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THE RELATIONSHIP OF GENDER DIVERSITY WITH FINANCIAL PERFORMANCE: EVIDENCE FROM IT FIRMS IN ESTONIA

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Allowed for defense on ………………………………………..

(date)

I wrote this master's thesis independently. All viewpoints of other authors, literary sources, and data from elsewhere used for the writing of this paper have been referenced.

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(Signature of the author)

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Abstract

Gender diversity has been researched at the board level, but little is known about its effect at the employee level, in specific industries, and countries. I expanded the research to the employee level and analyzed whether gender diversity affects the financial performance of IT firms in Estonia. This was done by employing panel data from the Estonian Tax and Customs Board (2006-2019), Estonian Commercial Registry (2006-2020), Statistical Registry of Population, Employment Registry, Structure of Earnings Survey (2014-2018), data from Estonian Housing and Population Census data for 2011 and considering the endogeneity problem. The results suggest that there is no significant relationship between gender diversity and the financial performance of Estonian IT firms.

Keywords: Gender Diversity, Effects, Financial, Information Technology, Estonia,

JEL classification: C33 C36 J40 L10 L80

Table of Contents

1. Introduction

The study aims to observe if larger shares of women in Estonian IT firms have a positive impact on financial performance. There is a lack of research on the far-reaching consequences of gender imbalance in IT firms; for this reason, I investigated these issues and recommended directions for future research. My research contributes to existing literature differently. Other studies covered gender diversity effects at the board level and in managerial positions. However, with the growing demand in the IT profession in Estonia, understanding how females contribute to this industry is an exciting study to cover. Khanna et al. (2017) expand on the idea that gender diversity creates awareness and helps us understand its importance.

Gender diversity and the need for more female representation in firms hahas been an ongoing debate for years. Some countries have been able to increase more labour force participation of females, while some other countries are still trying to scale up due to societal dynamics, norms, and what areas they perceive females are valued more in. Avram et al. (2019) pointed out that the effect of gender diversity is not the same in all industries. It is essential to consider this when analyzing and observing its impact. Studies have covered that if there is a significant growth in the role of females, there is still an essential gap between these indicators and the access of women to top management positions (Martin-Ugedo et al., 2019). Gender diversity should not be a one-time thing when it is needed to fulfill the firm's specific needs. It should be continuous work developed, maintained, and cultivated.

In developed countries, females now represent a higher percentage of IT firms compared to developing countries. Estonia has transitioned from the decades of authoritarianism to a democratic country (Alas and Kaarelson 2008). In 2004, Estonia also passed an act on gender equality by the European Institute for Gender Equality (Riigi Teataja 2004), the essence of the act was to breach the gap in gender discrimination. This study further provides evidence about Estonia's IT industry. The e-Estonia report (2021) shows that the IT sector is the fastest-growing sector in Estonia and is home to many start-ups with the highest average pay and most competitive recruitment. To state the obvious, people with IT skills are in great demand, and according to the report, Estonia ranks 5th, making it one of Europe’s top countries for digital skills, with 62% of Estonians having at least basic digital skills, the country is comfortably above the EU average on this measure.

This paper expands the existing empirical literature on gender diversity. The empirical model of the study employs the Ordinary Least Squares (OLS) regression method, which includes the pooled regression and fixed effects model. OLS could potentially result in omitted variables, measurement error, and endogeneity problems. The fixed-effects method controls the unobserved and omitted variable GMM method is used to address the problem and fully carry out the analysis. Other control variables could be affected by any of the explanatory variables in the model. The paper deals with these issues using exogenous variables as instrumental variables, addressing causality issues.

Section 2 compares past literature reviews on gender diversity and financial performance; section 3 explains the methodology and dataset; section 4 describes how the analysis was carried out and discusses the empirical results. The final section concludes and provides suggestions for future research.

