effect is direct.

Conclusion: The value of 0,029 > -0,072, meaning that the coefficient value of indirect effect > direct effect, then X1 affects X4 indirectly or in other words, X3 is an intervening variable or the real effect is direct.
This sixth hypothesis which state that there is an indirect effect of incentives on work achievement through job satisfaction leads to the conclusion that with the policy of providing incentives, teachers work achievements will improve through job satisfaction. Therefrom, in this case, incentives provision and job satisfaction can be directly linked through job satisfaction variable.

7. The effect of work passion on work achievement through job satisfaction

The results of path analysis of work passion (X2) on work achievement (X4) through job satisfaction (X3) are obtained from the results of multiplication between the X2 regression coefficient and X4 regression coefficient. The direct effect of work passion (X2) on work achievement (X4) is seen from X2 regression coefficient value on X4 ($P_{42}X_2$), which is 0,296; while indirect effect of X2 on X4 through X3 can be seen from the multiplication of X2 regression coefficient on X3 regression coefficient towards X4 as follows:
($P_{32}X_2$ x $P_{43}X_3$) = (0,144 x 0,296) 0.030
The *total effect of* X2 on X4 is seen from direct effect plus (+) indirect effect = 0.296 + 0,030 = 0,326 Criteria for drawing conclusions:

a. If the coefficient value of indirect effect > direct effect, then the variable of X3 is an intervening variable, which the real effect is indirect.

b. If the coefficient value of indirect effect < direct effect, then the variable of X3 is not an intervening variable, which the effect is direct.

Conclusion: The value of 0,030 < 0,296, meaning that the coefficient value of indirect effect < direct effect, then X2 affects X4 directly or in other words, X3 is non-intervening variable or the real effect is direct.
This seventh hypothesis maintains that there is a direct effect of work passion on work achievement without through the job satisfaction variable, where the results of the tests conclude that with work passion, teacher work achievement improves. Therefore, in this case, teachers work passion can be directly linked to the work achievement variable.

6. CONCLUSIONS AND SUGGESTIONS

6.1 Conclusions

Based on the results of data analysis, hypothesis testing and descriptive findings from the questionnaire with the samples size of 183 teachers in the City of Medan, the following conclusions are drawn:

1. From the results of the test conducted, it is concluded that there is a direct yet non-significant effect between the variables of incentives on teacher job satisfaction with a path coefficient value of 0,138 with Sig. of 0,095>0.05 and t count (1,676) > t table (1.65 at α=0.05 and 2.35 at α=0.01). With the first hypothesis proved that there is no significant direct effect between incentives on job satisfaction, it indicates that by providing incentives in an organization or institution where the research is conducted, in the city of Meda, has not been able to significantly improve employee/teacher job satisfaction. This requires other variables to significantly improve employee/teacher job satisfaction.
2. From the results of the test conducted, it can be concluded that there is a direct yet non-significant effect between the variable of work passion on teacher job satisfaction with path coefficient 0,144 with Sig. of 0,081>0.05 and t count (1,753) > t table (1.65 at α=0.05 and 2.35 at α=0.01). With the first hypothesis proved that there is no significant direct effect between work passion and job satisfaction, it indicates that work passion in an organization or institution where the research is conducted, in the city of Medan, has not been able to significantly improve employee/teacher satisfaction. Thus, other variables should be sought in order to significantly improve employee/teacher satisfaction at work.
3. From the results of the test conducted, it is concluded that there is a direct and significant effect between the variables of job satisfaction on teachers work achievement with a path coefficient value of 0,208 with Sig. of 0,004>0.05 and t count (2,909) > t table (1.65 at α=0.05 and 2.35 at α=0.01). With the first hypothesis proved that there is significant direct effect between job satisfaction and work achievement, it indicates that work passion in an organization or institution where the research is conducted, in the city of Meda, can significantly improve employee/teacher achievement in their daily tasks.
4. From the results of the test conducted, it is concluded that there is a direct yet non-significant effect between the variables of incentives on teachers work achievement with a path coefficient value of 0,138 with Sig. of0,371>0.05 and t count (-0,897) > t table (1.65 at α=0.05 and 2.35 at α=0.01). With the first hypothesis proved that there is no significant direct effect between incentives on work achievement, it indicates that by providing incentives in an organization or institution where the research is conducted, in the city of Meda, has not been able to significantly improve teacher achievement at work. This thus requires other research variables so that teacher work achievement can be significantly improved.
5. From the results of the test conducted, it is concluded that there is a direct and significant effect between the variables of work passion and teachers work achievement with a path coefficient value of 0,296 with Sig. of 0,000>0.05 and t count (3,709) > t table (1.65 at α=0.05 and 2.35 at α=0.01). With the first hypothesis proved that there is the significant direct effect of work passion on work achievement, it indicates that work passion in an organization or institution where the research is conducted, in the city of Medan, can significantly improve teachers work achievement in carrying out their daily duties.
6. The test results indicated that there is an indirect effect of incentives on work achievement through job satisfaction with a path coefficient of 0,029. This sixth hypothesis indicates an indirect effect of incentives variable on work achievement through job satisfaction. With the results of the tests, it is indicated that the provision of incentives at a workplace will improve teachers performance through job satisfaction, thus, in this case, incentives and work achievement can be directly linked to the job satisfaction variable.
7. The test results indicated that there is no indirect effect of work passion on work achievement through job satisfaction with a path coefficient of 0,030. This seventh hypothesis indicates a direct effect of work passion variable on work achievement without through job satisfaction. With the results of the tests, it is indicated that passion at work will improve teachers work achievement, thus, in this case, work passion is directly linked to work achievement variable.

6.2 Suggestions

Based on the above explanations and conclusions, the following suggestions are offered:

1. Despite the fact that the variable of incentives has a non-significant direct effect on work achievement and work passion and job satisfaction have a significant effect on improvement of work achievement, this variable, however, must be well implemented and improved on a continuous basis in order to achieve the best work achievement so as to maximally achieve the pre-defined goals or objectives.
2. It is suggested that further research can add several more variables, both exogenous and endogenous, for the purpose of improving and expanding the results of this research, so that the expected findings may bring more benefits for the development and advancement of education, especially in the City of Medan. In addition, the municipal Government of Medan can also take strategic steps that may help improve the quality of education in the City of Medan in general and in particular.

References

Ardana, Komang, Dkk. 2009, *Perilaku Keorganisasian*, Graha Ilmu, Yogyakarta.

Bangun, Wilson, 2012, *Manajemen Sumber Daya Manusia*, PT Gelora Aksara Pratama, Jakarta. Donelly, Ivancevich, Gibson, 2013: *Organisasi*, Binarupa Aksara, Tangerang.

Fudyartanta, Ki, 2011, *Psikologi Umum 1 & 2*, Cetakan 1, Yogyakarta

Hanggraeni, Dewi, 2011, *Perilaku Organisasi*, Lembaga Penerbit Fakultas Ekonomi, Universitas Indonesia, Jakarta. Hasibuan, Malayu S.P H. 2009, *Manajemen Sumber Daya Manusia*, PT Bumi Aksara, Jakarta.

Hermino, Agustinus, SP, M.Pd., Ir., 2013, *Asesmen Kebutuhan Organisasi Persekolahan : Tinjauan Perilaku Organisasi menuju Comprehensive Multilevel Planning*, Gramedia, PT, Jakarta.

Istiqomah, 2008 : *Pengaruh Kepuasan, Komitmen Organisasional Dan Komitmen Profesional Terhadap Keinginan Berpindah Auditor Pada Kantor Akuntan Publik (KAP) Di Jawa Timur*, e-jurnal.ump.ac.id/index.php/ekonomi/article/255, diakses tanggal 18 Mei 2014, jam 08.30 wib.

Karwati, Euis, dan Priansa, Juni, Donni, 2013, *Prestasi dan Profesionalisme Kepala Sekolah Membangun Sekolah yang Bermutu*, Cetakan Kesatu, Alfabeta, Bandung.

Kusnendi, 2008, *Model-model Persamaan Struktural*, Alfabeta, Bandung Manullang, Marihot, 2012, *Penilaian Prestasi.*

Manullang, Marihot, 2012, *Manajemen Sumber Daya Manusia.*

Manullang, Marihot, 2012, *Manajemen Strategi*, Cetakan Pertama, Citapustaka Media Perintis, Bandung.

Mardatilllah, Yos Indra, Nasution, Harmein dan Ishak, Aulia, 2013, *Evaluasi Prestasi Manajemen Sumber Daya Manusia PT. Bank XYZ dengan Human Resource Scorecard*, e-journal Teknik Industri FT USU, Vol. 1, PP 23-27

Mathis, Robert dan Jackson, John H, 2006, *Human Resource Management*, Salemba Empat, Jakarta. Mulyasa, E, 2012, Manajemen Berbasis Sekolah, Cetakan keempat belas, Remaja Rosdakarya, PT, Bandung.

N. Anthony, Robert, dan Govindarajan, Vijay, 2011, *Sistem Pengendalian Manajemen*, Edisi 12, Jilid Dua, Karisma Publishing, Jakarta

Noor, Juliansyah, 2013, *Penelitian Ilmu Manajemen*, Fajar Interpratama Mandiri, Jakarta.

Output Data dan Informasi, 2011, *Manajemen Kepala Sekolah*, Kementerian Pendidikan Nasional, Jakarta.

P. Siagian, Sondang, 2012, *Manajemen Sumber Daya Manusia*, Cetakan Kedua Puluh, Bumi Aksara, Jakarta. Rachmawati, Kusdah, Ike, 2008, Manajemen Sumber Daya Manusia, CV Andi Offset, Yogyakarta.

Riani, Laksmi, Asri, 2013, Manajemen Sumber Daya Manusia Masa kini, Graha Ilmu,Yogyakarta.

Rohiat, 2010, *Manajemen Sekolah : Teori Dasar dan Praktik*, Cetakan Ketiga, Refika Aditama, PT, Bandung. Rumengan, Jemmy, 2013, *Metodologi Penelitian*, Cetakan Pertama, Citapustaka Media Perintis, Bandung.

Sarwono, Jonathan, 2007, *Analisis Jalur Untuk Riset Bisnis*, Andi, Yogyakarta Sedarmayanti, 2011, *Manajemen Sumber Daya Manusia*, PT. Refika Aditama, Bandung

Simanjuntak, J Payaman, 2011, *Manajemen dan Evaluasi Prestasi*, Lembaga Penerbit Fakultas Ekonomi Universitas Indonesia, Jakarta.

Subkhi, Akhmad M.M., dkk, 2013, *Pengantar Teori dan Perilaku Organisasi*, PT Prestasi Pustakaraya, Jakarta. Sugiyono, 2013, *Metode Penelitian Kuantitatif, Kualitatif dan R&D*, Cetakan ke-19, Alfabeta, Bandung.

Suhud, Tubagus. Djumadi, Noor, Muhammad, 2013, *Peningkatan Prestasi Kerja Pegawai pada Dinas Perhubungan Provinsi Kalimantan Timur*, e-Journal Administrative Reform - Fisip Universitas Mulawarman. Kalimantan Timur, Volume 1, Nomor 2, 2013 : 590-601.

Sopiah, 2008, *Perilaku Organisasional*, Edisi Pertama, Andi, Yogyakarta.

Sule, Tisnawati, Ernie, dan Saefullah, Kurniawan, 2013, *Pengantar Manajemen*, Edisi Pertama, Kencana Prenamedia Group, Jakarta.

Sunyoto, Danang, 2012, *Manajemen Sumber Daya Manusia*, CAPS (Center for Academic Publishing Service), Yogyakarta.

Sutrisno, Edy, 2010, *Manajemen Sumber Daya Manusia*, Edisi Pertama, Cetakan Kedua, Kencana Prenada Media Group, Jakarta.

Thoha, Miftah, 2011, *Perilaku Organisasi*, PT Raja Grafindo Persada, Jakarta.

Torang, Syamsir, 2012, *Metode Riset Struktur dan Perilaku Organisasi*, Alfabeta, Bandung. Trihedral C, 2013, *Step By Step IBM SPSS 21 Analisis data Statistik*, CV Andi Offset, Yogyakarta.

Wahab, Azis, Abdul, 2011, *Anatomi Organisasi dan Kepemimpinan Pendidikan : Telaah terhadap Organisasi dan Pengelolaan Organisasi Pendidikan*, Cetakan Kedua, Alfabeta, Bandung

Wibowo, 2013, *Manajemen Prestasi*, PT Rajagrafindo Persada, Jakarta. Wibowo,Agung, 2012, *Aplikasi SPSS*, Tiga Sekawan, Jogjakarta.

Wirawan, 2013, *Kepemimpinan Teori, Psikologi, Perilaku Organisasi, Aplikasi dan Penelitian*, PT Rajagrafindo Persada, Jakarta

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The Effect of Job Satisfaction on Employee Commitment

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ABSTRACT

Purpose

This study examines the degree of employee satisfaction from the different factors that theoretically affect satisfaction. Moreover, the relationship between the factors of job satisfaction and organizational commitment on private employees is examined.

Design/methodology/approach

In order to achieve the objectives of this study, the survey was conducted using a structured questionnaire in January and March 2018. The final sample size consists of 439 private employees in Greece. The most frequent questioned industry is services, followed by trade and manufacturing at a smaller rate. The research instrument for content and construct validity was tested. Data were analyzed using ANOVA, Correlation and Regression analysis.

Findings

The results showed that the "Social Aspects of job", "Job Characteristics" and "Work Environment", are the most important factors positively affecting organizational commitment, while "Promotion" and "Rewards" are not significant factors.

Research limitations/implications

During survey some limitations were found to exist, the largest being the small sample size. Additionally, subjective measures of employee satisfaction were used instead of objective measures. However, this study shows that job satisfaction is inherently interwoven with organizational commitment. Since organizational commitment has a direct impact on employee retention, performance, and organizational behavior, it is essential to meet the required conditions for its existence

Originality/value

In the recent years of Greek economic crisis, very few private sector studies have addressed the satisfaction of employees and their commitment to the organization

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1. Introduction

The modern business environment, being particularly dynamic, requires new techniques for achieving competitive advantage. In accordance with Zeygaridis and Stamatiadis (1997), the creation of an excellent climate of cooperation with employees is a precondition for reaching a business's final objectives. Therefore, the satisfaction of employees is considered an important factor in the success of the company, since the worker is perhaps the most important component. Businesses appreciating these factors and making proper use of their collected data may shape the economic and working conditions governing their operation, placing greater emphasis on relations with the employees (Terzidis and Tziwrtzakis, 2004; Bontis et al., 2011). Many surveys have been conducted in the last decade for job satisfaction in the Greek private sector, highlighting the relationship between satisfaction and organizational commitment. In fact, the creation of employment captive workers has proven to be the organization's most difficult task to achieve. The outcome of various surveys has shown that work engagement is positively associated with organizational results, such as the low rate of resignations, high organizational commitment, high financial and business organizational performance (Salanova et al., 2005; Steger et al., 2013; Saari and Judge, 2004). The Specific Objective of the Study is: Measurement of the effect of job satisfaction on organizational commitment.

2. Literature Review and Research Hypotheses

2.1. The concept of job satisfaction

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Job satisfaction reflects the general attitude of employees towards the work, whether they are happy with their profession or their work (Porter et al., 1975; Locke and Henne, 1986; Spector, 1997). In particular, job satisfaction highlights the degree of identification of personality and the needs of the employee with the characteristics of the working environment (Wanous and Lawler, 1972; Holland, 1996), while connected to the mental health of workers, profitability and satisfaction (Spector, 1997). Also, job satisfaction has a positive impact on running a business, becoming a major factor in the emergence of well-functioning working conditions. At the same time, it plays an important role in gaining and maintaining competitive advantage under the appropriate leadership style (McGrath and MacMillan, 2000), as an increase in performance provides quality service and products, faster service and creates long-term partnerships, ensuring sustainability and development (Bontis et al., 2011). However, the negative or positive critical assessment is directly related to the mood and emotional situation in which the worker exists at a given time, the prevailing working conditions, as well as the requirements of the connection work and expectations (Bush and Middlewood, 2005).

2.2. Factors influencing job satisfaction

Over the years, a plethora of surveys investigated the factors influencing satisfaction of workers, the result of which categorize (a) internal and (b) external factors (Spector, 2000). Internal factors focus on the personality factors, including beliefs and values that shape the perception and the general attitude of life (Buitendach and Witte, 2005). Specifically, the worker's personality is one of the main factors in job satisfaction. The locus of control and negative affectivity as personality characteristics play a crucial role. Additionally, demographic features influence the level of job satisfaction and include gender, age and educational level. Satisfaction varies among men and women (Gonzalez et al., 2008, Hodson, 1989) and it is low in the early years of employment and steadily increases (Spector, 2000; Greenberg and Baron, 2000), while higher levels of job satisfaction exist for employees with a higher level of education (Anderson et al., 2001; Scott et al., 2005). External factors associated with both the nature of the work and other parameters. In particular, Hackman and Oldham (1974) developed the theory of characteristics of work affecting the attitude of workers. This theory refers to (i) skills variety, (ii) task identity, (iii) task significance, (iv) job feedback and (v) autonomy (Judge and Klinger, 2007; Spector, 2000; Saari and Judge, 2004). Subsequently, the theory of roles is an important factor (Homans, 1950; Katz and Kahn, 1966), according to which the required behavior of a worker in a defined role arises; indeed, the concepts of ambiguity and role conflict are variables here (Spector, 1997). Moreover the following parameters are the most popular and important factors influencing job satisfaction: (i) pay: a multitude of studies have highlighted the fee as one of the major factors in worker satisfaction, because it is a stimulating force for this (Robbins and Judge, 2011), (ii) working conditions: normal working conditions can positively impact on satisfaction of the workers against the adverse conditions (Bacotic and Batic, 2013; Le et al., 2014), as they relate to the cleaning and shaping of the space (Locke, 1976), (iii) relations with co-workers: the camaraderie in combination with good interpersonal relationships of employees contribute to creating a positive and more productive work climate, favoring the employee's emotional state (Robbins and Judge, 2011) and (iv) promotion: promotion capabilities provide opportunities for personal growth, taking more responsibilities and social recognition, and is directly related to an increase in earnings (Locke, 1976).

2.3. The concept of organizational commitment

Organizational commitment is considered one of the most important elements of each company, as is the power between the businesses internal and external environment that represents the extent to which the employee feels a part of the business. Additionally, as an extra element, the correlation between personal and organizational objectives and values is given by Ghorbanhosseini (2012). At the same time, organizational commitment is determined with regard to the psychological condition of the worker, in which is characterized the relationship of an employee with the company, leading to a strong belief in the values of the business, intention to pay significant effort for the achievement of objectives, as well as a desire for continued cooperation (Meyer and Allen, 1991; Liden et al., 2000; Mowday and Steers, 1979; Porter et al., 1974). Organizational commitment directly influences performance, as well as the development of organizational behavior (Meyer and Herscovitch, 2001; Iordanoglou, 2008; Bakola and Nicholaou, 2012).

2.4. Types of organizational commitment

The complexity of organizational commitment led investigators to establish three dimensions (Meyer and Allen, 1997; Maslach and Leiter, 1997; Robbins and Judge 2011; Bakola and Nicholaou, 2012): (i) Affective Commitment: the positive emotion of the employee against the company and its objectives (Mowday and Steers, 1979; Meyer and Allen, 1991), which occurs through job satisfaction cooperation. In this way the development of strong emotional relationships between the employee and the company, is promoted, gaining long-term and stable relations of trust (McMahon, 2007), (ii) Continuance Commitment: represents the conscious choice of residence of the worker in the company, taking into account the potential cost involved with the disengagement (Meyer and Allen, 1991), (iii) Normative Commitment: social obligation of the employee to the company and is mainly based on ethical reasons and factors (McMahon, 2007).

From all the above-mentioned, the hypotheses defined are:

H1: There is a positive relationship among job characteristics and organizational commitment.

H2: There is a positive relationship among rewards and organizational commitment.

H3: There is a positive relationship among promotion and organizational commitment.

H4: There is a positive relationship among work environment and organizational commitment.
H5: There is a positive relationship among social aspects of job and organizational commitment.

3. Research Methodology

3.1. Sample and Data Collection

In order to reach the objectives of this study, research was conducted during the months of January to March of 2018. A structured questionnaire was used as the research instrument. The study's target population was private Greek enterprise employees throughout Greece; 60% of them are men and 40% women. Particularly, 11% of respondents are aged between 15-24, 35% between 25-29, 26% between 30-44, 21% between 45-64, while 7% are aged over 65. It is noteworthy that 54% of respondents are university graduates, 25% are secondary school graduates and 18% are postgraduate study graduates, while 2% are holders of doctoral and 1% are primary graduates. The majority of businesses (50%) in the returned questionnaires are services, 40% commerce and 10% industries. The final sample size is 439 enterprises, of which 22% are very small (<9 employees), 40% are small (10-49 employees), 28% are medium-sized (50-249 employees), while 10% are big-sized enterprises (over 250 employees). In employment, 74% are employees, 20% are supervisors and only 6% are managers.

3.2. Instrument Development

The dual meaning of job satisfaction was examined as the independent variable and is measured in two ways: either as a result of the factors that affect it, or as a total. The measurement of job satisfaction was undertaken either via an interview process or using questionnaires. For this reason, a variety of questionnaires have occasionally been developed, the most important of which are listed below: (i) Smith, Kendal and Hulin's (1969) Job Descriptive Index (JDI) consisting of five areas: work, salary, promotion possibilities, the head and the colleagues. The answers are of the form "Yes", "I'm not sure " and "No", and from the sum of the results of these dimensions, the total job satisfaction index is established (Spector, 1997; Candan, 2013; Vroom, 1964), (ii) Minnesota Satisfaction Questionnaire (MSQ) (Weiss, 2002) with two comprehensive editions of 100 items and a Summary of 20 items. Points of reference are the 20 dimensions: camaraderie, promotion, salary, relationship with supervisor, safety, achievements, recognition, responsibility, political organization, creativity, diversity, autonomy, authority, social prestige, capacity utilization, ethical values, social services, work conditions, technical support, activity (Candan, 2013; Spector, 1997). The range of responses range from "Very satisfied" to "Very dissatisfied" in a five-point scale (Zavlanos, 2002; Weiss, 2002), (iii) Job in General Scale (JIG) with 18 elements in the form of adjectives or short phrases with a possibility to reply "Yes", "no" or "not sure" (Smith et al., 1987). This is considered a particularly reliable method and sufficiently associated with other measurement scales of overall work satisfaction (Russell et al., 2004; Balzer et al., 1990).

For this study, the instrument's development was based on an extensive literature review and all the items which have been used in previous relevant studies were adopted. It consists of three parts with 38 items. The first part refers to general information about the enterprises and private employees, such as the type and size of business, gender, age, education. The second part evaluates job satisfaction of private employees and consists of twenty-two statements, which are adopted from Aspioti, 2013; Lapanaiti, 2012; Anyango, 2015; Men, 2010 and Mohamed, 2016. The intentions of job satisfaction are: "Job Characteristics", "Pay and Promotion", "Work Environment" and "Social Aspects of the job"; a five-point Likert scale was used for the 22 statements (1=Strongly Disagree through to 5=Strongly Agree). The third and most important part consists of four statements, adopted from Zamora and Madariaga (2017) that refer to organizational commitment. A five-point Likert scale was again used for these statements (1=Strongly Disagree through to 5=Strongly Agree). The statements are: "I feel confident about the business", "I suggest my friends to work in the business that I work", "I'm willing to pay great effort to help the company succeed", "I feel proud when I tell others that I belong to the latter".

3.3. Validity and Reliability of Research Instrument

Several tests were performed to establish Content Validity, Construct Validity and Reliability of the research instrument. In particular, content validity addresses how well the items developed are a representative sample of all the items that might measure the construct of interest (Kimberlin and Winterstein, 2008). To ensure content validity primary a review of the literature on the subject of the study was made and secondly a pilot test in a panel of experts (professors and professionals) was conducted.

The Construct Validity test was the next step undertaken in the validation procedure, aimed at the harmony between a theoretical concept and a specific measurement process, evaluated with the three methods above (Cao and Dowlatshahi, 2005): (i) A test of unidimensionality, which gives evidence of a single latent construct (Flynn et al., 1990) using exploratory factor analysis (EFA). Principal Component Analysis was used for the extraction of the factors. The Varimax rotation method of the axis was adopted; this is one of the most popular methods of orthogonal rotation (Sharma, 1996; Hair et al., 1995). Bartlett's test of sphericity was performed to testing the appropriateness of the data for factor analysis. Moreover, Kaiser-Mayer-Olkin's (K.M.O) Measure of Sampling Adequacy (M.S.A) of was used; this is the most popular diagnostic measure and it estimates the extent to which some items belong to the same factor. K.M.O should be greater than 0,8 (Sharma, 1996) and for the determination of the number of the factors the criterion of Eigenvalue was used. Factors whose Eigenvalue exceeds one are selected. Finally, as far as the test of significance of items is concerned, the factor loadings were checked.

After running a factor analysis with the 22 items used to determine job satisfaction, a factor model was created with 5 distinctive factors. A second factor analysis

was performed for the 4 items of employee commitment. The subsequent results of factor analysis are presented in tables 1 and 2. All the results are very satisfying as they cover the restrictions mentioned previously.

Table 1. Factor Analysis for 22 items of job satisfaction

Items	Loadings	Factors
I understand how my job contributes to the achievement of the strategic goals of the company.	0, 720	Job Characteristics
Through my work, my personal ambitions are met.	0,594	
I use important skills and my ability to perform my work.	0,745	Eigenvalue
The training provided me develop my skills and knowledge.	0,537	1,640
My workload is satisfactory.	0,524	
I feel that my fee is fair for the work they offer.	0,855	Rewards
The benefits you derive are better than those offered by other companies.	0,667	
Additional economic benefits (bonus) are satisfactory.	0,678	Eigenvalue 1,111
The training provided me a factor for advancement or increased financial reward me.	0,527	Promotion
There are significant chances for advancement in my work.	0,740	Eigenvalue 1,540
There are equal opportunities for all employees.	0,778	
Those who carry out their work properly are more likely development.	0,812	
The company has a good workforce.	0,630	
The business that I work is known as a good employer locally.	0,618	Work Environment
I am satisfied from the natural environment of the company.	0,628	
Communication in the business that I work ranges to satisfactory levels.	0,657	Eigenvalue
There are relationships among colleagues of different parts.	0,710	8,353
There are relationships among colleagues of the same Department.	0,833	
The company assumes responsibility for the society.	0,686	Social Aspects
The company assumes responsibility for the environment.	0,634	of job
The company has strong future growth prospects.	0,630	
The company outperforms its competitors.	0,741	Eigenvalue 1,219

K.M.O = 0,845
Bartlett's test of sphericity
Approx. Chi-square 5452,832
df 231
Sig. 0,000
Total Variance Explained 69,669%

Table 2. Factor Analysis for 4 items of Commitment

Items	Loadings	Factors
I can trust my organization.	0, 705	Commitment
I suggest my friends to work at the same organization.	0,810	
I'm willing to make great efforts to help the organization to succeed.	0,836	Eigenvalue
I feel proud when I tell others that I belong to this organization.	0,863	2,598

K.M.O = 0,719
Bartlett's test of sphericity
Approx. Chi-square 671,134
df 6
Sig. 0,000
Total Variance Explained 64,943%

(ii) A test of discriminant validity: Discriminant validity copes with the concept that differing constructs should be dissimilar (Burns and Bush, 1995). An indicator of discriminant validity can be found if the correlation coefficients between the pairs of the variables are less than the Cronbach's alpha (Churchill, 1979). The table below presents the findings from the test which is very satisfactory.

