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A STUDY ON UNIVERSITY STAFF'S PERSPECTIVE ON THE HARMONIZATION OF THE INTERNAL AUDIT SYSTEM WITHIN THE FRAMEWORK OF INTERNATIONAL INTERNAL AUDITING STANDARDS

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ABSTRACT

Purpose- In this study, it is aimed to determine the problems experienced during the implementation of the internal audit system in state universities, which are a public administration, within the framework of international internal audit standards. Solution suggestions were made to the identified problems. In this research, a field study was conducted to determine the perceptions of senior supervisors working at Dicle University about the internal audit system at the university and their thoughts on compliance with international auditing standards.

Methodology- The application part of the research consists of two parts. The first part consists of 5 questions to determine the demographic characteristics of the personnel participating in the research. In the second part of the research, it consists of 26 statements that will determine the opinions of the personnel on the harmonization of internal audit with international internal audit standards within the scope of the study.

Findings- In general, it is seen that the participants of the research have an indecision about their working statements. Particularly, while disagreement comes to the fore in statements about international auditing standards, it is observed that the state of agreeing with statements about the role of internal auditing has increased.

Conclusion- As a result of this study, it is thought that the internal audit activities of the university staff are insufficient, there is not enough internal auditor in the university and the information about the internal audit activities is insufficient. In particular, the university should attach importance to the awareness-raising activities of the senior management personnel regarding internal audit. Because internal audit activities directly contribute to the efficient work of university personnel. Therefore, in-service training activities should be increased to increase the efficiency of internal audit units in universities. In addition, it is seen that there are not enough internal audit personnel in universities. In particular, universities should allow more internal auditors to work on this issue.

Keywords: Internal auditor, internal audit, international internal audit standards, university staff, Law No. 5018.
JEL Codes: M40, M42, M49

1. INTRODUCTION

The Audit process of institutions and organizations is the process of systematically examining whether a certain activity and work can be sustained and whether the results are carried out towards the previously determined objectives. From the first centuries to the present day, the audit process has been applied in all kinds of studies, activities and state management systems related to all kinds of human communities, both small and large. As a matter of fact, it is absolutely necessary to examine and control the work and transactions carried out within the hierarchical organization in creating unity and solidarity, achieving victory or creating the state system. Therefore, the necessity of the audit process is understood. As a result of the realization of the Industrial Revolution, which took place with the developments in the world, the issue of delegation of authority started to be discussed and the internal audit activity came to the agenda with the inadequacy of external audit. As a result of the development of the internal audit process within a certain system, it became operational in 1941 with the establishment of the Institute of Internal Auditors (IIA) in the United States of America.

With the globalization of the world, the disappearance of the borders between nation states and the social, financial, scientific and technical developments in the world have made structural reforms necessary not only in the private sector but also in the public sector. With the new developments that have emerged, radical changes have been made in the public sphere in more than one state. To keep up with these changes, Turkey adopted the Public Financial Management and Control Law No. 5018 in 2003, which accelerated the country's alignment with European Union criteria and eliminated the shortcomings of the current system. The notion of internal audit, which offered a new understanding of auditing in the public sector, found application in the public sector for the first time with the adoption of 5018.

With the implementation of internal audit, it is aimed to implement the provisions and activities given to the public interest in a reasonable, effective, efficient, affordable, accountable and transparent manner, to manage the existing risks and to carry out consultancy activities to the institution by managing the existing risks.

Examining the opinions of senior executives at Dicle University, a public legal entity that seeks to provide quality people and a workforce in accordance with the needs of our state, on matters relating to internal audit and the execution of internal audit standards, by recognising issues as they arise and producing effective solutions It is designed to make it possible to use an internal audit system.

This study aims to determine the level of compliance with international internal audit standards to ensure internal audit effectiveness in universities. In this direction, the study covers internal audit standards and international internal audit standards. In addition, in order to determine the compliance with internal audit standards in universities, data were obtained and analyzed through a questionnaire to senior managers. The results of the analysis are presented in tables and evaluated.

2. PUBLIC FINANCIAL MANAGEMENT AND CONTROL LAW NO. 5018

The Assembly adopted Public Financial Management and Control Law No. 5018 on December 10, 2003, and it was published in the Official Gazette No. 25326 on December 24, 2003. According to 5018, while the law should have gone into effect in its entirety on January 1, 2005, the provisions of Court of Accounts Law No. 832, which abolished the rules by considering visa registration, were attempted to be implemented, along with the articles on the budget law preparation process. The Law has been fully enacted since 01.01.2006, with the difference made with the Law on creating differences in the Public Financial Management and Control Law No. 5436 and some Laws and Decrees. With the enactment of the law, the differences in the law were eliminated with the General Accounting Law no. 1050, which was accepted as the 'Financial Constitution' (Uyar, 2009: 100).

Law No. 5018 introduced performance-based budgeting; is a budgeting system that determines the basic functions of public administrations, the goals and objectives to be realized as a result of the fulfillment of these functions, ensures the allocation and use of resources in line with these goals and objectives, evaluates whether the desired goals have been achieved by measuring performance, and reports the results based on performance (Erüz, 2009: 66).

The law consists of 9 main parts and 83 provisions. In the first chapter, general rules and the aim, content and what it is of the law are explained. Budgets for public administration are covered in the second chapter, articles on movables and immovables are covered in the third chapter, public accounts and statistics are covered in the fourth chapter, the internal control management system is covered in the fifth chapter, external audit is covered in the sixth chapter, sanctions and competent authorities are covered in the seventh chapter, and the other chapters are covered in the eighth chapter. provisions and section 9 includes repealed provisions, provisional articles and effective dates.

With the implementation of 5018, almost all of our public financial management system has changed; the functional and organisational structure and mechanisms of the public financial management control system have been renamed, and the duties, authorities, and responsibilities of individuals within the system have been redefined using a new approach. Important institutions for the rules on which the system is based, state activities with developed both legal and administrative infrastructure, and interstate rules have been planned (Bozkurt, 2009: 39; Arı, 2011: 74).

3. 5018 INTERNAL AUDITOR AND AUDIT PROCESS ACCORDING TO KMYK

For a quality audit process in accordance with the standards, the work and procedures related to the audit have been determined in advance. It must comply with the standards. At some point, the standards of the audit process cover both the auditor in terms of his/her individual characteristics and the entire audit process from the beginning to the end, including all the criteria related to the quality of the activity performed (Akşam, 2005: 76). The elements and appointment criteria for internal auditors to work in public institutions are specified in the law no. 5018. According to the law numbered 5018;

Those who will be appointed as internal auditors must meet the following criteria in accordance with Article 48 of the Civil Servants Law No. 657;

- ✓ Based on the characteristics of the relevant public institution, to be a graduate of a Faculty of at least 4 years in the subjects determined by the Internal Audit Coordination Board (IDKK) (Faculty of Economics and Administrative Sciences and Faculty of Engineering Departments),
- ✓ To have worked for a minimum of 5 years as an audit officer in public institutions or a minimum of 8 years in the fields specified by the IDKK,
- ✓ To have the knowledge, experience and potential required by the job,
- ✓ To have other conditions deemed necessary by the IDKK.

Although the qualifications of internal audit officers are mentioned in this provision of the legislation, the "Internal Audit Coordination Board" is responsible for determining these qualifications in general terms (Çevikbaş, 2011: 56). In the nineteenth article of the Regulation on Working Procedures and Principles on how the internal auditors created by the IDKK should work, the criteria for those who will serve as public internal auditors have been established in a way similar to the law.

In addition to the criteria stated above, candidates who want to be internal auditors are eligible to take the internal auditor nomination exam, pursuant to the sixth provision of the Training and Certification Regulation. Individuals who have been successful in the exam are provided with certificate training by the coordination of IDKK. Individuals who will take the exam during the certificate training are deemed to be on leave in the institutions and organizations they work. Those who successfully complete the given training are entitled to receive a certificate by IDKK. (IDKK OG: 19.04.2013/28623). What is important in these certificates is to give the task of carrying the proven competence next to the name as a title after the elements such as education, experience, personality and success in the exam are provided (Uyar, 2009: 86). Those who are entitled to receive this certificate are not accepted as public internal auditors. Internal auditors in public administrations are appointed from among certified individuals in ministries and affiliated administrations, by the Minister on the recommendation of top managers, and by top managers in other administrations, and internal auditors are dismissed in accordance with the same procedures and principles (IDKK, RG: 19.04.2013/28623 art.6).

2.1. Tasks of Internal Auditor

The duties of the internal auditor are clearly stated in Article 15 of the Legislation on Procedures and Principles regarding the work and transactions that the persons responsible for internal audit must perform in accordance with the provisions of Article 64 of this law within the scope of KMYK adopted in 2003. The creation of the regulations issued according to the hierarchy of norms in the Turkish legal system, both in accordance with the provisions of the law and in relation to each other, has been added to the legislation as additional articles. In this context, according to the provision in Article 15 of the legislation, the duties of the persons responsible for internal audit are; (Regulation on Working Procedures and Principles of Internal Auditors, O.G.: 12.07.2006/26226)

- ✓ Reviewing both the administration and control mechanisms in the management of public institutions and organizations within the scope of objective risk assessments.
- ✓ Making analyzes and giving suggestions for the distribution of the existing reserves of the state in an efficient, transparent and accountable manner.
- ✓ Conducting controls in accordance with the legislation after the use of budget reserves. Reviewing and controlling the expenditures of public administrations, provisions for financial financial transactions and avoidance of waste, compliance with objectives and strategies, development program, strategic targets and performance indicators.
- ✓ Reviewing the infrastructure and giving suggestions in the implementation process of PFMC.
- ✓ Giving suggestions for innovation within the scope of auditing Public Institutions and Organizations and monitoring them.
- ✓ Informing the highest authority of the responsible authority when a problem arises during the Internal Audit or when there is a problem that requires initiation of the investigation according to the outputs of the audit.
- ✓ Searching for the truth in the experiences and experiences created by the administration of public institutions and organizations.
- ✓ To enable the determination of performance scales under the conditions required by the most authoritative authorities of public institutions and organizations, to analyze the usability of the determined performance scales.
- ✓ It is mentioned in the form of informing the most competent authority of the situations determined as a result of the formation of the conditions that require punishment.

According to the law no. 5018, the persons responsible for internal audit should act in accordance with internal audit rules that comply with business ethics and have received positive opinions all over the world while performing their duties, that the persons responsible for internal audit should do their work and transactions without being connected to this process, and that they have to do to the people responsible for internal audit. It is mentioned in the rules that he will not be responsible for different duties other than his works.

2.2. Responsibilities of the Internal Auditor

The Institute of Internal Auditors also defines the independence of the internal auditor as follows: "Internal auditors are independent in the free and objective performance of their duties. Independence enables internal auditors to make impartial and unbiased decisions for the healthy conduct of audits. This can be achieved through institutional position and objectivity." The duty of internal auditor is terminated in the event of the auditor's voluntary resignation, appointment or election to another position, and the revocation of his/her certificate by the IDRA upon a report that he/she has acted in a manner incompatible with the profession of internal auditor (Gösterici, 2006:181)

Persons responsible for internal auditing, while performing their duties, must be subject to the obligations clearly expressed within the framework of Article 17 of the legislation for which these persons are responsible for their work. Obligations of those charged with internal audit; (Regulation on Working Procedures and Principles of Internal Auditors, O.G.: 12.07.2006/26226)

- ✓ Acting within the scope of the law, internal audit directive, both auditing and reporting rules and ethical rules.
- ✓ Continuous renewal of experience and experience in business and transactions.
- ✓ Informing the Internal Audit Coordination Presidency when the persons responsible for internal auditing are not authorized to do their work and transactions.
- ✓ Informing the head of the internal audit coordinatorship about the problems that arise in the free and unbiased execution of the works and transactions communicated by the competent authority.
- ✓ Basing the reports created after the internal audit on documents and that the analyzes put forward are real.
- ✓ It is listed as maintaining the confidentiality of the information and documents found by the persons responsible for internal auditing during their duties.

2.3. Process of the Internal Auditor

Establishing the audit organization within the scope of the activities, processes and strategies carried out by the persons responsible for internal auditing, taking the necessary actions regarding the audit, analyzing and reporting the information and documents resulting from the audit, and following this process.

2.3.1. Planning and Programming

The Internal Audit Strategy Document of the public institutions and organisations created by the board in consultation with the institution managers, including the audit activity, the channels and titles, the required personnel, and other elements, in order to carry out the effective, economical, and accountable implementation of the internal audit activity. It takes three years to develop (YK, 2020: 13).

The procedure for plans and programmes that those in charge of internal audit must follow entails definitions made during the audit phase, selection of the channels to be audited, calculation of risk ratios, classification of audit channels based on risk, provision of reserves required during the audit, and creation and acceptance of plans and programmes (Uyar, 2009: 163). Establishing a plan and programme for business and transactions throughout the year, a strategy, internal audit laws, and an audit process are all necessary for institutions and organisations to determine the share of current period audit reserves, objectives, and targets of the internal audit institution. However, the services to be provided within the scope of warranty and consultancy applications should be clearly stated in the plan and program (Pehlivanlı, 2010: 118).

The internal audit plan and program process should be created in a risk-based manner (Karamık, 2019: 30). Internal audit plans and programmes should be developed by focusing on the channels that are the major risk criteria, in addition to carrying out the audit process both effectively and in compliance with the law and in order to achieve the desired goals and objectives. The risk criteria that institutions and organisations will encounter should be determined. The internal audit plan and program should be created in 3-year periods by taking into account the opinions of the highest authorities and the audit organization, the channels that the highest authorities consider to have a high risk ratio, and the previous audit findings. It should be renewed in accordance with the need (RG; 26.06.2006 /10654, Art. 39). An effective and high-quality internal audit plan also contributes to the strengthening of corporate governance (Karyağdı Güngör, 2022: 17). A quality internal audit plan and program; It increases the prestige and quality of institutions and organizations by creating a strong risk analysis management.

2.3.2. Execution

After the approval of the audit plan and program created in the execution process of the rules and obligations that the persons responsible for internal audit have to apply, by the highest authority, it must be done within a certain sequence within the scope of this plan and program.

Persons responsible for Internal Audit are required to make a unique research plan in the first place when conducting audits. In this framework, people responsible for internal audit use documents and forms related to their work, and after determining the objectives and methods of the audit activities to be carried out, they conduct individual studies in order to collect data. After this process, before the execution of the audit activity, they make an opening speech with the institution to be examined, and create their personal work plans and programs, as well as a meeting where the risks will be analyzed. The most authoritative authority sends an official letter to those who carry out the internal audit and the persons responsible for the internal audit, including the purpose and methods of the internal audit mechanism (Günşen, 2012: 75).

2.3.2. Reporting

One of the most important elements that emerged as a result of internal audit activities is the audit report that shows the internal audit result that the persons responsible for internal auditing are obliged to prepare (Arslan, 2018: 71). The report, which is prepared as a result of the internal audit, is a brief analysis of the objectives, content and results of the audits and surveillance performed by the persons responsible for internal auditing. The main purpose of the audit report is to clearly state the findings obtained, to identify the deficient and weak situations within the scope of the internal audit functions, and to prove the suggestions and opinions of the audit persons (Pehlivanl, 2010: 136).

The reports created are consistent with sufficient evidence within the scope of internal audit reporting rules of public institutions and organizations. Thus, the institutions that will carry out this internal audit can revise the reporting titles in their internal audit institution circulars, provided that they do not contradict the internal audit reporting rules of public institutions and organizations (Uyar, 2009: 179). The report showing the internal audit created should be made in a transparent, simple and accountable manner. The reports prepared by the people responsible for internal auditing are to ensure that these risks are eliminated or to minimize these negative effects by finding risk analyzes and risk analyzes that are serious for the institution, and by finding ways to intervene against their negative effects.

It provides the director of the institution subject to the examination with the reports produced by the internal auditing personnel as a result of their examinations within ten days for a response, and the director of the institution responds to the report and sends it to the individual conducting the internal audit, provided that the opinions of those with a stake in the matter are sought. The person responsible for performing the internal audit adds the analysis based on this situation to the report he has created in the event that there are disagreements between the responsible person performing the internal audit and the manager regarding both the importance and risk level of the risk ratios specified in the report. The report prepared by the person responsible for performing the internal audit is submitted to the most authorized person of the institution by adding the opinions of the institution administrators and adding the answers to the report, which also includes their suggestions, as a short analysis. The reports created are analyzed by the top administrations and sent to the strategy development department besides the relevant authorities in order to carry out the necessary action (Özkan, 2008: 97). The reports related to the internal audit that have been created are sent to the most competent authority, to the audit committee and to the board of directors within certain time periods.

2.3.4. Monitoring and Valuation

Whether the information, documents and proposals determined in the examination report prepared by the persons responsible for internal audit are made in a strong and sufficient manner by the relevant authorities, whether there are mandatory measures, but the results of the audit can be analyzed and followed. The feasibility criterion of the proposals and recommendations presented in the prepared report is followed up by the most competent authority.

In monitoring the internal audit activity, the head of the internal audit organization will monitor and analyze the performance of the persons responsible for internal audit during the review process and the quality of the audit at all levels. As a result of these analyzes, the measures to be implemented will be planned and added to the annual report (Özkan, 2008: 98). Monitoring and analyzing the internal audit and the development of the findings from the review consists of both the review process and the review of the auditor who made this review. It draws attention to the fact that the persons responsible for internal audit should examine and analyze the findings obtained as a result of the audit in order to preserve the entire review process and carry it out strongly. It is important that internal auditors perform their audit activities in a manner that includes governance processes, particularly risk management (Çakalı, 2021: 3). In addition, revealing the problems that may arise in the processes in the organization, It also draws attention to solving, renewing processes and improving the systems used (Karyağdı Güngör, 2019: 324).

3. INTERNATIONAL INTERNAL AUDIT STANDARDS

International internal audit standards consist of 3 basic criteria: quality, performance and practice. When the quality standards are examined, they also cover the characteristics of the institutions, not the parties that perform the work and transactions related to internal audit. Performance standards examine the essence of internal audit-related work and operations and provide the quality standards applied in measuring the performance of these activities. While quality and performance standards cover all internal audit-related work and operations, executive standards apply to specific roles, such as both assurance and consulting activities. (TİDE, 2006: 4).

Within the framework of international internal audit standards, both the independence and the assurance feature of internal audit activities have created the necessity of establishing professional ethics criteria in this field. It has been tried to establish an ethical understanding for the internal audit profession, provided that the ethical rules that auditors subject to internal audit standards have to comply with are determined. The IIA has established ethical criteria that internal auditors will comply with. These criteria consist of the principles and behavioral criteria related to the profession and execution of internal auditing (Arcagök and Erüz, 2006: 224).

In the United States of America, the active use of accounting and auditing in the regulations on securities offered to the public in the Securities Act of 1933 and the Securities Exchange Act of 1934 led to the understanding that external audit alone cannot be sufficient to review the accuracy of accounting records and to ensure compliance with accounting controls (Korkmaz, 2007: 6).

The standards, which are constantly updated in line with the changing world, are periodically accepted by the IIA Internal Auditing Standards Board. Before the rules are updated again, the Board publishes the relevant updates, a draft text containing the rules to be added or canceled for discussion and evaluation on the country agenda. This discussion and evaluation process is of great importance in improving internal auditing standards.

4. THE IMPORTANT ROLE OF INTERNAL AUDIT IN PUBLIC UNIVERSITIES

According to the third article of Higher Education Law No. 2547, which is in effect in Universities within Higher Education Institutions in the State of the Republic of Turkey, university institutions have scientific and technical autonomy and public legal personality and engage in advanced education, scientific and technical activities, both publishing and consulting; It is a higher education body made up of faculties, institutes, colleges, etc. institutions and authorit (Higher Education Board, RG: 6.11.1981 / 17506/3)

According to Article 130 of the Constitution of the Republic of Turkey, universities with scientific and technical independence that have a public legal personality made up of various authorities, with the intention of providing educational opportunities, are affiliated with YÖK. "With the aim of creating a workforce compatible with the needs of the people and the nation within the framework of a plan and programme based on modern education-training criteria" (Constitutional Court, RG: 12.08.2006/26257/130).

According to the Constitution of the Republic of Turkey; YÖK has the authority to control, review, appoint and suspend duties, etc. in university institutions (Gözler, 2009: 235). YÖK is an independent institution and organization that has a public legal personality, coordinates all higher education and fulfills its own duties and responsibilities within the scope of legal regulations by channeling it into the plans and programs of higher education institutions and organizations (Kılıç, 1999: 292). It is a tutelage control due to the fact that the institutions affiliated to YÖK and two affiliated institutions between universities have their own public legal entities.

The functions of universities are gathered in three basic groups as education, scientific research, society and public service. The organs of the universities consist of the rector, the university senate and the university administrative board. In our country, we can examine the organization of universities in two ways: academic and administrative organization.

The academic structure formed by the university institutions is formed by an upside-down relationship starting from the rectorate, the most authoritative administrator of the institution, and extending to all the personnel in the academic authorities. The academic structure of university institutions and organizations consists of rector, senate, university administrative board, faculty, institute, college, department, department or main art branch, science or art branches, research and application centers and academic staff (Özdemir, 2017: 48).).

The organization of the academic organization of the universities takes place in the parent-child relationship, starting from the rector's office at the top of the institution, extending to all university members within the academic organization scheme. First and foremost, the rector in the academic organisation chart of the universities, the senate and the university administrative board that assists the rector in both management and audit issues, the faculties, institutes, colleges, faculties, institutes and colleges that are included in the academic organisation chart, department, department or main art, science or branches of art, research and application centres, and academic staff (Özdemir, 2017: 179).