2. Theoretical Background

2.1 Gender Diversity and the Workplace

The concept of gender diversity relates to the gender characteristics of males and females Gorbacheva et al., 2019). Our society defines and perceives females differently from men based on feelings, behavioral attributes, and characteristics. There are a lot of societal standards and obligations on women (Khanna et al., 2017). This topic has gained the spotlight in recent years. Theoretical literature reviews have explored the linkage between gender diversity and firm performance, most at the board level. Gutiérrez-Fernández and Fernández-Torres (2020) proposed that promoting gender diversity is vital to boosting efficiency. There have been significant relationships between various gender diversity programs and their acceptance in the workplace (Khanna et al., 2017).

Gender diversity can be measured in diverse ways in the workplace. According to (Kweh et al., 2019), the study created an interaction term for females on the board and their level of independence, suggesting that females are not as independent. Kouki (2021) found that gender diversity amongst boards reduces the authority it comes with. Gutiérrez-Fernández and Fernández-Torres (2020) proposed that gender diversity at senior levels continually poses challenges in the society at large, making it essential to investigate the main reasons gender diversity is necessary. Christiansen et al. (2016) also highlighted that gender diversity makes working in group tasks easier, promoting creative output, as there are more diverse ideas with potential ways to solve the task. Teruel and Segarra-Blasco (2017) established that the impact gender diversity has, differs in the type of innovation and size of the firms. High profitability means the sound financial status of the firm (Satria et al., 2020) expressed that females do not play an essential role in decision-making linked to profitability.

Ferrary and Deo (2019), females working in traditional roles are often ignored, focusing our attention on the board level, which might not truly give a bigger picture of the role that gender diversity plays in the general workplace. Zhang (2019) sees gender diversity as profitable for some firms and a loss to other firms. When there is the option to work flexibly, this will contribute to gender diversity because more females will have the option to work while taking care of family obligations as the society defined by Alas and Kaarelson (2008). Competitive advantage is linked to firms that hire more women to their workforce. According to Meah et al. (2021), females in top-level management positions are more sensitive to their environment and social issues, improving the firm's reputation and integrity in how a firm performs.

In a study by Zhang (2019), 1069 leading firms across 35 countries and 24 industries, gender diversity relate to more productive companies, as measured by market value and revenue, only in contexts where gender diversity is normally accepted. This reflects when comparing the influence of gender diversity on how well females are represented. (Noland et al., 2016) state that the representation of females is very low for countries with rapidly ageing populations, mostly underdeveloped countries.

Gender diversity regulations and norms are often country-specific. With policies that support gender diversity, society easily accepts that females are doing things differently, reflecting in other areas of life, as Zhang (2019) stated. Creating policies that increase the share of females in the labour force could substantially contribute to building more women in senior positions (Christiansen et al., 2016). Gender diversity is beneficial to firms because males and females have different ideas and insights to increase firms' productivity levels, attract different customer bases, promote positivity in the workplace, and improve job satisfaction (Ibrahim et al., 2019). Researching the trends of gender diversity is essential because it highlights its effect (Avram et al., 2019)

Culture affects how females are hired (Alazzani et al., 2017). Despite the numerous opportunities the IT industry in Estonia provides, it is still largely under-represented by females. According to the Eurostat table (2021) of employed IT specialists by sex for 2020, women represent about 22.1% of the IT industry in Estonia. According to the publication by the Fourth World Conference on Women and the adoption of the Beijing Declaration and Platform for Action (1995), the Estonian parental leave system is not flexible enough compared to other European countries like Finland, and because of the adequate time given for parental leave, females face longer career breaks and of course find them less represented in the workplace. This could be a contributing factor to why the proportion of females working in specific industries like IT, not typically seen as where females should work, is lower due to stereotypes.

Gender Equality Index in Estonia (2020) reported that Estonia ranks 18th in the EU, which is still low but better than the previous years. With gender balance, there is better design thinking and performance culture (Reino et al. 2020).

2.2 Risk Preference

The argument of risk preferences between genders is never-ending. Most argue that women are more risk-averse, which would be detrimental because being able to take risks is linked to a firm's growth; perhaps in the case of high growth opportunities, risk-taking is satisfied, but in the case of shortage of growth opportunities, having more females might be more important. A lower attitude to risk may have both negative and positive effects, and thus, given that, perhaps one should analyze the effect of gender diversity in different contexts. Chen (2008) addressed the risk behaviours of both genders, examining their character traits and how they respond to their environment. The paper concluded that men are more competitive and optimistic than women from their character traits perspective because women have less optimistic attitudes to risk-taking decisions, making them less tolerant of risk than men.