Table 3. Test for Discriminant Validity

	1	2	3	4	5	6
Job Characteristics	0,691[a]					
Rewards	0,517	0,797 [a]				

Promotion	0,444	0,520	0,765 [a]			
Work Environment	0,488	0,570	0,562	0,880[a]		
Social Aspects of job	0,480	0,472	0,511	0,673	0,788[a]	
Commitment	0,508	0,466	0,430	0,577	0,642	0,805[a]

[a]Cronbach's alpha index

(iii) A test of Convergent Validity**:** Convergent Validity is believed to be acceptable when all item loadings are more than 0,5 (Wixom and Watson, 2001) and the items for all construct load onto one factor with an eigenvalue greater than 1. Tables 1 and 2 show all items, that have load greater than 0,5 and the eigenvalue for all factors is greater than 1.

Table 4. Reliability Analysis

Factors	Cronbach's alpha
Job Characteristics	0,691
Rewards	0,797
Promotion	0,765
Work Environment	0,880
Social Aspects of job	0,788
Commitment	0,805

4. Data Analysis – Results

The means and standard deviations for all the factors used in the analysis are presented in table 5. According to the results, employees are more satisfied with "Job Characteristics", "Work Environment" and "Social Aspects of Job". On the other hand, they are less satisfied with "Promotion" and "Rewards". Moreover, employees are very committed to their organization.

Table 5. Basic Measures

Factors	Mean	St. Deviation	Coefficient of Variation
Job Characteristics	4,00	0,501	12,52%
Rewards	3,41	0,903	26,48%
Promotion	3,33	0,850	25,52%
Work Environment	3,94	0,643	16,31%
Social Aspects of job	3,83	0,676	17,65%
Commitment	4,09	0,666	16,28%

The coefficient of variation shows that the extent of variability of the mean score is quite large. Thus, ANOVA is used to determine whether there are any statistically significant differences. In terms of gender, there is no difference in any factor. In any case Sig. F > 0.05. As to age of employees, there is a difference on "Rewards", Work Environment", "Social Aspects of job" and "Commitment".

Finally, a reliability test, which measures the internal consistency, was performed. Internal consistency will be measured using Cronbach's alpha coefficient. Cronbach's *alpha* should be more than 0,7 so as to be characterized a reliable construct (Nunally, 1978). As shown in the table 4 all the indices are greater than 0,7 except from the index of job characteristics which is marginally accepted.

Table 6. ANOVA, Age

Factors	F	Sig.
Job Characteristics	0,659	,621
Rewards	6,323	,000
Promotion	1,177	,320
Work Environment	2,428	,047
Social Aspects of job	5,163	,000
Commitment	7,661	,000

Specifically, more employees over 45 years of age are satisfied from "Rewards", while less satisfied are those in the 30-44 years range. The "Work Environment" satisfies more the employees aged 15-24 and less those aged over 65 years, while "Social Aspects of job" shows more satisfied employees over 45 and less than 25-29 years. Finally, according to commitment, those employees aged above 45 are more committed in contrast to those in the 25-29 years range.

In addition, table 7 underlines the statistically significant differences between education level and all satisfaction factors except from "Job Characteristics". From "Rewards" the most satisfied are the graduates of primary school, those who have master and doctoral and less, as are graduates of secondary school. "Promotion" and "Work Environment" show that postgraduates are the most satisfied employees in contrast with the graduates of primary and secondary school. The last factor of the "Social Aspects of job" positively affects more Ph.D. holders than secondary school graduates. The final result refers to Ph.D. holders and primary graduates as the most committed employees against university graduates.

Table 7. ANOVA, Education

Factors	F	Sig.
Job Characteristics	1,791	,113
Rewards	5,560	,000
Promotion	9,480	,000
Work Environment	2,911	,013

Social Aspects of job	3,158	,008
Commitment	9,632	,000

A regression analysis was performed in order to examine the five hypotheses of our study. "Commitment" was used as the dependent variable, while "Job Characteristics", "Rewards", "Promotion", "Work Environment" and "Social Aspects of Job" were used as independent variables. The results indicate that the data are appropriate for regression analysis since the F- statistics is significant (F =82,798, Sig.F =0,000<0,01). Moreover, R-square with a value of 48,9% shows that about the half of the total variance of the dependent variable is explained by the five independent variables. The regression model was also tested for the autocorrelation and collinearity. The Durbin-Watson index of autocorrelation is 2,079 ≈ 2, which indicates that there is no problem of autocorrelation in the model. The V.I.F. indexes of Collinearity are all smaller than 5 and thus none of the variables has problem of collinearity.

Finally, table 8 presents the standardized coefficients Beta of the variables from which we can conclude that all Independent Variables positively effect on the dependent variable "Commitment". However, the impact of "Rewards" and "Promotion" is not significant as the Sig.t>0,05. The "Social Aspects of job" (Beta =0,396) variable affects more on the "Commitment", followed by "Job Characteristics" (Beta=0,192) and "Work Environment" (Beta=0,166). Table 9 presents the final decision about the five hypotheses.

Table 8. Regression Coefficients

Independent Variables	Beta	t	Sig.
Job Characteristics	,192	4,477	,000
Rewards	,081	1,773	,077
Promotion	,007	,152	,879
Work Environment	,166	3,193	,002
Social Aspects of job	,396	8,164	,000

Table 9. Hypotheses Testing Results

Hypotheses	Decision
H1: There is a positive relationship among job characteristics and organizational commitment	Accepted
H2: There is a positive relationship among rewards and organizational commitment.	Not supported
H3: There is a positive relationship among promotion and organizational commitment	Not supported
H4: There is a positive relationship among work environment and organizational commitment	Accepted
H5: There is a positive relationship among social aspects of job and organizational commitment	Accepted

5. Conclusions

The primary objective of this study was the investigation of the effect of employee job satisfaction on organizational commitment, in the private sector of Greece. As a result of the analyses, it is understood that job characteristics such as objectives, instructions, etc., are the most important factor in employee satisfaction, followed by work conditions and social aspects of the job. On the other side, employees are not so satisfied with payments and promotion opportunities. This can be explained by the economic crisis which has affected Greece since 2009 and is more evident in the private sector. However, the great sense of organizational commitment is remarkable.

Finally, this study proves the positive relationship of "Job Characteristics", "Work Environment" and "Social Aspects of job" with the "organizational commitment". The impact of "Rewards" and "Promotion" is not supported because of non-significance. This study focused on the general private sector, so future researchers may investigate the relationship between job satisfaction and organizational commitment in each business sector. The recording and recognition of employee proposals for being more satisfied is another future subject of research arising from this study.

References

Anderson, N., Ones, D. S., Sinangil, H. K. and Viswesvaran, C., 2001, *Handbook of industrial, work and organizational psychology: Organizational psychology*, Volume 2, Sage Publications, London.

Anyango, A. C., 2015, "Effects of leadership styles on employee performance at Bank of Africa", *The Open University of Tanzania*, pp. 1-79.

Aspioti, B., 2013, *Labor relations and job satisfaction: The case of OTE*, Diploma thesis, MBA, University of Patras.

Bacotic, D. and Batic, T., 2013, "Relationship between Working Conditions and Job Satisfaction: The Case of Croatian Shipbuilding Company", *International Journal of Business and Social Science*, 4, 2, pp. 206-213.

Bakola, M. and Nicholaou, I., 2012, *Organizational Psychology and Behavior*, Rosili Publishing.

Balzer, W. K., Smith, P. C., Kravitch, D. A., Lovell, S. E., Paul, K. B., Reilly, B. A. and Reilly, C. E., 1990, *User's manual for the Job Descriptive Index (JDI) and the Job in General (JIG) scales*, Bowling Green, OH: Bowling Green State University.

Bontis, N., Richards, D. and Serenko, A., 2011, "Improving service delivery: Investigating the role of information sharing, job characteristics, and employee satisfaction", *Learning Organization*, 18, 3, pp. 239-250.

Buitendach J. H. and De Witte, H., 2005, "Job insecurity, extrinsic and intrinsic job satisfaction and affective organizational commitment of maintenance workers in a parastatal", *South African Journal of Business Management*, 36, 2, pp. 27-37.

Burns, A. C. and Bush, R. F., 1995, *Marketing research*, Prentice-Hall, New York.

Bush, T. and Middlewood, D., 2005, *Leading and Managing people in education*, Sage Publications, London.

Candan, H., 2013, "A research towards determination of job satisfaction level of public employee: karaman governorship sample", *Journal of human Resource Management*, 1, 2, pp. 29-38.

Cao, R. Q. and Dowlatshahi, S., (2005),"The Impact of Alignment between Virtual Enterprise and Information Technology on Business Performance in an Agile Manufacturing Environment", *Journal of Operations Management*, 23, 5, pp. 531-550.

Churchchill, G.A., 1979, "A paradigm for developing better measures of marketing constructs", *Journal of Marketing Research*, 16, pp. 64-73.

Flynn, B., Sakakibara, S., Schroeder, R., Bates, K. and Flynn, E., 1990, "Empirical research methods in operations management", Journal of Operations Management, 9, 2, pp. 250-285.

Ghorbanhosseini, M., 2012, "Analysis of team working on organizational commitment in Safa Industrial Group in Iran", *International Journal of Engineering and Science*, 1, 3, pp. 22-25.

Gonzalez, S., Chapman, D., Lacivita, L., Harris, S. and House, G., 2008,"A study of the relationship between job satisfaction, age, degree major, and formal educational levels of employees working in human resources". Available at www.scribd.com/document/342154595.

Greenberg, J. and Baron, A. R., 2008, *Behavior in Organizations: Understanding and managing the human side of work*, Prentice Hall.

Hair, J., Anderson, R., Tatham, R. and Black, W., 1995, *Multivariate data analysis with readings*, 4th ed., Prentice-Hall International, London.

Hodson, R., 1989, "Gender differences in job satisfaction: why aren't women more dissatisfied?", *The Sociological Quarterly*, 30, 3, pp. 385-399.

Homans, G. C., 1950, *The human group*, Harcourt, Brace and World, New York.

Holland, J. L., 1996, "Exploring careers with a typology: What we have learned and some new directions", *American Psychologist*, 51, 4, pp. 397-406.

Iordanoglou, D., 2008, *Human Resources Management in Modern Organizations: New Trends and Practices*, Kritiki Publications.

Judge, T. A. and Klinger, R., 2007, *Job Satisfaction: Subjective Well-Being at Work. The Science of Subjective Well-Being*, Gulford Publications, New York.

Katz, D. and Kahn, R. L., 1966, *The social psychology of organizations*, Wiley, New York.

Kimberlin, L. C. and Winterstein, G. A., 2008, "Validity and reliability of measurement instruments used in research", *American Journal of Health-System Pharmacy*, 65, pp. 2276-2284.

Lapanaiti, A., 2012, *Job satisfaction of the academic staff. An empirical investigation at the University of Patras*, Diploma thesis, University of Patras.

Le, K., Donnellan, M. B. and Conger, R., 2014, "Personality Development at Work: Workplace Conditions, Personality Changes, and the Corresponsive Principle", *Journal of Personality*, 82, 1, pp. 44-56.

Liden R. C., Wayne S. J. and Sparrowe R. T., 2000, "An examination of the mediating role of psychological empowerment on the relations between the job, interpersonal relationships and work outcomes", *Journal of Applied Psychology*, 85, 3, pp. 407-416.

Locke, E. A., 1976, "The nature and causes of job satisfaction", *Handbook of industrial and organizational psychology*, pp. 1297-1349.

Locke, E. A. and Henne, D., 1986, "Work motivation theories", *International Review of Industrial and Organisational Psychology*, edited by C. L. Cooper and I. Roberston, pp. 1-35.

Maslach, C. and Leiter, M. P., 1997, T*he truth about burnout: How organizations cause personal stress and what to do about it*, CA: Jossey-Bass, San Francisco.

McGrath, G. R. and MacMillan, I. C., 2000, *Entrepreneurial Mindset: Strategies for continuously creating opportunity in an age of uncertainty*, Harvard Business School Press Books.

McMahon, B., 2007, *Organizational commitment, relationship commitment and their association with attachment style and locus of control.* USA: Georgia Institute of Technology.

Men, L. R., 2010, "Measuring the Impact of Leadership Style and Employee Empowerment on Perceived

Organizational Reputation", *Institute for Public Relations*, pp. 1-59.

Meyer, J. P. and Allen, N. J., 1991, "A three component conceptualization of organizational commitment", *Human Resource Management Review*, pp. 61-89.

Meyer, J. P. and Allen, N. J., 1997, *Commitment in the Workplace: Theory, Research and Application*, Thousand Oaks, CA, Sage.

Meyer, J. P. and Herscovitch, L., 2001, "Commitment in the Workplace: Towards a General Model", *Human Resource Management Review*, 11, pp. 299-326.

Mohamed, L. M., 2016, "Assessing the effects of transformational leadership: A study on Egyptian hotel employees", *Journal of Hospitality and Tourism Management* 27, pp. 49-59.

Mowday, R. and Steers, R., 1979, "The measurement of organizational commitment", *Journal of vocational behavior*, 14, pp. 224-247.

Nunnally, J. C., 1978, Psychometric Theory, 2nd ed., McGraw-Hall, New York.

Porter, L. W., Steers, R. M., Mowday, R. T. and Boulian, V. P., 1974, "Organizational Commitment, Job Satisfaction, and Turnover among Psychiatric Technicians", *Journal of Applied Psychology*, 59, pp. 603-609.

Porter, L. W., Lawler, E. E. and Hackman, J. R., 1975, *Behavior in organizations*, McGraw-Hill, New York.

Robbins, P., S. and Judge, A. T., 2011, *Organizational Behavior: Basic Concepts and Modern Approaches*, Kritiki Publications, Athens.

Russell, S. S., Spitzmuller, C., Lin, L. F., Stanton, J. M., Smith, P. C. and Ironson, G. H., 2004, "Shorter can also be better: The abridged job in general scale", *Educational and Psychological Measurement*, 64, 5, pp. 878.

Saari, L. M. and Judge, T. A. 2004, "Employee attitudes and job satisfaction", *Human Resource Management*, 43, pp. 395-407.

Salanova, M., Agut, S. and Peiro, J. M., 2005, "Linking organizational resources and work engagement to employee performance and customer loyalty: The mediation of service climate," *Journal of Applied Psychology*, 90, pp. 1217-1227.

Scott, M., Sworzel, K. and Taylor, W., 2005, "The relationships between selected demographic factors and the level of job satisfaction of extension agents" *Journal of Southern Agricultural Education Research*, 55, 1, pp. 102-115.

Sharma, S., 1996, *Applied Multivariate Techniques*, Willey, New York.

Spector, E. P., 1997, *Job Satisfaction: Application, Assessment, Causes, and Consequences*, Sage Publications, London.

Steger, F. M., Littman-Ovadia, H., Miller, M., Menger, L. and Rothmann, S., (2013), "Engaging in work even when it is meaningless: positive affective disposition and meaningful work interact in relation to work-engagement", *Journal of Career Assessment*, 21, 2, pp. 26-29.

Terzidis, K. and Tziwrtzakis, K., 2004, *Human Resource Management: Personnel Management*, 1st Edition, Rosili Publishing, Athens.

Vroom, H. V., 1964, *Work and Motivation*, John Wiley and Sons Inc, New York.

Wanous, J. P. and Lawler, E. E., 1972, "Measurement and meaning of job satisfaction", *Journal of Applied Psychology*, 56, 2, pp. 95-105.

Weiss, H. M., 2002, "Deconstructing job satisfaction: Separating evaluations, beliefs and affective experiences", *Human Resource Management Review*, 12, pp. 173-194.

Wixom, B. H. and Watson, H. J., 2001, "An empirical investigation of the factors affecting data warehousing", *MIS Quarterly*, 25, 1, pp. 17-41.

Zamora, J. F. and Madariaga, J. G., 2017; "Does opinion leadership influence service evaluation and loyalty intentions? Evidence from an arts services provider", *Journal of Retailing and Consumer Services*, 39, pp. 114-122.

Zavlanos, M., 2002, *Organizational Behavior*, Stamoulis Publications, Athens.

Zeygaridis, S. and Stamatiadis, G., 1997, *Personnel Management and Supervision*, Interbooks Publishing, Athens.

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Accrual Accounting Adoption In Java Municipalities: An Empirical Investigation

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ABSTRACT

Purpose
Beginning from the assumption that accrual accounting is useful in ensuring the high performance of management systems, this article investigates explanatory factors concerning the level of accrual accounting adoption in municipalities on the Indonesia island of Java.

Design/methodology/approach
Data collection in this study was based on a structured questionnaire sent to the Head of Accounting Sections of 119 Javanese municipalities. The instrument for content and construct validity and reliability was tested. Then, the hypotheses were tested using Structure Equation Modelling (SEM) by SmartPLS.

Findings
The results indicate that the variables of top management support, adequate training programs, and the quality of information technology has a significant effect on the level of accrual accounting adoption and key are factors influencing the level of accrual accounting adoption. They also indicate that organizational culture is an important moderating influence between these variables and the level of accrual accounting adoption.

Research limitations/implications
One of the limitations of this study is that data collection using a survey method through a questionnaire likely does not capture the wider knowledge of respondents; in addition, the questionnaires were distributed only to Javanese municipalities. The findings of this study and the limitations inherent in it can lead to some further research opportunities. For example, further research can examine neglected variables such as the size of the organization and its social capital and also the importance of organizational variables such as local political support and support from external auditing processes.

Originality/value
To the best of the researcher's knowledge, no study of Indonesian municipalities has tested the impact of factor such as top management support, and organizational culture as a moderating effect on the level of accrual accounting adoption.

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1. INTRODUCTION

Since the 1980, a phenomenon has occurred in regard to a change in public sector management style which is characterized by the introduction of New Public Management (NPM) – the adoption by the public sector of the management style of the private sector (Christensen & Parker, 2010; Christiaens & Rommel, 2008; Jagalla, Becker & Weber, 2011; Lapsley, Mussari, & Paulsson, 2009). In Indonesia, there was also a change in management style when the Suharto regime collapsed in 1998. Since then Indonesia has developed a more democratic political system and improved the transparency and accountability of the government (McLeod, 2005; Harun, 2007; Harun, Van Peursem & Eggleton, 2012). The state adopted centralized elections for the national legislature and executive (president), and governors of provinces and regents or mayors were elected democratically rather than appointed by the central government (McLeod, 2005). Indonesia has also introduced accrual accounting in public institutions to

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provide more effective and efficient services. The adoption of accrual accounting was explicitly identified as a public sector financial reform in the country (Nasution, 2006; Nasution, 2008).

Financial management reform in Indonesia had been in process for more than a decade since the enactment of Law No. 17 of 2003 on State Finance and Law No. 1 of 2004 on the State Treasury. The former mentioned that cover a period of five years, starting from 2003 until 2008. Furthermore, the Indonesian government issued a regulation or "Peraturan Pemerintah" (PP) No. 24 of 2005 identifying Government Accounting Standards or "Standar Akuntansi Pemerintah" (SAP) as the basis for the migration of the government's accounting system from a cash basis towards an accrual basis. This regulation provided a transition period for the application of accrual accounting based on the SAP of not more than four years before the budgeting process of 2010. This meant that the transition period was from 2005 until 2009. In 2010, the government published regulation No. 71 mandating the SAP as the basis for accrual accounting to improve the quality and accountability of government performance to replace PP No. 24 of 2005. This regulation also included a Statement of Government Accounting Standards or "Pernyataan Standar Akuntansi Pemerintah" (PSAP) which stated that these standards and accrual accounting methods should be used for the budget process of fiscal year 2010. However, those reporting entities that had not been able to apply the accrual-based PSAP were allowed to migrate from a cash-based system towards accrual-based PSAP during a period of at least four years after 2010. By 2015, the government accounting system had to fully adopt accrual accounting.

The adoption of accrual accounting in the public sector is often accompanied by weaknesses and problems which, during the transition process, are associated with organizational and procedural factors (Cohen, Keimenakis & Zorgios, 2007). These several factors include the lack of trained human resources, motivation and incentives, information technology capabilities, and management commitment (Cohen et al., 2007; Cohen, Keimenakis & Venieris, 2012; Irvine, 2011).

In Indonesia, there are few empirical studies on the adoption of accrual accounting. For example, Marwata and Alam (2006) investigated how various drivers of reform with different interests and preferences compete and cooperate in the process of the reform of government accounting policies. They found that the accounting reform process was marked by both rivalries and alliances between the drivers of reform. Harun (2008) provided an overview of public sector reform in Indonesia. He focused on the barriers, improvements, and actions taken by Indonesia to move to accrual accounting. Harun and Kamase (2012) described the institutional capacity of provincial governments and the adoption problems in accrual accounting. Harun, Van Paursem and Eggleton (2012) evaluated the institutionalization of the accrual accounting system in Indonesian local governments using case studies to gain insights in relation to the process of institutionalization in the public sector. McLeod and Harun (2014) described and analyzed the challenges faced in trying to reform public sector accounting in Indonesia. Additionally, previous research has been done in the public sector to look at the process of adopting accrual accounting. Simanjuntak (2010) and Bastian (2006) suggested that the adoption of accrual accounting in Indonesia requires adequate information technology and trained human resources.

This paper focuses on exploring the accrual accounting adoption with a focus on Java municipalities. There are two objectives for this study, namely: (i) to examine the relationship between explanatory factors such as top management support, adequate training programs, and the quality of information technology with the level of accrual accounting adoption in Java municipalities, and (ii) to explore whether organizational culture moderates the relationship among these factors.

2. RESEARCH QUESTIONS AND HYPOTHESES

Previous research has been done in the public sector to look at the process of adopting accrual accounting. Simanjuntak (2010) and Bastian (2006) suggested that the adoption of accrual accounting in the Indonesian government requires adequate information technology, management commitment, and human resources. Similarly, Tickell (2010) explained the most important factor in the adoption of accrual accounting is the capability of information technology. In line with this, Blondal (2003) argued that the adoption of accrual accounting must be based on information technology. McGuinness (1988) explained that the most important factors for adopting accrual accounting is management commitment. Furthermore, Ouda (2008) explained the factors that are needed for the adoption of accrual accounting, namely: adequate training programs and information technology capability. Therefore, the current study wishes to examine the relationship between the independent variables of top management support, adequate training program, and the quality of information technology and dependent variable, the level of accrual accounting adoption with moderating effect of organizational culture (see figure 1). Based on the above literature, the current research questions can be stated as follows:

What is the relationship between the explanatory factors (the independent variables) and the level of accrual accounting adoption (the dependent variable), and does organizational culture moderate the nature of this relationship?

The common interests of management who have had previous experience with reform, the reform initiative in terms of accounting practices, and the active involvement of managers are positive influences on the rate of reform adoption (Ridder & Bruns, 2006). Similarly, research conducted by Cavalluzzo and Ittner (2004) shows that top management support has a strong relationship with the adoption of the measurement system. Research by

Jackson and Lapley (2003) showed that managers sometimes resist and impede the practice of accounting. This argument leads to the following hypothesis:

H_1: There is a relationship between top management support and the level of accrual accounting adoption.

Currently, Indonesian municipalities continue to improve their accountability for public financial management in accordance with principles of good governance. Empirical research has found that adequate training programs have a positive and significant effect on the compliance level of accrual accounting (Christiaens & Peteghem, 2007; Christiaens, 1999; Eriotis, Stamatiadis, & Vasiliou, 2011; Windels & Christiaens, 2006). Based on the above discussion, this study would like to re-examine the relationship between the two variables and propose the following hypothesis:

H_2: There is a positive relationship between adequate training programs and the level of accrual accounting adoption.

Previous research revealed the importance of IT support in the creation of a new accounting system (Bloomfield & Danieli, 1995; Järvinen, 2006). As local authorities are not usually familiar with accounting applications, the application of additional IT support is assumed to be important in the new system. In line with this, studies by Eriotis et al. (2011) show a positive and significant correlation between the quality of information technology and the compliance rate of accrual accounting. Thus, high quality information systems that exist in organizations should be considered as an essential requisite for the successful adoption of NPM initiatives (Ouda, 2008). This argument leads to the following hypothesis:

H_3: There is a positive relationship between the quality of information technology and the level of accrual accounting adoption.

To encourage the adoption of any new and more effective system, the management team should be able to learn and be ready to accept and adapt to the tools that are new and also accept new concepts as opposed to management teams who prefer to maintain the "status-quo" and are suspicious of progress (Dong, 2001). Leaders as well as individuals at all levels of the organization need to learn, particularly at the top level of management. A management team that is conducive to change (as in the case of an organizational culture that is open and supports reform) is more likely to convince and persuade parts of the organization to follow, and this should contribute to the successful adoption of accrual accounting. Thus, the following hypothesis is stated:

H_4: Organizational culture moderates the relationship between top management support and the level of accrual accounting adoption.

Creating and influencing an adaptive culture is one of the important things for management to do through training and personnel development programs and the exploitation of opportunities (Daft, 2010). Thus, Siegal and Sussman (2003) asserted that to encourage the adoption of new knowledge and an innovative organizational culture, information exchange should be promoted through training of employees. Thus, the following hypothesis is stated:

H_5: Organizational culture moderates the relationship between adequate training programs and the level of accrual accounting adoption.

Human infrastructure is determined by cultural elements such as language, customs, general practices and forms of social organization. Changes in organizational culture, in parallel with the introduction of information technology face the same constraints. The change is expected to bring success in the harmonization of technological considerations in the adoption of accrual accounting. Thus, the following hypothesis is stated:

H_6: Organizational culture moderates the relationship between the quality of information technology and the level of accrual accounting adoption.