In all universities, all transactions and organizations of all administrative and academic authorities associated with the university, both financial and non-financial economic, enter the internal audit management system. The internal audit practice in public universities became operational with the implementation of the PFMC No. 5018 in 2006. (Ekiz, 2011: 33). Internal auditing practises ensure that the audit organisations implemented in academic institutions are planned and coordinated, provided that they do not conflict with the laws and regulations currently in effect, strategic plans and programmes, development goals, mission, vision, goals, and strategies of academic institutions and organisations, and by ensuring that reserves are used appropriately and effectively, information, and It is intended to ensure the integrity and guarantee of academic standards (www.yok.gov.tr).

As a result of the activities of the persons responsible for performing the internal audit, the internal auditor is responsible for taking the necessary measures to minimize the risks by ensuring that the tangible and moral assets of the universities are protected, by identifying risk situations that may negatively affect the activities of the universities, and always reviewing the measures and determination of risk ratios makes recommendations to the competent authorities within the framework of these headings. In addition to creating an objective guarantee in university institutions and organizations, being an internal audit, most importantly, it contributes to the improvement of risk management, review and management stages, providing an autonomous and impartial consultancy service in the institution, providing information and documentation.

5. DATA AND METHODOLOGY

All administrative and academic authorities in universities enter all transactions and organizations, both financial and non-financial, into the internal audit management system. Therefore, the importance of the internal audit system in universities is great. In line with this information, the effectiveness of the internal audit system in universities and its compliance with international internal audit standards are important.

In this study, it is aimed to determine the problems experienced during the implementation of the internal audit system in state universities, which are a public administration, within the framework of international internal audit standards. Solution suggestions were made to the identified problems. In this research, a field study was conducted to determine the perceptions of senior supervisors working at Dicle University about the internal audit system at the university and their thoughts on compliance with international auditing standards.

The application part of the research consists of two parts. The first part consists of 5 questions to determine the demographic characteristics of the personnel participating in the research. In the second part of the research, it consists of 26 statements that will determine the opinions of the personnel on the harmonization of internal audit with international internal audit standards within the scope of the study.

The universe of the research consists of the staff of Dicle University. A face-to-face questionnaire was applied to 100 randomly selected personnel for the research. All questionnaires were returned, but 10 questionnaires were excluded from the study due to incomplete or incorrect filling. A total of 90 survey data were included in the study. Frequency analysis was used in the evaluation of the survey questions of the study. Obtained results are presented in tables and interpreted. The Cronbach's Alpha value for the safety of the research statements was determined as 0.908. This result indicates that the research statements are reliable.

6. EVALUATION OF RESEARCH FINDINGS

Demographic characteristics of the personnel participating in the research are shown in Table 1.

Table 1: Descriptive Statistics on the Demographic Characteristics of the Participants

Age	**Frequency**	**Ratio %**	**Number of Employees**	**Frequency**	**Ratio %**
30 year and under	26	28.9	10 and below	12	13.3
31-44 years old	35	38.9	11-20 person	18	20.0
45 year and older	29	32.2	21 person and more	60	66.7
Total	90	100.0	**Total**	90	100.0
Task	**Frequency**	**Ratio %**	**Gender**	**Frequency**	**Ratio %**
Manager	29	32.2	Female	11	12.2
Assistant director	26	28.9	Male	79	87.8
Dean	9	10.0	**Total**	90	100.0
Vice-dean	16	17.8	**Professional Experience**	**Frequency**	**Ratio %**
Faculty Secretary	10	11.1	4-10 year	13	14.4
Total	90	100.0	11-20 year	30	33.3
			21 year and more	47	52.3

	Total	90	100.0

Table 1 shows the demographic characteristics of the participants. According to Table 1, it is seen that the majority of the participants are male. It was determined that the majority of the participants were 31 years old and over, middle-aged. It is seen that 60% of the university units employ 21 or more personnel. It is seen that half of the participants have 21 years or more professional experience. It was determined that the highest participants were principals (32%), and the lowest participants were deans (11%).

Table 2 contains statements and descriptive statistics to determine the opinions of the participants on internal audit and its compliance with international internal audit standards.

Table 2: Descriptive Statistics of Participants on Internal Audit Role

Questions	**Stringly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**	**Total**	**Mean**	**Standard Deviation**	**Sequence**
The internal audit activity is an independent function.	4	14	20	37	15	315	3.50	1.083	12
The reports prepared as a result of the internal audit activity objectively show the financial status of the institution.	4	12	29	36	9	304	3.39	0.989	13
The internal audit activity protects against possible risks.	3	7	14	53	13	336	3.73	0.921	10
Internal auditing is an activity that ensures the effectiveness of controls at the organization's objectives.	3	6	10	59	12	341	3.79	0.880	8
Senior management in administrations should adopt and own the internal audit system.	3	5	2	43	37	376	4.18	0.966	4
Seminars on the internal audit profession should be given to all staff at the university.	3	11	4	52	20	345	3.83	1.019	7
Internal audit units at universities should be independent and impartial.	2	3	6	35	44	386	4.29	0.902	1
Audit personnel should have easy access to information and documents in their duties and all personnel should support internal auditors.	1	5	3	45	36	380	4.22	0.845	2
Audit personnel should be given training on their professional development.	1	3	6	48	32	377	4.19	0.791	3
Collaboration should be made with external auditors.	1	3	7	55	24	368	4.09	0.759	5
Internal audit units should have an independent budget.	3	14	15	44	14	322	3.56	1.038	11
Internal audit activities are carried out continuously at the university.	5	15	24	39	7	298	3.30	1.023	16
University staff are independent in the internal audit activity.	4	21	30	29	6	282	3.13	0.996	18
Internal audit reports at the university are effective in the plans and decisions of the institution.	4	13	30	36	7	299	3.32	0.969	15
We have a suitable environment for internal audit activities and technology is used effectively.	1	17	27	37	8	304	3.38	0.931	14
We have sufficient internal auditors at our university.	6	23	29	26	6	273	3.03	1.043	20
In our country, in-service training that supports the continuous professional development and competence of the internal auditor is sufficient.	7	38	29	13	3	237	2.63	0.941	24

Sufficient awareness has been formed in our university about the importance and necessity of internal audit.	9	38	27	12	4	234	2.60	0.992	25
Internal audit services at the university are carried out in accordance with international auditing standards.	4	28	39	16	3	256	2.84	0.885	22
Those working at the university have knowledge of international auditing standards.	8	39	32	8	3	229	2.54	0.901	26
Other personnel belonging to the system at the university have the necessary knowledge, skills and other qualifications to fulfill their responsibilities in the field of supervision.	6	28	40	14	2	248	2.76	0.878	23
The internal audit legislation and standards in our country are sufficiently understandable, clear and applicable. Legislation is sufficient.	3	20	44	18	5	272	3.02	0.886	21
Internal audit at the university is seen as consisting only of financial auditing. Other types of controls are ignored.	4	26	22	33	5	279	3.10	1.028	19
The internal audit unit at the university receives sufficient support from the senior management during the performance of its audit activities.	3	15	35	32	5	291	3.23	0.912	17
The implementation of international auditing standards plays an important role in the institutionalization of the university.	1	5	10	54	20	357	3.97	0.813	6
The implementation of international auditing standards ensures that the internal auditor, their supervisors, and the work and transactions at the university are carried out according to certain rules.	1	6	19	53	11	337	3.74	0.801	9

Table 2 shows the answers given by the participants to the survey questions regarding the role of internal audit. According to Table 2, the statement with the highest average of the participants is **"Internal audit units in institutions should be independent and impartial."** has been determined. **"Audit staff should have easy access to information and documents in their duties and all staff should support internal auditors."** is the second expression with the highest mean. **"Inspection personnel should be given training on their professional development."** The expression was determined as the third expression with the highest mean.

In addition, according to Table 2, **'The people working at the university have knowledge about international auditing standards.'** The expression was determined as the expression with the lowest mean. **"Adequate awareness has been formed about the importance and necessity of internal auditing in our institution."** It is seen that the expression has the second lowest mean. **"In our country, in-service training that supports the continuous professional development and competence of the internal auditor is sufficient."** The expression was determined as the third expression with the lowest mean.

In general, it is seen that the participants of the research have an indecision about their working statements. Particularly, while disagreement comes to the fore in statements about international auditing standards, it is observed that the state of agreeing with statements about the role of internal auditing has increased.

7. CONCLUSION AND SUGGESTIONS

With the approval of the Law No. 5018, it is a strong practice in terms of preventing the spread of illegal activities in public administrations as a result of the effective use of auditing rules in universities that are public administrations at the point of realization of internal audit practices, which is a large-scale application area in public administrations, and in terms of prevention against possible negativities and dangers. It can be said that the reports are transparent, accountable, free from discussions and have a reassuring feature. However, it is necessary to increase the number of well-equipped internal auditors who have sufficient knowledge and experience about the legislation by increasing the lack of in-house training in order to carry out the internal audit activities in a more effective and powerful way in the administrations. In order to increase the rate of influence of Internal Audit, it is thought that the incentive of senior management to internal audit needs to be increased.

In a broad sense, there should be no problem in terms of providing direct connection with the senior administration, and that the employees and top managers of the organization in public institutions and organizations consist of individuals with the training and equipment needed within the scope of internal audit. T.R. It is seen that not all of the internal auditor positions are vacant in only twenty of the one hundred and two public universities that are in the 'Public Internal Auditor Staff' of the Ministry of Treasury and Finance on 25.12.2019.

The fact that legal changes, internal audit rules, and professional ethics standards within the scope of internal audit in Turkey are transparent and understandable demonstrates that public internal audit rules are compatible with global rules and can be implemented in public universities.

As a result of this study, it is thought that the internal audit activities of the university staff are insufficient, there is not enough internal auditor in the university and the information about the internal audit activities is insufficient. In particular, the university should attach importance to the awareness-raising activities of the senior management personnel regarding internal audit. Because internal audit activities directly contribute to the efficient work of university personnel. Therefore, in-service training activities should be increased to increase the efficiency of internal audit units in universities. In addition, it is seen that there are not enough internal audit personnel in universities. In particular, universities should allow more internal auditors to work on this issue.

Another important result determined as a result of the study was that the knowledge and awareness levels of university personnel (senior level) both regarding audit activities and international internal audit standards were found to be quite insufficient. Providing trainings on raising awareness and harmonization of activities according to international standards in universities at regular intervals will fill the gap in this regard. In addition, in-service training programs should be included in which not only senior personnel but also internal auditors can improve themselves.

This study was carried out on senior staff working at Dicle University. In future studies, studies should be carried out on different universities and units, and awareness-raising activities should be provided in both universities and public institutions and organizations about the effectiveness of internal audit activities.

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THE IMPACT OF DIVIDEND DISTRIBUTION ANNOUNCEMENTS ON STOCK PRICES: AN EVENT STUDY AT THE ISTANBUL STOCK EXCHANGE

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ABSTRACT

Purpose- The dividend is an essential part of the company's financial image. Because of its long-term growth, it is an overall source of return for an investor and a reliable predictor of the company's valuation. According to dividend distribution theory, when a corporation decides to disclose its dividend payment policy to indicate the market where it is now processing prospects, the price of its shares changes. The purpose of this article is to show how share prices on the Istanbul Stock Exchange react after dividends are distributed.
Methodology- The data from the Daily returns Series from the Turkish Financial Market between 2011 and 2017 was used to fulfill the goal of the study. The effect of the32 dividend announcement events for 8 banks on the 20-day announced stock price was examined using an event study approach which aid in predicting what stocks will look like in response to an event announcement.
Findings- The findings revealed that the market response was positive and the stock values have increased after dividend announcements. The market models CAR(5.0) and CAR(10.0) have statistically significant abnormal returns (AR0) and abnormal cumulative returns. Also, The tracking of the daily average return separately for each day showed that AAR's profit distribution day was 0.49 %, the fourth day had the highest positive increase of 0.56 %, and the fifth day had a positive high positive return of 0.47 %.
Conclusion- The results of this empirical study show that stock prices change after dividend announcements, and that support the dividend notification theory, which states that dividend announcements have a significant impact on stock prices. The researchers propose extending the run window to 61 days rather than 21 days in order to monitor the continued decline ten days after the event.

Keywords: Dividend distribution, event study, stock market reactions, Istanbul Stock exchange
JEL Codes: G20**,** G21, G41

1. INTRODUCTION

The dividend is a significant aspect of the company's financial profile. It is an overall source of return for an investor and a dependable predictor of the company's valuation because to its long-term growth. However, it is still a very complex variable with a difficult impact on the company's worth (Black, 1976). In general, dealing with it entails either severely disappointing the market or growing natural resources in naturally favorable situations.

There is consensus on the impact of dividend change disclosures on the firm's value. On the other hand, the debate over the cause of this market reaction rages on. The first explanation of the impact of dividend changes on the value of the firm is based on the future income reporting assumption developed by (Bhattacharya, 1979; Miller and Rock, 1985; John and Williams, 1985). With this assumption, managers will use information to inform outside shareholders about the company's current and future earnings via dividends. The greater the change in dividend, the better the expected results, and thus the higher the stock price, and vice versa if dividend cuts are announced. Through the concept of discretionary funds, the agency's theory explains, albeit in part, significant differences in how investors pay dividends. (Jensen,1986) identifies discretionary funds as the source of funds after funding all positive net present value projects at a discount rate equal to the cost of capital. The presence of large prudent funds can lead to a conflict of interest between management and shareholders, as the former tend to invest these funds primarily in projects aimed at increasing the firm's size or diversifying its operations. Second, it

seeks to re-distribute these funds. If changing the dividend is one way to reduce the risk of reducing funds available to executives and investing those funds in projects with negative net present value (excessive investment risk), investors should announce significant dividend changes. Their reaction should be proportional to their exposure to this excessive investment risk: the higher the risk, the more sensitive the stock price should be to the announcement.

This article will add to the existing literature on this topic in a variety of ways. First and foremost, the dividend notification is seen to be in line with the stock market price, and the increase in the price of the securities is also tested. Second, we attempted to identify the factors influencing dividend quality on the Istanbul Stock Exchange. Finally, the effect on stock price is investigated by focusing on stock buying and selling trends that follow stock traders' dividends from stock trading. The study's goal is to see if there is any correlation between the dividend declared by banks and the effect of these announcements on the share price. Other dimensions, such as market efficiency, insider trading, and corporate expenses, should be established based on the announcement's positive or negative impact on returns on equity. Following the collection of bank dividend statements, data collection sequences began with stock returns. There were approximately 32 dividend announcements for which sufficient data was available for the research and forecast window.

This article is organized around three main themes. First, we summarize the current theories and literature review on the impact of dividend announcements. Second, we represent the data and methodological aspects. Finally, the results obtained are presented and interpreted, followed by an overall conclusion.

2. THE DIVIDEND ANNOUNCEMENTS THEORIES AND LITERATURE REVIEW

2.1. The Market Reactions to Dividend Announcements Theories

Three lines of thought diverge from the extensive literature on dividends and their impact on stock returns. These are the "dividend neutrality" "bad dividends," and "beneficial dividends" schools of thought. As a result, the famous (Modigliani and Miller, 1961) articles were specifically focused on the theories of signaling, agency, and client effects; much work has been done to control the effect of dividend policy on firm value. However, with the current evolution of financial theory and the emergence of so-called behavioral finance, new arguments for market inefficiency are emerging.

2.1.1. Signal Theory and Market Reactions to Dividend Announcements

Many studies on the impact of dividend policy have been conducted in various ways, but the analysis in terms of market signaling is the most contentious. While there is widespread agreement that markets react to dividend announcements, there is no irrefutable evidence of a link between dividend policy and stock market response. The dividend is an important signal for investors, according to the majority of authors (Calvi-Reveyron, 1999; Harada and Nguyen, 2005; McCluskey et al., 2006). Dividend increases result in positive returns, while dividend decreases result in negative returns. However, some authors do not agree with these findings. Some studies show that dividend changes have little impact on markets (Conroy et al., 2000) and almost no impact on the company's value (Benartzi et al., 2005).

2.1.2. Agency Theory and/or Free Cash Flows and Market Responses in Dividend Announcements

According to agency theory, a dividend increase is beneficial to the firm because it helps to significantly reduce agency costs (Allen et al., 2000). To that end, the risk of overinvestment or free cash flow, or the risk of discretionary funds being invested in unprofitable projects, justifies investors' reaction to dividend changes (Jensen, 1986). If this is the case, it is an effective way to reduce the discretionary funds available to dividend leaders while also lowering the risk of over-investment. Investors should pay close attention to news of significant variations in profits. The severity of this reaction should be proportional to their exposure to such a risk. More importantly, the stock price should be more sensitive to dividend announcements in either direction. The weaker the reaction, the less significant the reaction (Denis et al.,1994) and (Poulain-Rhem, 2005).

2.1.3. Dividends and Insider Trading

There is also some work being done on the analysis of market reactions to dividend announcements, as well as transactions made by insiders on the date of the announcement. The insider trading agreement's purpose is to ensure that everyone has access to information that is available at the same time and that everyone has the same information. (Cheng et al., 2007) addressed this aspect of the question; however, their comments generally agree with (John and Lang, 1991) conclusions. Second, it demonstrated that the informative value of a dividend increase is inextricably linked to the second signal, insider trading. As a result, the market will value the informative content of any significant increase in dividends over the activities of participants prior to the announcement date. The most important contribution of this study is that it shows that observed insider trading can cause investors to react negatively to significant increases in dividends unless they anticipate rather than acquire shares. Dividend growth does not always result in value creation. In other words, a significant increase in dividends is bad news for the markets. As a result, the size and significance of insider trading in the period preceding the announcement date influence the announcement effect of a significant dividend increase.

2.1.4. Asymmetry Information and Dividends

When a person has more information about risk, information asymmetry occurs, contracts or transactions with another person or people. According to signaling theory, managers obtain more information about real value from investors and use dividends to communicate this information to the market. In other words, there is a positive relationship between information asymmetry and dividend policy (Alamdari, 2016).

Table 1: Comparison between Dividend Theories Impact

The Theory	The Impact
Signal Theory	Dividend increases result in positive returns, while dividend decreases result in negative returns.
Agency Theory	A dividend increase is beneficial to the firm because it helps to significantly reduce agency costs
Dividends and Insider Trading	The size and significance of insider trading in the period preceding the announcement date influence the announcement effect of a significant dividend increase.
Asymmetry Information and Dividends	There is a positive relationship between information asymmetry and dividend policy

2.2. LITERETURE REVIEW

Many other studies were later conducted to confirm the impact of dividend announcements on stock prices, and their findings were consistent with the previous four theories.

Aditya and Ashok (2017) investigated the stock price reactions to stock dividend announcements 30 days before and after the announcement dates of publicly traded companies from 2006 to 2012 in the CRSP historical data set. The study found a significant reaction in stock prices around the event date. Stock prices rose in response to dividend announcements.

Chanchal and Paromita (2017) empirically examined the price behavior around cash dividend announcements of companies, National Stock Exchange of India Limited (NSE). The article uses standard “event study” methodology based on a market model on a sample of 210 dividend announcements. The study finds that larger payouts experience greater stock returns than smaller payouts immediately after dividend announcements. However, stock returns after dividend announcements do not vary with company size.

Lotfi (2018) investigated the stock price reaction to dividend announcements by firms listed on the Tunisian Stock Exchange (TSE). A traditional event study was created by the researcher. The robust results showed that when the 196 dividend announcements between 1996 and 2004 are examined, the result is inconsistent with signaling theory, as long as no abnormal return is observed on the announcement day (event period).

Om and Goel (2018) studied 60 companies listed on the Bombay Stock Exchange from 20 days before the announcement to 20 days after the announcement. According to the study, there is no statistically significant difference between the pre and post window. The study's findings show no strong evidence that stock prices react significantly to dividend announcements on the stock exchange.

Similarly, Marisetty (2018) conducted an event study on 120 stocks that distributed cash dividends in 2016 and discovered that there is a dividend signaling hypothesis and that the market is semi-strong form efficient to adjust the dividend announcement on the share price within the event window.

Seyedimany (2019) examined the effect of special dividend announcements for five NASDAQ-listed companies from 2014 to 2018. The study looked at stock price reactions to special dividend announcements for 40 days before the event and challenged dividend signaling theory. As a result, do not confirm that the announcement of a dividend has a significant impact on the price of shares. And the findings support Miller and Modigliani's (1961) dividend irrelevance hypothesis.

Ozo and Arun (2019) used the event study methodology to investigate the effect of dividend announcements on stock prices in Nigeria. The findings support the signaling hypothesis: dividend increases are associated with positive stock price reaction, while dividend decreases are associated with negative stock price reaction. Companies that do not change their dividends see marginally positive abnormal returns.

Zahan and Rana (2020) used MAAR and CAAR to test the effect of dividend announcements on the Dhaka Stock Exchange in Bangladesh, using 21 listed companies, which slows significant dividend signaling while some companies are efficient and others are not.

Similarly, Hariyanto and Murhadi (2021) conducted a study in 2018 in ASEAN countries, and the findings agreed with dividend signaling theory and demonstrated the presence of a semi-strong form of efficiency in ASEAN stock markets.

Pournima and Huma (2021) conducted a systematic review of dividend announcements and examined the effect of dividend announcements on stock prices of service providers listed on the National Stock Exchange of India by using event study methodology. The study's findings revealed that stock prices react to a company's dividend announcement event, and thus there is a significant impact of dividend announcement on stock prices during the event window, resulting in abnormal returns.

Chanchal et al., (2021) used 3,671 cash dividend announcements from 2012 to 2019 to examine how stock prices behave following cash dividend announcements in the Indian equity market. they discovered that cash dividend announcements generate abnormal stock returns in the Indian equity market immediately after the dividend announcement. However, this effect is only temporary, and stock prices gradually return to normal.