One positive effect of a larger share of women in management on performance may be lowering excessive risk-taking by better identifying potential risks because women are more aware and cautious of risk. Na and Shin (2019) argue that women still have a place to improve performance better than men despite being risk-averse. The author highlighted how women perceive corruption and how they can objectively view situations without trying to outdo others or being too overconfident could contribute to performance. This paper gives a more interesting idea to the topic of women being better at avoiding corruption.

Also, Mukarram et al. (2018) gave another perspective and demonstrated that it is not in all areas that women are risk-averse and that risk can be based on context and behaviours. This means that even though we say women are more risk-averse, it could also be based on a particular thing or area, not that they are all more risk-averse than men, which reflects why women do not appear to be consistently risk-averse in all situations. According to Bertrand (2011), attempts at measuring the actual effect of attitudes toward risk have failed.

2.3 The IT Profession

Gender diversity in the IT industry has not been fully researched yet. Gorbacheva et al. (2019) proposed that a more solid basis for the research is needed to understand why females are still largely under-represented. IT roles involve developing, maintaining, and using computer networks, software, and systems; anything related to computing technology is IT. The IT industry is creative, and firms should look for ways to promote gender balance in underserved IT roles, which could help the firm to reach its goals (Anjiri 2018). Simionescu et al. (2021) claim that the IT sector faces male gender stereotyping. Khanna et al. (2017); Hsieh et al. (2019) found that the IT sector has grown compared to years back, with more females being recruited, which contributes to the development of the IT sector. Avram et al. (2019) reported that more research on gender equality in IT could be a prominent field of study because the number of women in this role could directly link with a firm's performance.

Teruel and Segarra-Blasco (2017), the smaller the firm, the less gender diversified it will be, which might be limiting, contributing to how the firm. On the other hand, large firms have more diversified teams, enabling them to benefit from the diverse skills and experiences they bring to the research and development research and development (R&D) process. Shin (2006) found that IT firms have core business values that enable growth. With the evolution of technological innovation and how women are seen to solve problems differently, more returns are anticipated from a higher level of gender diversity in IT than in other industries, as established by (Anjiri 2018). Christiansen et al. (2016) said policies should be in places that would facilitate more females working and occupying these positions. Yang et al. (2019) found a positive link between higher education and qualification level driving the performance of Norway firms. Simionescu et al. (2021) expand on the idea that a profitable firm is linked to its recruitment process, expressing that hiring individuals is now based on skills and qualifications rather than demographics.

Performance is a complex term. Jaber (2020), performance is linked to and defined differently depending on the context. Financial performance is an essential part that contributes to a firm's growth, and before a relationship can occur, there needs to be a measure of financial performance. Researchers have used various profitability metrics in estimating financial performance. The most popular indicator is the return on assets (Erdogan and Yamaltdinova 2019; Darmadi 2010; Habash and Abuzarour, 2022; Schmidt 2019; Dankwano and Hassan 2018; Afonina and Chalupsky 2014, etc.). The authors' used return on Equity (ROE) (Jaber 2020; Garanina and Muravyev 2019; Hamilton 2021). Nakagawa (2015), Yu (2019), Habash and Abuzarour (2022) used Tobin Q's and ordinary least square estimation and fixed effect rule to measure the ROA. Other financial metrics used that are not as common are return on investment (ROI), return on sales (ROS), and gross profit by these papers (Gansuwan and Onel 2012; Reino et al., 2020; Le Thi Kim 2021; Meah et al., 2021).

Studies have shown positive, negative, and no relationships between gender diversity and profitability. Simionescu et al. (2021) sampled European countries, suggesting that there should be a higher share of women on the board because there are positive links between increased productivity and digital innovation of firms. The article by Duppati et al. (2019) on gender reporting requirements of listed New Zealand companies indicates a strong positive correlation with financial performance. The article compared with and without female representation. Boards with female representation performed better than firms without female representation. The result by Dankwano and Hassan (2018) using an independent sample t-test suggests that companies dominated by females recorded a higher return on assets.