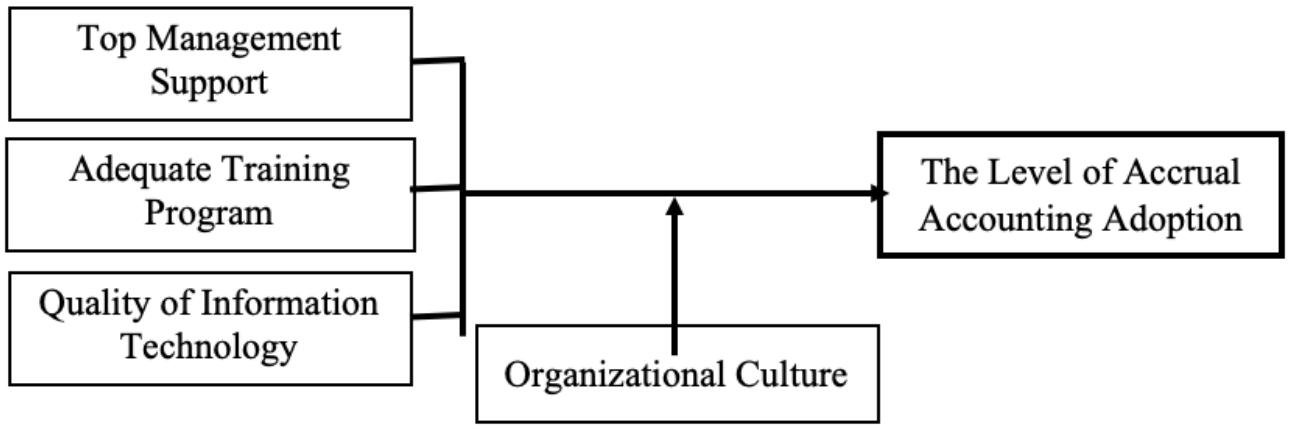

Figure 1. Research Model

3. RESEARCH METHOD

A questionnaire survey was pre-tested and then sent by e-mail or personally delivered to one hundred and nineteen heads of municipal accounting sections on the island of Java. A total of 80 questionnaires were returned. At the end, gathering 67% responses from the total questionnaires is considered more than adequate for analysis. The hypotheses were tested using structure equation modeling (SEM) by SmartPLS. The dependent variable was the level of accrual accounting adoption (LAAA). The level of accrual accounting adoption was estimated as the total number of items in the questionnaire selected by the respondents from local governments divided by the maximum applicable number of items. Respondents were asked to answer "yes" (value = 1) if the item were relevant/implemented and "no" (value = 0) if not. The overall compliance index was calculated for each local government as the sum of scores of all the dichotomous variables. The resulting local government index had a total value of 43 if all the standards were complied with in accordance to the Government Accounting Standards. This approach using an index methodology has proven to be a useful method as it allows general research on many aspects of reform and has been used in a number of previous studies (Cheng, 1992; Christiaens, 1999; Christiaens & Peteghem, 2007; Cohen & Kaimenakis, 2007; Eriotis et al, 2011; Ryan, Stanley & Nelson, 2002). The independent variables, top management support, adequate training programs, information technology, and organizational culture, use perceptive measures, and thus multi-question Likert scales (1 = strongly disagree and 5 = strongly agree) were used to derive composite scores for each factor. All of the measures were based on the previous literature.

4. RESULTS

This study eventually reached 80 heads of accountant sections in Javanese municipalities. Respondents were asked to provide demographic information. The statistical results indicate that the gender of the sample consisted of 60% males and only 40% females. For the education level, those with a bachelor's degree represented the largest group with 76% followed by those who held a master's degree with 22% and a doctorate, 2%. A majority of the respondents (50%) have been with their organization for over fifteen years, 32% of the respondents have been with their organization for 11 to 15 years, and 18% of the respondent have been with their organization less than 5 years.

Table 1 demonstrates the validity and reliability of the test results from the instruments. The lowest reliability level that can be accepted has to equal 60% and above for testing survey instruments (Malhotra, 2004). As can be seen in table 1 below, the constructs reliability test lay within the range of 0.637 - 0.902. These results confirmed an acceptable level of validity and reliability. Structure Equation Modeling (SEM) with Partial Least Squares (PLS) techniques was used to test the hypotheses, and this requires a significance level of 0.05 or 5% for the basis of acceptance or rejection of the hypothesis.

Table 1. Validity and Reliability Test

$R^2 = 0.492$			
Variable	**AVE**	**Composite Reliability**	**Cronbach's Alpha**
TMS	0.543	0.870	0.834
TRAIN	0.788	0.789	0.716
ITQUAL	0.589	0.884	0.855
TMS*ORCUL	0.457	0.854	0.835
TRAIN* ORCUL	0.649	0.912	0.902
ITQUAL* ORCUL	0.317	0.846	0.637

In Table 1, it can be seen that R^2=0.492 indicates that the variation of the dependent variables can be explained by the independent variable at a level of 49,2%, while the remaining 50.8% is explained by other variables outside the model. Furthermore, Table 2 shows the results of PLS testing. The table shows that top management support (TMS= t=3.276), adequate training program (TRAIN, t=4.074), and the quality of information technology (ITQUAL, t=2.529) influence the level of accrual accounting adoption (LAAA). Meanwhile, organizational culture (ORCUL) has a moderating effect on both the relationship between top management and the level of accrual accounting adoption (t=2.126) and the relationship between adequate training and the level of accrual accounting adoption (t=2.370). However, there is no moderating effect on the relationship between the quality of information technology and the level of accrual accounting adoption (t=0.779).

Top management support has a very important role in achieving the goals and objective of implementation (Harun, 2007; Simanjuntak, 2010). The result of this study indicates that top management support has a significant effect on the level of accrual accounting adoption, which means H1 can be accepted. These findings are in line with other accounting implementation studies which explain top management support as the key to the successful implementation of accrual accounting (Ridder & Brun, 2006; Jackson & Lapsley, 2003). In the context of the accrual accounting adoption rate in Java municipalities, the presence of peak management support is vital because the adoption of accrual accounting is a large and complex process and requires significant resources. With the commitment and support of top management concerning the necessity of adapting accrual

accounting, vital resources will likely be made available to facilitate the adoption process.

Another significant result of the survey is that an adequate training program was proven to affect the level of accrual accounting adoption. The result of this study therefore supports H2. This finding is in line with previous research findings that reinforce the assumption that adequate training programs have a positive and significant effect on the level of adoption of accrual accounting (Christiaens, 1999; Christiaens & Peteghem, 2007; Windels & Christiaens, 2006).

Testing the influence of the quality of information technology on the level of accrual accounting adoption obtained a p-value of 0.012, smaller than the level of significance 0.05. This shows that the quality of information technology is positively and significantly related to the level of accrual accounting adoption. The result of this study therefore confirms H3 -- that in Javanese municipalities, the quality of information technology has a positive and significant effect on the level of accrual accounting adoption. These findings are in line with research by Järvinen (2006) and Eriotis, et al (2011).

Table 2. Results of Hypothesis Testing Using Structural Equation Modeling

Hypothesis Number	Relationship	Path Coefficient	t-value	p-value
H1	TMS -> LAAA	0.112	3.276**	0.001
H2	TRAIN -> LAAA	-0.612	4.074**	0.000
H3	ITQUAL -> LAAA	0.163	2.529**	0.012
H4	TMS * ORCUL -> LAAA	-0.070	2.126**	0.041
H5	TRAIN * ORCUL -> LAAA	-0.050	2.370**	0.019
H6	ITQUAL * ORCUL -> LAAA	-0.023	0.779	0.437

** Sig. if the t-value ≥ 1.96 two tail t-test. p ≤ 0.05.

The relationship between top management support and the level of accrual accounting adoption is significantly moderated by the presence of a supportive organizational culture. The presence of such a culture has an effect on the relationship among the top management support and the level of accrual accounting adoption. Top management support should carefully consider the behaviour, working styles, and habits of employees to avoid rejection of a new system. The relationship between adequate training programs and the level of accrual accounting adoption is also significantly moderated by the existence of an open organizational culture. The presence of such a culture can be very important in the development of adequate training programs (Siegal & Sussman, 2003).

5. CONCLUSION

The empirical findings of this study are potentially important for regulatory bodies, municipalities, the central government, and users of local government financial reports. These findings can be applied to developing and improving public sector governance. In particular, these findings may serve as input for public policy making in the implementation of PP No. 71 of 2010 in order to ensure its full implementation in all Indonesian government institutions. Given the results of the hypotheses testing, it can be concluded that there is a relationship between top management support, adequate training programs, the quality of information technology and the level of accrual accounting adoption. One of the limitations of this study is that data collection using a survey method through a questionnaire does not likely capture the wider knowledge of respondents; in addition, the questionnaires were distributed only to Javanese municipalities. The findings of this study and the limitations inherent in it can lead to some further research opportunities. For example, further research can examine neglected variables such as the size of the organization and its social capital and also the importance of organizational variables such as local political support and support from external auditing processes. This study focuses solely on the perceptions of heads of municipal audit units to investigate the problem of accrual accounting adoption practices in the preparation of financial statements. However, there are other communication media through which municipalities can transmit financial information. Therefore, it is suggested that in the future, additional studies may explore other disclosure channels such as website data or press releases, although the latter is not a common form of communication in Indonesia.

References

Bastian, I, (2006), Sistem Perencanaan dan Penganggaran Pemerintahan Daerah di Indonesia, Salemba Empat, Jakarta.

Blondal, J. R. (2003). Accrual accounting and budgeting: key issues and recent developments. OECD Journal on Budgeting, 3(1), 43–59.

Bloomfield, B. P., & Danieli, a. (1995). The role of management-consultants in the development of information technology - the indissoluble nature of sociopolitical and technical skills. Journal of Management Studies, 32(1), 23–46.

Cavalluzzo, K. S., & Ittner, C. D. (2004). Implementing performance measurement innovations: Evidence from government. Accounting, Organizations and Society, 29(3-4), 243–267.

Cheng, R. H. (1992). An empirical analysis of theories on factors influencing state government accounting disclosure. Journal of Accounting and Public Policy, 11 (1), 1-42.

Christensen, M., & Parker, L. (2010). Using ideas to advance professions: public sector accrual accounting. Financial Accountability & Management, 26(3), 246–267.

Christiaens, J. (1999). Financial accounting reform in Flemish municipalities: an empirical study of adoption and annual financial reports. European Accounting Review, 15(1), 803–804.

Christiaens, J., & Peteghem, V. Van. (2007). Governmental accounting reform: Evolution of the adoption in Flemish municipalities. Financial Accountability & Management : In Governments, Public Services and Charities, 23(4), 351–466.

Christiaens, J., & Rommel, J. (2008). Accrual Accounting Reforms: Only for Businesslike (Parts of) Governments. Financial Accountability & Management, 24(1), 59–75.

Cohen, S., Kaimenaki, E., & Zorgios, Y. (2007). Assessing it as a key success factor for accrual accounting adoption in Greek Municipalities. Financial Accountability & Management, 23(1), 91–111.

Cohen, S., Kaimenakis, N., & Venieris, G. (2012). Reaping the benefits of two worlds. Journal of Applied Accounting Research, 14(2), 165–179.

Daft, R. L. (2010). Organization Theory and Design. USA: South-Western College Publishing, Thompson Learning.

Dong, L. (2001). Modelling Top Management Influence on ES Implementation. Business Process Management Journal, 7(3), 243-250.

Eriotis, N., Stamatiadis, F., & Vasiliou, D. (2011). Assessing accrual accounting reform in Greek Public Hospitals: An empirical investigation. International Journal of Economic Sciences and Applied Research, 4 (1), 153–184.

Government Regulation 24 (2005). Government Accounting Standards.

Government of Indonesia, (2004). Undang-Undang: Pembentukan Peraturan Perundang-Undangan. No. 10/2004. Jakarta, Indonesia.

Government Regulation 24 (2005) on Government Accounting Standards "Standar Akuntansi Pemerintahan" (SAP).

Harun, H. (2008). Obstacles to Indonesian public sector accounting reforms. Bulletin of Indonesian Economics Studies, 43 (3), 365-375.

Harun, H. (2007). Evaluasi Empiris Terhadap Kapasitas Suatu Pemerintah Daerah dalam Implementasi Standar Akuntansi Berbasis Akrual. Jurnal Akuntansi dan Bisnis, 8,(2), 113-122.

Harun, H., & Kamase, H. P. (2012). Accounting Change and Institutional Capacity : The Case of a Provincial Government in Indonesia. Australasian Accounting Business & Finance Journal, 6(2), 35–50.

Harun, H., Peursem, K. Van, & Eggleton, I. (2012). Institutionalization of Accrual Accounting in The Indonesian Public Sector. Accounting & Organizational Change, 8(3), 257–285.

International Federation of Accountants - Public Sector Committee (2002), Study 14: Transition to the Accrual Basis of Accounting: Guidance for Governments and Government Entities (IFAC, New York).

Irvine, H. (2011). From Go to Woe How a not-for-profit Managed the Change to Accrual Accounting. Accounting, Auditing & Accountability Journal, 24(7), 824–847.

Jackson, A., & Lapley, I. (2003). The Diffusion of accounting practices in the new "managerial" public sector. The International Journal of Public Sector Management, 16 (5), 359–372.

Jagalla, T., Becker, S. D., & Weber, J. (2011). a Taxonomy of the Perceived Benefits of Accrual Accounting and Budgeting: Evidence From German States. Financial Accountability & Management, 27(2), 134–165.

Järvinen, J. (2006). Institutional pressures for adopting new cost accounting systems in Finnish hospitals: two longitudinal case studies. Financial Accountability & Management, 22(1), 21–46.

Khan, A., & Mayes, S. (2009). Transition to accrual accounting, International Monetary Fund, 1–19.

Komite Standar Akuntansi Pemerintahan. (2005). Peraturan Pemerintah Nomor 24 Tahun 2005 tentang Standar Akuntansi Pemerintahan, Jakarta: Salemba Empat.

Lapsley, I., Mussari, R., & Paulsson, G. (2009). On the Adoption of Accrual Accounting in the Public Sector: A Self-Evident and Problematic Reform. European Accounting Review, 18(4), 719–723.

Malhotra, N. (2004). Marketing Research: An Applied Orientation, 4th ed. Pearson Prentice Hall - Hopper Saddle River. NJ 07458.

Marwata, & Alam, M. (2006). The interaction amongst reform drivers in governmental accounting changes. Accounting & Organizational Change, 2(2), 144–163.

McGuinness, W. L. (1988). The adoption of accrual accounting for government departments. August, 1-139.

Mcleod, R. H. (2005). Bulletin of Indonesian Economic Studies The struggle to regain effective government under democracy in Indonesia.

Bulletin of Indonesia Economic Studies, 41(3), 367–386.

Mcleod, R. H., & Harun, H. (2014). Public sector accounting reform at local government level in Indonesia. Financial Accountability & Management, 30(4), 238–258.

Nasution, A. (2006). Peranan BPK dalam pemberantas Korupsi. Jakarta: The State Audit Baord.

Nasution, A. (2008). Reforming the State and local government financial management (Perbaikan keuangan negara dan daerah). Jakarta: The State Audit Baord.

Ouda, H. (2008). Towards a generic model for government sector reform: The New Zealand experience. International Journal of Governmental Financial Management, 8(2), 91–115.

Ridder, H., & Bruns, H. And Spier. F (2006). Managing adoption processes. Public Management Review, 8(1), 87–118.

Ryan, C., T. Stanley, and Nelson, M. (2002). Accountability disclosure by Queensland local government councils: 1997-1998. Financial Accountability and Management 18 (3): 261-289.

Siegal, W.S., & Sussman, S.W. (2003). Informational Influence in Organizations: An Integrated Approach to Knowledge Adoption. Information Systems Research, 14 (1), 47-65.

Simanjuntak, B. H. (2010).Menyongsong era baru akuntansi pemerintahan di Indonesia. In Disampaikan pada Kongres XI Ikatan Akuntan Indonesia.1–15.

Tickell, G. (2010). Cash To Accrual Accounting: One Nation's Dilemma. The International Business & Economics Research Journal, 9(11), 71–78.

Windels, P., & Christiaens, J. (2008). The adoption of accrual accounting in Flemish public centres for sosial welfare: examining the importance of agents of change. Imprensa da Universidade de Coimbra. 229-251.

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Predicting Corporate Bankruptcy: A Cross-Sectoral Empirical Study - The Case of Greece

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ABSTRACT

Purpose
This article explores the prediction of bankruptcy of Greek companies, in particular of the manufacturing industry, wholesale, retail and service sectors.

Design/methodology/approach
The Probit model was developed so as to try to highlight the differences in the predictive capacity of the model across the sectors but also to investigate any differences in the behavior of the financial indicators used in the model. Moreover, for the selection of these indicators, the technique of factor analysis was applied.

Findings
The results showed significant explanatory capacity of the model in the four key sectors of the Greek economy up to four years before failure and bankruptcy, as well as a clear differentiation in the sector classification of companies

Research limitations/implications
This work can be used by managers, banks as well as by practitioners to identify the causes of firm's failure.

Originality/value
The limited investigation, to date, of the effects of sectoral features and the absence of sectoral samples of bankrupt companies with a higher degree of homogeneity in predicting bankruptcy may often lead prediction models to unreliable results. This paper has two main contributions to the relevant literature. At first, it serves as a work of distinguishing the differences between bankruptcy predictive power of the same financial indicators of enterprises belonging to different sectors. Secondly, the use of factor analysis in the selecting procedure of the appropriate variables provides better and more robust results in the field of bankruptcy prediction.

Eastern Macedonia and Thrace Institute of Technology

1. INTRODUCTION

The evolution of bankruptcies in recent decades is of particular interest due to their economic and social impact and the impact on the banking system. The industry in which an enterprise operates and develops plays an important role in the course of the business (Chava and Jarrow, 2004; Stokes and Blackburn, 2002). Each sector of economic activity has different financial characteristics and may face particular problems, which may be due either to in-house or extraneous factors.Differences in the features and problems of an industry may stem from over-borrowing, the level of competition, the import and export of goods, the impact of macroeconomic policy, the legislative framework, the different management and valuation of inventories, differences between family and non-family enterprises (Duller, 2010), the degree of sensitivity and deterioration of the raw materials, the completely different production process, etc.

When a sector of activity is experiencing severe financial problems, this will also inevitably affect sector businesses and it is possible that a number of companies may go into

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failure and bankruptcy.A large number of Greek companies that went bankrupt during the period 2003-2016 was used in this study. These companies were active in the major sectors of economic activity in the Greek economy, namely in the manufacturing industry, wholesale, retail and service sectors.The Probit model was developed so as to try to highlight the differences in the predictive capacity of the model across the sectors but also to investigate any differences in the behavior of the financial indicators used in the model. Moreover, for the selection of these indicators, the technique of factor analysis was applied.

This paper has two main contributions to the distinguishing the differences between bankruptcy predictive power of the same financial indicators of enterprises belonging to different sectors. Secondly, the use of factor analysis in the selecting procedure of the appropriate variables provides better and more robust results in the field of bankruptcy prediction. Finally, this work can be used by managers, banks as well as by practitioners to identify the causes of firm failures.The rest of the work is structured as follows:Section 2 reviews the relevant literature. Section 3 describes the database. Section 4 presents the choice of variables using factor analysis and the methodology followed for the development of the Probit model. Section 5 presents the results and their interpretation, while the conclusions are presented at the end of the paper, in Section 6.

2. LITERATURE REVIEW

The development of failure prediction models has been and still remains a topic of particular interest to researchers in recent decades in many countries. Beaver (1966) with the univariate analysis, Altman (1968) with multivariate discriminant analysis, Meyer and Pifer (1970) with the linear probability model, Martin (1977) and Ohlson (1980) with the development of the logarithmic probability model (Logit), and Hanweck (1977), Grablowsky and Talley (1981), and Zmijewski (1984), with the development of the normal probability model (Probit), laid the groundwork for later research in the field of business failure prediction.

In addition, a number of important studies that have been published and were based on the previous techniques refer to the prediction of business failure, such as: Deakin (1972), Edmister (1972), Blum (1974), Diamond (1976), Taffler and Tisshaw (1977); Altman, Haldeman and Narayanan (1977), Dambolena and Khoury (1980), Taffler (1982), Gombola and Ketz (1983), Micha (1984), Zavgren (1985), Frydman, Altman and Kao (1985), Gombola et al (1987), Aziz, Emanuel and Lawson (1988), Peel and Peel (1988), Keasey and McGuinness (1990); Platt and Platt (1990), Luoman and Laitinen (1991), Theodossiou (1993), Johnsen and Melicher (1994), Altman, Hartzell and Peck (1995), McGurr and DeVaney (1998), Dimitras, Slowinski, Susmaga and Zopounidis (1999), Kahya and Theodossiou (1999), Charitou et al (2004), Agarwal and Taffler (2008); Wu et al. (2010).

Charalambakis and Garrett (2016) investigate whether accounting and market-driven variables appropriately predict financial distress for developed market firms (USA), also predict financial distress in another developed market (UK) and in an emerging market (India). They show that for the UK, a model that combines book leverage and excess returns, market capitalization and return volatility amplify the prediction of financial distress for UK firms. In the case of Indian firms they find that market-based variables do not impact on the probability of financial distress when they are combined with accounting information.

The bulk of published research on business failure predictions refer to samples of bankrupt industrial firms, samples of industrial and commercial, as a whole, businesses, samples of companies in different sectors, and samples of banks.One of the most important elements (perhaps the most important) of a successful bankruptcy prediction is the creation of appropriate samples of bankrupt (failed) businesses, which should bring together the qualitative and quantitative characteristics of the financial information of the financial statements.

The limited investigation, to date, of the effects of sectoral features and the absence of sectoral samples of bankrupt companies with a higher degree of homogeneity in predicting bankruptcy may often lead prediction models to unreliable results. In order to highlight the importance of sectoral features, Altman et al. (1974), applied multivariate discriminant analysis (MDA) to a sample of 35 problematic and 99 healthy textile companies in France, with

fairly good results. Also in 1993, recognizing the diversity of sectoral effects, he revised his model (Z-Score, 1968) into a four-variable model, subtracting the asset turnover ratio variable, "X5 Sales to Total Assets", in order to minimize the potential sectoral effects.

Skogsvik K. (1990) investigated the predictive capacity of the Probit model in industrial mining companies in Sweden. Michalopoulos et al. (1993) applied the Regressive Differentiation Algorithm to a sample of twenty-one Greek textile companies (9 bankrupt and 12 healthy). McGurr (1996) investigated the predictive power of the discriminant analysis model in United States retailers, while McGurr and DeVaney (1998) compared the technique of discriminant analysis (MDA) with the logarithmic probability model (Logit), using US retailers from 1989 to 1993. Parsa et al. (2011) state that the variables location, affiliation, and size are significant influences on restaurants' failure. Pinkwart et al. (2015) analyzed the determinants for the business failure of German New Technology-Based Firms (NTBF) in different financial stages. They showed that the different financial states should be analyzed separately when determining factors of business failure.

Gemara et al (2016) use survival analysis techniques in the Spanish hotel industry They argue that the survival of hotels depends on their size, location, management and launch in a time of prosperity. Soo, (2018) investigates the key determinants of US hospitality firms' financial distress between 1988 and 2010 using ensemble models. Financial ratios such as debt-to-equity ratio and net profit margin, among others, were defined as significant financial distress predictors.

In studies undertaken since 1982, Standard and Poor's has highlighted significant differences between the same financial indicators of enterprises belonging to different sectors. Comparing the sectoral features of bankrupt businesses of the key sectors of an economy (manufacturing industry, wholesale, retail and services) which affect model behavior, is an important element of research.

Despite the development of the normal probability model (Probit) by Hanweck (1977) in order to investigate the bankruptcy of a group of banks, by Zmijewski (1984), who first applied the Probit model to the corporate bankruptcy prediction, by Skogsvik (1990), but also Grablowsky and Talley (1981), Gloubos and Grammatikos (1988), Theodossiou (1991), Papoulias and Theodossiou (1992), Ginoglou (1994), Spanos et al (1999), and Lin (2009), who compared the application of the Probit model with other models, its use is very limited, although its implementation results are encouraging. The earlier perception of implementation difficulties due to the complex calculations reported by some researchers such as Stock and Watson(2006), does not apply due to the development of software which allows any computational difficulties and problems encountered in the development of the Probit model to be overcome, Chris Brooks(2008).

3. DATA DESCRIPTION

The collection of the basic data of bankrupt Greek companies was carried out by the Hellenic Statistical Authority (ELSTAT) and includes bankrupt businesses across the whole country on which controls and verifications have been performed, while the search for the financial data of the financial statements was carried out by ICAP GROUP S.A.

The data and features of the final sample of the bankrupt companies are as follows:

- The number of companies in the sample amounted to 339 and refers to companies that went bankrupt in the period 2003-2016, whose published financial data refer to the period 2003-2014. The year in which a firm is declared bankrupt does not coincide with the year of publication of the latest financial statements due to the time required to complete the bankruptcy process.
- All the companies in the sample have the legal form of the public limited company.
- Bankruptcy is a result of the formal bankruptcy process.
- All the companies in the sample followed the same accounting principles, and their published financial statements were prepared based on the principles of the Greek General Accounting Plan.
- The companies are active in the four main sectors of economic activity of the Greek economy.
- In the absence of certain financial data, due to non-publication of financial statements, for some years before bankruptcy, the latest available data were used.

Table 1. Availability of data of bankrupt companies per year before bankruptcy

Year before bankruptcy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
-1					51	64	73	61	44	32	9	5	**339**
-2			1	9	62	67	53	42	30	8	2		**274**
-3		1	8	58	70	53	39	30	9	3			**271**
-4	1	7	56	64	51	38	31	8	3				**259**
-5	7	52	59	51	33	32	7	4					**245**
-6	44	55	48	35	29	8	5						**224**
-7	50	49	33	27	8	5							**172**
-8	39	29	26	7	5								**106**
-9	26	26	6	5									**63**
-10	23	6	5										**34**
-11	5	5											**10**
-12	5												**5**
Total	**200**	**230**	**242**	**256**	**309**	**267**	**208**	**145**	**86**	**43**	**11**	**5**	**2,002**

Also, a random sample of 339 active, non-bankrupt companies was created, which were matched to the bankrupt ones, based on year, sector and sub-sector. As Zmijewski (1984) states, non-random selection of sample enterprises creates bias problems. Then, in order to analyze the behavior of the individual sectors of the Greek economy, the companies were classified into the following sectors of economic activity by creating corresponding samples (see Figure 1): Manufacturing industry (101 companies), Wholesale trade (111 companies), Retail trade(58 companies), Services sector (69 companies).