Furthermore, Chou et al., (2021) examined the reaction from 358 companies from 2016 to 2018 and discovered strong dividend signaling and semi-strong form, as well as a strong relationship between dividend yield and systematic risk on market reaction to dividend announcements, which provides insights on variables controlling market reaction to dividend announcements.

The event study approach was also used in the study of (Nidar and Maraya, 2021) to analyze the return of the reaction of the announcement of stock dividend. The findings revealed that there is no significant positive abnormal return to the announcement of stock dividends around the event period; likewise, no average abnormal return is greater in companies issuing initial stock dividends compared to companies issuing subsequent stock dividends; and finally, no average abnormal return is greater in companies issuing high stock dividend ratio compared to companies issuing low stock dividend ratio.

3. DATA AND METHODOLOGY

3.1. Sample Selection

The primary goal of this research is to look into the impact of dividend announcements on stock returns. Dividend response will be controlled in stock returns as of the dividend announcement date using Event Study. Data for this study were manually collected from the Turkish Financial Market (www.investing.com) from 2012 to 2017. The most recent observations include 32 dividend announcement events for 8 banks. This study looked at the effect of dividend announcements on stock prices ten days before the announcement date and ten days after the announcement date.

Table 2: Number of Events for Different Banks

No	Bank Name	Bank Code in Istanbul Stock Exchange	Numbers of Events
1	Akbank	AKBNK	4
2	Halkbank	HALKB	4
3	Isbank	ISCTR	4
4	Garantibank	GARAN	4
5	Yapı ve Kredi Bank	YKBNK	3
6	Vakıfbank	VAKBN	6
7	Albaraka Bank	ALBRK	2
8	TS Bank	TSKB	5
	TOTAL		32

3.2. Event Study Methodology

Event study methodology is one of the most popular research methods for calculating the economic impact of an event by observing the event's safety effects. Event studies aid in predicting what security will look like in response to an event announcement. The event can have an impact on the security's value, either positively or negatively. Mergers and acquisitions, spin-offs, stock dividends, bonus shares, mergers, and other financial transactions are the most successful applications of event studies. It took place in conjunction with corporate events such as The impact of cash dividend notifications is examined in this context using the event study methodology (Brown and Warner, 1985; Mackinlay, 1997; McWilliams and Siegel, 1997; Peterson, 1989). The reasoning behind using this methodology is to assess the economic impact of an event by observing security prices over a relatively short period of time (Mackinlay, 1997). Within the context of this literature, this study examines the differences in the information conveyed in cash dividend announcements. The event study methodology is a popular approach for calculating abnormal returns (Brown and Warner, 1985; MacKinlay, 1997). It consists of specifying the relevant event, event window, forecast window, and forecast model (Bowman, 1983). To calculate expected (normal) returns, the methodology employs the "market model."

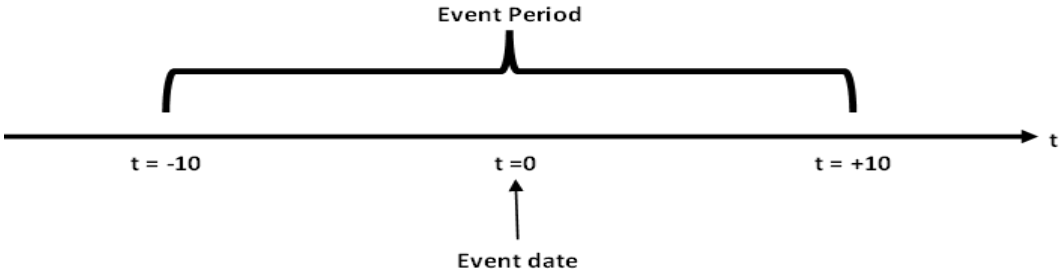
Event studies are statistical techniques used in the analysis of stock prices and returns when a special event occurs in our study (profit share notification). In this case, the case study methodology is as follows (Shweitzer, 1989):

Event date: The profit distribution date on which the board of directors proposes the dividend, denoted by t = 0.

Activity window: The activity period is responsible for correcting the time period, including the share prices of the banks. Before this possible pre-event response, a wide selection of event windows (-10, +10) is made, i.e. 10 business days up to 10 business days after the event.

Forecast period: This is the time period preceding the event window that is used to estimate the Market Return parameters (αi; βi).

Figure 1: Time Scale for the Event Study



Daily closing prices were used to calculate the actual return for each stock and the market index using the following formula:

$$R_{it} = \frac{P_{it}}{P_{it-1}} - 1 \quad (1)$$

R_{it} is the actual rate of return (t) on the date of the stock (i),

P_{it} and P_{it-1} show closing stock prices on dates t and t-1.

The rate of return for each stock during the forecast period is used to predict the market model (αi; βi).

$$E(R_{it}) = \alpha_i + \beta_i Rm_t + \varepsilon_t \quad (2)$$

$E(R_{it})$ are the expected returns on stock (i) at date (t).

Rm_t is the returns on the BIST 100 Market index at (t) date.

The market model is then used to calculate the expected rate of return for each stock over a 21-day period, 10 days before and 10 days after the profit distribution announcement day.

Abnormal return AR_{it} is calculated for each stock on each of the 21 days:

$$AR_{it} = R_{it} - E(R_{it}) \quad (3)$$

The average daily abnormal return AAR_t is calculated for each day during the activity period:

$$AAR_t = \sum_{i=1}^{n} \frac{AR_{it}}{n} \quad (4)$$

The cumulative average abnormal return $CAAR_j$ is calculated as:

$$CAAR_j = \sum_{i=1}^{j} AAR_{it} \quad (5)$$

5. FINDINGS AND DISCUSSION

Trough the period between 2012 and 2017, there are 32 events for 8 Turkish banks. Table 3 displays the descriptive statistics and t-test of abnormal returns for various time windows due to profit distribution in the banks studied.

Table 3: Average Abnormal Return, Cumulative Average Abnormal Returns and T-Values of the Stock

Event	CAR(10,0)	CAR(5,0)	CAR(2,0)	AR(0)	CAR(0,-2)	CAR(0,-5)	CAR(0,-10)
event 1	4,06%	1,27%	-0,25%	-0,01%	0,12%	0,62%	-0,49%
event 2	2,02%	-0,21%	-0,87%	1,32%	-1,64%	0,85%	-0,27%

event 3	-1,33%	2,19%	-1,22%	0,74%	0,09%	-1,82%	-0,23%
event 4	2,84%	3,14%	2,59%	-0,60%	1,31%	4,40%	4,88%
event 5	0,01%	1,20%	-0,81%	-0,43%	3,04%	3,27%	3,24%
event 6	4,06%	2,23%	-0,07%	-0,12%	-0,60%	-1,79%	-10,04%
event 7	-0,62%	-1,67%	-0,52%	1,02%	2,39%	1,12%	0,63%
event 8	-4,43%	-2,01%	-0,23%	0,65%	0,22%	2,18%	8,84%
event 9	4,74%	5,21%	1,80%	-0,54%	0,70%	1,45%	3,69%
event 10	1,85%	0,18%	-1,27%	0,34%	0,42%	-1,80%	-3,48%
event 11	-1,16%	-0,02%	-1,48%	1,04%	-0,07%	-3,29%	-3,67%
event 12	4,25%	4,31%	2,18%	0,41%	2,89%	3,44%	2,83%
event 13	-1,34%	0,17%	0,49%	1,09%	-0,91%	-3,64%	-1,55%
event 14	-1,82%	3,63%	2,17%	0,71%	-3,59%	-0,85%	-0,20%
event 15	-0,13%	0,34%	0,83%	1,58%	-1,48%	-1,66%	-2,54%
event 16	0,53%	-4,46%	-2,59%	0,30%	0,09%	-0,22%	0,41%
event 17	-1,57%	1,07%	-0,50%	0,70%	-1,87%	-2,71%	-3,76%
event 18	4,98%	6,32%	1,73%	0,02%	-1,50%	3,34%	3,22%
event 19	-1,39%	2,71%	-0,35%	2,07%	-3,54%	-3,01%	-1,64%
event 20	-1,17%	0,20%	0,11%	-0,34%	2,08%	1,37%	2,59%
event 21	3,38%	0,90%	0,16%	2,31%	1,64%	4,70%	0,30%
event 22	-4,88%	-1,27%	-2,00%	0,70%	-0,54%	-1,07%	-3,67%
event 23	-0,16%	1,47%	-0,77%	0,01%	2,42%	3,93%	7,42%
event 24	0,75%	-0,44%	0,82%	-0,94%	0,55%	-5,95%	-8,04%
event 25	5,75%	2,74%	2,17%	-1,93%	1,18%	0,81%	1,71%
event 26	-5,22%	-1,80%	-0,50%	0,09%	-0,14%	-0,24%	0,59%
event 27	0,39%	0,30%	0,95%	1,47%	-0,16%	-0,66%	-0,82%
event 28	0,46%	1,15%	0,47%	-0,65%	0,03%	-1,27%	-1,79%
event 29	-3,20%	-1,85%	-1,30%	0,62%	0,63%	-0,41%	-4,45%
event 30	6,64%	-1,13%	1,20%	3,51%	-1,32%	1,05%	-1,73%
event 31	-0,72%	-1,72%	-1,31%	1,90%	0,14%	-1,28%	-4,71%
event 32	4,38%	6,22%	1,22%	-1,48%	-2,23%	3,00%	2,98%
MAX	6,64%	6,32%	2,59%	3,51%	3,04%	4,70%	8,84%
MIN	-5,22%	-4,46%	-2,59%	-1,93%	-3,59%	-5,95%	-10,04%
AVG	0,69%	0,95%	0,09%	0,49%	0,01%	0,12%	-0,31%
SUM	21,94%	30,38%	2,88%	15,55%	0,35%	3,88%	-9,76%
COUNT (-)	15	11	17	10	14	17	18
COUNT (+)	17	21	15	22	18	15	14
p-value	0,11	0,02	0,35	0,01	0,49	0,40	0,67
% +	53,125	65,625	46,875	68,75	56,25	46,875	43,75
% -	46,875	34,375	53,125	31,25	43,75	53,125	56,25

CAR (10,0): Accumulated abnormal returns calculated between 0 and 10 days after the event.
CAR (5.0): cumulative abnormal returns calculated between 0 and 5 days after the event.
CAR (2.0): Total abnormal returns calculated between 0 and 2 days after the event.
AR (0): Abnormal returns generated on 'Day 0'
CAR (0,-2): Total abnormal returns calculated between 0 and 2 days before the event.
CAR (0,-5): Cumulative abnormal returns calculated between Day 0 and Day 5.
CAR (0,-10): Cumulative abnormal returns calculated between days 0 and 10 before the event.

The average abnormal returns for the day of the event were AR (0) 0.49 percent, with a range of about 5.44 % between the high and low, indicating a significant difference in the changes in returns in one day.

Following the event, the CAR (2.0), CAR (5.0), and CAR (10.0) averages were 0.09 %, 0.95 %, and 0.69 %, respectively. Furthermore, the difference between the maximum and minimum value is 5.18 %, 10.78 %, and 11.85 %. Before the event, the mean of CAR (0, -2), CAR (0, -5), and CAR (0, -10) was 0.01 %, 0.12 %, and -0.31 %, respectively. Furthermore, the difference between the maximum and minimum value is 5.18 %, 10.78 %, and 18.88 %.

The findings revealed that the market response was positive on average for the CAR (5.0), while the CAR (10.0) showed a decrease in average relative to the CAR (5.0). This drop could be attributed to investors needing time to assess the market impact of the dividend distribution. Table 2 also includes the P-value for the z-test, which indicates whether or not abnormal returns are greater than zero. The results revealed that the AR (0) elicited the greatest reaction, which was statistically significant at 0.01. CAR (5.0) and CAR (10.0) were both significant at 0.05 and 0.1. Other mean returns did not meet the statistical significance threshold.

To explain some of the results in Table 2, the daily average return should be tracked separately for each day. Table 4 and Figure 2 show that AAR's profit distribution day was 0.49 % (as previously stated), the fourth day had the highest positive increase of 0.56 %, and the fifth day had a positive high positive return of 0.47 %. This accounts for the 0.95 % increase in CAR (5.0). An abnormal negative return was observed on the sixth, seventh, eighth, and tenth days, explaining the drop in CAR (10.0) to 0.69 %.

Table 4: Average Abnormal Returns (AAR), Cumulative Average Abnormal Returns (CAAR)

	AAR	CAAR
10	-0,07%	0,87%
9	0,09%	0,93%
8	-0,05%	0,84%
7	-0,17%	0,88%
6	-0,07%	1,06%
5	0,47%	1,13%
4	0,56%	0,66%
3	-0,17%	0,10%
2	0,10%	0,27%
1	-0,01%	0,18%
0	0,49%	0,18%
1-	0,22%	-0,31%
2-	-0,21%	-0,53%
3-	-0,20%	-0,32%
4-	0,05%	-0,12%
5-	0,26%	-0,17%
6-	0,08%	-0,43%
7-	-0,10%	-0,50%
8-	-0,17%	-0,40%
9-	-0,23%	-0,23%

Figure 2: Average Abnormal Returns (AAR)

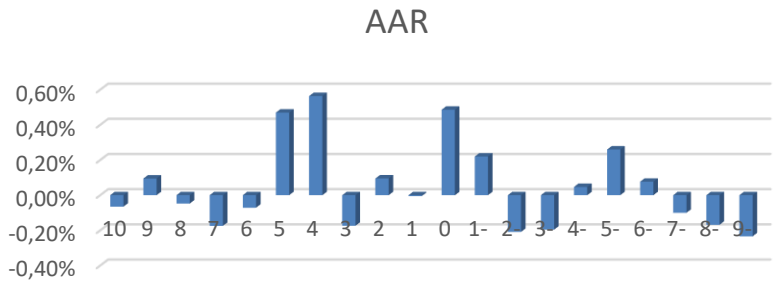


Figure 3: Cumulative Average Abnormal Returns (CAAR)

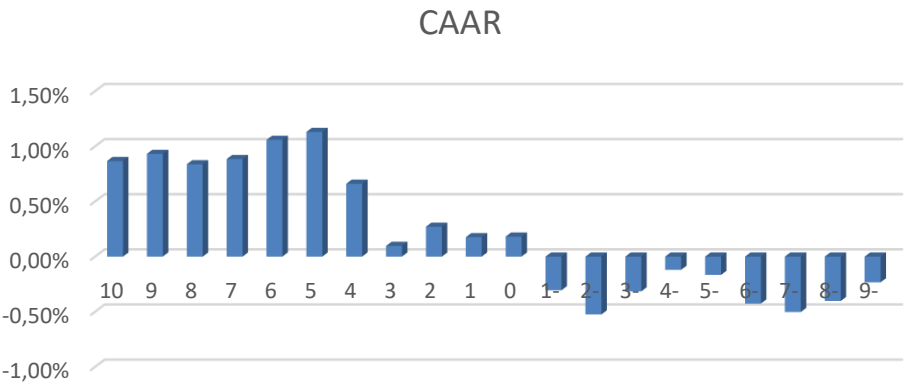


Figure 3 depicts CAAR exhibiting negative values in the days preceding the event, peaking at day five and then reverting to negative by day ten, with a slight improvement on day ninth. The results revealed that the event had a positive impact during the first five days, but a negative impact began between the sixth and tenth day, indicating that investors needed time to assess the impact of the dividend event.

6. CONCLUSION

Dividend announcements are one of the most essential data points made public in order to communicate the company's future prospects and growth to its shareholders. The primary purpose of this study is to investigate the impact of dividend announcements on stock returns. Dividend response in stock returns will be controlled using Event Study as of the dividend announcement date. From 2012 to 2017, data for this study were manually collected from the Turkish Financial Market. The most recent observations include 32 dividend announcement events for eight different banks.

According to the findings, the market reaction was positive, and stock prices increased following dividend announcements. The market models CAR(5.0) and CAR(10.0) have statistically significant abnormal returns (AR0) and abnormal cumulative returns. Furthermore, tracking the daily average return separately for each day revealed that AAR's profit distribution day was 0.49%, the fourth day had the highest positive increase of 0.56%, and the fifth day had the highest positive increase of 0.47%. The findings of this empirical study support the dividend notification theory, which states that dividend announcements have a significant impact on stock prices.

The researchers recommend extending the run window to 61 days rather than 21 days in order to monitor the continued decline ten days after the event.

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INVESTIGATING THE RELATIONSHIP BETWEEN MARKET VALUE-ADDED (MVA) AND ECONOMIC VALUE-ADDED MOMENTUM (EVAM): EMPIRICAL EVIDENCE FROM TURKIYE*

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ABSTRACT

Purpose- This study aims to investigate the possible relationship between market value added (MVA) and economic value-added momentum (EVAM). Besides, any possible linkage between leverage (in terms of the degree of combined leverage) and market value added is also tested.
Methodology- This study conducts a time series analysis to the quarterly data of manufacturing industry, comprising Borsa Istanbul (BIST) listed manufacturing firms for the period of 2001.q2-2022.q4 to test MVA-EVAM relationship. It employs autoregressive distributed lag (ARDL) bounds testing approach, developed firstly by Pesaran and Shin (1999) and further revised by Pesaran, Smith and Shin (2001). The stationarity of the series is tested by the Augmented Dickey-Fuller (ADF) and Phillips and Perron (PP) unit root tests.
Findings- Empirical findings from ARDL bounds testing approach refers the existence of long-run relationships between market value added and economic value added momentum; and market value added and degree of total leverage. The coefficients of the long-run form of ARDL model reveal that both economic value-added momentum and degree of combined leverage have statistically significant and negative effects on market value added. The estimated short-run coefficients indicate that economic value added momentum has significantly negative effect on market value added created as similar to the long-run finding. Another finding is that though leverage has significantly positive effect on market value added in the short-run, this positive effect turns out to be negative in lag one period.
Conclusion- This study contributes to the literature on MVA-EVA relationship by employing autoregressive ARDL bounds testing approach to manufacturing industry comprising Borsa Istanbul (BIST) listed manufacturing firms of Turkey as an emerging market. Besides, the research model includes EVAM -as an independent variable- that is so rarely considered in existing literature.

Keywords: Market value-added, economic value-added momentum, leverage, time series analysis, ARDL bounds testing approach.
JEL Codes: G32, C32, C58.

1. INTRODUCTION

The classical corporate finance theory states that the primary objective of financial management is to create maximum value and wealth for shareholders referred to as (shareholder) wealth-maximization paradigm. Focusing on this paradigm -in conjunction with three major functions of a finance manager as investment, financing and dividend decisions-, is a must for both financially stable businesses and overall economic stability (Kim, 2004). This focus requires contemporary, reliable and accurate performance evaluation measures. However, traditional measures such as return on assets (ROA), return on equity (ROE), return on (invested) capital (RO(I)C), net operating profit after taxes (NOPAT), return on sales (ROS), earnings per share (EPS), dividend per share (DPS), operating cash flow (OCF), and etc. have been strongly criticized due to their inability to consider the overall cost of capital (Rappaport, 1986; Stewart, 1991; Panigrahi et al., 2014); inconsistency problems that make them not much useful from the perspective of valuation and strategic value management guidance (Kim, 2004; Damodaran, 2005) and inaccuracies as performance measures leading to wealth-maximization (Johnson et al., 1985; Stewart, 1991). Consequently, especially since the early 80s, the need for connecting wealth-maximization paradigm with managerial decision processes has led to the emergence of new measures of performance, including economic value added (EVA), market

* This study is derived from PhD thesis titled as *The Effect of Economic Value Added on Stock Returns and Firm Value* prepared by Kartal Demirgunes, Niğde Ömer Halisdemir University, Institute of Social Sciences (2009).

value added (MVA), cash value added (CVA), discounted economic profit (DEP), shareholder value added (SVA), cash flow return on investment (CFROI), and etc.

EVA -as the most widely accepted measure among all- was firstly introduced in 1991 by a global consulting firm, Stern, Stewart & Co. It is a reconsidered version of shareholder wealth-maximization paradigm, that prioritizes shareholders as the primary stakeholders in hierarchical structure of any firm in evaluating economic and financial performance. However, the roots of EVA dates back to a well-known traditional accounting measure called residual income (or economic profit) as mentioned earlier by Marshall (1890), Scovell (1924) and Virtanen (1975). Residual income is, simply, calculated by subtracting capital charge from operating profit. EVA, as a variation of residual income with adjustments, differs from it by using net operating profit after taxes instead of operating profit in its calculation. The logic behind EVA is the calculation of value added created by any firm after deducting the overall cost of capital. This superiority of EVA to other measures has been supported by many researchers such as Lehn and Makhija (1996), Milunovich and Tsuei (1996), Bao and Bao (1998), Grant (2003), Worthington and West (2004) and, Lee and Kim (2009). Besides, within a short period, more than 300 worldwide companies including Coca-Cola & Co., Eli Lilly & Co., US Postal Service, Burton Group, SmithKline Beecham and Monsanto have adopted EVA to some degree and started disclosing their EVA information (Wallace, 1997; Ehrbar, 1998).

It can be concluded that existing literature on EVA mainly focuses on presenting, promoting and/or discussing EVA and its related concepts in relation to consulting firms and business consultants, mostly optimistically foregrounding advantages of these concepts. On the other hand, rejecting this optimism, some researchers have noted the existence of weak or no relationship between EVA and shareholder value or stock returns (see, for instance, Biddle et al., 1997; Chen and Dodd, 1997; Kramer and Pushner, 1997; Turvey et al., 2000; Ismail, 2006; Kyriazis and Anastassis, 2007, Kumar and Sharma, 2011).