Dankwano and Hassan (2018) identified a negative effect after analyzing data from an independent sample t-test in India, and the study results explain that companies with fewer women directors recorded a higher return on assets. It further explains that the negative impact on return on assets (ROA) could be because of the lack of a critical mass of women directors, especially in India, where the representation of women directors is low. Corporate performance, which is another aspect of a firm's performance in a study by Gallego-Alvarez et al. (2009), did not impact gender diversity. It further highlights that gender diversity is associated with conflict and a slow decision-making process, which could be especially negative in competitive environments where decision-making speed may be crucial. Schmidt (2019) analyzed 454 European firms using education as a moderating effect on the share of females on the board, and there was no link between the educational level of females on the board and financial performance.

Resource-based theory by Yu (2019) showed a pattern of the curvilinear relationship, which meant that a lower share of gender diversity increases performance, and when the share of women increases, there is a performance decrease. Even though the paper points out that in case of higher gender diversity and more women, there are new perspectives and ways to solve a problem which is why it is good to select a percentage of women at the board level, it still argues there should be more men compared to women at the boards. There were also insignificant effects; for instance, linear regression Al-Mamun et al. (2013) did not find any relationship between female board members and firm performance in Pakistan.

2.4 Causal Effect and Endogeneity Issues

Endogeneity is a major concern when estimating gender diversity variables (Pasaribu et al., 2019). Many econometric studies tackle the endogenous problem caused by omitted variables using instrumental variables (IV) estimators. An instrumental variable is usually used in regression analysis when other variables influence endogenous variables in the model.

Given the relevance of causality for addressing the effects on financial performance, we sometimes cannot resolve it in one way as there are issues with omitted variables, measurement errors, and simultaneous causality bias. To resolve endogeneity problems between dependent and independent variables, there needs to be a way to account for reverse causality (Meah et al., 2021). Finding causal relationships between gender diversity and financial performance could be challenging because many variables can influence performance (Christiansen et al., 2016). Gender diversity could either increase or decrease a firm's performance; other variables like employee age, education level, firm-level, and size, making it easy to attract more women, could also have affected firm performance (Wintoki et al., 2012).

Regression discontinuity was used by Vaccaro (2016), it was based on the comparison, and it was used to identify the causal effect of gender wage differences. (Christiansen et al., 2016) shed light on the potential causal effect when females have higher participation, using a simple difference-in-difference estimation. It states that if women can influence performance, the impact must be stronger than men, where there are more women in labor-intensive industries and more women in industries with greater demand for creativity and critical thinking since these industries are usually more dominated by men. Difference-in-difference regression approach was also used by Yang et al. (2019), using Norway as the treatment group and the control groups (Sweden, Denmark, and Finland). Using this to analyze the causal effect of Norway's gender-balancing quota, the empirical result showed better performance of firms, and women's pay quota significantly increased.

One standard method developed by Arellano and Bond 1991 (Arellano & Bond 1991) is used to control endogeneity and is the Dynamic Panel GMM model. Brahma et al. (2021) used the method to examine the impact of gender diversity on board firm performance. It considers all explanatory variables endogenous and uses past values as their corresponding instruments. Okoyeuzu et al. (2021) used both difference and system GMM and found better results using the two-system GMM because difference GMM's lagged levels are poor instruments for the first difference if the variables are close to a random walk. For the two-step system GMM, Wintoki et al. (2012) found potential problems with weak instruments, which become greater as the number of lags of the instrumental variables increases.

3. Research Methodology

3.1 Data and Sample

The firm-level data for this study were collected from four different sources. Employees' tax records include the gender and date of birth from the Estonian Tax and Customs Board (2006-2019). Merging tax records with firms' records from the Estonian Commercial Registry (2006-2020), including the registered companies' information on various indicators such as; the firm's size, financial information, and ownership, educational data from the Statistical Registry of Population (2010-2020), and Occupation data from the Employment Registry, Structure of Earnings Survey (2014-2018). Individuals' and educational level information is merged with the firm's data in the commercial registry to obtain the variables of interest. The data set was filtered to remove the outliers. Outliers could lead to biased results and incorrect conclusions if not handled properly, so excluding 1% top and bottom outliers helps explain the regression model further in the analysis. It avoids distortions and control for extreme cases that could yield different results (Gansuwan and Onel (2012). Small micro firms with 1 to 5 employees were also excluded from the analysis. IT firms with more than five employees are 7,359 from 2006 to 2020.