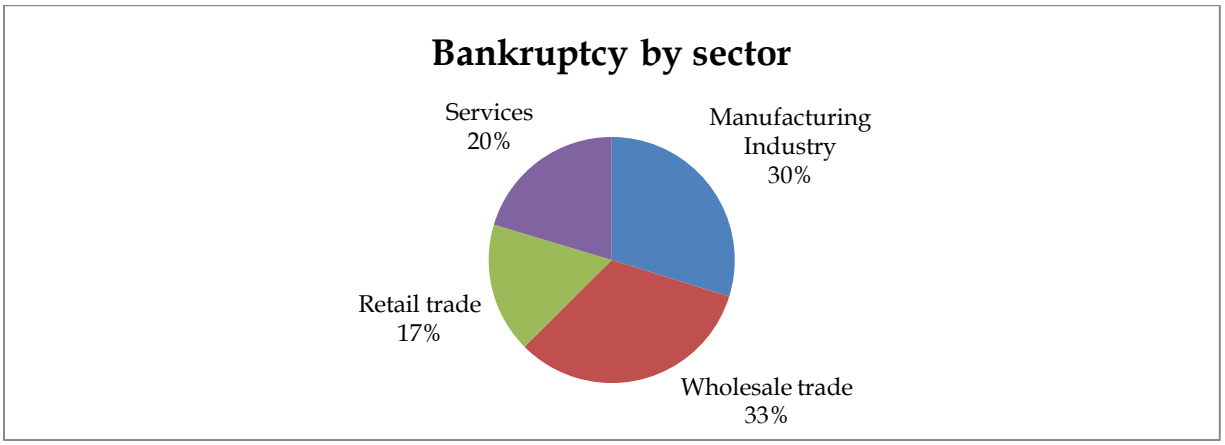

Figure 1. Bankruptcy by sector

4. METHODOLOGY
Econometric analysis

4.1 Selection of financial indices (independent variables)

The criteria with which the financial indicators were initially selected are:

- Their capacity and their interpretative power, which has been acknowledged in earlier investigations in other countries as well (Kung Chen and Thomas Shimerda, 1981).
- Their frequency and popularity, with which they appear in the international literature (Edward Altman, 1968).
- Covering all operational features of the company (Liquidity, Activity, Capital Efficiency, Capital Structure) (Dambolena and Khoury, 1980).

The following financial indicators cover a wide range of information and highlight the qualitative features of the individual samples.

X1 : Sales to Total Assets
X2 : EBITDA to Total Assets
X3 : Net Working Capital to Total Assets
X4 : Loan Capital to Total Funds
X5 : Current Assets to Current Liabilities
X6 : Gross Profit Margin
X7 : Equity to Loan Capital
X8 : Net Profit Margin
X9 : Return on Capital Employed
X10 : Return on Equity
X11 : Interest Coverage by EBITDA
X12 : Sales to Receivables (Customers)
X13 : Total Reserves to Total Funds
X14 : Operating Cash Flows to Total Assets.

The method of factor analysis [1] was used in order to identify and select the most appropriate financial ratios to be used in the development of business failure prediction models. This is a statistical technique designed to reduce the dimensions of the problem being analyzed. This reduction is achieved by minimizing the initial number of financial indices (independent variables) to a level that allows for better management, provided that the final number of variables retains as much as possible of the information that was given on the problem by the initial number of variables.

Descriptive statistics on the bankrupt and healthy companies in the sample are listed in the tables below.

Table 2. Descriptive statistics of bankrupt companies in the sample

Variable description	Variable	Mean	Std. Dev.	Min	Max
Sales to Total Assets	x1	0.810	0.693	0.002	4.650
EBITDA to Total Assets	x2	-0.016	0.154	-0.837	0.269
Net Working Capital to Total Assets	x3	-0.045	0.528	-3.349	0.854
Loan Capital to Total Funds	x4	0.913	0.508	0.103	4.324
Current Assets to Current Liabilities	x5	1.464	2.655	0.044	26.315
Gross Profit Margin	x6	0.279	0.212	0.009	1.000
Equity to Loan Capital	x7	0.409	1.192	-0.769	8.697
Net Profit Margin	x8	-0.563	2.962	-28.163	0.425
Return on Capital Employed	x9	-0.087	0.205	-1.307	0.193
Return on Equity	x10	-0.056	2.207	-11.978	12.422
Interest Coverage by EBITDA (EBITDA to interest expense ratios)	x11	-3.998	48.116	-346.032	181.359

[1] See, for example, Kim and Mueller, 1978 -- Kim, J. O., & Mueller, C. W. (1978). Introduction to factor analysis: What it is and how to do it. (Sage University Paper Series on Quantitative Applications in the Social Sciences, series no. 07-013). Newbury Park, CA: Sage.

Sales to Receivables (Customers)	x12	4.027	11.322	0.002	93.147
Total Reserves to Total Funds	x13	-0.241	0.773	-5.466	0.354
Operating Cash Flows to Total Assets	x14	0.058	0.184	-0.525	0.712

Table 3. Descriptive statistics of healthy companies in the sample

Variable description	Variable	Mean	Std. Dev.	Min	Max
Sales to Total Assets	x1	1.097	0.934	0.075	5.184
EBITDA to Total Assets	x2	0.082	0.114	-0.227	0.503
Net Working Capital to Total Assets	x3	0.206	0.281	-0.820	0.883
Loan Capital to Total Funds	x4	0.599	0.250	0.023	0.995
Current Assets to Current Liabilities	x5	2.338	4.085	0.214	33.183
Gross Profit Margin	x6	0.340	0.201	0.042	1.000
Equity to Loan Capital	x7	1.815	5.127	0.005	42.065
Net Profit Margin	x8	-0.006	0.272	-2.108	0.436
Return on Capital Employed	x9	0.027	0.127	-0.588	0.415
Return on Equity	x10	-0.002	0.851	-5.077	2.446
Interest Coverage by EBITDA (EBITDA to interest expense ratios)	x11	69.172	305.765	-557.419	2139.559
Sales to Receivables (Customers)	x12	8.408	18.929	0.186	123.286
Total Reserves to Total Funds	x13	0.059	0.096	0.000	0.457
Operating Cash Flows to Total Assets	x14	0.067	0.173	-0.387	0.731

4.2 Factor analysis

In technical terms, with factor analysis, we identify the least common factors, let us say $\boldsymbol{q}$ of them, which compose linearly all the initial variables:

$$y_{ij} = z_{i1}b_{1i} + z_{i2}b_{2i} + \cdots + z_{iq}b_{qi} + e_{ij}$$

Where $\boldsymbol{y_{ij}}$: the value of the i^{th} observation of the j^{th} variable,

$\boldsymbol{z_{ik}}$: is the i^{th} observation of the k^{th} common factor,

$\boldsymbol{b_{kj}}$: the linear loadings of the model, and

$\boldsymbol{e_{ij}}$: the error condition of the model or the percentage of the i^{th} observation of the j^{th} variable that cannot be explained by the common factors.

The assessment process is essentially based on the assessment of the common factors and their coefficients, following the steps below:

- Checking for correlations of variables.
- Determining the number of factors and assessing the model.
- Rotation of the model in order to better interpret the factors.
- Statistical verification of the suitability of the model.

For the assessment of the model, the maximum likelihood estimation will be used.

4.2.1. Variable correlations

Table 4. Variable correlations

	x1	x2	x3	x4	x5	x6	x7	x8	x9	x10	x11	x12	x13	x14
x1	1													
x2	-0.12	1												

x3	-0.07	0.05	1										
x4	0.07	-0.06	-0.99	1									
x5	-0.08	0.02	0.12	-0.10	1								
x6	-0.12	-0.03	-0.16	0.15	-0.01	1							
x7	-0.10	0.02	0.12	-0.12	0.76	0.04	1						
x8	0.04	-0.02	0.03	-0.03	0.01	0.11	0.01	1					
x9	-0.08	0.77	0.11	-0.13	0.05	0.01	0.05	0.05	1				
x10	-0.02	-0.12	-0.01	0.01	-0.01	0.08	-0.01	0.00	-0.09	1			
x11	-0.01	0.32	0.02	-0.02	-0.26	0.01	-0.39	0.00	0.19	0.04	1		
x12	0.28	0.02	0.01	0.00	-0.02	-0.03	-0.02	0.01	0.02	-0.04	-0.02	1	
x13	-0.05	0.15	0.95	-0.96	0.00	-0.15	-0.02	0.02	0.24	-0.03	0.09	0.01	1
x14	0.21	-0.08	0.09	-0.09	-0.04	-0.05	-0.04	0.01	-0.03	0.01	-0.02	-0.02	0.09	1

We observe:

a. A relatively large positive correlation between the variables, *EBITDA to Total Assets* (x2) and *Return on Capital Employed*(x9).
b. A largenegative correlation between the variables, *Net Working Capital to Total Assets* (x3) and *Loan Capital to Total Funds*(x4).
c. A largepositive correlation between the variables, *Net Working Capital to Total Assets*and *Total Reserves to Total Funds*(x13).
d. A largenegative correlation between the variables, *Loan Capital to Total Funds* (x4) και*Total Reserves to Total Funds*(x13).
e. A relatively large positive correlation between the variables, *Current Assets to Current Liabilities*(x5) και*Equity to Loan Capital*(x7).

4.2.2.Model assessment

The results of the assessment are presented in the table below. Based on the eigenvalues, the model favors the selection of 4 factors because 4 eigenvalues have a value greater than one.

Table 5. Factor variance - factor weights

Factor	Eigenvalues	Difference	Proportion	Cumulative
Factor1	2.95753	1.20902	0.3378	0.3378
Factor2	1.74850	0.59367	0.1997	0.5375
Factor3	1.15483	-0.45817	0.1319	0.6694
Factor4	1.61301	1.14793	0.1842	0.8536
Factor5	0.46508	0.30723	0.0531	0.9067
Factor6	0.15785	-0.12666	0.0180	0.9248
Factor7	0.28451	0.09416	0.0325	0.9573
Factor8	0.19035	0.00654	0.0217	0.9790
Factor9	0.18380	.	0.0210	1

Table 6. Factor variance - factor weights

Variable	Factor1	Factor2	Factor3	Factor4	Factor5	Factor6	Factor7	Factor8	Factor9	Uniqueness
x1	-0.116	-0.210	0.968	0.069	0.003	0.000	0.000	0.000	0.000	-0.116
x2	0.198	0.042	-0.162	0.966	-0.001	0.000	0.000	0.000	0.000	0.198

x3	0.944	0.094	0.074	-0.129	0.050	0.262	-0.002	0.007	0.005	0.944
x4	-0.953	-0.075	-0.071	0.123	-0.078	-0.213	-0.010	0.010	0.012	-0.953
x5	0.024	0.990	0.132	-0.003	-0.045	0.000	0.000	0.000	0.000	0.024
x6	-0.146	0.019	-0.140	-0.024	0.057	-0.066	0.351	-0.003	0.091	-0.146
x7	0.006	0.789	0.067	-0.001	0.611	0.000	0.000	0.000	0.000	0.006
x8	0.018	0.002	0.049	-0.013	0.004	0.011	0.313	0.140	0.03	0.018
x9	0.273	0.060	-0.089	0.723	0.016	-0.189	0.142	0.136	-0.056	0.273
x10	-0.029	-0.005	-0.019	-0.120	-0.005	0.016	0.155	-0.187	0.014	-0.029
x11	0.096	-0.270	-0.078	0.312	-0.278	0.052	0.120	-0.309	0.091	0.096
x12	-0.004	-0.054	0.273	0.065	0.002	0.011	-0.037	0.132	0.172	-0.004
x13	0.397	-0.033	0.060	-0.034	0.001	0.000	0.000	0.000	0.000	0.397
x14	0.069	-0.074	0.211	-0.057	0.009	0.029	0.060	-0.064	-0.365	0.069

The graphical representation of the eigenvalues is shown in the figure below.

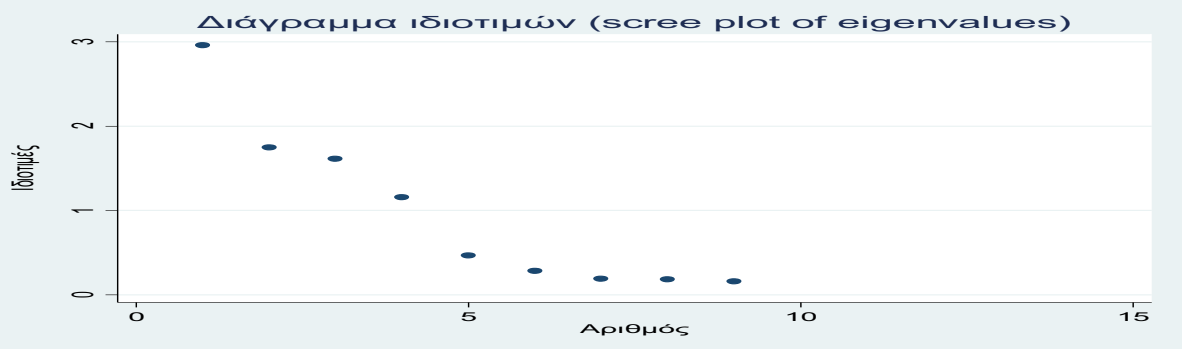

Figure 2. Eigenvalue chart

4.2.3 Model Rotation

For the best possible interpretation of the factors, a rotation of the model was applied. In particular, the varimax method was used, according to which the number of variables, which is very heavy for each factor, is minimized. After the model rotation, the results are presented in the table below:

Table 7. Factor variance - factor weights after rotation

Factor	Variance	Difference	Proportion	Cumulative
Factor1	2.970	1.076	0.339	0.339
Factor2	1.893	0.154	0.216	0.555
Factor3	1.739	0.598	0.199	0.754
Factor4	1.141	0.868	0.130	0.884
Factor5	0.273	0.028	0.031	0.916
Factor6	0.245	0.001	0.028	0.944
Factor7	0.244	0.056	0.028	0.972
Factor8	0.188	0.127	0.022	0.993

Table 8. Factor variance - factor weights after rotation

Variable	Factor1	Factor2	Factor3	Factor4	Factor5	Factor6	Factor7	Factor8	Factor9	Uniqueness
x1	-0.042	-0.054	-0.063	0.996	-0.006	-0.002	0.002	0.013	0.000	-0.042
x2	0.043	0.005	0.992	-0.058	-0.060	0.062	-0.012	-0.024	-0.058	0.043
x3	0.988	0.078	0.003	-0.021	-0.010	0.008	0.006	-0.001	-0.098	0.988
x4	-0.989	-0.068	-0.014	0.021	0.001	-0.008	0.026	-0.020	0.047	-0.989

x5	0.047	0.944	0.014	-0.030	-0.017	0.061	0.317	-0.008	0.001	0.047
x6	-0.157	0.020	-0.012	-0.128	0.355	0.083	-0.064	-0.021	0.037	-0.157
x7	0.045	0.928	0.016	-0.046	0.022	-0.097	-0.352	0.003	-0.005	0.045
x8	0.027	0.007	0.006	0.048	0.338	-0.047	0.032	0.005	-0.034	0.027
x9	0.126	0.035	0.791	-0.023	0.126	-0.089	0.030	0.033	0.133	0.126
x10	-0.009	-0.004	-0.125	-0.031	0.109	0.204	-0.040	0.057	0.021	-0.009
x11	0.039	-0.345	0.300	-0.007	0.015	0.403	0.101	-0.012	-0.008	0.039
x12	0.012	-0.013	0.032	0.286	0.017	-0.084	0.020	-0.195	-0.031	0.012
x13	0.378	-0.058	0.122	-0.008	-0.004	-0.017	0.024	-0.003	0.157	0.378
x14	0.095	-0.039	-0.061	0.202	-0.009	-0.017	-0.003	0.380	-0.001	0.095

4.2.4 Variable selection

The conclusions after the assessment are that four factors interpret (after rotation) more than 88% of the variance of the model. Reaching this conclusion is obvious, taking into account eigenvalues or fluctuations after rotation (see the above tables and the related chart). Additionally, the following table of selection criteria (AIC, BIC) reinforces this view.

Table 9. Factor selection criteria

factors	Loglik	df_m	df_r	AIC	BIC
1	-597.02	14	77	1222.04	1276.97
2	-307.65	27	64	669.31	775.26
3	-138.56	39	52	355.12	508.17
4	-92.03	50	41	284.06	480.28
5	-46.10	60	31	212.20	447.65
6	-19.00	69	22	176.01	446.78
7	-11.01	77	14	176.03	478.19
8	-3.34	84	7	174.68	504.32
9	-0.78	90	1	181.56	534.74

The selection of the most important variables for the analysis can primarily result from the above table, where the highest weighted variables are identified per most important factor. Apicture can also be given by the Kaiser-Meyer-Olkin (KMO) criterion in the following table. For KMO criteria above 0.5, the sample and variables are considered appropriate.

Table 10. Kaiser-Meyer-Olkin Criterion (KMO)

Kaiser-Meyer-Olkin(KMO) measure of sampling adequacy			
Variable	KMO	Variable	KMO
x1	0.626	x8	0.610
x2	0.713	x9	0.735
x3	0.739	x10	0.596
x4	0.683	x11	0.684
x5	0.618	x12	0.480
x6	0.515	x13	0.839
x7	0.512	x14	0.340
		Overall	0.678

Finally, taking into account the correlations between the initial variables and the results of the factor analysis, the variables to be used in the model are as follows:

Table 11. Variables to be used in the model

Variable description	Variables
Sales to Total Assets	x1
EBITDA to Total Assets	x2
Loan Capital to Total Funds	x4
Current Assets to Current Liabilities	x5
Interest Coverage by EBITDA	x11

In other words, the variables with the greatest weight in each factor were chosen, taking also into account the correlations between them and avoiding the simultaneous use of highly correlated variables, in order to minimize any problems of multicollinearity.

4.2.5 Econometric analysis

The Logit and Probit models are widely used for the form of analysis in this study. As mentioned above, their difference is in the hypothesis made concerning the form of the distribution. The logistic distribution is similar to normal, with only differences in heavy tails[2]. Therefore, for intermediate estimated values (**x'b**), for example in the range -1,2 and 1,2, the models give similar probabilities (Green, 2002). Different results in models can be observed when there are very few observations about the dependent variable or when there is a large fluctuation in the values of significant explanatory variables and, especially, when both apply(Green, 2002). Therefore, in the present study, since the sample is large in most estimates, no differences are expected between the models.

The model selected in order to investigate the prediction of failure and bankruptcy of Greek companies is the model of normal distribution (Probit).

Probit models use the standard normal cumulative distribution function to predict the probability that the dependent variable will take value 1:

$$\boldsymbol{Pr(y_i = 1|x_i) = \int_{-\infty}^{x'b} f(x)d(x) = \Phi(x'b)}$$

with $f(z)$ thestandard normal probability density function:

$$\boldsymbol{f(z) = (2\pi)^{-1/2}e^{-(z^2/2)}}$$

Therefore, according to the above, the model to be used will be in the form:

$$\boldsymbol{Pr(y = 1) = \Phi(c + b_1x1 + b_2x2 + \cdots + b_kxk)}$$

5. RESULTS

Detailed tables of results and company classification can be found in the appendix at the end of this paper. However, in this section the results are presented through comparative tables as follows.

5.1 Comparative tables

One year before bankruptcy

Table 12. Estimates of the coefficients of the Probit model

Variables	Manufacturing sector		Wholesale sector		Retail sector		Services sector	
	Coef.	p > Z	Coef.	p > Z	Coef.	p > Z	Coef.	p > Z
χ1	-0.604	0.012	-0.076	0.288	-0.545	0.021	-0.40455	0.017
χ2	-3.534	0.018	-3.135	0.002	-7.140	0.008	-1.05822	0.234
χ4	3.327	0.000	2.616	0.000	3.850	0.000	2.160966	0.000
χ5	0.036	0.190	0.049	0.064	-0.105	0.195	-0.15225	0.246
χ11	-0.001	0.512	-0.001	0.276	-0.009	0.171	0.000179	0.705
Cons	-1.827	0.000	-1.759	0.000	-2.149	0.007	-1.00154	0.087

[2] According to Green (2003) it is more like to resembles a t-distribution with 7 degrees of freedom.

Two years before bankruptcy

Table 13. Estimates of the coefficients of the Probit model

Variables	Manufacturing sector		Wholesale sector		Retail sector		Services sector	
	Coef.	p > Z	Coef.	p > Z	Coef.	p > Z	Coef.	p > Z
χ1	-0.325	0.166	-0.0192	0.8110	0.0131	0.9390	-0.031022	0.862
χ2	-1.967	0.280	-4.3556	0.0010	-7.3504	0.0010	-1.122032	0.262
χ4	2.798	0.000	2.2109	0.0000	3.1678	0.0010	2.015190	0.003
χ5	0.072	0.446	0.0379	0.2060	-0.0356	0.8530	-0.282369	0.277
χ11	-0.010	0.316	-0.0003	0.8640	0.0006	0.3150	-0.001611	0.314
Cons	-1.560	0.005	-1.4310	0.0010	-2.1959	0.0120	-0.909404	0.172

Three years before bankruptcy

Table 14. Estimates of the coefficients of the Probit model

Variables	Manufacturing sector		Wholesale sector		Retail sector		Services sector	
	Coef.	p > Z	Coef.	p > Z	Coef.	p > Z	Coef.	p > Z
χ1	0.171667	0.455	-0.0875857	0.310	0.1316329	0.378	0.0270708	0.861
χ2	-6.46724	0.000	-2.7134110	0.011	-3.7817130	0.047	-2.752004	0.038
χ4	2.383378	0.000	2.9102760	0.000	2.0870100	0.037	2.704942	0.000
χ5	0.05265	0.235	0.0440249	0.139	0.0210751	0.956	-0.138254	0.205
χ11	-0.00043	0.572	-0.0003467	0.417	0.0013221	0.303	-0.000424	0.558
Cons	-1.46485	0.005	-1.8886700	0.000	-1.7722450	0.112	-1.480488	0.016

Four years before bankruptcy

Table 15. Estimates of the coefficients of the Probit model

Variables	Manufacturing sector		Wholesale sector		Retail sector		Services sector	
	Coef.	p > Z	Coef.	p > Z	Coef.	p > Z	Coef.	p > Z
χ1	0.700137	0.018	-0.0738529	0.353	0.2168703	0.108	-0.022478	0.837
χ2	-4.84049	0.008	-0.7272684	0.584	-2.6516810	0.069	-0.967590	0.393
χ4	2.261233	0.002	1.4431500	0.016	2.8783030	0.005	1.531131	0.044
χ5	0.121206	0.406	0.0557438	0.270	0.1605971	0.396	0.0580878	0.768
χ11	-0.00609	0.261	-0.0158125	0.105	0.0000581	0.747	-0.000504	0.389
Cons	-1.84138	0.004	-0.8992389	0.082	-2.5981240	0.009	-0.997750	0.179

As shown in Tables 12, 13, 14 and 15, the financial variable of the debt burden, "X4 Loan Capital to Total Funds" is statistically significant for all sectors and years before bankruptcy.

The financial variables "X1 Sales to Total Assets" and "X2 EBITDA to Total Assets" are statistically significant in some cases, while the financial variables "X5 Current Assets to Current Liabilities" and "X11 Interest Coverage

by EBITDA" are by no means statistically significant.

Table 16. Total predictive capacity of the Probit model by sector

	MANUFACTURING SECTOR	WHOLESALE SECTOR	RETAIL SECTOR	SERVICES SECTOR
1 YEAR BEFORE BANKRUPTCY	74,26%	73,87%	79,31%	72,46%
2 YEARS BEFORE BANKRUPTCY	76,58%	66,85%	78,72%	71,19%
3 YEARS BEFORE BANKRUPTCY	74,40%	68,97%	64,13%	71,30%
4 YEARS BEFORE BANKRUPTCY	65,24%	61,90%	68,18%	63,27%

As can be seen in Table 16, the total predictability of the Probit model by sector and year before bankruptcy ranges from 61.90% to 79.31%.

Table 17. Predictive Capacity of the Probit Model, of bankrupt companies

	MANUFACTURING SECTOR	WHOLESALE SECTOR	RETAIL SECTOR	SERVICES SECTOR
1 YEAR BEFORE BANKRUPTCY	75,25%	79,28%	75,86%	78,26%
2 YEARS BEFORE BANKRUPTCY	79,75%	74,16%	78,72%	77,97%
3 YEARS BEFORE BANKRUPTCY	77,38%	74,71%	58,70%	75,93%
4 YEARS BEFORE BANKRUPTCY	67,07%	75,00%	70,45%	71,43%

The above table shows that in the manufacturing and retail trade sectors, the difference in the 1st and 2nd year classification rates is increasing in the second year before bankruptcy. Normally, as the bankruptcy approaches, the classification rates of bankrupt companies are rising.

This leads us to the conclusion that an attempt was made by a number of companies to exercise creative accounting in order to improve their financial data and to embellish the data of the financial statements.

The upward trend in inventories (Table 18), as the firms that are bankruptcy candidates approach the collapse, reinforces the conclusion of the falsification of the financial statements through intervention in the end-of-year inventory.

This intervention in the inventory entails the improvement of the results and the ratio of the general liquidity through the enhancement of the current assets and the general embellishment of the financial statements.

Table 18. Average Inventories of Companies in Bankruptcy Regime

YEAR BEFORE BANKRUPTCY	AVERAGE INVENTORIES OF COMPANIES IN BANKRUPTCY REGIME(€)	CHANGE (%)
-1	2.107.681	9,28
-2	1.928783	2,57
-3	1.880.406	6,73

-4	1.761.768	1,27
-5	1.739.657	

The attempt to alter the results in the last year before bankruptcy in the industrial and retail sectors can even better be shown by the profitability in the last year before bankruptcy in the following table (19).

Table 19. Evolution of Results (Profit/Loss) from 5 years to 1 year before bankruptcy

YEAR BEFORE BANKRUPTCY	PROFIT BEFORE TAX (Average)	EBITDA (Average)
-1	23.177	348.497
-2	-217.715	127.454
-3	-40.711	297.899
-4	3.656	386.191
-5	51.035	266.683

In a total of 159 companies in the manufacturing industry and retail trade sectors, 34 companies or 21.38% presented profits. More specifically, in the manufacturing industry sector, in a total of 101 companies in the sample, 20 companies (19,80%) show profits in the last year before bankruptcy, while respectively in the retail trade, in a total of 58 companies in the sector, 14 companies reported profits (24.13%).

The above are also consistent with the international literature. As Argenti(1976), Sweeney (1994), Charitou et al(2007), and Lara et al (2009) report, when an enterprise is close to bankruptcy, the management increasingly intervenes by applying profit management practices in order to alter the results and embellish the financial statements.