This study aims to investigate the possible relationship between market value added (MVA) and economic value added momentum (EVAM). To the best of our knowledge, this is the first study that conducts a time series analysis to the quarterly data of manufacturing industry, comprising Borsa Istanbul (BIST) listed manufacturing firms for the period of 2001.q2-2022.q4, addressing MVA-EVAM relationship in Turkey. Besides, any possible linkage between MVA and leverage (in terms of the degree of combined leverage) is also tested. The empirical findings of the study are expected to fill the gap in existing literature and guide firm managers and investors to re-evaluate their asset allocations.

The remainder of the paper is as follows. In section two, a brief literature review is presented. Section three is about the sample, data, variables, the research model and empirical findings. Finally, section four summarizes the findings and concludes the discussion.

2. LITERATURE REVIEW

Though EVA has been subject of many studies due to its adaptability to integrated financial management systems (Stern et al., 1996); it is possible to mention that the majority of these studies has focused on analyzing EVA and its related concepts in relation to business world in a descriptive manner, paying no or a little attention on empirical findings [see, for instance, studies on EVA philosophy (Tully, 1993); implementation process of EVA (Ehrbar, 1998); EVA's role in CEO performance evaluation (Coles et al., 2001), optimal resource allocation (Zimmermann, 1997; Rompho, 2009) and formulation of organizations' strategic targets (Bahri et al., 2011)].

It is expected that the market value of a firm is the sum of invested capital (at the beginning) and discounted value of expected EVAs in the future. Therefore, integrating EVA into entire firm as a predictor of financial and business performance should provide significant benefits. From viewpoint of wealth-maximization paradigm, the general objective of EVA-related empirical studies is two-fold as: (*i*) to address whether EVA (and/or MVA) is superior to traditional accounting-based financial performance measures such as ROA, ROE, ROIC, ROS, EPS and DPS, etc. in explaining stock returns and market values; and (*ii*) to investigate the correlation between EVA and MVA.

Stewart (1991) and Stern et al. (1996) argue that accounting measures (and even cash flow) mostly lack of evaluating firm performance; and underline EVA's close linkage to firm's market value and its significant effect on MVA. Similarly, studies of Lehn and Makhija (1996) and Uyemura et al. (1996) using samples of 241 large US firms and 100 US banks, respectively, refer positive relationship among EVA, MVA and stock returns and EVA's slight advantage over accounting measures. This advantage is more perceivable for especially EVA-adopting firms that have better stock prices compared to those not using it [see, for instance, studies of Fernandez (2003) on 582 US firms; and Lee and Kim (2009) on the data set from Stern, Stewart & Co.]. Further support on EVA's superiority to accounting measures and positive correlation between EVA and MVA comes from Stern (1993), O'Byrne (1996), Biddle et al. (1997), Grant (1997), Hatfield (2002) and Irala (2005).

However, some researchers criticize the overrated predictive power of EVA relative to the accounting-based measures and its linkage to MVA. For example, De wet (2005) points the existence of relatively strong correlation between MVA and OCF, compared to very little correlation between MVA and EPS, and MVA and DPS. Biddle et al. (1998), Kramer and Peters (2001) and, Misra and Kanwall (2007) are among other researchers rejecting EVA's superiority compared to accounting measures such as ROC, OCF and EPS. Accordingly, Riahi-Belkaoui (1993), Kim (2006) and, Kumar and Sharma (2011) also provide

evidence that measures such as NOPAT, EPS and OCF are relatively superior to EVA in explaining shareholder value and EVA has no significant effect on MVA. These opposite findings may be attributed to the extent of implementation period of EVA (Ehrbar, 1998); EVA's over-emphasis on (only financial) value creation (Zimmennan, 1997), inappropriateness of EVA to certain industries such as (bio)technology and high growth firms (Dierks and Patel, 1997) and failure of EVA in accounting for inflation (De Villiers and Auret, 1997).

3. METHODOLOGY

3.1. Sample and Data

This study conducts a time series analysis to the quarterly data of manufacturing industry, comprising Borsa Istanbul (BIST) listed manufacturing firms for the period of 2001.q2-2022.q4. The sample financial data is derived using *Financial Analysis* software developed by Finnet, a leading software company in Istanbul.

3.2. Variables

3.2.1. Independent Variable

The theoretical research model includes EVAM as the independent variable of interest. Though this model is so similar to that of O'Byrne (1996), Biddle et al. (1997), Grant (1997), Hatfield (2002), Zaima et al. (2005), De wet and Hall (2004) and, Aloy Niresh and Alfred (2014) that refers EVA variable as total amount of EVA created by the firm or EVA/Market Capitalization ratio, it differs greatly depending on how EVA is proxied. Along with Wirawann (2011), Nakhaei et al. (2012), Fayed and Dubey (2016) and Maeenuddina et al. (2020); this is one of the pioneering studies that proxies EVA by EVAM.

As a size-neutral measure, EVA's failure is that it is mostly reported in absolute monetary value, causing uncertainty for especially certain investors. This failure has motivated Stewart (2009) to improve a new measure over classical EVA. In this regard, EVAM, firstly introduced by Stern, Stewart & Co. in 2009, has come out as a new economic profit ratio that accounts for the change in economic profit over sales for the prior period. This recent EVA-based measure is thought to be the best single financial performance measure ever by Stewart (2009).

EVAM (*also called* EVA margin) is, simply, the same as the ratio of EVA to sales [for detailed calculation, see Stewart (2013: 123-129)]:

$$\mathrm{EVAM} = (\mathrm{EVA_t} - \mathrm{EVA_{t-1}}) \div \mathrm{Sales_{t-1}} \quad (1)$$

where $\mathrm{EVA_t}$ and $\mathrm{EVA_{t-1}}$ denote economic value added created by the firm in period t and t-1, respectively.

As EVA's primary goal is to calculate the real economic profit, focusing on the effects of managerial actions; the first step in EVA calculation deals with net operating profit after taxes (Beaver, 2001; Fernandez, 2005):

$$\mathrm{EVA} = \mathrm{NOPAT_t} - (\mathrm{IC_{t-1}} \times \mathrm{k_{WACC}}) \quad (2)$$

where $\mathrm{NOPAT_t}$, $\mathrm{IC_{t-1}}$ and $\mathrm{k_{WACC}}$ denote net operating profit after tax in period t; invested capital in period t-1 and weighted average cost of capital, respectively.

In his own words, Stewart (1991) defines NOPAT as "*the profit derived from company's operations after taxes, but before financing costs and non-cash bookkeeping entries*". NOPAT is, simply, after-tax profit of a firm under the assumption that the firm is debt-free and has no investment in non-operating assets such as underutilized cash, marketable securities, unutilized assets, loans receivable, etc. These assets are considered apart from firm's core operations and income generated from these assets contributes to the non-operating income of the firm. Therefore, compared to net income, NOPAT can be considered to be a better operating performance measure, as it excludes effects of financial decision; and is calculated as:

$$\mathrm{NOPAT_t} = \mathrm{NI_t} + \mathrm{i}(1 - \text{tax rate}) \quad (3)$$

where $\mathrm{NI_t}$ and i denote net income in period t and interest expense, respectively.

Stewart (1991) ignores depreciation in NOPAT calculation, considering it as a "true economic expense" and adjusts NOPAT as an income available to shareholders plus after-tax interest expenses. This adjustment deviates NOPAT from classical definition of economic profit.

EVA calculation totally requires 164 adjustments and approximately 120 of these adjustments are about NOPAT. Typical adjustments required in EVA calculations can be classified into two major groups as (*i*) adjustments to net income -adding net capitalized intangibles, impairment and deferred income tax and goodwill written-off, and deducting depreciation)- and (*ii*) adjustments to invested capital -adding net book value of amortized intangible assets, accumulated provision for depreciation and goodwill amortization previously written off, provisions related to bad debts and deferred income tax- (Cheng, 2011). Stewart (1991) claims that these adjustments would minimize potential accounting-based distortions due to the inherent nature of different Generally Accepted Accounting Principles (GAAP) in different countries. Considering the

complexity of these adjustments, he suggests that only four common adjustments would be sufficient to truly convert accounting net income to economic income, NOPAT, as a promising financial performance measure for investors. These common adjustments are (*i*) deferred tax reserve, (*ii*) Last-in-First-out (LIFO) reserve, (*iii*) goodwill amortization and (*iv*) research and development costs amortization (Banerjee, 2000).

Invested capital refers to the sum of all of firm's financing net of short-term non-interest-bearing liabilities (NIBL) (or operating liabilities) such as accounts payable, deferred revenues, and accrued liabilities. NIBL do not require any interest payment and are ignored in net debt calculation. Hence, IC is the sum of shareholders' equity plus all interest bearing both short-term and long-term debt (Young, 1998). EVA considers long-term non-interest-bearing liabilities as an equity equivalent item and includes in shareholders' equity, and refers invested capital as total (net) assets net of short-term NIBL:

$$\mathrm{IC}_{t-1} = \text{Total Assets}_{t-1} - \mathrm{NIBL}_{t-1} \tag{4}$$

The underlying logic of weighted average cost of capital ($\mathrm{k}_{\mathrm{WACC}}$) as a discount rate is that the value of a firm is a function of (*i*) the after-tax cost of debt, (*ii*) the cost of equity, (*iii*) the systematic risk of debt and equity and (*iv*) the capital structure of the firm. Thus, $\mathrm{k}_{\mathrm{WACC}}$ can be formulated by considering exclusively two important sources of finance, debt and equity mechanisms (Villarreal and Cordoba, 2010):

$$\mathrm{k}_{\mathrm{WACC}} = [\mathrm{k}_{\mathrm{E}} \times (\mathrm{E} \div \mathrm{IC})] + [\mathrm{k}_{\mathrm{D}}(\mathrm{D} \div \mathrm{IC})(1 - \mathrm{T})] \tag{5}$$

where k_{E}, E, k_{D}, D and T denote cost of equity, shareholders' equity, cost of debt, debt and tax rate, respectively. Here, cost of equity is calculated by Capital Asset Pricing Model (CAPM) introduced by Sharpe (1964) and Lintner (1965):

$$\mathrm{k}_{\mathrm{E}} = \mathrm{r}_{\mathrm{f}} + \beta(\mathrm{r}_{\mathrm{M}} - \mathrm{r}_{\mathrm{f}}) \tag{6}$$

where r_{f}, r_{M}, β and $(\mathrm{r}_{\mathrm{M}} - \mathrm{r}_{\mathrm{f}})$ denote risk-free rate of return, average rate of return on the market, market risk (measured by beta coefficient) and risk premium.

3.2.2. Control Variable

Leverage is included as a control variable in the research model in the context of degrees of operational, financial and combined leverage. As known, change in operating profit (or loss) may sometimes be more sensible and vulnerable to change in the sales volume. The degree of operating leverage (DOL) is a quantitative measure of this sensitivity. The degree of operating leverage of a firm at a particular level of sales is, simply, calculated as the percentage change in operating profit (or earnings before interest and taxes-EBIT) over the percentage change in sales that causes the change in profits:

$$\mathrm{DOL}_{\text{at q units}} = \text{Percentage Change in EBIT} \div \text{Percentage Change in Sales} \tag{7}$$

DOL, as only one determinant of the overall business risk of the firm, overemphasizes the uncertainty of sales and production costs on the variability of operating profits. However, under the assumption that firm's sales and cost structure are constant, high DOL will be meaningless. Therefore, DOL should be considered as a measure of potential risk that activates only in the presence of sales and production cost variability (Van Horne and Wachowizc, Jr. 2008: 424).

Operating leverage is mostly related to physical requirements of the firm's operations. It is a must, rather than a choice for firms especially operating in heavy industries such as construction, mining, shipbuilding, and etc. that face with large fixed operating costs consisting of depreciation. On the other hand, financial leverage is always optional. Compared to debt-financing, firms may have options to finance their operations and investments with retained earnings and/or external equity financing. The favorability of financial leverage depends on the effect of debt-financing on earnings per share (EPS) to common shareholders. This effect is sensible to the relationship between EPS and EBIT under various financing alternatives and the indifference points between these alternatives. The degree of financial leverage (DOF) is a quantitative measure of this sensitivity and is calculated as the percentage change in EPS over the percentage change in EBIT that causes the change in EPS (Van Horne and Wachowizc, Jr. 2008: 432):

$$\mathrm{DFL}_{\text{EBIT of X dollars}} = \text{Percantage Change in EPS} \div \text{Percentage Change in EBIT} \tag{8}$$

The combination of operating leverage and financial leverage is referred to as combined (or total) leverage. The degree of combined leverage (DCL) is calculated as the percentage change in EPS over the percentage change in sales that causes the change in EPS:

$$\mathrm{DCL}_{\text{at q units of sales}} = \text{Percantage Change in EPS} \div \text{Percentage Change in Sales} \tag{9}$$

3.2.3. Dependent Variable

The dependent variable of the research model is MVA as a proxy for market valuation. MVA is so similar to market-to-book value ratio with a little difference that it is absolute measure of value while market-to-book value ratio is a relative measure. Theoretically, the cost of capital approach values the market value of entire firm by discounting the cumulated (expected)

free cash flows to all claim holders in the firm by the weighted average cost of capital. The linkage between MVA and EVA involves exactly the same logic that MVA equals to the present value of all expected EVAs:

$$\mathrm{MVA} = \sum_{t=1}^{\infty} \frac{\mathrm{EVA_t}}{(1+\mathrm{k_{WACC}})^t} \tag{10}$$

Besides, MVA can also be calculated by deducting invested capital (total assets net of short-term non-interest-bearing liabilities) from the total market value of the firm:

$$\mathrm{MVA} = \text{Total Market Value of the Firm} - \text{Invested Capital} \tag{11}$$

Derivation of Equation 11 is linked to alternative valuation approaches used to incorporate the effect of leverage (debt) in equity valuation of a firm. These methods as discussed by Fernandez (2004) depends on the same idea that the value of a levered firm equals the sum of the value of unlevered firm and the present value of the tax shields arising from debt financing:

$$\mathrm{MV_E} + \mathrm{MV_D} = \mathrm{V_L} = \mathrm{V_U} + \mathrm{PV_{TS}} \tag{12}$$

where $\mathrm{MV_E}$, $\mathrm{MV_D}$, $\mathrm{V_L}$, $\mathrm{V_U}$ and $\mathrm{PV_{TS}}$ denote market value of equity of a levered firm, market value of debt of a levered firm, the value of a levered firm, the value of unlevered firm and the present value of tax shields arising from debt financing.

Table 1 summarizes definitions and descriptions of the variables in the research model.

Table 1: Variables

Dependent variable	*Symbol*	*Definition*
Market Value Added	*MVA*	Total Market Value of the Firm – Invested Capital
Independent variables		
Economic Value-Added Momentum	*EVAM*	Net Operating Profit After Tax – [Capital Employed × Weighted Average Cost of Capital]
Degree of Combined Leverage	*DCL*	Percentage Change in Earnings per Share ÷ Percentage Change in Sales

3.3. The Research Model

The research model tests the relationship between MVA and EVAM by the regression equation as given below:

$$MVA_t = \alpha_0 + \beta_1 EVAM_t + \beta_2 DCL_t + \beta_t \tag{13}$$

3.4. Empirical Findings

Time series analysis is a specific method to identify and forecast trends in repeated sampling of the same data over time. However, before proceeding any type of time series analysis, stationarity of data should be ensured (Granger and Newbold, 1974; Gujarati, 2006). If the mean, variance and autocorrelation structure of a time series do not change over time, it said to be stationary. Stationarity, as the key idea in time series, indeed emphasizes that behavior of a time series does not alter over time. This means that the values always vary around the same level and their variability is steady over time (Charlton and Caimo, 2012).

This study refers autoregressive distributed lag (ARDL) bounds testing approach, developed firstly by Pesaran and Shin (1999) and further revised by Pesaran et al. (2001) to test MVA-EVAM relationship. ARDL bounds testing approach differs from classical cointegration approaches of Granger (1981), Engle and Granger (1987) and Johansen (1988, 1991) that it can be applied though variables in the data set are a combination of stationary *I*(0), non-stationary *I*(1), or each of them in a different order of cointegration. Despite this superiority of ARDL approach, possible presence of an integrated stochastic trend of *I*(2) necessitates to use various unit root tests to check the number of unit roots in the series for increasing reliability of the empirical findings.

3.4.1. Unit Root Tests

This study tests the stationarity of the series of MVA, EVAM and DCL by employing the Augmented Dickey-Fuller (ADF) and Phillips and Perron (PP) unit root tests.

Dickey and Fuller (1981) derive ADF test considering a higher order autoregressive process formulated as:

$$Y_t = \emptyset_1 Y_{t-1} + \cdots + \emptyset_p Y_{t-p} + e_t \tag{14}$$

In this process, the current value of time series is a linear combination of previous values of the time series and a white noise term, e_t. Here, the white noise refers to a random shock is what is not explained by the past values of time series (Cryer and Chan, 2008) and has a zero mean and variance σ_e^2 whereas $\emptyset_i$ are fixed coefficients. The process in Equation 14 can also be formulated by using the lag operator as:

$$\emptyset(L)Y_t = e_t \quad (15)$$

where

$$\emptyset(L) = 1 - \emptyset_1(L) - \cdots - \emptyset_P L^P \quad (16)$$

The process has a unit root under the condition that the polynomial $\emptyset(1) = 1 - \emptyset_1 - \cdots - \emptyset_P$ equals zero. Hence, the hypothesis that should be considered is if $\emptyset(1) = 0$. This hypothesis can be tested by Equation 17 and estimated by Ordinary Least Squares (OLS) as:

$$\Delta Y_t = aY_{t-1} + \sum_{i=1}^{p-1} \emptyset_i \Delta Y_{t-1} + e_t \quad (17)$$

According to Dickey and Fuller (1981), a linear trend can be included into Equation 17 as:

$$\Delta Y_t = \delta + aY_{t-1} + \sum_{i=1}^{p-1} \emptyset_i \Delta Y_{t-1} + e_t \quad (18)$$

where $\sum_{i=1}^{p-1} \emptyset_i \Delta Y_{t-1} + e_t$ is a stationary process and e_t are normally and independently distributed $(0, \sigma^2)$. Further, $a = -\emptyset(1)$ and $\emptyset_i = -(\emptyset_{i+1} + \cdots + \emptyset_n)$. ADF test has the hypothesis $H_0: a = 0$ and $H_1: a < 0$ meaning that time series contains and does not contain a unit root, respectively. The calculated t-value is compared to the simulated critical values provided by Fuller (1976) and the null hypothesis is rejected for small values.

The unit root test statistics (Z statistics) developed by Phillips and Perron (1988) have gained popularity in especially financial time series analysis. They have differentiated their test by considering the limiting distributions of the usual ADF tests. While the autoregressive moving average (ARMA) structure of the errors in the test regression is approximated by a parametric autoregression in ADF tests, Phillips Perron test ignores any serial correlation in the test regression. PP test solves the problem of serial correlation in the errors by a correction factor. Despite its serious size distortion problems due to the presence of negative autocorrelations, PP test also allows for dependence among disturbances of either AR or MA form. Besides, PP tests are robust to general forms of heteroskedasticity in the error term, u_t and does not require the specification of a lag length for the test regression. These properties of PP test enable it to be more powerful than ADF tests.

The test regression in PP tests is as:

$$\Delta Y_t = \emptyset Y_{t-1} + \alpha + \beta t + u_t \quad (19)$$

where u_t is a stationary process (which also may be heteroscedastic). As stated before, any problem related to serial correlation and heteroscedasticity in the errors u_t of the test regression in Equation 19 can be corrected by directly modifying the test statistics. These modified statistics, Z_t and $Z_\emptyset$ are as:

$$Z_t = \left(\frac{\hat{\sigma}^2}{\hat{\lambda}^2}\right)^{\frac{1}{2}} t_{\phi=0} - \frac{1}{2}\left(\frac{\hat{\lambda}^2 - \hat{\sigma}^2}{\hat{\lambda}^2}\right)\left(\frac{Ts.e(\hat{\rho})}{\hat{\sigma}^2}\right) \quad (20)$$

$$Z_\emptyset = T\phi - \frac{1}{2}\left(\frac{Ts.e(\hat{\rho})}{\hat{\sigma}^2}\right)\left(\hat{\lambda}^2 - \hat{\sigma}^2\right) \quad (21)$$

$\hat{\sigma}^2$ and $\hat{\lambda}^2$ are consistent estimates of the variance parameters as:

$$\hat{\sigma}^2 = \lim_{T\to\infty} T^{-1} \sum_{t=1}^{T} E[u_t^2] \quad (22)$$

$$\hat{\lambda}^2 = \lim_{T\to\infty} \sum_{t=1}^{T} E[T^{-1} S_T^2] \quad (23)$$

where $S_T = \sum_{t=1}^{T} u_t$ (24)

The null hypothesis of the PP test is that there is a unit root, with the alternative hypothesis that there is no unit root. If the calculated t-value is above the simulated critical value, then the null hypothesis cannot be rejected. Results of ADF and PP unit root tests are given in Table 2. The results show that while a few variables are stationarity at level [*I*(0)] (according to only PP test results); all variables are stationarity at first differences [*I*(1)]. These results lead the research to autoregressive distributed lag (ARDL) cointegration analysis and bounds testing approach. Results of ADF and PP unit root tests are given in Table 2.