3.2 Empirical Model

To conduct this research, I needed to measure firm performance indicated as ROA and ROE, the independent variables Blau index and share of females, and the control for other explanatory variables (age, size, foreign ownership, female managers, log of labour productivity, tertiary education, year dummies, and industry dummies). The methodology is based on the study by Mukarram et al. (2018), who carried out pooled OLS, fixed effect, and GMM analysis. OLS is the basic model for analyzing panel data. The OLS regression method estimates the pooled regression and fixed-effect. Mukarram et al. (2018) used it to measure female directors' propensity toward risk in a sample of 71 listed technology firms on the National Stock Exchange of India from 2008 to 2013.

The pooled regression model is potentially flawed. It can be inconsistent and biased. If the regression model does not capture the influences on the dependent variable, these are collected in the error term, resulting in regressors correlating with the error term and are considered omitted variables. In other words, even if there are significant relationships between these variables or they show promising results, it could be misleading.

For this reason, I introduced the fixed effect model to address the problem of heterogeneity bias in the model and better fit the model. The fixed-effect method is considered more consistent since each firm has its firm-specific characteristics that may or may not influence the predictor variables.

Other papers that have used this technique in their research are (Abad et al., 2017; Martin-Ugedo et al., 2019; Simionescu et al., 2021; Gall al., 2009). It is measured as below in equation 1.

$$Perf_{it} = \beta_0 + \beta_1 Gender_{it} + \beta_2 Controls_{it} + \gamma_{it} + \mu_{ij} + \varepsilon_{it} \qquad (1)$$

$Perf_{it}$ is the financial performance that represents ROA and ROE, they are the indicators for the firm's financial performance, $\beta_1\ Gender_{it}$ comprises the independent variables on gender share and gender inequality at the firms (Blau index and share of females). The $Controls_{it}$ represents all the control variables used in this paper and ε_{it} is the random error term that shows how the observed data differs from the sample data. γ_{it} denotes strong specific time-invariant fixed effect by removing the time-invariant characteristics to show that each firm's characteristics are uncorrelated with other firms' characteristics. μ_{ij} controls the industry effects. The subscript i represents the individual firms $(1, 2, 3....)$, t denotes the year from 2006, 2007…. 2020, and the subscript j denotes the industry.

Since there could be econometrics issues that still need to be solved, I estimated my model using the two-step system GMM estimator to control for this endogeneity issue. The two-step system GMM method is the best fit because our data contains observations of multiple observations obtained at multiple periods. GMM model has been commonly used to control endogeneity (Ugedo et al., 2019; Okoyeuzu et al., 2021). It controls the problem of potential endogeneity that may arise due to potential reverse causation between financial performance and the predictor variables. For instance, an increase in female size, which can positively affect a firm's finances, could also influence a firm to increase the female size for more female representation. I estimated the following models below to carry out the analysis fully.

Model 1: $$Perf_{it} = \beta_0 + \beta_1 Gender_{it} + \beta_2 Age_{it} + \beta_3 Size_{it} + \beta_4 Foreign_{it} + YearEffect_{it} + IndustryEffect_{ij} + \varepsilon_{it} \quad (2)$$

Model 2: $$Perf_{it} = \beta_0 + \beta_1 Gender_{it} + \beta_2 Age_{it} + \beta_3 Size_{it} + \beta_4 Foreign_{it} + \beta_5 FemaleManagers_{it} + YearEffect_{it} + IndustryEffect_{ij} + \varepsilon_{it} \quad (3)$$