5. CONCLUSIONS

There is significant explanatory capacity of the Probit model in the 4 key sectors of the Greek economy, which varies:

For the first year before bankruptcy between 72.46% and 79.31%.

For the second year before bankruptcy between 66.85% and 78.72%.

For the third year before bankruptcy between 64,13% and 74,40%.

For the fourth year before bankruptcy between 61.90% and 68.18%.

- There is a clear differentiation in the classification of companies among the sectors of the Greek economy, which is explained by the specific features of each sector and the degree of homogeneity of the samples of the bankrupt and healthy (non-bankrupt) companies. This differentiation is also referred to in Standard and Poor's surveys, which have highlighted significant differences between the same financial indicators of enterprises belonging to different sectors.
- The predictive capacity of the Probit model is superior in the retail sector, which in the 1st and 2nd year before bankruptcy reached 79.31% and 78.72%, respectively.
- Tendencies towards creative accounting by a number of companies are observed in their last year of operation, before bankruptcy, in the industrial and retail trade sectors, in order to embellish the financial statements. Exercising creative accounting in the above sectors is characterized by greater ease, and is achieved in the industrial sector by altering the inventory (stocks of many and different species), while in the retail sector it is achieved not only through the falsification of the inventory but also by creating fictitious sales.
- The financial variable of the debt burden, "X4 Loan Capital to Total Funds", presents the greatest stability and contributes substantially to the interpretative power of the Probit model. It is presented with a positive sign and is statistically significant in all sectors and in all years before bankruptcy, which means that an increase in the value of this variable increases the probability of bankruptcy.
- The financial variable "X2 EBITDA to Total Assets" is statistically significant in the majority of cases, while it is presented with a negative sign in all sectors and in all years before bankruptcy, which means that a decrease in its value increases the probability of bankruptcy.
- The financial variable "X1 Sales to Total Assets" is statistically significant in 4 cases, while in the majority of cases it is presented with a negative sign, which means that a decrease in the value of the variable increases the probability of bankruptcy.
- In none of the cases is the financial variable "X5 Current Assets to Current Liabilities" statistically significant. However, the current ratio is not in itself representative of liquidity. There are many cases of companies which, while being on the verge of bankruptcy, have index values higher than 2, as well as cases of companies in which a relatively low index (depending on the industry in which the business operates) can be

considered satisfactory. Therefore, adverse effects on a case-by-case basis reduce the overall effect on the model.

- In none of the cases is the financial variable "X11 Interest Coverage by EBITDA" statistically significant and this is due to the mixed effects that take place and reduce the overall impact on the model. Companies with the ability to cover interest from the operating result are less likely to fail. However, an increase in this indicator may indicate an increase in investment activity, i.e. the implementation of investment projects partly based on bank lending; a process which entails an increase in interest rates and a decline in the index, without the firm being considered to have failed (rather the opposite).

REFERENCES

Agarwal, V., and Tafler, R., 2008, "Comparing the performance of market – based and accounting-based bankruptcy prediction models", *Journal of Banking and Finance*, 32, 8, pp. 1541-1551.

Altman, E., 1968, "Financial Ratios, Discriminant Analysis and the Prediction of Corporate Bankruptcy", *The Journal of Finance*, 23, 4, pp. 589-609.

Altman, E., M. Margaine, M. Schlosser and P. Vernimmen, 1974, "Statistical credit analysis in the textile industry: A French experience", *Journal of Financial and Quantitative Analysis*, 9, pp. 195-211.

Altman, E., Haldeman R., and Narayanan P., 1977, "Zeta Analysis: A new model to identify bankruptcy risk of corporations", *Journal of Banking and Finance*,1, pp. 29-54.

Altman, E., Hartzell J., and Peck, M.,1995, "A scoring system for emerging market corporate bonds", *Salomon Brothers High Yield Research.*

Argenti, J., 1976, "Corporate planning and corporate collapse", *Long Range Planning*, 9, 6, pp. 12-17.

Argenti, J., 1976, "*Corporate collapse: the causes and symptoms*", *McGraw – Hill, New York.*

Aziz, A., D. Emanuel, and G. Lawson, 1988, "Bankruptcy prediction – An investigation of cash flow based models", *Journal of Management Studies*, 25, 5, pp.419-437.

Aziz, A., and Humayon, Dar, 2006, "Predicting corporate bankruptcy: Where we stand?", *Corporate Governance*, 6, 1, pp. 18-33.

Balcaen, S., and H. Ooghe, 2006, "35 years of studies on business failure: an overview of classic statistical methodologies and their related problems», *The British Accounting Review*, 38, 1, pp. 63-93.

Beaver, W., 1966, "Financial Ratios as Predictors of Failure", *Journal of Accounting Research*, 4 , pp. 71-111.

Blum, M., 1974, "Failing company discriminant analysis", *Journal of Accounting Research*, 12, 1, pp.1-25.

Brooks, C., 2008, *Introductory Econometrics for Finance*, 2d Ed, Cambridge University Press, New York.

Charalambakis, E. C., & Garrett, I., 2016, "On the prediction of financial distress in developed and emerging markets: Does the choice of accounting and market information matter? A comparison of UK and indian firms", *Review of Quantitative Finance and Accounting*, 47,1, pp. 1-28.

Charitou, A., Neophytou, E., and Charalambous, C., 2004, "Predicting corporate failure: empirical evidence for the U.K" , *European Accounting Review*, 13, 3, pp. 465-497.

Charitou, A., Lambertides, N., and Trigeorgis, L., 2007, "Managerial discretion in distressed firms", *The British Accounting Review*, 39, 4, pp. 323-346.

Chava, S., and Jarrow, R. A., 2004, "Bankruptcy Prediction with Industry Effects", *Review of Finance*, Vol. 8, No. 4, pp. 537-569.

Chen, K., and Shimerda, T., 1981, "An Empirical Analysis of Useful Financial Ratios", *Financial Management*, 10, 1, pp.51-60.

Dambolena, I., and S. Khoury, 1980, "Ratio stability and corporate failure", *The Journal of Finance*, 35, 4, 1017-1026.

Deakin, E. B., 1972, "A Discriminant Analysis of Predictors of Business Failure", Journal of Accounting Research, 10, 1, pp. 167-179.

Diamond, J., 1976, "*Pattern Recognition and the Detection of Corporate Failure*", Ph.D Thesis, New York University.

Dimitras, A., Slowinski, R., Susmaga, R. and Zopounidis, C., 1999, "Business failure prediction using rough sets", *European Journal of Operational Research*, 114, pp. 263-280.

Duller, C., 2010, "Differences in Management accounting between family enterprises and non-family enterprises: A Statistical Approach", International Journal of Business and Economic Sciences Applied Research, 3, 1, pp. 89-95.

Edmister, R., 1972, "An empirical test of financial ratio analysis for small business failure prediction" , *The Journal of Financial and Quantitative Analysis*, 7, 2, pp. 1477-1493.

Frydman, H., Altman, E., Kao, D., 1985. "Introducing Recursive Partitioning for Financial Classification: The Case of Financial Distress", *The Journal of Finance*, 40, 1, pp. 269-291.

Gemara, G., Monicheb, L., & Moralesc, A. J., 2016, "Survival analysis of the spanish hotel industry", *Tourism Management*, *54*, pp. 428-438.

Ginoglou, D., 1994, "*Examining Greek Problematic Firms and Predicting their Failure*", Ph.D Thesis, University of Macedonia, Thessaloniki.

Gloubos, G., and Grammatikos, T., 1988, "The Success of Bankruptcy Prediction Models in Greece", *Studies in Banking and Finance*, 7, pp. 37 – 46.

Gombola, M., and Ketz, J., 1983, "A Note on Cash Flow and Classification Patterns of Financial Ratios", *The Accounting Review*, Vol. LVIII, No 1 pp. 105-114.

Gombola, M., and M., Haskins, J., Ketz, D., Williams, 1987, "Cash Flow in Bankruptcy Prediction", *Financial Management*, Vol. 16, pp. 55-65.

Grablowsky, B. J. and Talley, W. K. , 1981, "Probit and discriminant factors for classifying credit applicants: A comparison", *Journal of Economics and Business*, 33, 3, pp. 254-261.

Hanweck, G., 1977, "Predicting bank failure. Research Papers in Banking and Financial Economics, Financial Studies Section, Board of Governors of the Federal Reserve System, Washington D.C.

Johnsen, T., and Melicher, R., 1994, "Predicting corporate bankruptcy and financial distress: Information value added by multinomial logit models", *Journal of Economics and Business*, 46, pp. 269-286.

Kahya, E., and Theodossiou, P., 1999, "Predicting Corporate Financial Distress: A Time-Series CUSUM Methodology", *Review of Quantitative Finance and Accounting*, 13, 4, pp. 323-345.

Keasey, K., and McGuinness, P., 1990, "The Failure of UK Industrial Firms for the Period 1976 – 1984, Logistic Analysis and Entropy Measures", *Journal of Business Finance and Accounting*, 17, 1, pp. 119-135.

Kim, J. O., and Mueller, C. W., 1978a, "*Introduction to factor analysis: What it is and how to do it*", ,Sage University Paper Series on Quantitative Applications in the Social Sciences, series no. 07-013. Newbury Park, CA: Sage.

Kim, J. O., and Mueller, C. W., 1978b, "*Factor analysis: Statistical methods and practical issues*", Sage University Paper Series on Quantitative Applications in the Social Sciences, series no. 07-014. Newbury Park, CA: Sage.

Kung, C., and Th., Shimerda, 1981, "An Empirical Analysis of Useful Financial

Ratios", *Financial Management*, 10, 1, pp. 51-60.

Lara, J. M. Garcia, B. G. Osma, and E. Neophytou, 2009, "Earnings quality in ex-post failed firms", *Accounting and Business Research*, 39, 2, pp. 119-138.

Lin, H., 2009, "A cross model study of corporate financial distress prediction in Taiwan: Multiple discriminant analysis, logit, probit, and neural networks models", *Neurocomputing*, 72, pp. 3507-3516.

Luoma, M., and E. K. Laitinen, 1991, "Survival Analysis as a Tool for Company Failure Prediction", *Omega International Journal of Management Science*, 19, 6, pp. 673-678.

Martin, D., 1977, "Early warning of bank failure: A logit regression approach", *Journal of Banking and Finance*, 1, pp. 249-276.

McGurr, P., 1996, "*Failure prediction of retail firms through use of financial ratios*" *Ph.D.* Thesis, *Purde University.*

McGurr, P., and DeVaney, S., 1998, "Predicting Business Failure of Retail Firms: An Analysis Using Mixed Industry Models", *Journal of Business Research*, 43, 3, pp. 169-176.

Meyer, P. A., and Pifer, H. W., 1970, "Prediction of bank failure", *Journal of Finance*, 25, pp. 853-868.

Micha, B., 1984, "Analysis of Business failures in France", *Journal of Banking and Finance*, 8, pp. 281-291.

Michalopoulos, M., C. Zopounidis, and I., Kouris, 1993, "An integrated DSS for assessment of the risk of failure", *Applied Stochastic Models and Data Analysis, World Scientific Publishing Co Pte , Ltd*, New Jersey, pp. 606-625.

Ohlson, J., 1980, "Financial Ratios and the Probabilistic Prediction of Bankruptcy", *Journal of Accounting Research*,18, 1, pp. 109-131.

Papoulias, C. and P. Theodossiou, 1992, "Analysis and Modeling of Recent Business Failures in Greece", *Managerial and Decision Economics*, 13, 2, pp. 163-169.

Parsa, H. G., Self, J., Sydnor-Busso, S., & Hae, J. Y., 2011, "Why restaurants fail? part II - the impact of affiliation, location, and size on restaurant failures: Results from a survival analysis", *Journal of Foodservice Business Research, 14, 4, pp. 360 - 379.*

Peel, M. J. and Peel, D. A., 1988, "A multilogit approach to predicting corporate failure – some evidence for the U.K corporate sector", *Omega*, 16, 4, pp. 309-318.

Pinkwart A., Proksch D., Schefczyk M., Fiegler T., Ernst C., 2015, "Reasons for the Failure of New Technology-Based Firms: A Longitudinal Empirical Study for Germany", Credit and Capital Markets, 48, 4, pp. 597 – 627.

Platt, H., and Platt, M., 1990, "Development of a class of stable predictive variable: the case of bankruptcy prediction", *Journal of Business Finance and Accounting*, 17, 1, pp. 31-51.

Skogsvik, K., 1990, "Current cost accounting ratios as predictors of business failure: The Swedish case", *Journal of Business Finance and Accounting*, 17, 1, pp. 137-160.

Soo, Y. K., 2018, "Predicting hospitality financial distress with ensemble models: The case of US hotels, restaurants, and amusement and recreation", *Service Business, 12,3*, pp. 483-503.

Spanos, M., Dounias G., Matsatsinis N, Zopounidis C., 1999, "A fuzzy Knowledge-based decision aiding method for the assessment of financial risks: the case of corporate bankruptcy prediction", *Proceedings of ESIT'99*, Greece.

Standard and Poor's Corporation, 1982, "Credit overview: Corporate and international ratings", New York, pp. 30-33.

Stock, J. H. and Watson, M. W., 2006, *Introduction to Econometrics* 2d Ed, Addison Wesley Upper Saddle River, NJ.

Stokes, D. and Blackburn, R., 2002, "Learning the hard way: the lessons of owner-managers who have closed their business", *Journal of Small Business and Enterprise Development*, 9, 1, pp. 17-27.

Sweeney, A., 1994, "Debt covenant violations and managers' responses", *Journal of Accounting and Economics*, 17, 3, pp. 281-308.

Taffler, R. and Tisshaw, H., 1977, "Going, Going, Gone – Four Factors Which Predict", *Accountancy*, 88, pp. 50-54.

Taffler, R., 1982, "Forecasting company failure in the U.K using discriminant analysis and financial ratio data", *Journal of the Royal Statistical Society*, 145, 3, pp. 342 - 358.

Theodossiou, P., 1991, "Alternative Models for Assessing the Financial Condition of Business in Greece", *Journal of Business and Finance*,18, 5, pp. 697 - 720.

Theodossiou, P., 1993, "Predicting Shifts in the Mean of a Multivariate Time Series Process: An Application in Predicting Business Failures", *Journal of the American Statistical Association*, 88, 422, pp. 441-449.

Wu, Y., Gaunt, C. and Gray, S., 2010, "A comparison of alternative bankruptcy prediction models", *Journal of Contemporary Accounting and Economics*, 6, 1, pp. 34 - 45.

Zavgren, C., 1985, "Assessing the Vulnerability to Failure of America Industrial Firms. A Logistic Analysis", *Journal of Business Finance and Accounting*, 12, 1, pp. 19-45.

Zmijewski, M., 1984, "Methodological issues related to the estimation of financial distress prediction models", *Journal of Accounting Research*, 22, pp.59-86.

ANNEX

A1. Manufacturing sector (One year before bankruptcy)

bankr	Coef.	Std. Err	z	p >z	[95% Conf.	Interval]
x1	-0.604	0.241	-2.510	0.012	-1.076	-0.131
x2	-3.534	1.491	-2.370	0.018	-6.455	-0.612
x4	3.327	0.582	5.720	0.000	2.186	4.468
x5	0.036	0.028	1.310	0.190	-0.018	0.090
x11	-0.001	0.001	-0.660	0.512	-0.004	0.002
cons	-1.827	0.440	-4.150	0.000	-2.690	-0.965

1	Classified	D	-D	Total
2	+	76	27	103
3	–	25	74	99
4	Total	101	101	202
5	Sensitivity	Pr(+ D)	75.25%	
6	Specificity	Pr(-~D)	73.27%	
7	Positive predictive value	Pr(D +)	73.79%	
8	Negative predictive value	Pr(~D -)	74.75%	
9	False + rate for true ~D	Pr(+~D)	26.73%	
10	False - rate for true D	Pr(- D)	24.75%	
11	False + rate for classified +	Pr(~D +)	26.21%	
12	False - rate for classified -	Pr(D -)	25.25%	
13	Correctly classified	74,26%		

As planned in this paper, the variable bankr=1 represents the bankrupt companies, while the variable bankr=0 represents the "healthy" (sound) ones.
With this data, the table of results is interpreted as follows:

1. symbol"**D**": bankrupt companies
2. symbol"**~D**": "helathy" companies
3. symbol"**+**":classification as bankrupt
4. symbol"**-**":classification of "healthy"
5. Sensitivity : the percentage of correct classification of bankrupt companies
6. Specificity : the percentage of correct classification of healthy companies
7. Positive predictive value : the percentage of the actually bankrupt companies in the total of those that were classified as bankrupt (in the example 76/103=73,79%)
8. Negative predictive value: the percentage of actually "healthy" companies in the total of those that were classified as "healthy" (in the example 74/99=74,75%)
9. *TypeII* error
10. *TypeI* error
11. the error of the percentage in "*Positive predictive value"*
12. the error of the percentage in "*Negativepredictive value"*
13. the total predictive capacity of the model.

A2. Manufacturing sector (Two years before bankruptcy)

bankr	Coef.	Std. Err	z	p >z	[95% Conf.	Interval]
x1	-0.325	0.235	-1.390	0.166	-0.786	0.135
x2	-1.967	1.819	-1.080	0.280	-5.533	1.599
x4	2.798	0.664	4.210	0.000	1.496	4.099
x5	0.072	0.094	0.760	0.446	-0.113	0.256
x11	-0.010	0.010	-1.000	0.316	-0.030	0.010
cons	-1.560	0.551	-2.830	0.005	-2.640	-0.480

1	Classified	D	-D	Total
2	+	63	21	84
3	–	16	58	74
4	Total	79	79	158
5	Sensitivity	Pr(+ D)	79.75%	
6	Specificity	Pr(-~D)	73.42%	
7	Positive predictive value	Pr(D +)	75.00%	
8	Negative predictive value	Pr(~D -)	78.38%	
9	False + rate for true ~D	Pr(+~D)	26.58%	
10	False - rate for true D	Pr(- D)	20.25%	
11	False + rate for classified +	Pr(~D +)	25.00%	
12	False - rate for classified -	Pr(D -)	21.62%	
13	Correctly classified	76,58%		

A3. Manufacturing sector (Three years before bankruptcy)

bankr	Coef.	Std. Err	z	p >z	[95% Conf.	Interval]
x1	0.172	0.230	0.750	0.455	-0.279	0.622
x2	-6.467	1.657	-3.900	0.000	-9.715	-3.220
x4	2.383	0.642	3.710	0.000	1.125	3.641
x5	0.053	0.044	1.190	0.235	-0.034	0.140
x11	0.000	0.001	-0.570	0.572	-0.002	0.001
cons	-1.465	0.519	-2.820	0.005	-2.482	-0.448

1	Classified	D	-D	Total
2	+	65	24	89
3	–	19	60	79
4	Total	84	84	168
5	Sensitivity	Pr(+ D)	77.38%	
6	Specificity	Pr(-~D)	71.43%	
7	Positive predictive value	Pr(D +)	73.03%	
8	Negative predictive value	Pr(~D -)	75.95%	
9	False + rate for true ~D	Pr(+~D)	28.57%	
10	False - rate for true D	Pr(- D)	22.62%	
11	False + rateforclassified +	Pr(~D +)	26.97%	
12	False - rateforclassified -	Pr(D -)	24.05%	
13	Correctlyclassified	74,40%		

A4. Manufacturing sector (Four years before bankruptcy)

bankr	Coef.	Std. Err	z	p >z	[95% Conf.	Interval]
x1	0.700	0.297	2.360	0.018	0.118	1.282
x2	-4.840	1.838	-2.630	0.008	-8.444	-1.237
x4	2.261	0.729	3.100	0.002	0.832	3.690
x5	0.121	0.146	0.830	0.406	-0.165	0.407
x11	-0.006	0.005	-1.120	0.261	-0.017	0.005
cons	-1.841	0.645	-2.850	0.004	-3.106	-0.577

1	Classified	D	-D	Total
2	+	55	30	85
3	–	27	52	79
4	Total	82	82	164
5	Sensitivity	Pr(+ D)	67.07%	
6	Specificity	Pr(-~D)	63.41%	
7	Positivepredictivevalue	Pr(D +)	64.71%	
8	Negativepredictivevalue	Pr(~D -)	65.82%	
9	False + rate for true ~D	Pr(+~D)	36.59%	
10	False - rate for true D	Pr(- D)	32.93%	
11	False + rateforclassified +	Pr(~D +)	35.29%	
12	False - rateforclassified -	Pr(D -)	34.18%	
13	Correctlyclassified	65,24%		

A5. Wholesale sector(One year before bankruptcy)

bankr	Coef.	Std. Err	z	p >z	[95% Conf.	Interval]
x1	-0.076	0.072	-1.060	0.288	-0.216	0.064
x2	-3.135	1.023	-3.060	0.002	-5.141	-1.129
x4	2.616	0.499	5.240	0.000	1.638	3.593
x5	0.049	0.027	1.850	0.064	-0.003	0.101
x11	-0.001	0.001	-1.090	0.276	-0.002	0.001
cons	-1.759	0.407	-4.330	0.000	-2.556	-0.962

1	Classified	D	-D	Total
2	+	88	35	123
3	–	23	76	99
4	Total	111	111	222
5	Sensitivity	Pr(+ D)	79.28%	
6	Specificity	Pr(-~D)	68.47%	
7	Positive predictive value	Pr(D +)	71.54%	
8	Negative predictive value	Pr(~D -)	76.77%	
9	False + rate for true ~D	Pr(+~D)	31.53%	
10	False - rate for true D	Pr(- D)	20.72%	
11	False + rate for classified +	Pr(~D +)	28.46%	
12	False – rate for classified -	Pr(D -)	23.23%	
13	Correctly classified	73,87%		

A6. Wholesale sector (Two years before bankruptcy)

bankr	Coef.	Std. Err	z	p >z	[95% Conf.	Interval]
x1	-0.0192	0.0802	-0.2400	0.8110	-0.1763	0.1379
x2	-4.3556	1.3707	-3.1800	0.0010	-7.0421	-1.6691
x4	2.2109	0.5379	4.1100	0.0000	1.1565	3.2652
x5	0.0379	0.0300	1.2600	0.2060	-0.0209	0.0967
x11	-0.0003	0.0017	-0.1700	0.8640	-0.0036	0.0030
cons	-1.4310	0.4306	-3.3200	0.0010	-2.2749	-0.5871

1	Classified	D	-D	Total
2	+	66	36	102
3	–	23	53	76
4	Total	89	89	178
5	Sensitivity	Pr(+ D)	74.16%	
6	Specificity	Pr(-~D)	59.55%	
7	Positive predictive value	Pr(D +)	64.71%	
8	Negative predictive value	Pr(~D -)	69.74%	
9	False + rate for true ~D	Pr(+~D)	40.45%	
10	False - rate for true D	Pr(- D)	25.84%	
11	False + rate for classified +	Pr(~D +)	35.29%	
12	False – rate for classified -	Pr(D -)	30.26%	
13	Correctly classified	66,85%		

A7. Wholesale sector (Three years before bankruptcy)

bankr	Coef.	Std. Err	z	p >z	[95% Conf.	Interval]
x1	-0.088	0.086	-1.020	0.310	-0.257	0.081
x2	-2.713	1.068	-2.540	0.011	-4.807	-0.619
x4	2.910	0.615	4.740	0.000	1.706	4.115
x5	0.044	0.030	1.480	0.139	-0.014	0.102
x11	0.000	0.000	-0.810	0.417	-0.001	0.000
cons	-1.889	0.483	-3.910	0.000	-2.835	-0.943

1	Classified	D	-D	Total
2	+	65	32	97
3	–	22	55	77
4	Total	87	87	174
5	Sensitivity	Pr(+ D)	74.71%	
6	Specificity	Pr(-~D)	63.22%	
7	Positive predictive value	Pr(D +)	67.01%	
8	Negative predictive value	Pr(~D -)	71.43%	
9	False + rate for true ~D	Pr(+~D)	36.78%	
10	False - rate for true D	Pr(- D)	25.29%	
11	False + rate for classified +	Pr(~D +)	32.99%	
12	False – rate for classified -	Pr(D -)	28.57%	
13	Correctly classified	68,97%		

A8. **Wholesale sector** (Four years before bankruptcy)

bankr	Coef.	Std. Err	z	p >z	[95% Conf.	Interval]
x1	-0.074	0.080	-0.930	0.353	-0.230	0.082
x2	-0.727	1.330	-0.550	0.584	-3.333	1.879
x4	1.443	0.601	2.400	0.016	0.265	2.621
x5	0.056	0.051	1.100	0.270	-0.043	0.155
x11	-0.016	0.010	-1.620	0.105	-0.035	0.003
cons	-0.899	0.516	-1.740	0.082	-1.911	0.113

1	Classified	D	-D	Total

2	+	63	43	106
3	–	21	41	62
4	Total	84	84	168
5	Sensitivity	Pr(+ D)	75.00%	
6	Specificity	Pr(-~D)	48.81%	
7	Positive predictive value	Pr(D +)	59.43%	
8	Negative predictive value	Pr(~D -)	66.13%	
9	False + rate for true ~D	Pr(+~D)	75.00%	
10	False - rate for true D	Pr(- D)	48.81%	
11	False + rate for classified +	Pr(~D +)	59.43%	
12	False – rate for classified -	Pr(D -)	66.13%	
13	Correctly classified	61,90%		

A9. Retail sector (One year before bankruptcy)

bankr	Coef.	Std. Err	z	p >z	[95% Conf.	Interval]
x1	-0.545	0.236	-2.310	0.021	-1.007	-0.083
x2	-7.140	2.713	-2.630	0.008	-12.457	-1.823
x4	3.850	1.049	3.670	0.000	1.793	5.907
x5	-0.105	0.081	-1.290	0.195	-0.265	0.054
x11	-0.009	0.006	-1.370	0.171	-0.021	0.004
cons	-2.149	0.796	-2.700	0.007	-3.709	-0.589

1	Classified	D	-D	Total
2	+	44	10	54
3	–	14	48	62
4	Total	58	58	116
5	Sensitivity	Pr(+ D)	75.86%	
6	Specificity	Pr(-~D)	82.76%	
7	Positive predictive value	Pr(D +)	81.48%	
8	Negative predictive value	Pr(~D -)	77.42%	
9	False + rate for true ~D	Pr(+~D)	17.24%	
10	False - rate for true D	Pr(- D)	24.14%	
11	False + rate for classified +	Pr(~D +)	18.52%	
12	False – rate for classified -	Pr(D -)	22.58%	
13	Correctly classified	79,31%		