Table 2: Results of ADF and PP Unit Root Tests

Variable	ADF				PP			
	Level		1st Difference		Level		1st Difference	
	intercept	*intercept with trend*	*intercept*	*Intercept with trend*	*intercept*	*intercept with trend*	*intercept*	*intercept with trend*
MVA	-1.774 (0.398)	-2.141 (0.227)	-9.012* (0.000)	-9.121* (0,000)	-1,714 (0.424)	-2.178 (0.218)	-10.947* (0.000)	-11.241* (0.000)
EVAM	-1.191 (0.557)	-2.147 (0.601)	-6.111* (0.000)	-5.999* (0.000)	-5.425* (0.000)	-7.899* (0.000)	-19.114* (0.000)	-19.784* (0.000)
DCL	-1.726 (0.411)	-1.501 (0.743)	-8.999* (0.000)	-9.011* (0.000)	-1.698 (0.477)	-1.488 (0.847)	-10.024* (0.000)	-10.427* (0.000)
Level of significance	*Critical values***							
1%	-3.508	-4.068	-3.508	-4.068	-3.508	-4.068	-3.508	-4.068
5%	-2.895	-3.462	-2.895	-3.462	-2.895	-3.462	-2.895	-3.462
10%	-2.584	-3.157	-2.584	-3.157	-2.584	-3.157	-2.584	-3.157

Note: * indicates level of significance at level 1%. **The simulated critical values are provided by Fuller (1976).

3.4.2. ARDL Cointegration Analysis and Bounds Testing Approach

Its applicability though variables in the data set whether they are a combination of stationary *I*(0), non-stationary *I*(1), or each of them is in a different order of cointegration is not the only superiority of ARDL bounds testing approach over the residual based approach of Granger (1981), and Engle and Granger (1987) and the maximum-likelihood based approach of Johansen (1988, 1991), and Johansen and Juselius (1990). It also enables a simultaneous estimation of both short-run and long-run relationships among variables and effectively overcomes the endogeneity problem by adding lags of both dependent and independent variables in the model. Besides, ARDL bound testing approach enables to derive a dynamic error correction model through a simple linear transformation that allows for inferences of long-run estimates (Banerjee et al., 1993). Another advantage of the approach is that it is also efficient even the sample size is small (Al-Assaf and Al-Abdulrazag, 2015).

ARDL approach is indeed a two-stage test. While the existence of long-run relationships among all the variables are examined is the first stage, the second stage is about the estimation of both the long-run and the short-run coefficients under the same equation. The second stage depends on the existence of a long-run relationship in the first stage.

The relationships among MVA, EVAM and DCL can be modelled as a conditional ARDL model as:

$$\Delta MVA_t = c_0 + c_1 trend + \alpha_1 MVA_{t-1} + \alpha_2 EVAM_{t-1} + \alpha_3 DCL_{t-1} + \sum_{i=1}^{p} \delta_i \Delta MVA_{t-i} + \sum_{i=0}^{q} \beta_i \Delta EVAM_{t-i} + \sum_{i=0}^{s} \theta_i \Delta DCL_{t-i} + e_t \quad (25)$$

where Δ, c_0 and α_{1-3} are the first difference operator, the constant term and long-run coefficients of the variables, respectively.

Before proceeding to test the conditional ARDL model in Equation 25, the optimal lag length for each variable should be selected. ARDL approach makes this selection by estimating $(p+1)k$ number of regressions, where p and k the maximum number of lags used and the number of variables. The best fitting model in this study is selected by using the Akaike information criterion (AIC) and of Schwarz information criterion (SIC) developed by Akaike (1974) and Schwarz (1978), respectively.

Table 3: The Models Selected by AIC and SIC

Lag length suggested by AIC and SIC	*intercept*				*intercept with trend*			
	AIC	SIC	$\chi^2(1)$	$\chi^2(4)$	AIC	SIC	$\chi^2(1)$	$\chi^2(4)$
1	-1.0822	-1.1007**	0.0015 (0.912)	8.1781 (0.084)	-1.0251	-0.9124	0.0796 (0.668)	9.0879 (0.087)
2	-1.1024	-1.0956	6.1214 (0.007)	11.1572 (0.009)	-1.1041	-1.0111	8.4498 (0.087)	16.1569 (0.049)
3	-1.2281**	-0.9812	0.4802 (0.547)	6.1289 (0.118)	-1.4265**	-1.0245**	2.2358 (0.388)	9.5789 (0.134)
4	-1.2047	-0.8714	0.0128 (0.642)	4.1289 (0.514)	-1.4017	-0.9345	0.0078 (0.897)	4.6428 (0.428)

Note: ** are the smallest AIC and SIC values referring optimal lag lengths. $\chi^2(1)$ and $\chi^2(4)$ are LM test statistics. *p*-values of χ^2 statistics are given in parenthesis.

Both information criterions are estimators of prediction errors and measures of the goodness of fit of a statistical model. They are referred to compare regression models and the smaller the AIC or SIC values are, the better the time series model is. The existence of autocorrelation of the residuals is tested by Lagrange Multiplier (LM) test of Breusch and Pagan (1979). The models selected by AIC and SIC are given in Table 3.

After selecting the lag lengths, the results of ARDL bounds test indicating the existence of long-run relationships among the series are given in Table 4. The value of *F*-statistics in Table 4 is compared to the lower and upper bound critical values by Pesaran et al. (2001). The null hypothesis (H_0: $\alpha_1 = \alpha_2 = \alpha_3 = 0$) ignoring whether the series are *I*(0) or *I*(1) is rejected in case of that the *F*-statistics calculated is greater than the upper bound critical value, concluding the existence of long-run relationships among the series. The empirical results show that at significance level of 5% only *F-v* statistics is over the upper bound critical values (ARDL Model 3.0.1.).

Table 4: Results of ARDL Bounds Test

intercept			intercept with trend			
Lag length suggested by AIC and SIC	*F-iii*	*t-iii*	Lag length suggested by AIC and SIC	*F-iv*	*F-v*	*t-iv*
3 (AIC)	4.458 (0.003)	-3.191 (0.001)	*3 (AIC)*	5.213 (0.003)	6.004* (0.001)	-3.811 (0.002)
1 (SIC)	3.812 (0.019)	-3.109 (0.002)	*3 (SIC)*	5.871 (0.002)	5.428 (0.003)	-3.717 (0.001)

Note: Lower and upper bound critical values for *k*=2 at significance level of 5% are *F-iii* = [3.79-4.85], *F-iv* = [5.17-6.15], *F-v* = [4.87-5.85], *t-iii* = [(-2.57)-(-3.21)], *t-iv* = [(-3.13)-(-4.34)]. *F-iv* is the *F*-statistics testing $\alpha_1 = \alpha_2 = \alpha_3 = 0$ and $c_1 = 0$ and *F-v* is the *F*-statistics only testing $\alpha_1 = \alpha_2 = \alpha_3 = 0$ as given in Equation 25.

The long-run coefficients estimated by ARDL Model 3.0.1. based on AIC are given in Table 5. EVAM and DCL have both statistically significant and negative effects on MVA for the intercept model. Similar empirical findings are also valid for the intercept with trend model. However, these findings are not statistically significant.

Tablo 5: Long-Run Coefficients (ARDL Model 3.0.1.)

intercept (ARDL Model 3.0.1.)			Intercept with trend (ARDL Model 3.0.1.)		
Variable	Coefficient	*t*-statistics	Variable	Coefficient	*t*-statistics
EVAM	-7.212	-1,428 (0,047)**	*EVAM*	-5.759	-1,117 (0,245)
DCL	-0.742	-3,128 (0,000)*	*DCL*	-0.351	-1,751 (0,129)
c	2.012	5,359 (0,000)	*c*	1.786	4.286 (0,000)

Note: * and ** indicate level of significance at level 1% and 5%. *p*-values are given in parenthesis.

The second stage in ARDL bounds testing approach is about the estimation of both the long-run and the short-run coefficients under the same equation. After confirming the long-run relationship, short-run dynamics can be captured by converting the conditional ARDL model into an error correction model (ECM). ECM firstly introduced by Davidson et al. (1978), then developed by Engle and Granger (1987) is proper to use when a priori theory dictates that the dependent variable exhibits short-run changes in response to changes in the independent variable as well as long-run levels consistent with those of the independent variable(s) (Durr, 1992). These changes in the dependent variable regarding to independent variable(s) can be expressed by an error correction term (ECT) and this term refers the direction and the speed of adjustment in the model depending on any short-run disequilibrium.

Error correction model can be formulated by replacing the lagged variables in the conditional ARDL model in Equation 25 with ECT_{t-1} and estimating the model after imposing the same optimal lags as:

$$\Delta MVA_t = c_0 + \sum_{i=1}^{p} \delta_i \, \Delta MVA_{t-i} + \sum_{i=0}^{q} \beta_i \, \Delta EVAM_{t-i} + \sum_{i=0}^{s} \theta_i \, \Delta DCL_{t-i} + \vartheta ECT_{t-1} + e_t \quad (26)$$

The coefficient of error correction implies the speed of re-adjustment to the long-run equilibrium after short-run shocks lead to disequilibrium. Here, the coefficient of ECT_{t-1}, i.e., ϑ, captures the speed of adjustment and ECT_{t-1} with a statistically significant and negative sign portrays causality in this process (Shabbaz et al., 2011). The error correction estimates and short-run dynamics are given in Table 6.

Table 6: Error Correction Estimates and Short-Run Dynamics

intercept (ARDL Model 3.0.1.)			Intercept with trend (ARDL Model 3.0.1.)		
Variable	Coefficient	*t*-statistics	Variable	Coefficient	*t*-statistics
ΔMVA(-1)	0.642	6.898 (0,000)*	*ΔMVA(-1)*	0.812	5,426 (0.000)*
ΔMVA(-2)	0.249	2.237 (0.017)**	*ΔMVA(-2)*	0.324	2,444 (0.024)**
ΔMVA(-3)	-0.278	-2.208 (0.018)**	*ΔMVA(-3)*	-0.215	-2.438 (0.006)*
ΔEVAM	-9.278	-1.824 (0.049)**	*ΔEVAM*	-7.936	-1.429 (0.192)
ΔDCL	0.071	1.859 (0.078)***	*ΔDCL*	0.061	1.790 (0.071)***
ΔDCL(-1)	-0.068	-2.567 (0.017)**	*ΔDCL(-1)*	-0.014	-2.512 (0.000)*
Constant	0.447	4.192 (0.000)*	*Constant*	0.491	3.771 (0.000)*
ECM(-1)	-0.169	-4.512 (0.000)*	*ECM(-1)*	-0.279	-4.612 (0.000)*
F-statistics	169.235 (0.000)		*F-statistics*	124.428 (0.000)	

Note: R^2 values are 0.821 and 0.834 for the intercept model and intercept with trend model, respectively. *, ** and *** indicate level of significance at level 1%, 5% and 10%. *p*-values are given in parenthesis.

An ARDL model also requires model diagnostic checking to ensure whether its fundamental assumptions such as that errors are serially independent and normally distributed. This study refers to Breusch-Godfrey LM test developed by Breusch (1978) and Godfrey (1978a, 1978b) to detect autocorrelation; White variance test proposed by White (1980) for checking heteroskedasticity and Jarque-Bera test introduced by Jarque and Bera (1980) for checking normality. ARDL Model (3.0.1) diagnostics given in Table 7 indicate that fundamental assumptions are met.

Table 7: Model Diagnostics

intercept (ARDL Model 3.0.1.)		Intercept with trend (ARDL Model 3.0.1.)	
Breusch-Godfrey LM Test	0.017 (0.932)	Breusch-Godfrey LM Test	0.041 (0.953)
White Test	0.524 (0.726)	White Test	0.642 (0.691)
Jarque-Bera Test	0.481 (0.782)	Jarque-Bera Test	2.245 (0.324)

The estimated short-run coefficients indicate that EVAM has statistically significant and negative effect on MVA, while DCL has statistically significant and positive effect on MVA. However, it is also observed that in lag one period, the positive effect of DCL on MVA turns out to be negative.

4. CONCLUSION

This study investigates the relationship between market value added and economic value-added momentum. To the best of our knowledge, this is the first study that conducts a time series analysis to the quarterly data of manufacturing industry, comprising Borsa Istanbul (BIST) listed manufacturing firms for the period of 2001.q2-2022.q4, addressing this relationship in Turkey. Besides, the effect of leverage on market value added is also tested. The empirical findings are expected to fill the gap in existing literature and guide firm managers and investors to re-evaluate their asset allocations.

Empirical findings from ARDL bounds testing approach indicates that -in the long-run- there exists a significantly negative relationship between market value added and economic value-added momentum. This finding is contrary to both the argument of Stewart (1991) and Stern et al. (1996) that there is closed and positive linkage between EVA and MVA; and the empirical findings of Lehn and Makhija (1996), and Uyemura et al. (1996) defending EVA's advantage over accounting measures. The relationship between market value added and leverage is also the same that leverage negatively affects market value added created in the long-run.

The estimated short-run coefficients indicate that economic value added momentum has significantly negative effect on market value added created as similar to the long-run finding. Another finding is that though leverage has significantly positive effect on market value added in the short-run, this positive effect turns out to be negative in lag one period.

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MACROECONOMIC IMPACT OF AGRICULTURAL FINANCING REFORMS: A COMPUTABLE GENERAL EQUILIBRIUM ANALYSIS OF NIGERIA

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ABSTRACT

Purpose- The study analyzed the macroeconomic impact of agricultural financing reforms: a computable general equilibrium analysis of Nigeria. Specifically, the study evaluated the macroeconomic impact of the agricultural financing reforms on economic growth, and agricultural output.

Methodology- This study employed time series data from secondary sources such as the Central Bank of Nigeria (CBN), the National Bureau of Statistics' (NBS) in conjunction with the World Bank Living Standard Measurement Study (LSMS) and Information from the Nigerian Living Standard Survey for 2019 was used to obtain shares of household income and expenditure which covered the period 2010-2022. Applying the economy-wide methodology of Computer General Equilibrium model on reformatted upgraded Social Accounting Matrix for Nigeria, Simulation Designs, and t- test.

Findings- The study finds that agricultural financing reforms through a decrease in interest rates on agricultural loans by 10% and 8% have positive significant impact on economic growth. The results of the study also reveal that agricultural financing reforms through a decrease in interest rates on agricultural loans by 10% and 8% have positive significant impact on agricultural output.

Conclusion- The two policy scenarios (10% and 8% reduction in interest rate on agricultural loans) were simulated and the results for both cases indicated that all the macroeconomic indicators increased significantly due to the policy options.

Keywords: Macroeconomic impact, agricultural financing reforms, computable general equilibrium analysis, economic growth, Nigeria.
JEL Codes: A11, B23, B41, C53, E47

1. INTRODUCTION

Agriculture serves as a panacea in the development of an economy and is renowned in the annals of developed and developing economies. Agriculture is the foundation of economic development and an avenue for eradication of poverty (Sertoglu, Ugural and Bekun, 2017). It acts as an impetus that quickens the drive of basic change and economic diversification, empowering nations to completely use their factor enrichment, depending less on import of farm products or raw materials for its economic growth, development, and sustainability (Ademola et al., 2013).

Despite these enormous potentials, the sector still grapples to meet her obligations given the concurrent supply-demand gap in food production. It is impossible to over stress the role of capital in agriculture, much the same as in the industrial and service sectors, given that it serves as a stimulant to production. However, it has been shown that public expenditure on agriculture is inadequate to achieve the goal of the Government's agricultural policies (IFPRI, 2008).

Reforms are a necessary aspect of every organization's or system's evolution. The Nigerian government had accepted financial sector improvements as part of its monetary change program. Various governments aimed to alter the financial sector and ease its contact with the agriculture sector through this change initiative (Omankhanlen, 2012). In this study, two policy scenarios were developed and tested. Given that agricultural finance changes are strongly tied to output, these possibilities entail lowering the base-year share of farm loan interest rates by a significant amount. The two scenarios are as follows: (1) a 10% reduction in the interest rate on agricultural loans in accordance with the CBN's interest draw-back policy. (2) An 8% reduction in the interest rate on agricultural loans in accordance with the single-digit interest rate policy. The Federal Government of Nigeria (FGN) developed and implemented several agricultural financial reforms through the Central Bank of Nigeria (CBN) in recognition of its importance to the Nigerian economy. These reforms all aimed at ensuring that finance is available to improve the real sectors, particularly the agricultural sector, leading to development and economic growth, among other things. The financial sector is undoubtedly a pertinent segment of every economy and is central in the development of the Agricultural sector. Inconsistencies in financial policies may be an impediment to domestic crop production, farmers' welfare, and attainment of food self-sufficiency (Feridun et al. 2006) and (Nwanze *et al.*, 2006). Decision-making and planning become extremely unclear, putting investments at risk, resulting in revenue losses for producers, worsening their welfare status and plunging them deeper into poverty. Consumers' incomes, on the other hand, are impacted since they pay up to four times the global price for imported food under high tariff regimes, worsening their welfare and poor status (Griswold, 2006). According to the National Bureau of Statistics (NBS), over 69 percent of Nigerians are poor, showing a lack of welfare and well-being. Public policy must increase social welfare, which necessitates addressing the question of how these policies affect the wellbeing of persons in that society (Slesnick, 1998). Computable General Equilibrium (CGE) models are a class of economic models that use real-world data to predict how an economy will react to changes in policy, technology, or external factors. CGE models are appropriate whenever it is necessary to estimate the impact of changes in one part of the study, such as agricultural finance reforms and economic growth, on the rest. In a single term, the Nigerian government had the ability to drive its economy forward through banking sector reform (Onoja *et al.*, 2011). However, considering the reforms of the past two decades, the Nigerian financial system has been unable to fulfil its potential as a stimulant to economic growth and development. The lack of research results explaining the magnitude of the effects of financial reforms on the agricultural sector in Nigeria which details the constraints on the acceptable policy derivation and implementation of Nigeria's agricultural finance policy, has made the need for this study to become apparent. Such research becomes even more relevant when one considers the discoveries of Manyong *et al.* (2004) which displayed the pace of growth of the quantity of credits guaranteed by ACGSF to agriculture showing high nominal growth rates but a negative real growth rate. The critical role of agricultural financing in promoting agricultural growth and development cannot be overstated. Olomola (2017) asserts that the agricultural credit guarantee scheme is usually viewed as a successful policy instrument for enhancing agricultural commodities production and distribution. Credit finance, according to Rahji (2010), is more than a resource like labor, land, equipment, and raw materials. Obansa and Madueke (2013) explored the impact of agriculture finance on Nigerian economic growth and determined that causality exists in both directions between economic growth and agriculture financing, as well as between economic growth and agricultural growth. Additionally, the study suggests that foreign direct private loan, share capital, foreign direct investment, and development stocks will be more productive financing options for investment. Additionally, when multilateral loans, domestic savings, Treasury bills, government development aid, foreign direct investment, and development stock are used to support the capital-output ratio, it becomes more appropriate. The study concluded that agricultural-led economic growth requires the continuation of credible pro-investment macroeconomic policies, as well as the possibility of a debt-equity swap. Similarly, Ullah et al. (2002) asserts that credit affects farmers' access to all available resources. As a result, implementing suitable macroeconomic policies and facilitating institutional financing for agricultural growth has the potential to support agricultural development by increasing the sector's contribution to employment, income, and foreign exchange creation (Olomola, 2017).

This study aimed to answer two research questions: firstly, what is the impact of agricultural financing reforms on economic growth in Nigeria, and secondly, what impact does agricultural financing reform have on agricultural output in Nigeria? The main objective of this research was to examine the macroeconomic impact of agricultural financing reforms in Nigeria. To achieve this goal, the study aimed to determine the impact of agricultural financing reforms on economic growth in Nigeria and evaluate the impact of agricultural financing reforms on agricultural output in Nigeria. The study was guided by two null hypotheses, which are as follows: $H0_1$: Agricultural financial reforms do not have a significant impact on economic growth in Nigeria, and $H0_2$: Agricultural financial reforms do not have a significant impact on agricultural output in Nigeria. These hypotheses were used to test the relationship between agricultural financing reforms and economic growth as well as agricultural output in Nigeria.

This paper will continue as follows. The second section is a review of the relevant literature. The third section discusses the study's methodology. The fourth section describes the data analysis procedure and specifies the Computable General Equilibrium (CGE) model. The final section concludes with a summary of the results, discussions of the findings, and recommendations for the country's relevant authorities.

2. LITERATURE REVIEW

2.1. Review of Agricultural Financing Reforms in Nigeria

The Federal Government of Nigeria (FGN) developed and implemented several agricultural financial reforms through the Central Bank of Nigeria (CBN) in recognition of its importance to the Nigerian economy. The preceding schemes are as follows:

The Regulatory Era (1952-1991) and Agricultural Development

A couple of agricultural financial sector reforms occurred during this time period in the economy. The 1952 banking ordinance, the 1973 establishment of the Nigerian Agricultural and Cooperative Bank, the establishment of rural banking in 1977, and the establishment of the Agricultural Credit Guarantee Scheme Fund (ACGSF) in 1977 all contributed to commercial banks bearing less risk when extending credit to farmers (Nsikak *& Udoh*., 2015).

The Nigerian Agricultural and Cooperative Bank (NACB)

The Nigerian Agricultural and Cooperative Bank was established in 1973 as an agricultural development bank with the mission of assisting in the growth and development of agriculture through credit extension. Its broad objectives were "To aid in encouraging agricultural production and rural development, as well as improving the quality of life of Nigeria's rural population and making the country self-sufficient in food production," (Ajakaiye, 1985).

The Rural Banking Programme

The Rural Banking Programme was established in July 1977 in response to the recommendations of the Okigbo Financial Review Commission in 1976. The program's goals include the improvement of rural banking habits, the mobilization of savings and their use for productive businesses in rural areas, the development of agriculture and agro-based industries, the reduction of youth migration to cities, and the attainment of the national goal of food self-sufficiency. (Acha & Acha 2012).