Model 3: $$Perf_{it} = \beta_0 + \beta_1 Gender_{it} + \beta_2 Age_{it} + \beta_3 Size_{it} + \beta_4 Foreign_{it} + \beta_5 FemaleManagers_{it} + \beta_6 LabourProductivity_{it} + YearEffect_{it} + IndustryEffect_{ij} + \varepsilon_{it} \quad (4)$$

Model 4: $$Perf_{it} = \beta_0 + \beta_1 Gender_{it} + \beta_2 Age_{it} + \beta_3 Size_{it} + \beta_4 Foreign_{it} + \beta_5 FemaleManagers_{it} + \beta_6 LabourProductivity_{it} + \beta_7 Tertiary_{it} + YearEffect_{it} + IndustryEffect_{ij} + \varepsilon_{it} \quad (5)$$

Model 5: $$Perf_{it+1,it+3} = \beta_0 + \beta_1 Gender_{it} + 4Age_{it} + \beta_5 Size_{it} + \beta_6 Foreign_{it} + YearEffect_{it} + IndustryEffect_{ij} + \varepsilon_{it} \quad (6)$$

Model 6: $Perf_{it} = \beta_0 + \beta_1 Gender_{it} + \beta_2 Gender^2_{it} + \beta_3 Age_{it} + \beta_4 Size_{it}$

$$+ \beta_5 Foreign_{it} + YearEffect_{it} + IndustryEffect_{ij} + \varepsilon_{it} \quad (7)$$

Model 7: $Perf_{it} = \beta_0 + \beta_1 Gender_{it} + \beta_2 ManufacturingIT_{it}$

$$+ \beta_3 ManufacturingIT_{it} * Gender_{it} + \beta_4 Age_{it} + Size_{it} + \beta_5 Foreign_{it}$$

$$+ YearEffect_{it} + IndustryEffect_{ij} + \varepsilon_{it} \quad (8)$$

The design of this paper is using stepwise regression. Stepwise is used in my model to fit the regression based on my choice variables, adding variables step by step to see how the results change (Ekadah and Kiweu 2012). A baseline model represented as model 1 was first specified, and other control variables were added as the model progressed. is the first step of the regression, using the firm-level characteristics (size, age, foreign ownership, and the year dummies). Instrumental variables are the log of age and year dummies, while the rest are endogenous variables. In model 2, the share of females is added to the regression as endogenous because ownership structure could influence females at the board level or in managerial roles. In model 3, labour productivity is included and treated as an endogenous variable because any shock in wages or in productivity levels might generate correlated changes in the firm's workforce and in labour productivity. In the final model, tertiary was added to the model and used as an instrumental variable with age and year dummies because it is not affected by any variables in the model.

I examined the nonlinear effects of gender diversity (Nakagawa 2015; Erdogan and Yamaltdinova 2019). The idea is to check if there is an opposite effect of gender diversity. For example, with decreasing gender diversity, the firm's profit increases. I then analysed the future time effects in 2 periods to understand how current measures of gender diversity affect future profits. I finalise the analysis by introducing a moderating effect to examine the interaction between gender diversity measures and their effect on firms' profits. I introduced manufacturing IT firms in further analysis to moderate the changes in gender diversity with financial performance. All tests were carried out using the pooled regression and fixed-effect model. The GMM model is introduced at the last stage of my analysis to control the endogeneity issues.

3.2.1 Variables

Dependent Variables: The dependent variable consists of two accounting-based variables, return on assets (ROA) and return on equity (ROE). ROA was chosen as a metric for financial performance because it has shown consistency with prior research in similar studies. ROA and ROE are also commonly used in other types of studies and the business world as measures of financial performance. ROA is a measure of how efficient a company is. It makes use of its assets to generate profit (Habash and Abuzarour 2022; Dankwano and Hassan 2018). The second variable of interest is ROE, which has been used by several researchers to show efficiency, (Dankwano and Hassan 2018; Jaber 2020) analyzed ROE using t-test statistics, they suggested that performance is higher when there are more females in management positions. ROE ratio measures the financial profitability of the capital contributed by the firm owners. This indication was also used by (Shin 2006; Ibrahim et al., 2019).