A10. Retail sector (Two years before bankruptcy)

bankr	Coef.	Std. Err	z	p >z	[95% Conf.	Interval]
x1	0.013	0.171	0.080	0.939	-0.321	0.347
x2	-7.350	2.184	-3.370	0.001	-11.631	-3.070
x4	3.168	0.958	3.310	0.001	1.289	5.046
x5	-0.036	0.192	-0.190	0.853	-0.412	0.340
x11	0.001	0.001	1.010	0.315	-0.001	0.002
cons	-2.196	0.875	-2.510	0.012	-3.911	-0.481

1	Classified	D	-D	Total
2	+	37	10	47

3	–	10	37	47
4	Total	47	47	94
5	Sensitivity	Pr(+ D)	78.72%	
6	Specificity	Pr(-~D)	78.72%	
7	Positivepredictivevalue	Pr(D +)	78.72%	
8	Negativepredictivevalue	Pr(~D -)	78.72%	
9	False + rate for true ~D	Pr(+~D)	21.28%	
10	False - rate for true D	Pr(- D)	21.28%	
11	False + rateforclassified +	Pr(~D +)	21.28%	
12	False - rateforclassified -	Pr(D -)	21.28%	
13	Correctlyclassified	78,72%		

A11. Retail sector (Three years before bankruptcy)

bankr	Coef.	Std. Err	z	p >z	[95% Conf.	Interval]
x1	0.132	0.149	0.880	0.378	-0.161	0.424
x2	-3.782	1.903	-1.990	0.047	-7.512	-0.052
x4	2.087	0.999	2.090	0.037	0.128	4.046
x5	0.021	0.385	0.050	0.956	-0.734	0.776
x11	0.001	0.001	1.030	0.303	-0.001	0.004
cons	-1.772	1.114	-1.590	0.112	-3.955	0.410

1	Classified	D	-D	Total
2	+	27	14	41
3	–	19	32	51
4	Total	46	46	92
5	Sensitivity	Pr(+ D)	58.70%	
6	Specificity	Pr(-~D)	69.57%	
7	Positivepredictivevalue	Pr(D +)	65.85%	
8	Negativepredictivevalue	Pr(~D -)	62.75%	
9	False + rate for true ~D	Pr(+~D)	30.43%	
10	False - rate for true D	Pr(- D)	41.30%	
11	False + rateforclassified +	Pr(~D +)	34.15%	
12	False - rateforclassified -	Pr(D -)	37.25%	
13	Correctlyclassified	64,13%		

A12. Retail sector (Four years before bankruptcy)

bankr	Coef.	Std. Err	z	p >z	[95% Conf.	Interval]
x1	0.217	0.135	1.610	0.108	-0.047	0.481
x2	-2.652	1.459	-1.820	0.069	-5.511	0.208
x4	2.878	1.021	2.820	0.005	0.877	4.880
x5	0.161	0.189	0.850	0.396	-0.210	0.531
x11	0.000	0.000	0.320	0.747	0.000	0.000
cons	-2.598	0.998	-2.600	0.009	-4.554	-0.642

1	Classified	D	-D	Total
2	+	31	15	46
3	–	13	29	42
4	Total	44	44	88

5	Sensitivity	Pr(+ D)	70.45%	
6	Specificity	Pr(-~D)	65.91%	
7	Positivepredictivevalue	Pr(D +)	67.39%	
8	Negativepredictivevalue	Pr(~D -)	69.05%	
9	False + rate for true ~D	Pr(+~D)	34.09%	
10	False - rate for true D	Pr(- D)	29.55%	
11	False + rateforclassified +	Pr(~D +)	32.61%	
12	False - rateforclassified -	Pr(D -)	30.95%	
13	Correctlyclassified	68,18%		

A13. Services sector(One year before bankruptcy)

bankr	Coef.	Std. Err	z	p >z	[95% Conf.	Interval]
x1	-0.405	0.170	-2.380	0.017	-0.737	-0.072
x2	-1.058	0.888	-1.190	0.234	-2.799	0.683
x4	2.161	0.613	3.530	0.000	0.960	3.362
x5	-0.152	0.131	-1.160	0.246	-0.410	0.105
x11	0.000	0.000	0.380	0.705	-0.001	0.001
cons	-1.002	0.586	-1.710	0.087	-2.149	0.146

1	Classified	D	-D	Total
2	+	54	23	77
3	–	15	46	61
4	Total	69	69	138
5	Sensitivity	Pr(+ D)	78.26%	
6	Specificity	Pr(-~D)	66.67%	
7	Positive predictive value	Pr(D +)	70.13%	
8	Negative predictive value	Pr(~D -)	75.41%	
9	False + rate for true ~D	Pr(+~D)	33.33%	
10	False - rate for true D	Pr(- D)	21.74%	
11	False + rate for classified +	Pr(~D +)	29.87%	
12	False - rate for classified -	Pr(D -)	24.59%	
13	Correctly classified	72,46%		

A14. Services sector (Two years before bankruptcy)

bankr	Coef.	Std. Err	z	p >z	[95% Conf.	Interval]
x1	-0.031	0.179	-0.170	0.862	-0.382	0.320
x2	-1.122	1.001	-1.120	0.262	-3.085	0.841
x4	2.015	0.682	2.960	0.003	0.679	3.352
x5	-0.282	0.260	-1.090	0.277	-0.791	0.227
x11	-0.002	0.002	-1.010	0.314	-0.005	0.002
cons	-0.909	0.666	-1.370	0.172	-2.214	0.395

1	Classified	D	-D	Total
2	+	46	21	67
3	–	13	38	51
4	Total	59	59	118
5	Sensitivity	Pr(+ D)	77.97%	
6	Specificity	Pr(-~D)	64.41%	

7	Positive predictive value	Pr(D +)	68.66%	
8	Negative predictive value	Pr(~D -)	74.51%	
9	False + rate for true ~D	Pr(+~D)	35.59%	
10	False - rate for true D	Pr(- D)	22.03%	
11	False + rate for classified +	Pr(~D +)	31.34%	
12	False - rate for classified -	Pr(D -)	25.49%	
13	Correctly classified	71,19%		

A15. Services sector (Three years before bankruptcy)

bankr	Coef.	Std. Err	z	p >z	[95% Conf.	Interval]
x1	0.027	0.155	0.170	0.861	-0.277	0.331
x2	-2.752	1.325	-2.080	0.038	-5.349	-0.155
x4	2.705	0.677	4.000	0.000	1.378	4.032
x5	-0.138	0.109	-1.270	0.205	-0.352	0.075
x11	0.000	0.001	-0.590	0.558	-0.002	0.001
cons	-1.480	0.612	-2.420	0.016	-2.679	-0.282

1	Classified	D	-D	Total
2	+	41	18	59
3	-	13	36	49
4	Total	54	54	108
5	Sensitivity	Pr(+ D)	75.93%	
6	Specificity	Pr(-~D)	66.67%	
7	Positive predictive value	Pr(D +)	69.49%	
8	Negative predictive value	Pr(~D -)	73.47%	
9	False + rate for true ~D	Pr(+~D)	33.33%	
10	False - rate for true D	Pr(- D)	24.07%	
11	False + rate for classified +	Pr(~D +)	30.51%	
12	False - rate for classified -	Pr(D -)	26.53%	
13	Correctly classified	71,30%		

A16. Services sector (Four years before bankruptcy)

bankr	Coef.	Std. Err	z	p >z	[95% Conf.	Interval]
x1	-0.022	0.109	-0.210	0.837	-0.237	0.192
x2	-0.968	1.133	-0.850	0.393	-3.188	1.253
x4	1.531	0.760	2.020	0.044	0.042	3.020
x5	0.058	0.197	0.290	0.768	-0.328	0.445
x11	-0.001	0.001	-0.860	0.389	-0.002	0.001
cons	-0.998	0.742	-1.340	0.179	-2.452	0.457

1	Classified	D	-D	Total
2	+	35	22	57
3	-	14	27	41
4	Total	49	49	98
5	Sensitivity	Pr(+ D)	71.43%	
6	Specificity	Pr(-~D)	55.10%	
7	Positive predictive value	Pr(D +)	61.40%	

8	Negative predictive value	Pr(~D -)	65.85%	
9	False + rate for true ~D	Pr(+~D)	44.90%	
10	False - rate for true D	Pr(- D)	28.57%	
11	False + rate for classified +	Pr(~D +)	38.60%	
12	False - rate for classified -	Pr(D -)	34.15%	
13	Correctly classified	63,27%		

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Trade Openness and Economic Growth in the GCC Countries: A Panel Data Analysis Approach

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ABSTRACT

Purpose
The purpose of this study is to re-examine the relationship between trade openness and economic growth in the Gulf Cooperation Council countries (GCC), with emphasis on both the role of exports and imports in economic growth in a multivariate framework including gross fixed capital formation, energy consumption, import, and export as the regressors.

Design/methodology/approach
The study covers the period from 1992 to 2014 and utilizes five models of the panel data regression: pooled ordinary least squares, one-way and two-way of fixed effects models as well as one-way and two-way of random effects models. In addition, the study employs the root mean square error statistics in selecting the most representative model.

Findings:
The study found that partially, export had a significant positive effect on economic growth, while import had a significant but negative impact on economic growth. These results provide evidence that GCC countries during the period of study were largely dependent on exports, in which carbohydrate exports account for the bulk of their business trading activities. Moreover, the findings reveal that investment and energy, as conventional input factors had a significant and positive impact on the GCC's economies.

Research limitations/implications:
According to our finding, export is the most important contributor to economic growth. In addition, in order to ensure the stability of economic growth of these countries, more effective and efficient import policies must be pursued.

Originality/value
The novelty of this study is the uses of panel data covering more than two decades, and employs different models that allow testing of many hypotheses.

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1. Introduction

Economic theories that are related to economic growth are abundant. It can be dated back to Adam Smith in his notable book "The Wealth of Nations", then followed by the evolvement of the classical economic theory that was pioneered by economists such as Ricardo, Malthus and Mill. Later on, Carl Marx explained the historical development of growth while the Austrian economist Joseph Schumpeter introduced the theory of technological innovation. On the other hand, Harrod and Domar developed the classical Keynesian model of economic growth, implying that capital formation is an important factor of economic growth because it generates income and increases production capacity. Similarly, the neo-classic theory was expanded by economists such as Tobin, Swan, Solow, Meade, etc. According to this theory, economic growth can be achieved with the help of variables such as stock of capital, supply of labor and technological development. On the other hand, the endogenous economic growth theory was advanced by American economists Paul Romer and Robert Lucas. They stressed on the endogenous nature of technological innovations that are based on investment in human capital and technological development.

Accordingly, extensive empirical studies related to previous different economic grow theories were accomplished such as in Solow (1956), Feder (1983), Lucas (1988), Barro (1991, 2003), Mankiw, et al., (1992), Kim and Lau (1994), De Mello (1997, 1999), Al-Yousef (2000), Obwona (2001), Tuwaijri (2001), Bengoa and Sanchez-Robles (2003), Choe (2003), Al-Jarrah (2005), Bahraumahah and Thannon (2006), Al-Iriani and Al-Shamsi (2007) Bloom and Finlay (2009), Aghion and Howitt (2009), Cavalcanti, et al., (2011), Mahran (2012), Alkhathlan (2013), Alhowaish (2014), Kim (2014),

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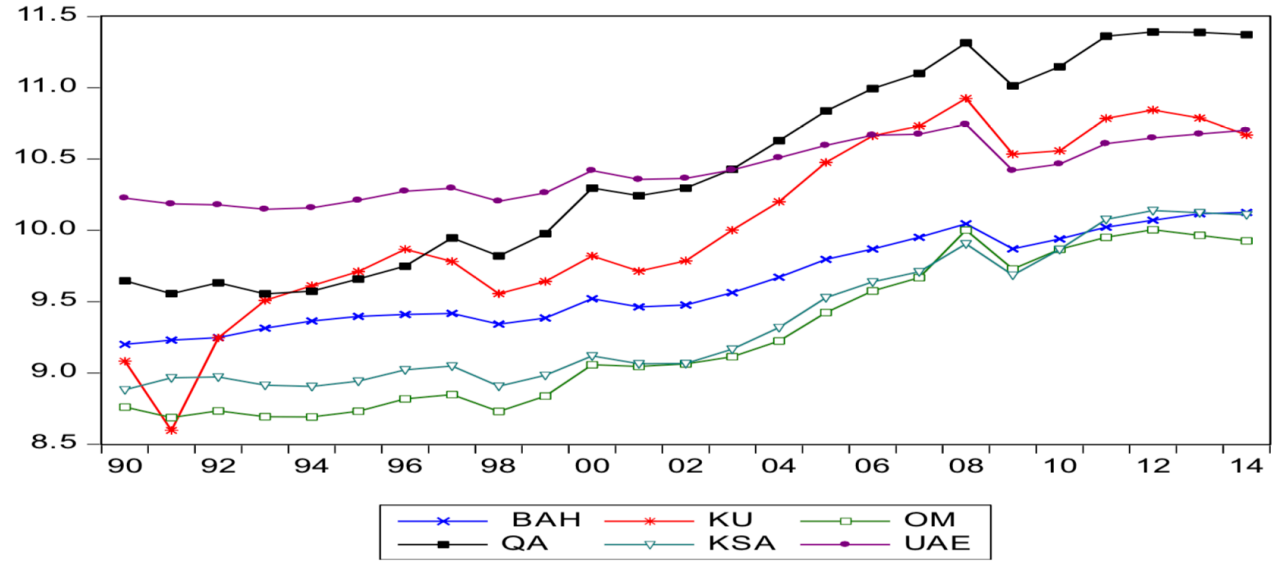
Alodadi and Benhin (2015), Altaee and Al-Jafari (2015), Altaee et al., (2016), Howarth et al., (2017), Bekhet et al., (2017), Echchabi et al., (2018) and others. However, this study selected GCC countries for several positive key characteristics. This is to include: i- a high per capita income as in Figure 1; ii-abundance wealth of energy resources reserves of mainly oil and gas; iii- young population that can enrich the labor market; and iv- excellent places for investment opportunities in different industrial sectors, especially in the financial, real estate, and technology sectors. Therefore, the purpose of this study is to examine the relationship between trade openness and economic growth in the GCC countries utilizing a panel data analysis approach. This paper is unrivaled to previous empirical studies in several ways. Studies on the determinants of economic growth in the GCC countries are scarce.

Figure 1. Trend of real per capita income of GCC.



Therefore, this study will add to the previous literature and enrich the knowledge and benefits of policymakers of those countries. In addition, the study employed five models that have not been utilized in previous studies to test the significance of the relationship between the dependent variable and the independent variables, and then used the root mean square error statistics to choose the most suitable model. Moreover, the tested data were more recent and updated.

This study is organized into five sections: Section 2 sheds some lights on the previous literature related to this subject. On the other hand, data and econometric models are presented in section 3. Section 4 discusses and analyzes the findings and the results of the study, while the concluding remarks and recommendations are presented in section 5.

2. Literature Review

There is a wealth of research on the relationship between trade openness and economic growth in most countries worldwide. However, there is a lack of research related to economic growth in the GCC countries. GCC countries are emerging market economies with affluent economic wealth that comes from gas and oil production that can exert a significant influence on the global economy. Therefore, in this section we introduce previous studies that discussed economic growth determinants in the GCC countries.

Starting with a more recent study by Echchabi et al, (2018), where they examined the impact of Sukuk financing on economic growth in the GCC countries. Their results show that Sukuk financing had no impact on economic growth of the GCC countries. On the other hand, Howarth et al, (2017), investigated the relationship between energy consumption at a sectoral level and the gross domestic product in the GCC countries. Their findings show that energy consumption and economic growth were significantly related at all sectors. They stressed the need for improvement in energy efficiency in GCC countries. Similarly, Bekhet et al., (2017) used the ARDL model to test the relationship between carbon emission, financial development, economic growth and energy consumption for the GCC countries. Their results confirm a long-run causal relationship among carbon emissions, financial development, GDP and energy use in all GCC countries except for the UAE. The study emphasized the need for curbing carbon emissions and preserving economic growth in GCC countries. In addition, Osman et al, (2016), used a panel data analysis approach to explore the relationship between electricity consumption and economic growth in the GCC countries. The findings reveal an existing long-run equilibrium relationship between electricity consumption and economic growth. The study concluded that adopting electricity conservation policies could result in a negative impact on economic growth. Furthermore, Edrees (2016) utilized the ARDL approach to explore the impact of foreign workers and outflow remittances on economic growth in selected GCC countries. He concluded that foreign workers contribute positively to economic growth. On the other hand, outflow remittances found to have a significant and negative impact on economic growth.

From another perspective, Jouini (2015) examined the relationship between economic growth and international trade openness for the GCC countries. The results reveal

evidence of cointegration and that economic growth were positively linked to trade openness in both the short-run and the long-run.

On the other hand, Abdalla & Abdelbaki (2014) utilized the vector error correction model (VECM) to investigate the determinants of economic growth in the GCC countries. The findings show that foreign direct investment and gross capital formation are important determinants of economic growth in Bahrain. Further, exports and gross capital formation were found to be important determinants of economic growth for Kuwait, Qatar and Saudi Arabia. As for the UAE, both exports and foreign direct investment were found to be significant determinants of economic growth. In contrast, the study found no evidence of short-run or long-run unidirectional or bidirectional causality relationship for Oman. Additionally, Grassa & Gazdar (2014) investigated the effects of Islamic financial development and conventional financial development on economic growth in five GCC countries (Bahrain, Kuwait, Qatar, Saudi Arabia & UAE). They utilized the OLS model and panel data analysis technique. The results indicate a strong and significant relationship between Islamic finance and economic growth in all five GCC countries. On the other hand, conventional financial development was found to have no significant impact on economic growth.

Furthermore, Al Awad (2010) tested the role of manufacturing on economic growth in GCC countries. He found that in the long-run, manufacturing is strongly related to non-oil economic growth. In contrast, short-run link between manufacturing and non-oil economic growth were found to be insignificant. On the other hand, Hussein (2009) studied the impact of foreign direct investment (FDI) on economic growth in the GCC countries. His results revealed a weak relationship between FDI and gross domestic product.

3. Data and Econometric Methods

3.1 Data

The data sample consists of the six GCC member states: Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates. The data sample covers the period from 1992 to 2014. Table 1 summarizes all variables used in this study as well as their sources.

Table 1: Variables definitions and sources

Variable	Indicator Name	Source
GDPPC	Gross Domestic Product per capita (constant 2010 US $)	National Accounts Main Aggregate Database, https://unstats.un.org/unsd/nationalaccount/ama.asp ma.asp
LEN	Energy use (kg of oil equivalent per capita)	World Bank indicators http://www.worldbank.org/
GFCF	Gross fixed capital formation constant 2010 US $)	National Accounts Main Aggregate Database, https://unstats.un.org/unsd/nationalaccount/ama.asp
EXP	Export volume (constant 2010 US $)	National Accounts Main Aggregate Database https://unstats.un.org/unsd/nationalaccount/ama.asp
IMP	Import volume (constant 2010 US $)	National Accounts Main Aggregate Database https://unstats.un.org/unsd/nationalaccount/ama.asp

3.2 Methodology

A longitudinal, or panel data set can capture variations along cross section units (country, region, state, individual, etc.) and time. This is important to the study for the following reasons: (1) unobservable and time-invariant effects may exist for each country. (e.g., political and economic policies, trade policies, values, spending pattern on higher education, and economic freedom); and (2) time may have potential effect in some variables (Hsiao, 2007). In addition, including the variation in both time series and cross section data into fixed or random effects models would provide a rich and powerful study of a group of countries, if one is willing to consider both the region and the time dimension of the data.

Therefore, this study uses the gross domestic product per capita (GDPPC) as a measure of economic growth to be the dependent variable, and four explanatory independent variables. Furthermore, there are panel data sets for the dependent and the independent variables.

Given the panel data nature, the most general specification of the model that we consider is the following:

$$y_{it} = a_{it} + x'_{it}\beta_{it} + u_{it} \qquad (1)$$
$$i = 1,\ldots\ldots\ldots,N \quad t = 1,\ldots\ldots\ldots,T$$

The index i refers to individuals (countries), the unit of observation, t refers to the time period. Where y is the gross domestic product per capita representing economic growth, x is representing the explanatory variables. Is the constant is the error term for country i in the period t, satisfies all the standard assumptions. are the estimated coefficients of all independent variables.

However, this study employed five different versions of panel data static regressions as described below:

a. Pooled OLS

This model does differentiate between period and cross section and it is mostly not applicable for analysis. However, it is often suitable to apply redundant fixed

effect tests and based on the results, decide whether we have to use fixed-effect or pooled model.
The pooled model can be written as:

$$y_i = \beta_0 + \beta_1 x'_i + \varepsilon_{it} \qquad i = 1,\ldots\ldots,6 \quad t = 1,\ldots\ldots,25 \qquad (2)$$

Model (2) does not make optimal use of the assumed structure in the error term. Thus, it is not considered to be a practical model. (Wooldridge, 2006).

b. One-way fixed effects model

Although we expect that GCC countries have too many similarities among themselves, but still there are some differences, at least in their country sizes, geographical locations, political and economic policies, etc. Individuality among the studied countries could result in bias of the estimated parameters. Accordingly, it seems reasonable to account for the individuality among the GCC countries. One set of panel data models account for the individuality across countries, but confines that individuality to the intercept term of the relationship.
The one-way fixed effects model is the

$$y_{it} = \left(a + \mu_{it}\right) + x'_{it}\beta + \nu_{it} \qquad (3)$$

The individual effects μ_i assumed as unobserved constants (parameters), is the written as: fixed-effects (FE) regression model, encapsulating all variables that affect the dependent variable cross-sectionally but do not vary over time. (ν_{it}) fulfills the usual conditions on errors: independent, E (v) = 0, var (v) = σ_v^2

c. One-way random effects model

An alternative to the fixed effects model is the random effects model. Unlike with the one- way fixed effects specification, the one-way random effects propose different terms for each country and again these intercepts are invariant over time, with the relationships between the regressor and the predicted variables assumed to be the same, both cross-sectionally and over time. Moreover, this approach assumes that the individuality comes in the form of an error component model (as part of individual disturbance terms).

The basic one-way random effects model is written as:

$$y_i = \alpha + x'_{it}\beta + \left(\mu_i + \nu_{it}\right) \qquad \nu_{it} \sim IID\left(0, \sigma_v^2\right) \qquad (4)$$

μ_i measures the random deviation of each country's intercept from the —common intercept term.

d. Two-way fixed effects model

Another possible panel data model is the two-way fixed effects approach. By using this approach, we extend the analysis to account for the average value of the dependent variable changes over time as well as cross-countries. The final specification of this approach would be:

$$y_{it} = \left(\alpha + \mu_i + \tau_t\right) + x'_{it}\beta + \nu_{it} \qquad (5)$$

where:
ui is time invariant individual fixed-effects. Control for permanent differences between countries.
τ_t is time fixed effects. Impacts common to all groups but vary by year.
vit is I.I.D. component.

e. Two-way random effects model

One variant of model (5) examines how individuals and time effect error variances. This model functional form is:

$$y_{it} = a + x'_{it}\beta + \left(\mu_i + \tau_t + \nu_{it}\right) \qquad (6)$$

As in the two-way fixed effects model, μ_i represents the time invariant individual effects, τ_t stands for the time effects, and vit is idiosyncratic error.

4. Results and Analysis

Before going further and starting our estimation of the proposed models we believe it is necessary to check the properties of our data. For this purpose, we will test the stationarity of our panel and then the cointegration among the variables.

4.1 Panel Unit Root Tests Results

Although there are several kinds of unit root test methods including Breitung, Choi, Hadri, Levin, Lin and Chu (LLC test), Im, Pesaran and Shin (IPS test), and Carrion-i-Silvestre, etc., only two test have been used in this study, to examine for the existence of a unit root in our panel. The Levin, Lin and Chu (2002) (LLC) specification as well as the Im, Pesaran and Shin (IPS) (2003).
These tests are performed on the variables in the levels, and first difference. The null hypothesis of the presence of a unit root is rejected if the two tests confirm that hypothesis simultaneously. Since LLC does not consider a possible heterogeneity bias present in the data, IPS generally would be the favored test.
We can conclude that the results of panel unit root tests stated in Table 2 backing the hypothesis of a unit root in all variables across the six GCC countries, as well as the hypothesis of zero-order integration in first rejection of the null hypothesis of no cointegration at 1% level of significance.

4.2. Panel Cointegration

Given that each variable contains a panel unit root, the set of Pedroni's panel differences. Indeed, six of the tests reveal the cointegration tests were carried out to examine whether there was a long-term relationship among the dependent variable and the independent variables. Pedroni has proposed seven different statistics. Out of these seven statistics, four are based on pooling, what is referred to as the "Within"dimension. The other three tests based on the —Between dimension. Both ype of tests were focused on the absence of integration. In

our case, the majority of tests (Table 3) clearly suggest rejecting the null hypothesis and presence of cointegration.

Table 2: Panel unit root tests

Variable	Level				First difference			
	LLC		***IPS***		***LLC***		***IPS***	
	Intercept	***Intercept and trend***	***Intercept***	***Intercept and trend***	***Intercept***	***Intercept and trend***	***Intercept***	***Intercept and trend***
LGDPPC	-0.47260 0.31830	-1.4625* 0.07180	1.96370 0.97520	-1.09100 0.13760	-11.24*** 0.00000	-10.408*** 0.00000	-10.07*** 0.00000	-8.838*** 0.00000
LGFCF	0.81680 0.79300	-2.10720 0.0176**	1.17640 0.88030	-1.69200 0.04530	-8.459*** 0.00000	-8.304*** 0.00000	-8.70*** 0.00000	-8.820*** 0.00000
LEN	-6.417*** 0.00000	-0.71500 0.23730	-2.606*** 0.00460	-1.3067* 0.09570	-12.36*** 0.00000	-12.485*** 0.00000	-12.57*** 0.00000	-12.627*** 0.00000
LEXP	-1.880** 0.03000	-10.946** 0.01570	-0.39620 0.34600	-7.811*** 0.00030	-10.88*** 0.00000	-10.272*** 0.00000	-10.86*** 0.00000	-10.210*** 0.00000
LIMP	2.38340 0.99140	-2.561*** 0.00510	4.68790 1.00000	-1.3680* 0.08560	-10.53*** 0.00000	-10.091*** 0.00000	-9.571*** 0.00000	-9.1208*** 0.00000

Note: *, **, *** indicates rejection of the null hypothesis of no unit root at 10%, 5%, and 1% levels of significance

Table 3: Panel co-integration test results of the GCC countries

(Dependent variable: Real GDPPC)

Alternative hypothesis: Common AR coefs. (within-dimension)

			Weighted	
	Statistic	*Prob.*	*Statistic*	*Prob.*
Panel v-Statistic	-1.524505	0.9363	-2.572446	0.9950
Panel rho-Statistic	0.995144	0.8402	0.867118	0.8071
Panel PP-Statistic	-3.756719	0.0001***	-2.376793	0.0087***
Panel ADF-Statistic	-3.761791	0.0001***	-2.790198	0.0026***

Alternative hypothesis: Individual AR coefs. (between-dimension)

	Statistic	*Prob.*
Group rho-Statistic	2.246893	0.9877
Group PP-Statistic	-3.843779	0.0001***
Group ADF-Statistic	-4.628695	0.0000***

*Denotes 10% level of significance; ** denotes 5% level of significance; and *denotes 10% significant level.