Mandatory Sectoral Allocation to Agriculture

Under this scheme, Commercial and merchant banks were required to lend a minimum of 6% of their loan portfolio to agriculture, which was eventually increased to 12%. In order to boost agricultural export trade, the government implemented a trade strategy in 1973 that abolished export taxes on designated export crops. Imports of food, agricultural machinery, and equipment have been liberalized. (Okafor, 2020).

Structural Adjustment Programme

As the country's economic troubles, which have plagued it since the early 1980s, became increasingly apparent, including stalled growth, growing inflation, unemployment, food shortages, and accumulating external indebtedness. The government initiated the Structural Adjustment Program (SAP) in July 1986, which included economic and financial liberalization as a key component. SAP was created, according to (Olomola 1994), to restructure and diversify the economy's productive base, achieve fiscal balance of payment stability, maximize the private sector's intense growth potential, and put the economy on a steady and balanced growth path. The restructuring of the fiscal sector, as well as the liberalization of financial institution and market supervision and regulation, are two important gaps in this program.

The Agricultural Credit Guarantee Scheme

The Agricultural Credit Guarantee Scheme Fund (ACGSF) was a policy tool used by the Nigerian government to encourage farmers to take out loans. The program was founded by Decree No. 20 of 1977, although it only became operational in 1978. Its purpose was to provide bank loans to farmers for agricultural output and agro-allied processing (Nwosu and Oguoma 2010).

The Liberalized Regulation Era (2000 – 2005)

From 2000 to 2005, there was a period of liberalized regulation with universal roles, which saw the merger of commercial and investment banking. It resulted in the creation of a financial supermarket for both wholesalers and retailers and provided a wide range of financial services. Under the universal banking system, deposits can be made into current, savings, or other accounts, and checks can be paid out or collected.

The Regimented Regulation/Consolidation (2005-2009)

This reform, which began in 2004, was spurred by the need to strengthen banks. The policy objective from the start was to expand banks and position them to play critical roles in driving economic development across all sectors. Bank capital bases were increased from N2 billion to a minimum of N25 billion as a result of the mergers and acquisitions, lowering the number of banks from 89 to 25 in 2005 and subsequently to 24 in 2006. (Eyo & Eleojo 2019).

The Nigeria Incentive Based Risk Sharing System for Agricultural Lending

The Nigeria Incentive-Based Risk Sharing System for Agricultural Lending (NIRSAL Plc.) is a non-bank financial institution with a market capitalization of $500 million and is solely owned by the Central Bank of Nigeria (CBN). Its goal is to help financiers and investors redefine, dimension, measure, re-price, and share agribusiness-related credit risk. Through its five (5) strategic pillars, NIRSAL aims to increase the flow of affordable finance and investments into the agricultural sector by de-risking the agribusiness finance value chain, fixing agricultural value chains, building long-term capacity, and institutionalizing agricultural lending incentives. (Polycarp 2020).

NIRSAL Microfinance Bank (NMFB)

The NIRSAL Microfinance bank was incorporated in 2019 as a private Limited Company and commenced operations in 2020 following the issuance of license by the Central Bank of Nigeria to operate as a national microfinance bank in the same year. The bank is owned by the Bankers Committee, NIRSAL PLC and NIPOST. The bank was designed to effectively administer intervention funds for Agricultural and other small informal businesses under the Agribusiness Small and Medium Enterprise Investment Scheme (AGSMEIS), improve access to intervention funds for SME's and farmers and address the challenges militating against the AGSMEIS initiative. (Mikugi & Bagudu 2020).

2.2. Agricultural Finance and Economic Growth in Nigeria

Peasant small holder farmers dominate agricultural activity in Nigeria, accounting for over 90% of farm holdings in the country. These farmers typically use traditional farming practices and produce mostly for sustenance. Government interventions have been shaped by the need to provide inputs and other support to peasant farmers to boost productivity and facilitate the transition to mechanized agricultural practices, while commercial farmers have benefited from credit facilities, input subsidies, capacity building initiatives, and export incentives. FMARD (2016). Agriculture has remained a growth driver in Nigeria, despite the fact that its pace of growth has continually fallen over time. Between 2000 and 2005, the sector increased by 15.9% (although this high figure can be attributable to the massive rise of 55.9% in 2002, without which it would have grown at 6.0%). However, between 2006 and 2010, and 2011 and 2016, it grew at 6.5 and 4.1 percent, respectively. Similarly, the industry has remained prominent in Nigeria's economy, owing in part to its contribution to GDP in terms of value added and the proportion of the population employed in the sector, which is estimated to be around 50% of Nigerians. Between 2000 and 2005, the sector provided 36.3 percent of total GDP value added. Its average contribution, on the other hand, has steadily fallen over time, falling to 31.7 percent in 2006-2010 and 21.3 percent in 2011-2016 (World Bank, 2017).

One of the goals of most government agricultural policies or programs has been to increase the country's self-sufficiency, lower the share of imported food, and boost the export of agricultural goods. The ratio of agricultural raw material exports as a percentage of overall merchandise exports increased steadily from 2000 to 2016, as shown in Table 1. Its market share increased from a meager 0.1 percent in 2000-2005 to 1.0 and 4.3 percent in 2006-2010 and 2011-2016, respectively. However, significant improvements in lowering the share of agricultural raw materials imports in total merchandise imports at the start of the period under study were reversed by the conclusion of the year. Adamgbe et al (2020). Ayeomoni & Aladejana (2016) examined the relationship between agricultural credit and economic growth in Nigeria and observed a short- and long-run relationship between agricultural credit and economic growth. Additionally, they noted that the agricultural sector of a country cannot be understated because it has been and will continue to be a source of food for the general population as well as a solid source of revenue to encourage economic development. Despite having the resources to generate its own food, Nigeria imports a large portion of its food from the worldwide market (Noko, 2016a). Nigeria has become economically and politically unstable because of such importation, which has resulted in a falling standard of life for its rural and urban households, who spend most of their incomes on food. The agriculture sector's transformation will put the country on the road to food security, as productivity rises, imported inflation falls, and foreign exchange savings rise, resulting in economic stability. Food security will encourage the development of agro-allied businesses to add value to agricultural products for export. Not only would this increase the value of raw resources, but it will also result in large-scale employment and foreign exchange earnings. This will also determine the rate at which industrialization takes place. When this occurs, the agricultural sector will meet the industries' labor demands. Furthermore, because most people work in the rural agricultural sector, a large portion of domestic consumption occurs there. This population provides a vast market for industrial products as their income rises. Umeji (2019).

2.3. Agricultural Finance and Agricultural Output in Nigeria

Agriculture output in Nigeria was studied by Iganiga and Unemhilin (2011), who looked at the impact of federal government agricultural expenditure and other agricultural output variables. To calculate GDP growth, a Cobb Douglas Growth Model was used, which included commercial credits for agriculture as well as a consumer price index and an annual average rainfall as well as a population growth rate and food importation. According to their findings, federal government spending on capital projects

was linked to agricultural output. Multiple regression analysis was utilized by Izuchukwu (2011) to examine the agriculture sector's role in Nigeria's economic growth. They found a positive correlation between GDP and domestic savings, government spending on agriculture, and foreign direct investment between 1986 and 2007. According to the findings, 81 percent of the fluctuation in GDP may be attributed to domestic savings, public spending, and foreign direct investment.

3. METHODOLOGY

Creswell (2017) described research design as the plan used to generate answers to the various research problems by the researcher. Mohajan (2018) in agreement with Creswell (2017) also defined research design as a specific plan set out by a researcher to obtain information from research participants and research tools. This study is designed to examine the macroeconomic implications of agricultural financing reforms on the economic growth and agricultural output of Nigeria; it is descriptive in nature and will therefore employ the descriptive research design.

The study was conducted in Nigeria. In the Gulf of Guinea in Western Africa, the country has a total land area of 923 768 km2 (356 669 sqm), ranking it as the world's 32nd largest country by land area. Located between 40 and 140 degrees' north latitude and 20 to 150 degrees' east longitude, Nigeria is a country in West Africa

This study employed time series data from secondary sources such as the Central Bank of Nigeria (CBN) database and other relevant entities; including the updated Social Accounting Matrix (SAM) derived from the 2006 Input-Output Table; (ii) the Central Bank of Nigeria's (2019) sectoral output data; and (iii) the National Bureau of Statistics' (NBS) Year 2019 household income and expenditure data for Nigeria in conjunction with the World Bank Living Standard Measurement Study (LSMS).

4. METHOD OF DATA ANALYSIS

4.1. Specifying CGE Model

Based on the work of Dervis *et al.* (1982) and its adaptation to Nigeria by Olofin *et al.* (2003) and Obi-Egbedi *et al.* (2012), the CGE structure was modeled to suit the objectives of this study. All Cobb Douglas and Leontief types were used, and the Constant Elasticity of Substitution (CES) functions were used. As shown in Equation 1, each sector's output comprises value-added, which is the product of two main inputs: labor and capital.

$$XV = avLAB_i^{\propto} CAP_i^{(1-\propto)} \quad (1)$$

As a result, Equations 2 and 3 can also be used to calculate labor and capital in each sector.

$$LAB_i = \propto_i PV_t \frac{X_t}{W} \quad (2)$$

$$CAP_i = (1 - \propto_i) PV_t \frac{Xt}{PK_i} \quad (3)$$

PVt, Xt, W, PKi are the price value-added, domestic output, current wage rate in the economy, and capital price in sector I respectively.

The household income function is written as follows:

$$HHY_h = \sum hfylshi(LAB_i W) + \sum hfykshiCAP_i PK_i(1 - depr_i) \quad (4)$$

where HHYh is the household income of household h (rich or poor), is a function of labor supplied at the ruling wage rate (W) and capital stock (K) of the households at the ruling price of capital (PK) and depreciation rate (depri), and hfylshi is the share factor income from labor received by household i and hfykshi is the share factor income from capital received by household i. Households spend their money on items produced by the sectors, including rival commodities imported from other countries. Imports and domestic demand, on the other hand, are believed to be imperfect substitutes under the Armington assumption (Armington,1969). Hence, the quantity of composite commodity *i* consumed by household *h* is given by

$$HEXPQ_{(h,i)} = \frac{hexp_{shi} * HHY_h}{PQ_i} \quad (5)$$

Where $HEXPQ_{(h,i)}$ is the quantity of composite commodity *i* consumed by household *h*, $hexp_{shi}$is the expenditure share for household h on goods from sector I and PQ_i is the price of a composite commodity sector I and $hexp_{shi}$ as defined earlier. Each household maximizes a Cobb–Douglas utility function subject to their income, thus the household utility function is given by

$$HHU_h = \sum hexp_{shi} logHEXPQ_{hi} \quad (6)$$

where$HHU_h$is household utility, $hexp_{shi}$and are as defined. Household savings are defined as the difference between household income and expenditure, but total household savings are calculated by adding the savings of all households together.

$$SAV_h = HHY_h - \sum hexpS_i HHY_h \quad (7)$$

$$HSAV = \sum SAV_h \quad (8)$$

Where *SAV$_h$* and *HSAV* are household savings and total households' savings respectively and the Agricultural loan disbursement function is given as:

$$AGRLOANEX_{AGR} = GSEC * \frac{GRTOT}{P_{AGR}} \quad (9)$$

Where $AGRLOANEX_{AGR}$ is Agricultural loan disbursement due to reforms, *GSEC $_{AGR}$* is government sectoral consumption, *GRTOT* is government total revenue and *P$_{AGR}$* is the price of the composite agricultural commodity (domestically produced and imported).

4.2. Simulation Design

To achieve the objectives of the study, two policy scenarios were formulated and simulated in this study. These scenarios involve reducing the base-year share of agriculture loan interest rate by some magnitude, given that financial reforms in agriculture are directly related to output. The two scenarios include:

(1) 10 percent decrease in the interest rate on agriculture loan in line with the Interest draw-back policy of the CBN.

(2) 8 percent decrease in the interest rate on agriculture loan in line with single-digit interest rate policy

The evaluation of the effect of decreases in the interest rate on agriculture loans on households' welfare regarding utility gained or lost will be analyzed using the Hicksian Equivalent. Following Obi-Egbedi *et al*. (2012) and Philip and Iorember (2017). The Hicksian Equivalent Variation (EV) is given as:

$$EV^h = \left[\frac{U_n^h - U_0^h}{U_0^h}\right] Y_0^h \quad (10)$$

Where,

Y_0^h=Income of household h before the policy change,

U_0^h =Utility of household h before the policy change,

U_n^h = Utility of household h after policy change, and

EV^h =Equivalent Variation of household h.

A policy is said to affect households if the calculated value of the equivalent variation (Hicks in a coefficient) is greater than zero. o (i.e., if EV > 0). The higher the value of the equivalent variation, the more impactful the policy is to the households (Phillip and Iorember, 2017).

5. RESULTS

Macroeconomic Impact of Increase in Agricultural Financing through 10 Percent Decrease in Interest Rate

In order to ascertain the impact of increase in agricultural financing on the macroeconomic variables of economic growth, household income and household welfare in Nigeria, scenario one (10 percent decrease in the interest rate on agriculture loan) was simulated and the results are presented in Table 1.

Table 1: Simulation One (10% decrease in interest rate)

	Baseline Impact (₦'Billion)	Simulated Impact (₦'Billion)	Percentage Change (%)
Economic Growth	10,744.90	11,832.75	10.12
Agricultural Output	3,328.182	3,764.33	13.10

Result in Table 1 shows that, the macroeconomic variable of economic growth increase from ₦10,744.90 to ₦11,832.75 representing 10.12% due to increase in agricultural financing through 10% reduction in interest rate on agricultural loans. Also evident in Table 1, the results indicated that agricultural output increased from ₦3,328 to ₦3,764 which is about 13.10 percentage increase as a result of increase in agricultural financing through 10% reduction in interest rate on agricultural loans. Furthermore, for all the indicators, the results showed a positive increase suggesting that a policy of 10% reduction in interest rate on agricultural loans have significant positive impact on the macroeconomic variables.

Macroeconomic Impact of Increase in Agricultural Financing through 8 Percent Decrease in Interest Rate

In order to ascertain the impact of increase in agricultural financing on the macroeconomic variables of economic growth, and agricultural output, scenario one (8 percent decrease in the interest rate on agriculture loan) was simulated and the results are presented in Table 2.

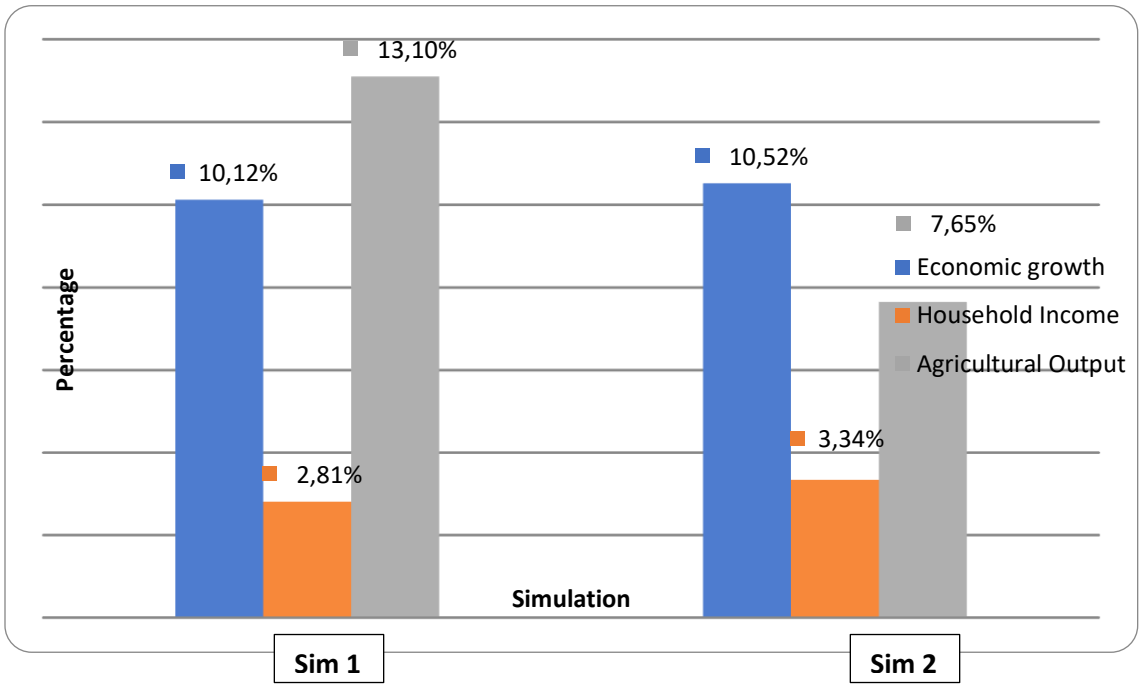
Table 2: Simulation Two (8% decrease in interest rate)

	Baseline Impact (₦'Billion)	Simulated Impact (₦'Billion)	Percentage (%) Change
Economic Growth	10,744.90	11,874.99	10.52
Agricultural Output	3,328.182	3,582.87	7.65

Result in Table 2 reveal that, economic growth increase from ₦10,744.90 to ₦ 11,874.99 representing 10.52% due to increase in agricultural financing through 8% decrease in interest rate on agricultural loans. Further, the results divulge that agricultural output increased from ₦3,328.18 to ₦3,582.87 which is about 7.65 percentage increase as a result of increase in agricultural financing through 8% decrease in interest rate on agricultural loans.

To further buttress the findings, the results of simulation one (SIM 1) and simulation two (SIM 2) is presented on Figure 1. For SIM 1, Figure 1 shows that the impact of the policy (10% decrease in interest rate on agricultural loans) has highest impact on agricultural output, followed by economic growth and then household income. While for SIM 2, Figure 1 indicates that the policy (8% reduction in interest rate on agricultural loan) has highest impact on economic growth, followed by agricultural output and then household income.

Figure 1: Percentage Change in the Macroeconomic Indicators due to Simulation One and Simulation Two



Diagnostic and Sensitivity Checks

To determine the robustness and reliability of the simulations results, the study employed two diagnostics and sensitivity checks; to evaluate if the model has been able to replicate the benchmark or initial equilibrium, and to verify the non-violation of the Walras law which states that the Walras variable must be approximately zero. In the first case, the results indicated that the baseline simulations replicated the benchmark equilibrium, and in the second case, the results showed that the values of the Walras variable for both the baseline simulation and the counterfactual simulations are approximately zero as required. These suggest that the model has goodness of fit and has performed well; hence, the findings of the study are robust and reliable.

Test of Hypotheses

For hypotheses one, and two, the decision rule is to reject the null hypothesis (H_0) if a policy option has greater than 5% impact on the macroeconomic economic variables. Otherwise, do not reject H_0.

All two hypotheses were tested using the results in Tables 1 and 2 as well as Figure 1.

Hypothesis 1: Since the percentage change in economic growth is greater than 5% due to agricultural financing reforms (simulations one and two), the study rejects the null hypothesis and conclude that agricultural financing reforms have significant impact on economic growth in Nigeria.

Hypothesis 2: Since the percentage change in agricultural output is greater than 5%due to agricultural financing reforms (simulations one and two), the study rejects the null hypothesis and conclude that agricultural financing reforms has significant impact on agricultural output in Nigeria.

6. CONCLUSION

The discussion of the findings of the study is in line with the objectives and hypotheses of the study. Regarding economic growth, the study confirmed that agricultural financing reforms have significant impact on economic growth. This suggests that reducing the interest rate charged on agricultural loans as a measure of agricultural financial reforms will increase access to finance for investment in agriculture. And since agriculture is a major contributor to economic growth, increase in its output would ultimately result to increase in economic growth. This finding is consistent with the study of Dim and Ezenekwe (2013); Ademola *et al.* (2013); Iorember and Jelilov (2018) who established that increase in agricultural financing results to improvement in economic growth. With respect to agricultural output, the study established that agricultural financing reforms through reduction in agricultural loans interest rate can lead to enhancement in agricultural output. A reduction in interest rate on agricultural loans implies a decrease in the cost of investable capital which will in turn lead to increase in agricultural output. Agricultural financing reforms through reduction in agricultural loans may lead to increase in agricultural output, it does not determine the prices of agricultural produce. In fact, prices of agricultural produce may decline when the supply is high. This study is in line with the study of Ademola (2019).

The study investigated the impact of an increase in agricultural financing on macroeconomic aggregates such as economic growth, agricultural output and household welfare in Nigeria using a computable general equilibrium model. To achieve the objectives of the study, two policy scenarios (10% and 8% reduction in interest rate on agricultural loans) were simulated and the results for both cases indicated that all the macroeconomic indicators increased significantly due to the policy options.

Based on the findings of the study which indicate that agricultural financing reforms have a positive significant impact on macroeconomic aggregates of economic growth, agricultural output and household welfare, the study recommends the implementation of the policy scenarios that lead to this conclusion. That is, a 10 percent or 8 percent reduction in interest rate on agricultural loans in line with the interest draw-back policy of the CBN.

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THE IMPACT OF THE US EMPLOYMENT REPORT ON THE GOLD SPOT RATE

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ABSTRACT

Purpose- Considering the various financial markets, it can be observed that macroeconomic events such as announcement releases might affect the volatility and the direction of price movements in the related markets. While some announcements might play a substantial role in this subject, some might be categorized as unessential announcements in the economic calendars. Reports related to the employment situation, inflation, growth of the domestic product, and commodity reservations of a country are crucial points on the schedule of investors and traders all around the globe. However, reports coming from countries with a major economic share have a much more significant effect on the market. In that regard, researchers are more interested in the evaluation of economic events of countries like the United States, United Kingdom, Germany, and China. In that regard, this study focuses on the impact of the U.S. employment situation report on the XAU/USD spot exchange rate.