Independent Variables: The Independent variables are; Blau and the share of female employees. Blau represents the Blau index, and it means equality. It tests the degree of gender distribution and measures diversity in different areas. Blau's index, initially proposed by Simpson (1949), is used in this paper to measure the ratio of males and females in the firm. I classified the Blau index as either male or female by multiplying the square of females and deducting it from 1. Van der Heijden and Zhang (2019) stated that the closer the Blau index is to 0.5, the better it portrays diversity; however, the closer it is to 0, it is based on just one gender (male or female). Gender diversity = 1 – (share of female workers)^2 – (share of male workers)^2. The equation in equation 10.

Blau's Index: $$B = 1 - \lfloor \sum_{i=1}^{n} \left(p_i^2\right) \rfloor \quad (10)$$

B is the value of Blau Index, $n = 2$, representing the total number of categories (male and female), and P_i is the proportion of the population in both gender groups measuring the ratio of males and females represented. The value of this index ranges between 0 to 0.5, where 0 indicates 1 gender group and 0.5 denotes equal groups. The share of females employed used in the studies (Alazzani et al., 2017; Teruel and Segarra-Blasco, 2017) is used to measure the share of female working employees.

Control Variables: This paper controls for some variables that could affect the firm's profitability, These controls have been used in prior research (for example, Alazzani et al., 2017; Meah et al., 2021; Hamilton, 2021). These controls are firm age which measures how long the firm has been in existence, and firm size, measured as the logarithm of the firm's total assets. (Noland et al., 2016) state that the firm size has also proven to be a huge determining factor that positively improves financial performance. The share of female managers was calculated using the tax data based on the wage of females earning above 80% average wage, and a dummy for tertiary education as the highest level of education as used in the paper (Darmadi 2010) were all controlled for.

Labour productivity and foreign ownership structure are also controlled (Meah et al., 2021). Industry dummies to account for each industry effect of the firm-level sample were included. Year dummies were included to control the time trends that can influence profitability; for example, if the data was for 2006, it takes the value of 1 and 0, otherwise accounting for seasonal fluctuations. Authors who used these variables as controls are (Shin 2006; Duppati et al., 2019; Simionescu et al., 2021). There are potentially other variables that could be used as control variables, for example, debt ratio, leverage, employee-specific roles, and occupation level; however, data for these are difficult to collect and have shallow observations, debt ratio, and leverage. Other characteristics of board members and firms are complex to quantify, impacting financial performance. These include things such as corporate culture or the characteristics of specific individuals.

Table 3.1: Variables Definitions

Dependent Variables	
Return on Assets (ROA)	The ratio of the firm's annual income to the average total assets during the financial year.
Return on Equity (ROE)	The measure of profitability shows how a firm earns relative to the shareholder's equity.
Independent Variables	
Blau Index	Blau index means gender equality. (Equal values at 0.5 for each gender means gender balance in the firm).
Share of Females	Share of female working employees in the firm.

Control Variables	
Firm Size	The firm's size is calculated by taking the logarithm of assets.
Firm Age	Measures how many years the firm has been in existence.
Share of Female Managers	The share of female managers is based on the wage range of over 80%, which means lower than 80% wage earners is not considered.
Tertiary Education Dummy	A dummy variable that takes the value 1 if the employee has a tertiary education, the highest level of education obtained in our data, and 0 otherwise.
Foreign Ownership	Firm who have a foreign ownership structure.
Log of Labour Productivity	This is the relative value-added per employee taken as a log.
Year dummies	Dummy variable for every year between 2006 to 2020 to control for time-varying effects
Industry dummies	A dummy variable for each industry according to EMTAK 2-digit industry classification

Table 3.2: Summary of Descriptive Statistics

	IT Firms			**Non-IT Firms**		
Variables	**Mean**	**Std. Dev.**	**Obs.**	**Mean**	**Std. Dev.**	**Obs.**
Total Employees	15.073	36.334	6,046	17.158	78.106	292,552
Dependent Variables						
ROA	-2.329	179.01	10,764	-9.411	2998.72	318,474
ROE	1.979	261.319	10,775	-4.960	3115,041	318,525
Independent Variables						
Blau	-7.858	329.578	5,542	-5.524	1000.788	278,906
Share of Females	0.306	0.461	5,192	0.460	0.498	261,005