4.3. Estimation, Model Selection, and Discussion

We now turn to the estimated results of the panel regression models. The starting point is selecting the most fitting model for our panel. However, when a distinction is made between several models, one of the two measures is to be adopted, namely, the mean absolute error (MAE) and the root mean squares error (RMSE). However, recent literature has debated which of these should be preferred. In this research, we use RMSEs based on the results of Brassington (2017), Pesaran & Zhou (2016) and Fernandez-Van &Weidner (2017).

Table 4 shows the RMSEs for the five estimated models. It is clear that two-way fixed model has the lowest

RMSE. Therefore, the two-way fixed effect model has been selected.

Table 4: RMSE Statistics

Model	RMSE
POLS	0.24190
FEM *(one-way)*	0.13692
FEM *(two-way)*	0.10000
REM *(one-way)*	0.24190
REM *(two-way)*	0.13642

In the selected model, we see that 87.7 percent of the variation in real gross domestic product per capita of GCC countries was explained by export, import, gross fixed capital formation. As expected, we find that export has positive and significant impacts on economic growth in the GCC countries. This finding is justified by the fact that hydrocarbon export still plays a significant role in the Gulf economies (Hvidt , 2013). Saudi Arabia, for example, depends on the oil sector for 80 percent of its export revenues and around 85 percent of its budget revenues. The results are in line with the results of Hamdan (2016) for 17 Arab countries and Altaee et al., (2016) for KSA.

Moreover, figures in Table 5 reveal that energy input has the second highest positive effect on economic growth. This finding is similar to those of Odhiambo (2009); Apergis & Payne (2010); Iyke (2015); and Esen & Bayrak, (2017). This implies that energy is an important factor of production; therefore, it stimulates economic growth. An important implication for that is since energy and other inputs are found to be complements (Gibbons, 1984; Apostolakis, 1990; Ebohon, 1996), and since the GCC countries have abundant energy resources, it is considered an advantage in their development.

Table 5: Panel data regression estimates for GCC countries

Variables	*POLS*	*(One-way) FEM*	*(Two-way) FEM*	*(One-way) REM*	*(Two-way) REM*
GFCF	0.1965** 0.0104	0.1781** 0.0308	0.1300** 0.0138	0.1964** 0.0314	0.1464*** 0.0098
LIMP	0.09483 0.1965	0.11748 0.1184	-0.137*** 0.0000	0.09483 0.2353	-0.119*** 0.006
LEN	0.16387* 0.0697	0.12793 0.2161	0.1636*** 0.0000	0.16387 0.1071	0.1743*** 0.0011
LEXP	0.541*** 0.0000	0.5545*** 0.0000	0.344*** 0.0000	0.541*** 0.0000	0.363*** 0.0000
C	0.00406 0.7086	0.00283 0.5379	0.0347*** 0.0000	0.00406 0.7524	0.0316 0.1348
R2	*0.3945*	*0.41045*	*0.8768*	*0.3945*	*0.5398*
Adjusted R^2	*0.3763*	*0.369*	*0.8408*	*0.3763*	*0.526*
S.E.R	*0.1024*	*0.103*	*0.0517*	*0.1023*	*0.0517*
F-stat.	*21.665*	*9.9016*	*24.339*	*21.665*	*39.003*
Prob(F-sta.)	*0.0000*	*0.0000*	*0.0000*	*0.0000*	*0.0000*
S.D.	*0.1296*	*0.1296*	*0.1296*	*0.1296*	*0.075*

Notes: Values beneath the parameters values are the estimated p-values. ***Coefficient significant at the 1% level, ** Coefficient significant at the 5% level, and * Coefficient significant at the 10% level.

The results of the study confirmed a negative relationship between economic growth and imports during the investigated period. The negative coefficient proposes that GCC countries could be adversely affected due to the inflow of imports. Theoretically, imports are an important factor in economic growth. The impact of imports on economic growth is largely related to the composition of imports. When imports of productive goods and advanced technology constitute a large part of imports of a country, a positive and effective contribution to imports can be expected on the economic growth process.

In any event, the rise in per capita income and the high level of consumption lead to allocate a large part of imports to the import of luxury goods, which does not make a positive contribution to the process of economic growth. This result is supported by previous research such as Altaee, et al., (2016) for KSA, and Mushtaq, et al., (2014) for China, Indonesia, Japan, Malaysia, Pakistan, Philippines, Sri Lanka and Thailand.

5. Conclusion and Policy Recommendations

In this study, we have scrutinized the impact of export, import, energy consumption, and capital on economic growth in the GCC countries, by employing annual panel data from 1992 to 2014. To appropriately deal with static panel models, we employed ordinary least squares (POLS), one and two-way fixed effects (FE) and

one and two-way random effects (RE) models. Findings show that export is the main contributor to economic growth of GCC countries, followed by energy usage, then gross fixed capital formation. In contrast, import contribution ended to be negative. Based on estimation results of the study, the following recommendations are found to be important:

First, according to our finding, export is the most important contributor to economic growth. This provides a support for the export-led growth hypothesis in the GCC countries. Thus, significant attention must be directed towards diversifying the GCC economies.

Second, as long as energy usage and gross capital formation input play significant role in economic growth in the GCC countries, Gulf States must encourage an increase in gross capital formation, to increase its contribution to economic growth. At the same time great attention should be given to energy usage especially there is an abundant energy reserve available at cheap prices.

Third, since import plays a negative role in the economic growth process of the GCC countries, thus, they should decrease their imports or at least change their import policies to achieve higher economic growth.

References

Abdalla, M. A. & Abdelbaki, H. H. 2014. Determinants of Economic Growth in GCC Countries. *Asian Journal of Research in Business Economics and Management*, *4*(11), 46-62.

Aghion, P. & Howitt, P. 2009. *The Economics of Growth.* Cambridge, MA: The. MIT Press.

Alhowaish, A. K. 2015. Causality between Construction Sector and Economic Growth:The Case of Saudi Arabia. *International Real Estate Review*, *18*(1), 131-147.

Alkhathlan, K. 2013. The Nexus between Remittance Outflows and Growth: A Study of Saudi Arabia. *Economic Modelling*, 33, 695-700.

Alodadi, A., & Benhin, J. 2015. Religious Tourism and Economic Growth in Oil-Rich Countries: Evidence from Saudi Arabia. *Tourism Analysis*, *20*(6), 645-651.

Altaee, H. H., Al-Jafari, M., K & Masoud, K. 2016. Determinants of Economic Growth in the Kingdom of Saudi Arabia: AnApplication of Autoregressive Distributed Lag Model. Applied Economic and Finance, 3 (1), 83 93. https://doi.org/10.11114/aef.v3i1.1200.

Altaee, H. H. A., & Al-Jafari, M. K. 2015. Financial Development, Trade Openness and Economic Growth: A trilateral Analysis of Bahrain. *International Journal of Economics and Finance*, 7(1), 241–254.

Al Awad, M. 2010. The Role of Manufacturing in Promoting Sustainable Economic Growth in the GCC. Working Paper ZU-WP 2010-003, Institute for Social & Economic Research, Zayed University.

Al-Jarrah, M. A. 2005. Defense Spending and Economic Growth in an Oil-Rich Country: The Case of Saudi Arabia. *Pakistan Economic and Social Review*, *43*(2), 151-166.

Al-Iriani, M. & Al-Shamsi, F. M. 2009. Foreign Direct Investment and Economic Growth in the GCC Countries. A Causality Investigation Using Heterogeneous Panel Analysis. Topics in Middle Eastern and North African Economies, electronic Journal, Volume 9, Middle East Economic Association and Loyola University Chicago.

Al-Yousif, Y. 2000. Do Government Expenditures Inhibit or Promote Economic Growth: Some Empirical Evidence from Saudi Arabia. *The Indian Economic Journal*, *48*(2), 92- 96.

Apergis, N. & Payne, J.E. 2010. Energy Consumption and Growth in South America: Evidence from a Panel Error Correction Model. *Energy Economics*, *32* (6), 1421-1426. http://dx.doi.org/10.1016/j.eneco.2010.04.006.

Apostolakis, B. E. 1990. Energy-Capital Substitutability/Complementarity: The Dichotomy. *Energy Economics*, *12*(1), 48-58. http://dx.doi.org/10.1016/0140-9883(90)90007-3.

Bahraumahah, A. Z., & Thanoon, M. A. 2006. Foreign Capital Flow and economic Growth in East Asian Countries. *China Economic Review* 17, 70-83.

Barro R. J. 2003. Determinants of economic growth in a panel of countries. *Annals of Economics and Finance*, *4*(2), 231-274.

Barro R. J. 1991. Economic growth in a cross section of countries. *The Quarterly Journal of Economics*, *106*(2), 407-443.

Bekhet, H. A., Matar, A., & Yasmin, T. 2017. CO2 Emissions, Energy Consumption, Economic Growth, and Financial Development in GCC countries: Dynamic Simultaneous Equation Models. *Renewable and Sustainable Energy Review*, 70, 117–132.

Bengoa, M. & Sanchez-Robles, B. 2003. Foreign Direct Investment, Economic Freedom and Growth: New Evidence from Latin America. *European Journal of Political Economy*, *19* (3), 529-545.

Bloom, D. E. & Finlay, J. 2009. Demographic Change and Economic Growth in Asia. *Asian Economic Policy Review*, *4*(1), 45-64.

Brassington, G. 2017. Mean Absolute Error and Root Mean Square Error: Which is the Better Metric for Assessing Model Performance? *EGU General Assembly Conference Abstracts*, *19*, 3574.

Cavalcanti, T. V., Mohaddes, K. & Raissi, M. 2011. Growth, Development and Natural Resources: New Evidence Using a Heterogeneous Panel Analysis. *The Quarterly Review of Economics and Finance*, *51*(4), 305-318. https://doi.org/10.1016/j.qref.2011.07.007.

Choe, J. 2003. Do Foreign Direct Investment and Gross Domestic Investment Promote Economic Growth. *Review of Development Economics*, *7(1)*, *44-57. https://doi.org/10.1111/1467-9361.00174.*

De Mello, Jr. L. R. 1997. Foreign Direct Investment in Developing Countries and Growth: A selective Survey. *The Journal of Development Studies*, *34*(1), 1-34. https://doi.org/10.1080/00220389708422501

De Mello, Jr. L.R. 1999. Foreign Direct Investment-Led Growth: Evidence from Time

Series and Panel Data. Oxford Economic Papers, 51(1), 133–151, https://doi.org/10.1093/oep/51.1.133.

Ebohon, O.J. 1996. Energy, Economic Growth and Causality in Developing Countries: A Case Study of Tanzania and Nigeria. *Energy policy*, *24*(5), 447-453, http://dx.doi.org/10.1016/0301-4215(96)00027-4.

Echchabi, A., Abd Aziz, H., & Idriss, U. 2018. The Impact of Sukuk Financing on Economic Growth: The Case of GCC Countries. *International Journal of Financial Services Management*, *9*(1), 60 – 69.

Edrees, A. 2016. The Impact of Foreign Workers, Outflow Remittances on Economic Growth in Selected GCC Countries: ARDL Approach. *Arabian Journal of Business and Management Review*, 6, 250. DOI: 10.4172/2223-5833.1000250.

Esen, Ö. & Bayrak, M. 2017. Does More Energy Consumption Support Economic Growth in Net Energy-Importing Countries?*Journal of Economics, Finance and Administrative Science*, *22* (42), 75-98.

Feder, G. 1983. On Exports and Economic Growth. *Journal of Development Economics*, *12*(1-2), 59-73. https://doi.org/10.1016/0304-3878(83)90031-7.

Fernandez-Van, I. & Weidner, M. 2017. Fixed Effect Estimation of Large T Panel Data Models. CEMMAP Working Paper P. /142CW, Gibbons, J. (1984), Capital-Energy Substitution in the Long Run. *The Energy Journal*, *5* (2), 109-118.

Grassa, R., & Gazdar, K. 2014. The Financial Development and Economic Growth in GCC Countries: A Comparative Study between Islamic and Conventional Finance, *International Journal of Social Economics*, *Vol.* 41, *No. 6, 2014, 493-514.* DOI 10.1108/IJSE-12-2012-0232.

Hamdan, B. S. S. 2016. The Effect of Exports and Imports on Economic Growth in the Arab Countries: A Panel Data Approach. *Journal of Economics Bibliography*, *3*(1), 100-107, http://dx.doi.org/10.1453/jeb.v3i1.600

Hsiao, C., Panel Data Analysis — Advantages and Challenges, Sociedad de Estadística e Investigación Operativa, Test (2007) 16: 1–22. DOI 10.1007/s11749-007-0046-x.

Howarth, N., Galeotti, M., Lanza, A. & Dubey, K. 2017. Economic Development and Energy Consumption in the GCC: An International Sectoral Analysis. *Energy Transitions*, *1*(6). https://doi.org/10.1007/s41825-017-0006-3.

Hvidt, M. 2013. Economic Diversification in GCC Countries: Past Record and Future Trends. LSE, Monograph (Report),http://eprints.lse.ac.uk/id/eprint/55252.

Im, K.S., Pesaran, M. H. & Shin, Y. 2003. Testing for Unit Roots in Heterogeneous Panels. *Journal of Econometrics*, *115*, 53-74. Iyke, B.N. 2015. Electricity Consumption and Economic Growth in Nigeria: A Revisit of the Energy-Growth Debate. *Energy Economics*, *51*, 166-176. http://dx.doi.org/10.1016/j.eneco.2015.05.024

Jouini, J. 2015. Linkage between International Trade and Economic Growth in GCC Countries: Empirical Evidence from PMG Estimation Approach. *The Journal of International Trade and Economic Development*, (3), 341-372.

Kim, Jong-Il & Lau, L. 199). The Sources of Economic Growth in the East Asian Newly Industrialized Countries. *Journal of the Japanese and International Economies*, *8*(3), 235-271.

Kim, P. 2014. A New Economic Growth Theory: An Obstacle to Economic Growth. *Economics Papers and Presentations*, 4.

Levin, Lin & Chu 2002. Unit Root Tests in Panel Data: Asymptotic and Finite-Sample Properties. *Journal of Econometrics*, *108*(1), 1– 24.

Lucas, Jr., R. E. 1988. On the Mechanics of Economic Development. *Journal of Monetary Economics*, *22*(1), 3-42. https://doi.org/10.1016/0304-3932(88)90168-7.

Mahran, H. A.2012. Financial Intermediation and Economic Growth in Saudi Arabia: An Empirical Analysis, *Modern Economy*, 3, 1968-2010.

Mankiw, N. G., Romer, D. & Weil, D. N. 1992. A Contribution to the Empirics of Economic Growth. *The Quarterly Journal of Economics*, *107*(2), 407-437.

Mushtaq, M., Nazir, R., Bashir, I., Ahmed, S. Nadeem, M. 2014. Panel Cointegration Analysis of Government Spending, Exports, Imports and Economic Growth. *International Review of Research in Emerging Markets and the Global Economy*, *1*(2), 81-89.

Obwona, M. 2001. Determinants of FDI and their Impact on Economic Growth in Uganda. *African Development Review* 13, 46– 81.

Odhiambo, N.M. 2009. Energy Consumption and Economic Growth Nexus in Tanzania: An ARDL Bounds Testing Approach. *Energy Policy*, *37*(2), 617-622. http://dx.doi.org/10.1016/j.enpol.2008.09.077.

Osman, M., Gachino, G., & Hoque, A. 2016. Electricity Consumption and Economic Growth in the GCC Countries: Panel Data Analysis. *Energy Policy*, *98*, 318-327. https://doi.org/10.1016/j.enpol.2016.07.050.

Pedroni, P. 1999. Critical Values for Cointegration Tests in Heterogeneous Panels with Multiple Regressors. *Oxford Bulletin of Economics and Statistics*, *61*, 653–670.

Pedroni, P. 2004. Panel Cointegration: Asymptotic and Finite Sample Properties of Pooled Time Series Tests with an Application to the PPP Hypothesis. *Econometric Theory*, *20* (3), 597–625.

Pesaran M. H. & Zhou, Q. 2016. Estimation of Time-Invariant Effects in Static Panel Data Models. *Econometric Reviews*, *37*(10), 1137-1171. http://dx.doi.org/10.1080/2016.1222225.

Solow, R. M. 1956. A Contribution to the Theory of Economic Growth. The Quarterly *Journal of Economics*, *70*(1), 65–94. https://doi.org/10.2307/1884513.

Tuwaijri, A. 2001. The Relationship between Exports and Economic Growth. *Journal of King Saud University*, *13*(1), 219-234.

Wooldridge, J. M. 2006. *Introductory Econometrics: A Modern Approach.* 3rd Edition, Thomson/South-Western, Mason.

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The Macro-economy and Non-Performing Loans in Ghana: A BVAR approach

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ABSTRACT

Purpose
The purpose of the paper was to estimate the interdependence between selected macroeconomic variables and non-performing loans in Ghana using a Bayesian Vector autoregressive approach.

Design/methodology/approach
This paper used annual series from 2008-2017 which was interpolated into quarterly frequencies to estimate how macroeconomic shocks affects quality of loan portfolio using a Bayesian Vector Autoregressive approach. Our Bayesian VAR system satisfied the stability condition where the inverse root polynomial is within the unit root circle hence our VAR system was deemed stable. The model was estimated at levels with 1 lag as indicated by the AIC and the SBIC

Findings
The findings were that shocks to gross domestic product , consumer price index , credit to private sector, imports and monetary policy rate leads to an increase in the NPL ratio at varying magnitudes and quarters. On the other-hand a shock to government debt lead to a fall in the NPL ratio in the short-run but it rebounded later in the tenth quarter.

Originality/value
This study concludes that the macroeconomic environment is a big influence on the performance of bank loan portfolio which translates into the NPLs. A shock to CPI seems to be highest in affecting the NPL ratio hence the Bank of Ghana should endeavour to keep a low inflation environment such that the policy rate will not be revised upwards which will put more strain on the _NPL ratio.

Eastern Macedonia and Thrace Institute of Technology

1. Introduction

The financial sector in any economy plays a substantial role in economic growth by means of financial-intermediation which includes savings' mobilization, risk management, project evaluation and facilitating transactions (Schumpeter, 1934). In this vein, the stability of the banking sector dwells on banks' macro-environment, exposure to risk, and banks' ability to be resolute if an adverse shock hits the sector or the economy. The banking sector determines economic growth by offering varied services such as facilitating the movement of money across borders and ensuring a formalised way of borrower-lender interactions (Murithii & Louw, 2017). In the recent past the Ghanaian[1] economy has seen the collapse of seven (7) indigenous commercials banks; namely UT-Bank, Capital Bank, Sovereign Bank, Royal Bank, Beige Bank, Construction Bank and Uni-Bank, primary due to non-performing loans and other managerial and board-level breaches. Most of the bad debts were as a result of non-performing loans which is treated as a balance sheet cost which eventually derails the financial performance of a bank (Amuakwa-Mensah & Boakye-Adjei, 2015). The GFC[2] of 2008 which was later amplified by the Lehmann shock has given us a stark reminder of a link between the financial sector and the real sector of an economy. Behind this backdrop, it has become imperative for policy makers to examine the performance of the macro-economy and its transmission of shocks to the banking system or the reverse scenario. Globally, NPLs[3] has been the widely used measure of financial health of banks in the banking sector of any economy; in effect this metric measures the ratio of non-performing loans (NPLs) to total loans hence policy makers should consider its relevance for macroeconomic stability. This ratio is often used to evaluate and compare bank loans portfolio quality (Festic, Repina, & Kavkler, 2009), (Mendoza & Terrones, 2008), (Podpiera & Weill, 2008) to analyse banking sectors efficiency to foretell forthcoming failures.

[1] The Country Ghana was chosen because the NPL ratio rose to about 17.6% in 2009 giving an indication of some macroeconomic instability.

[2] The Great financial crisis

[3] *The non-performing loans are facilities which payments of principal and interest are past due by three months or more. The 90-day criterion is the time period that is most widely used by countries to determine whether a loan is non performing (see Cortavarria et al 2000).*

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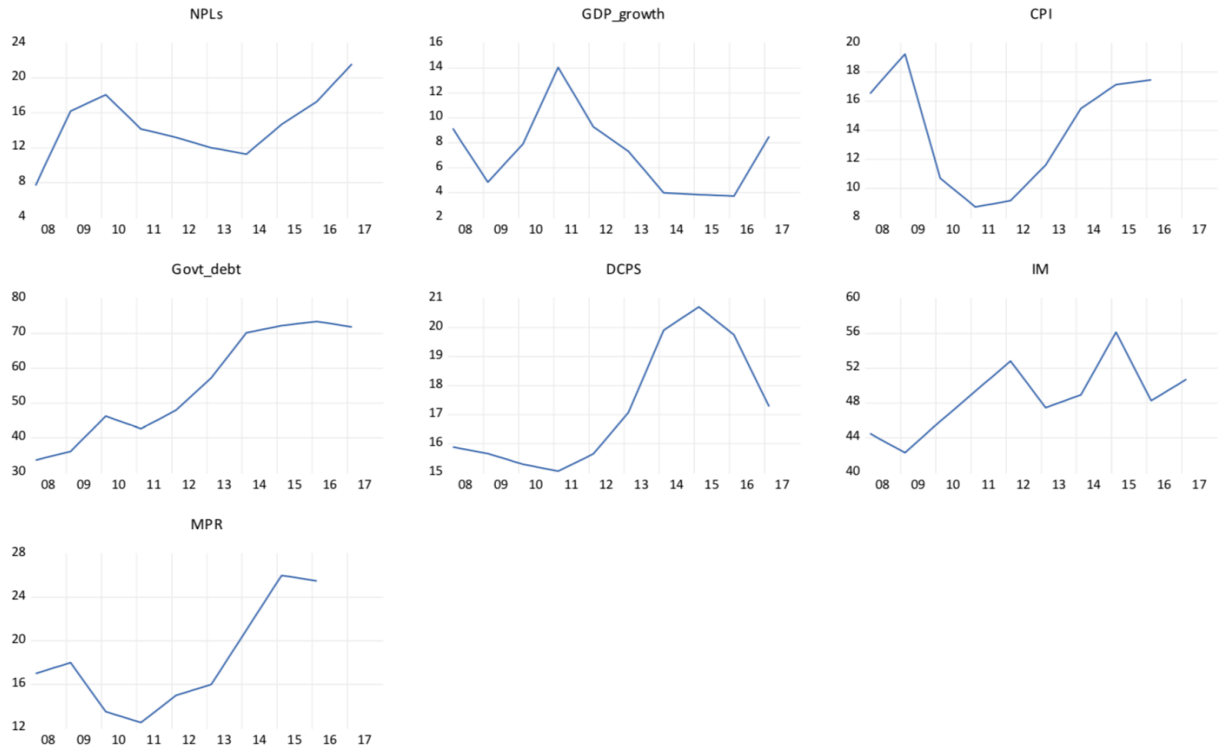
The present work contributes to this literature by estimating a Bayesian Vector Autoregressive model on the dynamics between non-performing loans as a financial fragility indicator and total credit to private sector and government debt. The Bayesian method detailed in the VAR literature is currently at the forefront of empirical macroeconomics, and is adopted here for use. Because VAR models are highly parametrised, the shrinkage prior in the Bayesian method will help the VAR system achieve parsimony. The approach is an update on AMEDIKU, 2006, where a traditional VAR model was used to stress test the Ghanaian banking sector. Our findings buttress what has been found in the VAR literature, that a negative shock to GDP deteriorates bank loan portfolio hence increases the NPL ratio. Alternatively, an inflationary environment also increases the rate of loan default which will translate into the NPL. Our Impulse response functions indicated that a GDP shock will increase the NPL ratio by 1%, likewise a shock to CPI, monetary policy, credit to private sector which increases the NPL ratio by 11%, 3% and 2% respectively. On the other-hand, a shock to government debt initially decreases the NPL ratio but it later rebounds about 2% in the tenth quarter.

To the best of my knowledge this is the first paper to use a Bayesian procedure to estimate interdependence between Ghana's banking industry's NPL, a key financial fragility index, and macro-economic shocks. The rest of the paper is as follows; section 2 discusses the NPL and macroeconomic variables literature review, section 3 discusses the VAR methodology, section 4 discusses the data and its sources, section 5 discusses the estimation and analysis using impulse response functions and section 6 has the concluding remarks.

A look at the time series plotted in (Figure 1) shows that NPL rose to 17% in 2009 during the financial crisis but it later fell in 2013, perhaps when Ghana was enjoying some oil growth due to the discovery of oil in commercial quantities. The NPL ratio later fell but rose again to about 22%. That could also be likened to the fall in commodities prices which affected the Ghana's foreign exchange leading to a fall in GDP. Clearly, we could see GDP falling in the latter part of 2013 when NPL was increasing. Government debt and private sector domestic credit has also been increasing. The policy rate and imports has also shown an upward trend.

Figure 1: A Graphical look at the endogenous variables



Source: Constructed from the data

2. Literature Review

There is no doubt that there exists some link between non-performing loans and macroeconomic variables. Principally the literature identifies those macroeconomic determinants as GDP, CPI, real interest, real exchange rate, money supply and unemployment rate (Sims, 1980). Seminal work of using VAR to estimate monetary policy shocks has preceded a myriad of studies which used the VAR models to investigate the monetary policy transmission mechanism across the field of applied macro research. Amuakwa-Mensah & Boakye-Adjei (2015) found a significant negative effect of real GDP per capita on NPLs. In addition, they concluded that real GDP per capita has a significant effect on NPLs of large banks, but no effect is observed for small banks (Alhassan, Kyereboah-Coleman, & Andoh, 2014). They also found a significant negative effect of real GDP

growth on asset quality and that a real depreciation of the local currency increases NPLs of banks in Ghana.