Methodology- In the first part of the study, the significance of relevant factors of the announcement has been evaluated to specify the importance of the elements included in the employment report. In that interest, an OLS regression model has been developed in the first step. Furthermore, the face and statistical validity phases have been controlled to improve the efficiency of the model. The second part of the study focuses on the direction of the price movement respectively after specific periods from the report's release. To satisfy the desired goal of the study, two various models have been applied to the data to evaluate the two models and their performances. The first model is based on logistic regression approaches while the second model benefits from XGboost regression. Accuracy metrics have been evaluated for both models to decide on the healthiness of the performances.

Findings- Findings demonstrate that the gold spot exchange rate reacts strongly to the announced nonfarm payroll employment figure, while the market takes its revision of the prior month and unemployment rate as additional data around the release of the announcement. Results suggest that employment reports labeled as "bad news" for the U.S. economy caused an increase in the exchange rate of the gold spot. Price discovery for different time intervals after the announcement release shows that the first 10 minutes are the most crucial. Time intervals before the announcement release imply that exchange rate changes are regular and there is not any recognizable pattern for price movements before the announcement release, while abnormal returns start to show up just after the release of the announcement.

Conclusion- To sum up, the impact of the announcement report on the price movement of the gold spot is undeniable. However, uncertainties increase before the announcement, and volatility increases after the announcement. Various statuses lead to specific movements in the market. While the uncertainties are lower before the announcement, the price movement of the gold spot would be diverse to the status of the announcement.

Keywords: U.S. Nonfarm payrolls, employment report, macroeconomic event study, gold spot, machine learning, decision tree
JEL Codes: F31, F62, G15

1. INTRODUCTION

In general, Gold is viewed as a safe-haven asset, particularly during uncertain economic periods. As a result, a variety of variables, including macroeconomic updates like the US nonfarm payroll report, can affect changes in the price of Gold. The effect of scheduled macroeconomic events in the U.S. and other countries on foreign exchange markets has been studied in several papers. These studies include the impact of announcements such as employment situation reports, gross domestic product, producer price index, customer price index, and trade surplus or deficit on different features of exchange markets such as price changes, market volume, and market volatility. Based on numerous studies, the U.S. employment situation report can be called one of the most effective announcements on the gold market. Instead of studying various events, this

paper will focus on the U.S. employment situation announcement to comprehensively evaluate its impact on the Gold spot exchange rate. U.S. employment report includes the total number of nonfarm payroll employment, unemployment rate, and revisions of the previously announced figures in the preceding month. First, this study aims to answer questions about the effect of each figure during the time of the announcement on exchange rate changes. What will be the direction of changes in the exchange rate regarding the effect of each figure? Which figure has more effect on exchange rate changes? Most studies evaluate the impact of the U.S. employment situation based on the total number of nonfarm payroll employment statistics, which can be addressed as the announcement's headline. In contrast, some other studies make this evaluation based on unemployment statistics (K. P. Evans & A. E. Speight, 2010), and eventually, some studies evaluate each of them separately (Chatrath et al., 2014). This study focuses on measuring the effect of the U.S. employment report based on all predictor variables together to achieve more reliable results. Furthermore, the standard procedure suggested by (Ederington et al., 2019) is followed, which is based on the differences between announced figures and the median of forecasted numbers compiled by Bloomberg and MMS. This difference is labeled as "Surprise" for the announced figures. It is mandatory to mention that economic events can affect pre-market so that after evaluating the effect of each figure on exchange rate changes, the reaction of the gold spot exchange before the announcement is evaluated to see if there is the existence of abnormal returns before the release of announcement or not. Abnormal returns are defined as the difference between exchange rate changes and expected exchange rate changes. The advent of high-frequency data has inspired an explosion of writing on a wide range of financial market concerns, so in this study, high-frequency data are used to inspect intraday price movement with high precision. In this case, one day before the announcement in one-minute time intervals are examined, and likewise, after the announcement, one day afterward, the announcement in one-minute intervals using data from January 2011 to March 2020 are explored. Reasonably more than forecasted amounts for the total number of nonfarm payroll and its revision for the preceding month are considered good status for the U.S. economy, so they strengthen the value of the U.S. Dollar. In contrast, more than the forecasted unemployment rate is considered a bad status for the U.S. economy. Hence, it weakens the value of the U.S. Dollar. Based on this logic, more than forecasted amounts for the total number of nonfarm payroll and its revision weakens Gold, while more than forecasted unemployment rate strengthens Gold. Three distinct regression techniques have been taken into consideration for this: XGboost regression, logistic regression, and linear regression. The same independent variables and dependent variables are specified for each of these techniques. For logistic regression and XGboost regression, the dependent variable is a binary variable that indicates whether the exchange rate increased or decreased over a given time frame. The dependent variable for linear regression is the change in the XAU/USD exchange rate. The purpose of this research is to compare the findings from various regression techniques and to comprehend how these independent variables affect the dependent variable. The strength and direction of the relationships between these variables using linear regression can be determined, and the direction and size of changes in the XAU/USD exchange rate using logistic regression and XGboost regression can be predicted. The effect of US nonfarm payroll report releases on spot exchange rates can be understood more thoroughly and useful inferences about the variables that influence changes in the price of Gold can be made by employing multiple regression methods. Investors, decision-makers, and anyone else interested in comprehending the intricacies of the gold market may find the findings to be of interest. The statistical technique of linear regression involves fitting a linear equation to the observed data to model the connection between a dependent variable and one or more independent variables. Finding the link between the dependent variable and the independent variables and estimating its strength and direction are the goals of linear regression. According to the assumptions of linear regression, the dependent variable must be continuous, normally distributed, and have a linear connection to the independent variables. Contrarily, logistic regression is a statistical technique used to simulate the relationship between a binary dependent variable and one or more independent variables. A binary dependent variable has only two possible values, 0 or 1. Based on the values of the independent variables, logistic regression aims to forecast the likelihood of the binary outcome. Given that the relationship between the dependent variable and the independent factors is not always linear, logistic regression assumes that the dependent variable has a logistic distribution. To determine the strength and direction of the link between the change in the XAU/USD exchange rate and the independent variables, linear regression is utilized in this research work. On the other hand, to anticipate the course of changes in the exchange rate, logistic regression is used to estimate the likelihood of the XAU/USD exchange rate increasing or decreasing depending on the values of the independent variables. In summary, this study hypothesizes that the gold spot exchange reacts negatively to "surprise" amounts on the total number of nonfarm payroll and its revision, while it reacts positively to the "Surprise" amount in the unemployment rate. Other sections of this paper are organized as follows. Section 2 describes previously studied literature. Section 3 explains the data and relevant methodology. In section 4 results are included. Moreover, section 5 includes the conclusion of this study.

2. LITERATURE REVIEW

The classification of price discoveries, and studies about the effect of macroeconomic fundamentals on asset prices included in various financial markets, are essential concerns of market efficiency models and market microstructure theoretical literature. Investors worldwide are interested in the movements of the U.S. economy as the leading economy in the world. As a result, the economic news of the U.S. is unquestionably one of the most important topics of discussion among investors throughout the world (Nikkinen et al., 2006), so any economic event in the U.S. can be assumed as a potential opportunity in

financial markets. Also, evidence from Gau & Wu (2017) suggests that New York's trading time is one of the most dominant trading times in the financial markets. That is why the effect of macroeconomic events on the U.S. has been studied in numerous papers. These events usually cause abnormal exchange rate changes between various financial markets regarding the importance of these events. The advent of high-frequency data plays a vital role in the development of literature related to price discoveries (Cai et al., 2001). Some of these studies focus on classifying jumps in exchange rate changes corresponding to macroeconomic events. (Chatrath et al., 2014) focuses on intra-day jump distributions of currency returns, which extends the microstructure analysis. Similarly, Andersen & Bollerslev (1998) and Andersen et al., (2001) suggest that the most significant returns are related to public information announcements and, in particular, specific macroeconomic reports. Moreover, Andersen et al. (2001) focus on spikes in volatility to develop a structure for the identification of jumps where they extend this identification by including features from realized bi-power variation (Barndorff-Nielsen & Shephard, 2004). It should be noted that the impact of macroeconomic events is not only limited to abnormal returns and jumps on exchange rate changes but also affects volatility, volume, and buy/sell spread. Numerous papers particularly evaluate the impact of macroeconomic announcements on the volatility of different markets (DeGennaro & Shrieves, 1997), (Melvin & Yin, 2000), and (Evans & Lyons, 2002). (K. Evans & A. Speight, 2010) evaluates the price movement and market volatility regarding macroeconomic news announcements in the short run. Likewise, Sun et al., (2011) propose a new volatility estimator based on wavelet analysis and demonstrate that Intraday volatility clusters grow as we get closer to the release date and then dissipate exponentially afterward. Few papers discover the effect of macroeconomic announcements on market volume, so it is theoretically ambiguous. Fleming & Remolona (1999) is one of the studies which considers the effects of macroeconomic announcements on Treasury securities market volume. They illustrate that the release of the announcements causes an immediate jump in the market return, and subsequently, market volatility and volume increase and remain steady for several hours. Congruently, Chaboud et al. (2004) find that trade activity surges around the time of scheduled macroeconomic data releases, as well as at other periods of the day when trading volume is often higher for institutional reasons. This study focuses more on literature, studying the effect of macroeconomic announcements on commodities such as gold. Cai et al. (2001) is one of the essential studies which addresses abnormal volatilities on gold futures to related macroeconomic events and ranks them by their importance. They examine the impact of 23 regularly released macroeconomic announcements in the U.S. and find that only 4 of them significantly affect the volatility of the gold market. Their findings display that employment reports turn out to be the most important announcement for the Gold market, followed by GDP, CPI, and personal income. Christie–David et al. (2000) applies a regression model between the unemployment rate and price movements of Gold and Silver using four-year intra-day data. Results demonstrate that Gold strongly reacts to the release of CPI, unemployment rate, and gross domestic product. And the PPI. Similarly, Smales & Yang (2015) studies the reaction of Gold futures during the announcement releases where they distinguish the status of the received announcement as "good" economic news and "bad" economic news. Their findings show that news relating to the unemployment rate significantly affects the gold market, and Gold reacts positively to unexpectedly "bad" economic reports and negatively to "good" reports. Eventually, Chen & Gau (2010) compares the behavior of price movements around announcements between spot and future rates and identifies the characteristics of each market. According to their findings, the foreign exchange spot market has a more significant influence on price discovery, although futures returns are more susceptible to announcements than spot returns.

Dezhkam & Manzuri (2023) use extreme gradient boost (XGBoost) to predict shifting stock price trends. The model outperforms benchmark methods and exhibits superior performance metrics when it comes to portfolio creation. In a similar work (Abu-Doush et al., 2023) used a multilayer perceptron neural network and an archive-based Harris Hawks optimization algorithm, to introduces a new framework for forecasting Gold prices. The framework examines several feature selection strategies and uses a variety of input datasets to show how well the proposed algorithm predicts gold prices when compared to other optimization algorithms and traditional machine learning approaches. In contrast to prior models, (Hajek & Novotny, 2022) proposes a fuzzy rule-based prediction system for Gold prices that takes into account past financial data as well as news sentiment. The results emphasize the significance of news effects in short-term forecasts and point to the possibility for fuzzy rule-based systems to beat current strategies while providing investors with clear trading guidelines. However, (Yun et al., 2021) describes an improved feature engineering approach and a stock price prediction system based on the GA-XGBoost algorithm. The study highlights the value of feature engineering in enhancing prediction precision and striking a balance between the benefits and drawbacks of dimensionality in predicting stock price direction. The analysis presented in (Han et al., 2023) suggests a brand-new labeling technique for predicting stock price trends termed N-Period Min-Max (NPMM). The study shows that by focusing on instance selection and lowering data size, the NPMM labeling method outperforms other labeling methods in terms of trading performance. Also, the Post-Earnings-Announcement Drift (PEAD) phenomenon in the stock market is examined in (Ye & Schuller, 2021) using a machine learning strategy, specifically XGBoost. It exhibits the capability of XGBoost to estimate PEAD direction and the potential for creating portfolios with higher positive returns and smaller negative returns based on the model's predictions.

3. DATA AND METHODOLOGY

3.1. Data

For this study, related data of U.S. employment situation report is collected from the Bureau of Labor Statistics (BLS), which is usually issued on the first Friday of each month at 8:30 AM Eastern Time to illustrate the employment situation of the preceding month, from January 2011 to March 2020 giving 139 observations. This data includes (1) the total number of U.S. nonfarm payroll employment for the preceding month, (2) the revision of previously announced nonfarm payroll employment figures, (3) the unemployment rate for the preceding month, (4) The median of most recent analyst forecasts of the total number of U.S. nonfarm payroll and unemployment before to the announcement. To study the impact of the employment situation, report on the gold spot exchange rate more accurately and avoid data adjustment error in this study, data that are precisely released on the announcement time should be studied. U.S. nonfarm employment and unemployment "surprises" are calculated as the difference between the announced BLS figure, and the median of analyst forecasts compiled by Bloomberg to follow the most recent studies approach. On behalf of calculating changes on the gold spot exchange rate, historical data of the Gold spot exchange in one-minute frequency are collected from Histdata.com for U.S. employment situation report days from January 2011 through March 2020. Cumulative price changes from one before to the release of the announcement through market close time on announcement days are calculated. The observation window is defined from 8:30 AM open price to 8:40 AM open price interval and extended each 10 minutes up to 9:30 AM open price to cover one hour after the announcement release. Furthermore, 6:00 AM open price through 8:29 AM open price is defined as observation window for pre-market reaction. This approach aims to test various intervals before and after the release of the announcement to interpret more precise results. Time intervals are not extended beyond the observation windows to evade effects on exchange rate changes by factors other than the U.S. employment situation report. In addition, to observe any abnormal exchange rate changes, data in the same frequency are collected to include the announcement window on U.S. employment report days from January 2011 through March 2020. Table 1 includes descriptive statistics for data included in this study. Furthermore, figure 1 and figure 2 exhibit the changes in the level of the essential figures of the announcement. As can be seen, the median of forecasts collected by Bloomberg can vary from the actual announced number for total nonfarm figure. In contrast, the actual figure for unemployment experiences less deviation to the forecasted figure from Bloomberg side. Additionally, for the period of study, the unemployment ratio has a steady trendline. Necessary to mention that some announcement dates include simultaneous events which might affect the price movement in a particular time interval. All simultaneous events have been considered for data period of this study and eliminated in order to achieve more reliable results based on pure impact of variables included in this study.

Table 1: Descriptive Statistics

	Mean	Median	Standard Deviation
Panel A - U.S nonfarm payroll employment statistics (All numbers in 1000 of jobs)			
Announced Change	137.39	162.00	147.37
Median analyst forecast change	136.46	139.95	139.95
Nonfarm payroll surprise	0.93	1.00	65.04
Revision of prior month	7.51	10.00	31.23
Panel B – U.S Unemployment rate (all in percentage)			
Announced Change	6.43%	5.90%	2.19%
Median analyst forecast change	6.47%	6.10%	2.21%
Unemployment surprise	-0.04%	0.00%	0.14%
Panel C – XAU/USD Cumulative exchange rate changes following the release of the employment report (all in percentage)			
8:30 - 8:40	0.03%	0.06%	0.61%
8:30 - 8:50	0.01%	0.02%	0.66%
8:30 - 9:00	0.01%	0.04%	0.70%
8:30 - 9:10	0.04%	0.07%	0.72%
8:30 - 9:20	0.04%	0.08%	0.75%

8:30 - 9:30	0.07%	0.12%	0.79%

Figure 1: Actual Versus Forecasted Total Number of Nonfarm Payrolls

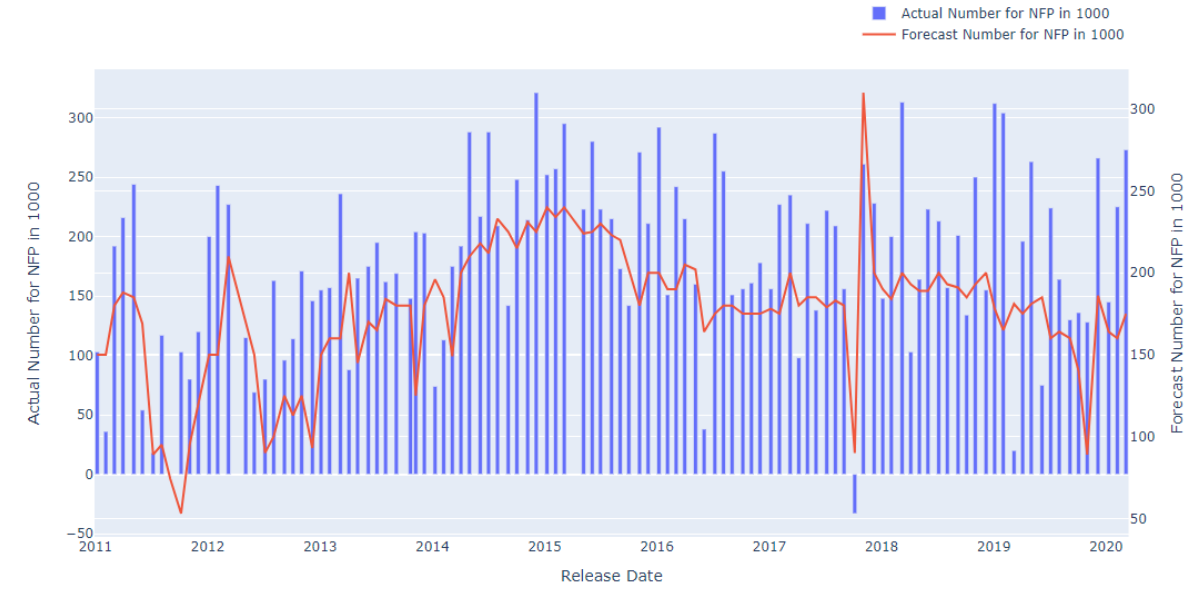
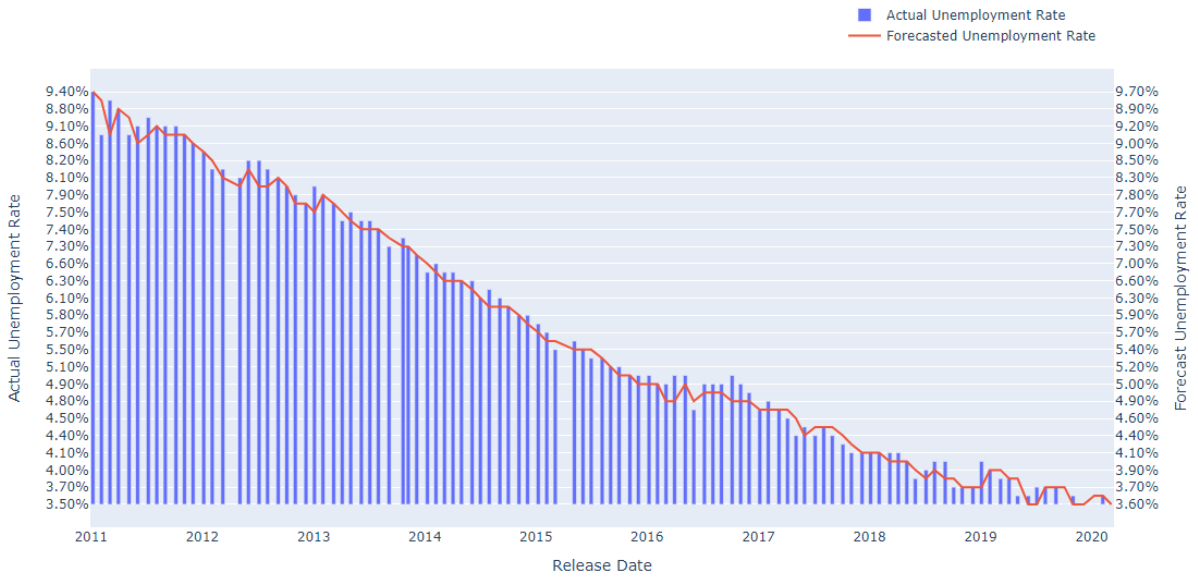


Figure 2: Actual Versus Forecasted Unemployment Rate



3.2. Methodology

The objective of this study is to determine whether the U.S. Nonfarm Payrolls announcement affects the spot price of Gold. Linear regression will be used to examine the relationship between changes in the XAU/USD rate, which is the dependent variable, and the number of Nonfarm Payrolls surprises, unemployment rate surprises, and preceding month revision surprises, which are the independent variables. In addition, for model estimation and evaluation, logistic regression and XGBoost regression are used to predict the direction of the dependent variable based on the independent variables.