Arpa, Guilini , Ittner, & Pauer (2001) present a single-equation regression analysis focusing on the risk provisions and operating income of Austrian banks, and conclude that the share of risk provisions in the total loans of the Austrian banking sector varies indirectly with real GDP growth and real interest rates and directly with CPI inflation and real estate price inflation. Gambera (2000), using bivariate VAR models, investigated the influence of the development of the US economy on the loan portfolio quality of a large sample of US banks. The empirical result suggests that a limited number of regional and national macroeconomic variables are often good predictors for problem-loan ratios, and that simple, bivariate VAR systems of one bank variable, one macroeconomic variable, and seasonal dummies can be quite effective. Shu (2002) examined the impact of macroeconomic developments on the asset quality of the Hong Kong banking sector and concludes that the increase in non-performing loans between 1995 and 2002 was largely attributable to changes in macroeconomic conditions. The single-equation regression analysis indicates that the NPL ratio rises with increasing nominal interest rates and faster growth in bankruptcies, but decreases with higher CPI inflation, economic growth and property price inflation. Louzis, Vouldis, & Metaxas (2010), in a dynamic panel model, examined the determinants of NPLs for each category of loan in the Greek banking sector. Studying real gross domestic product growth rate, rate of unemployment and real interest rate from 2003 to 2009, the study concluded that bad or doubtful loans were related to these macroeconomic factors and to how well they were managed. They further indicated that the sensitivity of non-performing loans on mortgages was less to macroeconomic conditions.

Keeton (1999) investigated the relationship between the growth of business loans granted by US banks on the one hand and banks credit standards and the share of NPLs in business loans. The VAR model involves growth in business loans, the share of NPLs in business loans and non-farm earnings. It supports the hypotheses that faster loan growth leads to higher loan losses, that an increase in earnings reduces the delinquency rate and that an increase in the delinquency rate causes a decrease in loans. In addition, deterioration in the quality of loan portfolio causes a subsequent increase in the ratio of NPLs. Hoggarth, Logan, & Zicchino, (2005) apply the VAR approach to investigate the link between loan write-offs and the UK output gap, retail and house price inflation, the nominal short-term interest rate and the real exchange rate.

Adebola, Sulaiman, Yusoff, & Dahalan (2011) used an ARDL[4] in exploring the factors that explain NPL and concluded that long run relationship between macroeconomic variables and interest rate has a positive long-term effect on bad loans. The authors further stated that the producer prices were inversely related to bad loans. Jimenez, Salas, & Saurina (2006) presented evidence from Spain and suggested that GDP growth, real interest rate and a credit condition explain NPL. Khemraj & Pasha (2009) asserts that banks giving out loans excessively and charging high levels of interest rate are most likely to have higher bad debts.

3. Methodology

In econometric analysis the VAR models starts with the reduced form where each dependent variable is regressed on its own lags and on the lags of the other variables. The vector
notation is given as:

$$y_t = \alpha + \varphi_1 y_{t-1} + \ldots + \varphi_p y_{t-p} + u_t$$

where y_t is a vector of endogenous variables that is: GDP growth rate, CPI inflation, non-performing loans, government debt, domestic credit to private sector, imports and monetary policy rate at all at quarter t, α is a vector of constants and φ_1 and φ_p is a matrix of parameters, u_t is reduced form error term with zero mean and covariance matrix $\sum$. We include 1 lag of the endogenous variable as recommended by SBC and AIC as the best lag to explain the dynamics in the VAR system (see Table1.)

Prior to the model specification our Baysian VAR system has satisfied the stability condition that modulus of the Eigenvalue is less than 1 in absolute terms (see Table 2).

3.1 Model Specification

In our empirical specification, the reduced form VAR will be estimated with the Bayesian procedure because it is well suited for shorter datasets. To evaluate how shocks to macro- economic variables affect the quality of loan portfolio which translate into the NPL, the empirical model is specified in the following way:

$$NPLS_t = \alpha_1 + \phi_1 NPLS_{t-1} + \phi_2 GDP\ GROWTH_{t-1} + \phi_3 CPI_{t-1} + \phi_4 GOVT\_DEBT_{t-1} + \phi_5 DCPS_{t-1} + \phi_6 IM_{t-1} + \phi_7 MPR_{t-1} + \varepsilon NPLS_t \quad (1)$$

$$GDPGROWTH_t = \alpha_2 + \phi_8 NPLS_{t-1} + \phi_9 GDP\ GROWTH_{t-1} + \phi_{10} CPI_{t-1} + \phi_{11} GOVT\_DEBT_{t-1} + \phi_{12} DCPS_{t-1} + \phi_{13} IM_{t-1} + \phi_{14} MPR_{t-1} + \varepsilon GDP\ GROWTH_t \quad (2)$$

$$CPI_t = \alpha_3 + \phi_{15} NPLS_{t-1} + \phi_{16} GDP\ GROWTH_{t-1} + \phi_{17} CPI_{t-1} + \phi_{18} GOVT\_DEBT_{t-1} + \phi_{19} DCPS_{t-1} + \phi_{20} IM_{t-1} + \phi_{21} MPR_{t-1} + \varepsilon CPI_t \quad (3)$$

$$GOVT\_DEBT_t = \alpha_4 + \phi_{22} NPLS_{t-1} + \phi_{23} GDP\ GROWTH_{t-1} + \phi_{24} CPI_{t-1} + \phi_{25} GOVT\_DEBT_{t-1} + \phi_{26} DCPS_{t-1} + \phi_{27} IM_{t-1} + \phi_{28} MPR_{t-1} + \varepsilon GOVT\_DEBT_t \quad (4)$$

$$DCPS_t = \alpha_5 + \phi_{29} NPLS_{t-1} + \phi_{30} GDP\ GROWTH_{t-1} + \phi_{31} CPI_{t-1} + \phi_{32} GOVT\_DEBT_{t-1} + \phi_{33} DCPS_{t-1} + \phi_{34} IM_{t-1} + \phi_{35} MPR_{t-1} + \varepsilon DCPS_t \quad (5)$$

[4] Autoregressive Distributed Lag Model I used to estimate time series with different orders of integration.

$$IM_t = \alpha_6 + \phi_{36}NPLS_{t-1} + \phi_{37}GDP\ GROWTH_{t-1} + \phi_{38}CPI_{t-1} + \phi_{39}GOVT\_DEBT_{t-1} + \phi_{40}DCPS_{t-1} + \phi_{41}IM_{t-1} + \phi_{42}MPR_{t-1} + \varepsilon IM_t \quad (6)$$

Where
NPL: aggregate of non-performing loans to total gross loans.
GDP GROWTH: refers to growth rate of output
CPI: denotes the consumer price index
GOVT_DEBT: refers to stock of Government debt
DCPS: Total stock of credit to the private sector.
IM: Imports of goods and services
MPR: refers to Monetary policy rate.
$\varepsilon NPLS_t$ *= shocks to non performing loans equation*
ε*GDP GROWTH: shock to GDP equation*
εCPI: shock to CPI equation
εGOVT_DEBT: shocks to government debt equation
εDCPS: shocks to DCPS equation
εIM_t: Shock to imports equation
εMPR: shock to monetary policy rate equation

3.2 Choice of Macro-Economic Variables

The choice of the macroeconomic variables is based on the literature and some degree of intuitive arbitrariness (see Blake and Westaway, 1996). The selection of import is due to the fact that Ghana is a high import economy and since importation requires a huge outlay, the assumption is that most of the importers will opt for a bank credit. Secondly, due to Ghana's high debt/GDP ratio the country enrolled in an International Monetary Fund extended credit facility to ensure policy credibility and good fiscal governance. According to Louzis, Vouldis, & Metaxas (2010) there are two transmission channels through which public debt or sovereign debt crisis can affect the banking system. Reinhart & Rogoff (2010) found that when public debt increases, it places a form of "ceiling" on the market evaluation of credibility for the national banks and consequently banks struggle for liquidity. As a result, banks would have to cut lending and debtors cannot also refinance their debts. In addition, an increase in public debt, according to Perotti (1996) may lead to fiscal measures where, for example, social expenditure on the wage component of government consumption are cut. This results in outstanding loans and unpaid interest, as households' income experiences a negative shock.

3.3 Shock Identification

In order to generate the impulse response functions, the identification of shocks is carried out via Cholesky's decomposition of the covariance matrix, which assumes a recursive exogeneity structure. Therefore, the first variable in the VAR is only affected contemporaneously by the shock to itself; the second variable in the VAR is affected contemporaneously by the shocks to the first variable and the shock to itself, and so on. The number of lags to explain the model dynamics is set to 1 as indicated by the AIC and SBIC.

4. Data

Annual time series data spanning from 2008-2017 was interpolated into quarterly series using the Denton procedure. All datasets enter into the model as quarterly series after interpolation. NPLs is taken as a percentage of non-performing loans to total gross loans, GDP Growth enters the model as quarterly growth of output,

$$MPR_t = \alpha_7 + \phi_{43}NPLS_{t-1} + \phi_{44}GDP\ GROWTH_{t-1} + \phi_{45}CPI_{t-1} + \phi_{46}GOVT\_DEBT_{t-1} + \phi_{47}DCPS_{t-1} + \phi_{48}IM_{t-1} + \phi_{49}MPR_{t-1} + \varepsilon MPR_t \quad (7)$$

CPI enters as quarterly growth rate of prices, GOVT_DEBT is government receipts and spending taken as a percentage of gross domestic product, DCPS enter the model as quarterly stock of domestic credit to private sector as a percentage of output, IM enters as quarterly imports of goods and services as a percentage of output and MPR is the central bank's monetary policy rate (used as the benchmark lending rate). The data sources are Federal Reserve Economic Data (FRED), World Development Indicators of the World Bank, Banking Supervision and Research Departments of the Bank of Ghana and the Ghana Statistical Service.

5. Estimation and Analysis

This paper examined the interdependence of macroeconomic shocks and non-performing loans in Ghana. Table 3: displays the statistics of the Bayesian VAR results as it was specified in equations in the model specification section. Figure 20 display the impulse responses to a Cholesky one standard deviation shock to NPLS, GDP growth, consumer price index, Government debt, domestic credit to private sector, imports and monetary policy rate respectively. The empirical findings of this paper corroborates what has been found in the literature on the inverse relationship between GDP and NPL ratio and the positive relationship between CPI and NPL ratio. Our findings show a shock to GDP growth leads to a 1% increase in NPL ratio in the first quarter, to a peak of 3% in the fifth quarter, and later falls to the baseline. This finding implies that when GDP growth falls, the NPL ratio increases and vice versa. Additionally, a one standard deviation shock to CPI leads the NPL ratio to increase as much as 11% in the second quarter to a peak of about 25% in the fifth quarter. This gives an indication that the influence of inflation on financial variables is very immediate and effective hence the central bank's target of inflation is in line with financial stability objectives. Furthermore, the NPL ratio initially decreased after a shock to government debt but it rebounded by 2% in the tenth quarter. This could mean that whilst the government is increasing the deficit by taking on more debt, the NPL ratio falls in the short run. It could mean that the banks in the short-run were buying Government of Ghana treasury bonds which paid higher returns, hence they were able to diversify their books against the huge bad debts on their books. The hypothesis that credit growth leads to higher loan losses could be explained by the findings that a one-standard deviation shock to total domestic credit to the private sector will make NPL ratio increase as early as the second quarter by 2% to a peak of about 5% in the sixth quarter. The NPL ratio also increased by 4% in the second quarter with a shock to imports and later peaked by 7% in the fourth quarter.
The monetary policy rate is the rate at which the Bank of Ghana lends to the commercial banks. A shock to this policy rate increased the NPL ratio by 3% in the second quarter, later reached a peak of about 6% in the fourth quarter.

6. Concluding Remarks

This paper applied the BVAR methodology to estimate the variations in macroeconomic variables and their effect on the NPL ratio in Ghana. The importance of financial fragility for macroeconomic stability has gained lots of momentum in recent policy debates leading to the intensification of bank directives. Annual series was interpolated into quarterly frequencies to estimate the interdependences of macro-economic variables and NPL ratio. We include NPL ratio as a measure of financial fragility, GDP growth as a measure of economic growth, CPI growth to measure the rate of change of prices, government debt stock to measure government's fiscal position, domestic credit to private sector to capture the amount of credit circulating from the banks to private sector, imports and monetary policy rates. Impulse response findings show that NPL ratio reacts early to a CPI inflation shock by 11% followed by a shock to Imports shock by 4% and finally the monetary policy rate shock by 3%. Findings also show that the peak responses of NPL ratio was higher with CPI at 25% in the fifth quarter with monetary policy peaked by 6% in the fifth quarter and GDP growth also peaked by 3% in the fifth quarter. Overall, finding support the literature in that shocks to GDP growth, CPI and MPR increases the NPL ratio. By extension, a shock to domestic credit to private sector also increased the NPL ratio whilst a shock to Government debt initially reduces the NPL ratio but later rebounded. It is recommended that for Ghana's economy to reduce the deterioration of loan portfolio, policy makers should endeavour to keep a low inflation environment that will also render the Bank of Ghana to revise downward the policy rate. In addition, there should be measures to curb the excessive credit growth to the private sector since findings shows that the higher the rate of growth of credit, the higher the default rate.

References

Arpa, M., Guilini, I., Ittner, A., and Pauer, F. (2001): "The Influence of Macroeconomic Developments on Austrian Banks: Implications for Banking Supervision" BIS Paper No. 1 (Basle: Bank for International Settlements).

AMEDIKU (2006) Stress tests of the Ghanaian Banking Sector: A VAR Approach. Working Paper. Bank of Ghana WP/BOG2006/02

Alhassan, A. L., Kyereboah-Coleman, A., & Andoh, C. (2014). Asset quality in a crisis period: An empirical examination of Ghanaian banks. Review of Development Finance, 4, 50–62. doi:10.1016/j.rdf.2014.03.001

Adebola, S.S., Sulaiman, W., Yusoff, W., and Dahalan, J. (2011). An ARDL Approach to the determinants of nonperforming loans in Islamic banking system in Malaysia. Kuwait Chapter of Arabian Journal of Business, and Management Review, 1(1), 20-30.

Amuakwa–Mensah, F., & Boakye–Adjei, A. (2014). Determinants of non–performing loans in Ghana banking industry. *International Journal of Computational Economics and Econometrics*,*5*(1), 35-54.

Batini, N and Haldane, A (1999), „Forward-looking rules for monetary policy', Bank of England Working Paper no. 91.

Barseghyan, L. (2010). Non-performing loans, prospective bailouts, and Japan's slowdown. *Journal of Monetary Economics*, 57(7), 873-890.

Bunn, P, Cunningham, A and Drehmann, M (2005), „Stress testing as a tool for assessing systemic risk', Bank of England Financial Stability Review, June, pages 116-26.

Blake, A P and Westaway, P F (1996), „Credibility and the effectiveness of inflation targeting regimes', The Manchester School Supplement, Vol. 64, pages 28-50.

Bofondi, M., & Ropele, T. (2011). Macroeconomic determinants of bad loans: evidence from Italian banks. Bank of Italy Occasional Paper, (89).

Christopher F Baum & Sylvia Hristakeva, 2001. "DENTON: Stata module to interpolate a flow or stock series from low-frequency totals via proportional Denton method," Statistical Software Components S422501, Boston College Department of Economics, revised 17 Jul 2014.

Dickey, D.A. and W.A. Fuller (1981), "Likelihood Ratio Statistics for Autoregressive Time Series with a Unit Root", Econometrica, 49(4), 1057-1072.

Dash, M. K., & Kabra, G. (2010). The determinants of non-performing assets in Indian commercial bank: An econometric study. *Middle Eastern Finance and Economics*, 7, 94-106.

Festic_, M., Repina, S., & Kavkler, A. (2009). The Up-Coming Crisis and the Banking Sector in the Baltic States. *Swiss Journal of Economics and Statistics*, 145, 269-291.

González-Hermosillo, B. (1999). Developing indicators to provide early warnings of banking crises. *Finance and Development*, 36, 36-39.

Gambera, M. (2000): Simple Forecasts of Bank Loan Quality in the Business Cycle. Chicago: Federal Reserve Bank of Chicago.

Hoggarth, G., Logan, A., and Zicchino, L. (2005): "Macro stress tests of UK banks". BIS papers No.22. Basle: Bank for International Settlements.

Jimenez, G., and Salas, V., & Saurina, J. (2006). Determination of Collateral. Journal of Financial Economics, 81(2), 255-281.

Khemraj, T., & Pasha, S. (2009). The Determinants of Nonperforming Loans: An Econometric Case Study of Guyana, presented at the Caribbean Centre for Banking and Finance Bi-annual Conference on Banking and Finance, St. Augustine, Trinidad.

Keeton, W. (1999): "Does Faster Loan Growth Lead to Higher Loan Losses?" Economic Review. Kansas City: Federal Reserve Bank of Kansas City.

Louzis, D.P., Vouldis, A.T., and Metaxas, V.L. (2010). Macroeconomic and bank specific determinants of non-performing loans in Greece: a comparative

study of mortgage, business and consumer loan portfolios. Bank of Greece, Working Paper, 118.

Mendoza, E. G., & Terrones, M. E. (2008). An anatomy of credit booms: evidence from macro aggregates and micro data (No. w14049). National Bureau of Economic Research.

Perotti, R. (1996). Fiscal consolidation in Europe: Composition matters. The American Economic Review, 86, 105–110.

Reinhart, C. M., & Rogoff, K. S. (2010). From financial crash to debt crisis (NBER Working Paper No. 15795). Cambridge: National Bureau of Economic Research. Retrieved from http://www.nber.org/papers/w15795

Sims, C. (1980): "Macroeconomics and Reality". Econometrica, Vol. 48.

Schumpeter, J. (1934). The fundamental phenomenon of economic development. *The Theory of Economic Development*, 57-94.

Shu, C. (2002): "The Impact of Macroeconomic Environment on the Asset Quality of Hong Kong's Banking Sector" Hong Kong Monetary Authority Research Memorandum.

Zeng, S. (2012). Bank non-performing loans (NPLS): A dynamic model and analysis in China.

Annex

Table 1: Lag Order Selection Criteria

VAR Lag Order Selection Criteria
Endogenous variables: NPLS GDP_GROWTH CPI GOVT_DEBT DCPS IM MPR
Exogenous variables: C
Date: 09/09/18 Time: 18:35
Sample: 2008Q1 2017Q4
Included observations: 31

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-353.034...	NA	28.87739	23.22804	23.55185	23.33359
1	223.4055...	855.3628*	5.23e-14*	-10.80036*	-8.209928*	-9.955942*
2	261.6757...	39.50478	1.78e-13	-10.10812	-5.251062	-8.524837

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion
Source: Authors Calculation

Table 2: Table 2: Stability of BVAR system

Roots of Characteristic Polynomial
Endogenous variables: NPLS
GDP_GROWTH CPI GOVT_DEBT
DCPS IM MPR
Exogenous variables: C
Lag specification: 1 1
Date: 09/09/18 Time: 18:33

Root		Modulus
0.950930		0.9509302876271893
0.863126	- 0.210082i	0.8883245353476471
0.863126	+ 0.210082i	0.8883245353476471
0.524685	- 0.031673i	0.5256402748798472
0.524685	+ 0.031673i	0.5256402748798472
0.335176		0.3351762852074857
0.023020		0.02301981394283...

No root lies outside the unit circle.
VAR satisfies the stability condition.
Source: Authors Calculation

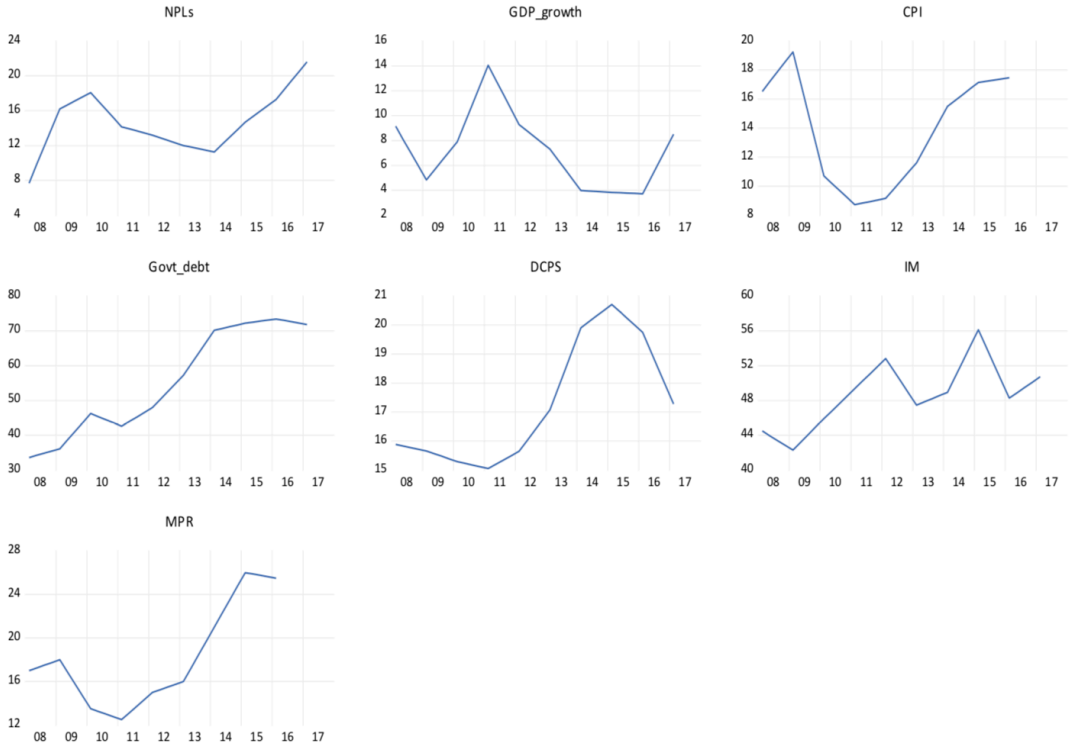
Table 3: Estimated BVAR Results

Bayesian VAR Estimates
Date: 09/09/18 Time: 18:32
Sample (adjusted): 2008Q2 2016Q1
Included observations: 32 after adjustments
Prior type: Litterman/Minnesota
Initial residual covariance: Diagonal VAR
Hyper-parameters: Mu: 0, L1: 0.1, L2: 0.99, L3: 1
Standard errors in ( ) & t-statistics in [ ]

	NPLS	GDP_GRO...	CPI	GOVT_DEBT	DCPS	IM	MPR
NPLS(-1)	0.79334979...	0.22320305...	-0.2495398...	-0.0568250...	-0.0989268...	0.12177749...	-0.1235000...
	0.03016328...	0.04582669...	0.04446850...	0.07541695...	0.00964015...	0.06922653...	0.03169913...
	[26.3018]	[4.87059]	[-5.61161]	[-0.75348]	[-10.2619]	[1.75912]	[-3.89601]
GDP_GROWTH(-1)	-0.0133921...	0.52333429...	-0.1141432...	-0.3927774...	-0.0423395...	0.21517815...	0.01582969...
	0.04313976...	0.06588297...	0.06369516...	0.10792100...	0.01378641...	0.09913449...	0.04536597...
	[-0.31044]	[7.94339]	[-1.79202]	[-3.63949]	[-3.07111]	[2.17057]	[0.34893]
CPI(-1)	0.09121991...	-0.1717010...	0.38189639...	-0.3663536...	0.01999607...	-0.2769592...	0.15671538...
	0.05072834...	0.07717143...	0.07528338...	0.12701258...	0.01621735...	0.11663106...	0.05340326...
	[1.79820]	[-2.22493]	[5.07278]	[-2.88439]	[1.23300]	[-2.37466]	[2.93457]
GOVT_DEBT(-1)	-0.0342957...	-0.0532508...	-0.1104591...	0.78994306...	0.05764030...	-0.0206767...	0.00348474...
	0.02181791...	0.03317627...	0.03224775...	0.05473302...	0.00699015...	0.05011329...	0.02294163...
	[-1.57191]	[-1.60509]	[-3.42533]	[14.4327]	[8.24593]	[-0.41260]	[0.15190]
DCPS(-1)	-0.1582370...	0.18984956...	0.58152542...	1.42255921...	0.58988084...	1.26485405...	0.84642602...
	0.18930258...	0.28777546...	0.27941489...	0.47443321...	0.06070843...	0.43476227...	0.19919516...
	[-0.83590]	[0.65971]	[2.08123]	[2.99844]	[9.71662]	[2.90930]	[4.24923]
IM(-1)	-0.0023340...	0.04635433...	-0.1327521...	0.01641899...	-0.0053686...	0.49277553...	0.06865849...
	0.02904964...	0.04418710...	0.04291146...	0.07266564...	0.00928378...	0.06703591...	0.03056701...
	[-0.08035]	[1.04905]	[-3.09363]	[0.22595]	[-0.57828]	[7.35092]	[2.24616]
MPR(-1)	0.18163097...	-0.1524205...	0.39513037...	-0.1758896...	-0.0082641...	-0.1069291...	0.51356826...
	0.05863474...	0.08915270...	0.08665219...	0.14666486...	0.01875280...	0.13477978...	0.06189626...
	[3.09767]	[-1.70966]	[4.55996]	[-1.19926]	[-0.44069]	[-0.79336]	[8.29724]
C	3.41226693...	2.56755202...	8.04655969...	-1.0334606...	5.90857061...	6.66542986...	-9.6073879...
	2.25685329...	3.43177682...	3.33001294...	5.64896725...	0.72255917...	5.18690733...	2.37589607...
	[1.51196]	[0.74817]	[2.41637]	[-0.18295]	[8.17728]	[1.28505]	[-4.04369]
R-squared	0.97398554...	0.94740741...	0.98100773...	0.99197054...	0.99588912...	0.90200549...	0.99320304...
Adj. R-squared	0.96639800...	0.93206791...	0.97546833...	0.98962861...	0.99469011...	0.87342375...	0.99122060...
Sum sq. resids	3.95469876...	15.0946638...	7.55763575...	47.4633981...	0.58453862...	39.3917717...	4.33803641...
S.E. equation	0.40592993...	0.79306010...	0.56116084...	1.40628645...	0.15606337...	1.28114160...	0.42514881...
F-statistic	128.366309...	61.7625843...	177.096095...	423.570449...	830.595574...	31.5588117...	500.999062...
Mean dependent	14.1567987...	7.12211341...	13.6511848...	53.8694238...	17.2040384...	48.7164280...	18.0390625
S.D. dependent	2.21446350...	3.04276642...	3.58281024...	13.8087830...	2.14169917...	3.60098274...	4.53741585...

Source: Authors Calculation

Figure 2: Impulse Response Functions for the Estimated BVAR model, 2008q1-2017q4
Response to Cholesky One S.D. (d.f. adjusted) Innovations



Source: Authors Calculation