3.2.1. The Reaction of Gold Spot Exchange Rate to the U.S. Nonfarm Payroll Report

First, essential predictor variables are identified to study market reaction to U.S. nonfarm payroll reports. Following most recent studies, the total number of U.S. nonfarm payroll employment, unemployment rate, the median of most recent analyst forecasts, and revision of the previous month's payroll number are the essential predictor variables. Based on the typical procedure in literature, the difference between the announced level of U.S. nonfarm payroll employment and the median analyst forecast, which Bloomberg compiles, is recognized as the "surprise" change in employment levels. To make more accurate analyses and understandable results, employment level "surprises" are standardized to the mean of zero and variance of one for the data period from January 2011 through March 2020 and named "Employment surprise." Similarly, the same practice is applied for the unemployment rate, and the standardized difference between the unemployment rate and the median of analyst forecast change is named "Unemployment Surprise." Also, the standardized difference between the revised number of nonfarm employment and the previously announced nonfarm employment number is named "Employment Revision." Multiple regression methods are applied for both samples to discover the relationship between predictor variables and changes in the gold spot exchange rate during the release of the U.S. employment situation. The multiple regression method helps find coefficients relevant to each predictor variable, so it is mandatory to prevent any possibility of multicollinearity. Before applying multiple regression for exchange rate changes, Pearson correlation coefficients between predictor variables are calculated and shown in table 2. Results in correlation analysis show a low correlation between independent variables of the model, which indicates a low possibility of multicollinearity in the regression model. Additionally, in order to achieve robust results variance inflation factor for independent variables of the study has been considered to conclude the possibility of multicollinearity shown in table 3. Since variance inflation factor for all variables is approximately equal to 1, it can be concluded that there is no possibility of multicollinearity in the OLS model.

Table 2: Correlation Matrix for Independent Variables

	Total NFP Surprise	**Unemployment Surprise**	**Revision**
Total NFP Surprise	1		
Unemployment Surprise	0.2113	1	
Revision	0.0358	-0.0636	1

Table 3: Variance Inflation Factor Metrics

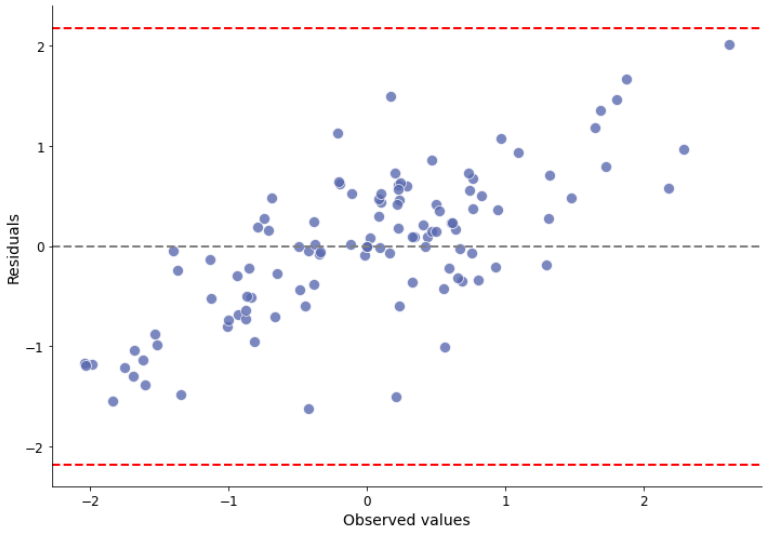
Variable	**VIF**
Total NFP Surprise	1.0494
Unemployment Surprise	1.0523
Revision	1.0066

Estimations for cumulative exchange rate change ($Exchange\_Change\,\%_t$) in equation (1) for different time intervals following the release of announcement has been considered for OLS model.

$$Exchange\_Change\%_t = \beta_0 + \beta_1\, Total\_Nonfarm\_Surprise_t + \beta_2\, Unemployment\_Surprise_t + \beta_3\, Revision_t + \varepsilon_t \quad (1)$$

Necessary to mention, residuals for OLS model have been considered in order to evaluate the possibility of heteroskedasticity in the residuals of the model. In that regard, figure 3 represents the distribution of the residuals for the initial model.

Figure 3: Distribution of Residuals



However, distribution of residuals presented on the graph might not provide accurate understanding of the residual's variance. To evaluate this issue more adequately, alternative tests have been applied on the initial model in case of presence of heteroskedasticity. Alternative tests according to the evaluation of this phenomenon are presented in Table 4.

Table 4: Heteroskedasticity Tests

Test	Test Metric	P-value	Hypotheses
Goldfeld-Quandt test	F-statistic: 1.1308	0.3295	Null hypothesis: homoscedasticity
Breusch-Pagan test	Chi-squared statistic: 1.1753	0.7589	Null hypothesis: homoscedasticity
White test	Chi-squared statistic: 13.5276	0.1401	Null hypothesis: homoscedasticity

The Goldfeld-Quandt test, the Breusch-Pagan test, and the White test were the three tests used to determine heteroskedasticity. These tests' findings indicate that there isn't much evidence of heteroskedasticity in the model. The results of the Goldfeld-Quandt test showed that there was no significant difference in variance between the two groups of data, with a test statistic of 1.1308 and a p-value of 0.3296. The Breusch-Pagan test, which had a test statistic of 1.1753 and a p-value of 0.7589, also revealed no indication of heteroskedasticity. The White test resulted in a test statistic of 13.5276 and a p-value of 0.1401, indicating that the homoskedasticity null hypothesis cannot be rejected. Overall, the findings of the three tests have agreed, showing that presence of heteroskedasticity is rejected. However, considering homoscedasticity, GLS model has been applied to compare findings in both models.

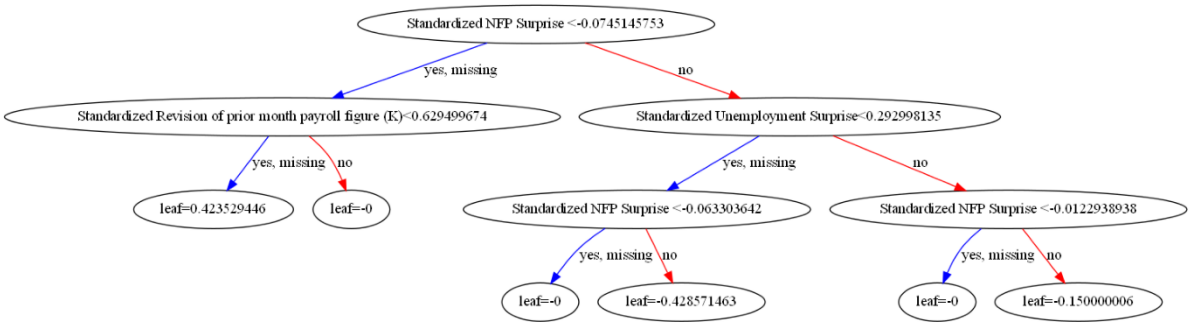
Furthermore, fixing predictors, dependent variable has been considered for various time intervals following the announcement release.

3.2.2. The Direction of Exchange Rate Movement After Announcement Release

Since the impact of announcement release is observable, it is appealing to predict the behavior of the movement following the announcement release. In that regard two feasible behaviors have been considered for price movement. Based on the status of the announcement the movement can be either ascending or descending. While the outcome is binary, decision tree approaches can be beneficial to be practiced in this regard. In this case, movement direction has been evaluated based on the same predictors of this study. Two separate models based on logistic regression and XGboost regression developed and accuracy metrics for both models has been compared in order to select a model with more accuracy metrics.
The effectiveness of the XGboost and logistic regression models has been assessed using a variety of criteria. These binary classification models are often evaluated using two metrics: accuracy and AUC-ROC (Area Under the Receiver Operating Characteristic Curve). The percentage of instances that were correctly classified out of all instances has been utilized to calculate accuracy. However, accuracy alone might not be adequate to judge model performance in scenarios when the classes are unbalanced. In order to test the model's capability to distinguish between positive and negative cases across all potential threshold values, AUC-ROC has also been used. The confusion matrix has also been looked at in order to total up the number of true positives, false positives, true negatives, and false negatives in addition to these metrics. Other helpful metrics, including precision, recall, and F1-score, have been computed from the confusion matrix. The fraction of real positives among all instances projected to be positive has been measured using precision. The proportion of true positives among all real positive cases has been calculated using recall. The harmonic mean of recall and precision has been calculated

using the F1-score, which offers a fair evaluation of both measurements. Figure 4 represents the decision tree structure for XGboost model.

Figure 4: Decision Tree Structure



3.2.3. The Reaction of Pre-Market to Release of U.S. Nonfarm Payroll Report on The Gold Spot Exchange Rate

The efficient market hypothesis (EMH) suggested by (Fama et al., 1969) remains the dominant theory to interpret market behavior. It implies that prices movements in financial markets should be formed in a random walk without any discernible patterns that can be analyzed to extract potential profits (Caporale & Plastun, 2021). Based on this hypothesis, it is assumed that price movements prior to the release of the U.S. Employment should follow a random walk if there is no existence of information leakage. Abnormal returns on the gold spot exchange rate changes 150 minutes before the announcement release and 10 minutes after the announcement release are calculated for data from January 2011 through March 2020.

Abnormal returns for time are calculated as follows:

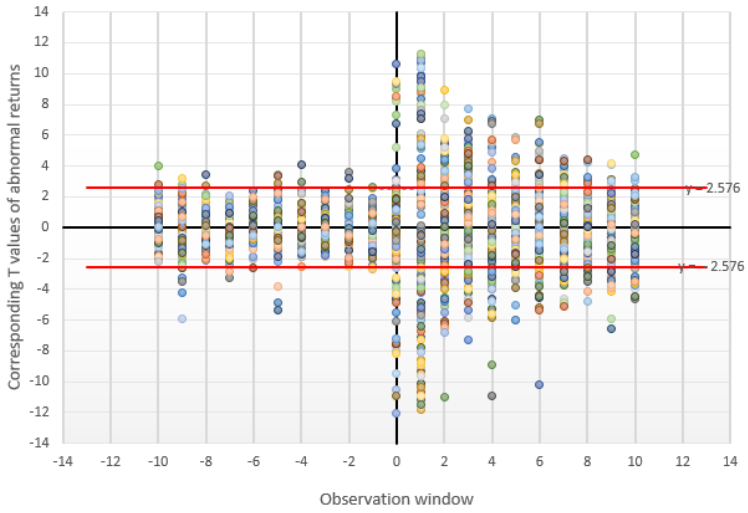
$$AR_t = R_t - E(R)_t \tag{2}$$

Where R_t is return at time t, and $E(R)_t$ is expected return which is corresponding average return for sample period, and it is calculated as follows:

$$E(R)_t = (\frac{1}{T}) \sum_{i=1}^{T} R_i \tag{3}$$

In this formula, t is the sample size, and for this study, it equals 131, including 150 minutes before the announcement release and 10 minutes after. In the following, T-Statistics for abnormal returns are calculated figure5. The observation window includes 10 minutes before the announcement release and 10 minutes after the announcement release.

Figure 5: Corresponding T-Values of Returns



4. FINDINGS AND DISCUSSIONS

Standardized variables provide a better understanding of results. In this case, each coefficient measures the movement of one standard deviation change in the predictor variable on cumulative changes of the exchange rate before and after the release of the announcement. In order to evaluate the presence of heteroskedasticity, GLS model has been performed. Results coming from GLS model approve the robustness of the OLS model while coefficients show no deviation between two approaches shown in table 5.

Table 5: OLS and GLS Regression Results

	Dependent variable: Exchange Rate	
	OLS Model	**GLS Model**
Standardized NFP Surprise	-9.458*** (1.059)	-9.458*** (1.059)
Standardized Revision	-0.355*** (0.118)	-0.355*** (0.118)
Standardized Unemployment Surprise	0.347** (0.302)	0.347** (0.302)
Intercept	-0.880*** (0.128)	-0.880*** (0.128)
Observations	112	112
Adj. R-squared	44.51%	44.51%
Residual Std. Error	0.738 (df=108)	0.738 (df=108)
F Statistic	30.684*** (df=3; 108)	30.684*** (df=3; 108)
Note:	*p<0.1; **p<0.05; ***p<0.01	

For the sample of this study, employment surprise coefficient is significantly different from zero at 5% level for all time intervals, so it can infer that one standard deviation increase in employment surprise tends to origin decreases between 0.34% through 0.14% in exchange rate changes 30 minutes following the release of the announcement. Likewise, the employment revision coefficient is significantly different from zero at a 5% level for all time intervals, indicating that one standard deviation increase in employment revision tends to origin decreases almost 0.035% through in exchange rate 30 minutes following the release of the announcement. In contrast, the unemployment surprise coefficient is different from zero at 5% level for all time intervals, representing that one standard deviation increase in unemployment surprise tends to origin increase between 0.034% through 0.014% in exchange rate 30 minutes following the announcement.

The statistics show that positive employment surprise weakens Gold, consistent with previous studies and the hypothesis of this study. Additionally, coefficients show the relative importance of each predictor variable. The results on Wald tests at 5% level can infer that the coefficient of employment surprise is significantly greater than the coefficient of employment revision and unemployment surprise, indicating that it has more impact relative to employment revision and unemployment surprise on the exchange rate changes. Coefficients for predictor variables in different time intervals 30 minutes following the release of announcement stay consistent, indicating that the impact of announcement release is completed in the first 30 minutes following the release of the announcement. In summary, it can infer from results on multiple regression model that at the time of announcement release, market presumes surprise on nonfarm payroll employment number as the most deciding variable and strictly reacts to this variable and views the employment revision and unemployment surprise as variables which contain additional information regarding the release of the announcement. Moreover, a multiple regression model for time intervals included one hour prior to the release of the announcement is applied to see if there are significant coefficients for predictor variables or not. Results show that coefficients of predictor variables are not significantly different from zero, indicating no information leakage prior to announcement release. The market does not react to the release of the U.S. nonfarm payrolls report one hour before the release of the announcement. Results for T-Statistics of abnormal returns specifies that 2.12% of abnormal returns through 8:20 to 8:30 interval is out of confidence level, and an expansion in T-statistics of abnormal returns happens just after the release of the U.S. nonfarm payrolls report where 28.64% of abnormal returns are out of desired range. Results on abnormal returns are in line with results achieved by the multiple regression method because both indicate the existence of jumps in exchange rate changes after the U.S. nonfarm payrolls report release. At the same time, both reject the reality of exchange rate changes caused by the U.S. nonfarm payrolls report for time intervals before the release of the announcement. Table 6 represents results for various time intervals following the announcement release. While first time window includes 5 minutes after the announcement, the largest observation time window presents 30 minutes following the announcement.

Table 6: OLS Regression for Each Cumulative Intervals

	Dependent variable: Exchange Rate					
	Cum 5	**Cum 10**	**Cum 15**	**Cum 20**	**Cum 25**	**Cum 30**
Standardized NFP Surprise	-3.4581*** (1.052)	-2.3782*** (1.119)	-2.1040*** (1.125)	-1.8755*** (0.168)	-1.7664*** (1.173)	-1.4254*** (1.201)
Standardized Revision	-0.355*** (0.118)	-0.3606*** (0.125)	-0.4154*** (0.125)	-0.3849*** (0.130)	-0.3918*** (0.131)	-0.3516*** (0.134)
Standardized Unemployment Surprise	0.3475** (0.302)	0.1692** (0.319)	0.3242** (0.321)	0.3075** (0.334)	0.2712** (0.336)	0.1207** (0.343)
Intercept	-0.8803*** (0.128)	-0.7861*** (0.135)	-0.7858*** (0.136)	-0.7379*** (0.141)	-0.7239*** (0.142)	-0.6737*** (0.145)
Observation	112	112	112	112	112	112
Adj. R-squared	44.51%	38.10%	37.46%	32.51%	31.97%	28.63%
Residual Std. Error	0.738 (df=108)	0.749 (df=108)	0.786 (df=108)	0.820 (df=108)	0.893 (df=108)	0.941 (df=108)
F Statistic	30.684*** (df=3; 108)	23.771*** (df=3; 108)	23.160*** (df=3; 108)	18.821*** (df=3; 108)	18.386*** (df=3; 108)	15.842*** (df=3; 108)
Note:	*p<0.1; **p<0.05; ***p<0.01					

Note: Each column represents cumulative exchange rate change 5 to 30 minutes following the announcement release.

Up to this point, it has been shown that gold spot exchange rate reacts negatively to a positive status of employment report especially to the headline of the announcement and other features included in the announcement gives additional information related to the announcement. In order to predict the direction of the movement, it is necessary to evaluate findings on decision tree approaches. Table 7 shows measurement metrics for two models of this study.

The goal was to evaluate how the release of the U.S. employment data affected the direction of the movement of the spot gold exchange rate. Logistic regression and XGboost decision tree methods were used, and 70% of the data was used to train the models. At a 5% level of significance, the logistic regression model produced coefficients for the standardized NFP surprise, standardized unemployment surprise, and standardized revision, respectively, of -1.00201, 0.3286, and -0.2388. The logistic regression model's accuracy, precision, recall, F1 score, and AUC score were discovered to be 0.7111, 0.6845, 0.9627,

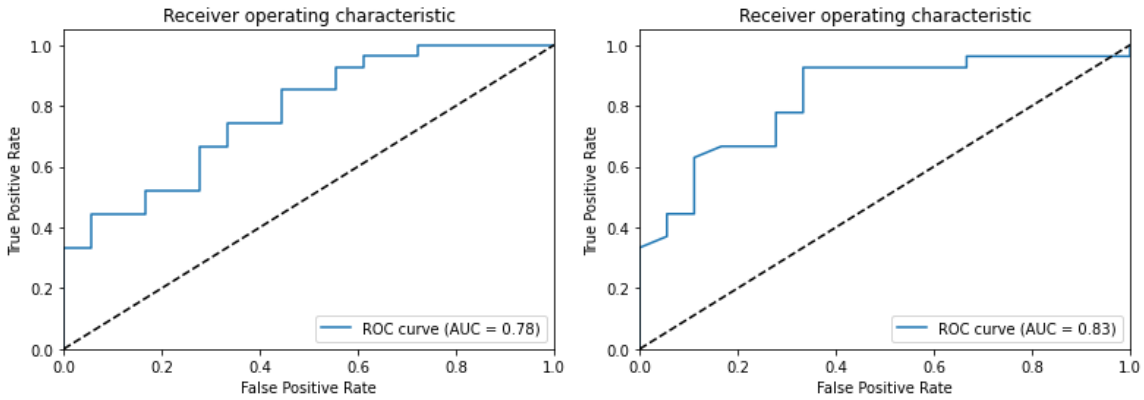
0.8, and 0.7757, respectively. The study's findings show that the standardized NFP surprise, standardized unemployment surprise, and standardized revision all significantly affect the spot price of gold after the announcement is made. The direction of the movement in the exchange rate was reasonably well predicted using the logistic regression model, which is a widely used decision tree approach in binary outcome prediction. The model had an accuracy of 0.7111, which means that 71.11% of the time it predicted the movement's direction accurately. The accuracy of the logistic regression model was 0.6845, which indicates that 68.45% of the positive cases that the model predicted were in fact true. The model's recall was 0.9627, which indicates that 96.27% of all positive cases in the dataset were accurately predicted by the model. The model's F1 score was 0.8, which represents the harmonic mean of precision and recall and offers a single indicator of the model's general effectiveness. The model's AUC score was 0.7757, which shows that it is more accurate than random guessing in differentiating between positive and negative cases. Overall, the study's findings show that decision tree methods can be used to foretell how economic announcements will affect the spot price of gold. To increase the models' precision and investigate additional variables that can influence the exchange rate, more research is nonetheless required.

The effect of the U.S. employment data on the spot price of gold after the announcement has been predicted using the XGboost decision tree approach. The same features as in the logistic regression model were utilized, and for the standardized NFP surprise, standardized unemployment surprise, and standardized revision, respectively, the relevance of each feature was found to be 0.4388, 0.3286, and 0.2325. The accuracy of the XGboost model was 0.7777, which is somewhat better than the accuracy of the logistic regression model. The model's accuracy was 0.7931, which indicates that 79.31% of the positive cases it predicted were in fact positive. The model's recall was 0.8518, which indicates that it accurately predicted 85.18% of the positive cases in the dataset. The harmonic mean of precision and recall for the model was 0.8214, which is known as the F1 score. The model's AUC score was 0.8271, indicating that it performs better than random guessing in differentiating between positive and negative cases. The findings of this study show that the XGboost decision tree approach is a good technique for forecasting how economic announcements will affect the spot price of gold. The NFP surprise, followed by the unemployment surprise and revision, has the greatest influence on the exchange rate, according to the relevance of each component in the XGboost model. Figure 6 shows ROC curves for both model and corresponding AUC scores. In conclusion, the XGboost model fared better in predicting the movement of the exchange rate than the logistic regression model. According to the study's findings, decision tree methods can be a useful tool for forecasting how economic announcements will affect the financial markets. The accuracy of the models can be increased by conducting additional research to examine additional variables that may impact the exchange rate.

Table 7: Measurement Features for Decision Tree Models

Model	Accuracy	Precision	Recall	F1 score	AUC score
Logistic Regression	0.7111	0.6842	0.9630	0.8000	0.7757
XGboost	0.7778	0.7931	0.8519	0.8214	0.8272

Figure 6: ROC Curve for Logistic Regression and XGboost Regression



Note: graph in the right side represents ROC curve of logistic regression approach with AUC of 78%, while graph in the right side represents ROC curve of XGboost approach with AUC of 83%.

5. CONCLUSION AND IMPLICATIONS

The release of the U.S. jobs report has a considerable impact on gold spot exchange rates, the study's findings show. According to the analysis, a high number of nonfarm payrolls has the most bearing on the announcement, while the unemployment rate and the revision from the previous month also add to the picture. It has been discovered that an upbeat job report weakens gold spot exchange rates. Additionally, the research has demonstrated that abnormal returns occur immediately following the announcement, indicating that the market is responding fast to the fresh information. The study's decision tree methods, such as logistic regression and XGboost, have shown great precision and accuracy in forecasting the direction of gold spot exchange rates depending on the timing of the release of the U.S. employment report. Overall, the analysis emphasizes the significance of the release of the U.S. employment data as a significant factor influencing gold spot exchange rates. For traders and investors who are interested in forecasting the direction of gold spot exchange rates after the release of the U.S. jobs report announcement, the findings and models created in this study may be helpful.

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