Controls						
Share of Female Managers	0.243	0.401	18,494	0.411	0.445	292,551
Firm Age	1.798	0.851	16,434	2.085	0.836	614,895
Firm Size	2.599,	0.941	4,037	2.537	0.939	190,574
Tertiary Education	0.564	0.496	6,046	0.429	0.495	292,552
Log of Labour Productivity	10.428	0.727	3,282	10.008	0.869	151,383
Foreign Ownership	0.157	0.364	16,225	0.109	0.311	471,996

Table 3.2 depicts the descriptive statistics. It covers IT firms, and Non-IT firms, summarising all key variables. Comparing IT firms and Non-IT firms, the mean values of the explanatory variables Blau and Share of females show different effects on firms in Estonia. In the IT firms, Blau has a mean value of (-7.858), though there is not much difference with Non-IT firms (-5.524), the share of females mean value is lower for IT firms (0.306) than Non-IT firms (0.460). The result explains that all firms in Estonia are more dominated by males than females. The mean values of ROA (-2.329) and ROE (1.979) in IT firms indicate that Estonian IT firms are less profitable in their total assets; comparing this with Non-IT firms, IT firms are better because Non-IT firms are negative for both ROA and ROE, representing (-9.411) and (-4.960) respectively. The average firm age is approximately 2 years for both IT and Non-IT firms. The firm size is highest for IT firms (2.599), though not much different from Non-IT firms with an average of (2.537). Tertiary education for IT firms is (0.564) higher, and log of labour productivity is also higher for IT firms with a difference of 0.42% than Non-IT firms. Foreign ownership of IT firms in Estonia is also higher than in Non-IT firms with a mean difference of 0.048, while there are more female managers in Non-IT firms, with a mean of (0.445) than in IT firms (0.243).

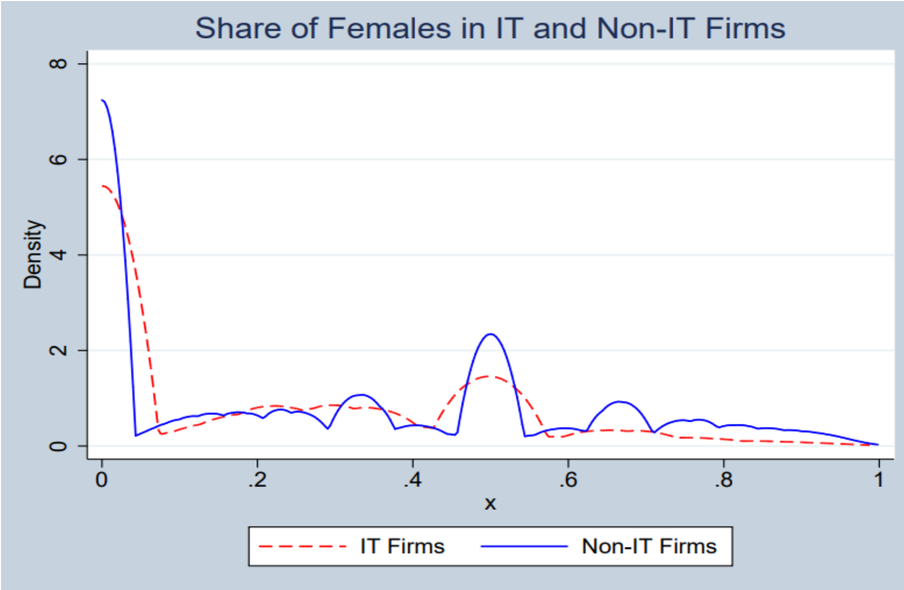

Figure 3.1: Kernel density plot of the distribution for IT and Non-IT firms.

Figure 3.1 shows the Kernel density plot of the distribution of the share of females in IT firms and Non-IT firms. Hence, it is observed that there is a higher share of females in Non-IT firms throughout the distribution. This means that the share of female employees in Non-IT firms is higher than in IT firms in Estonia. To formally test the differences in the distributions of firms, a two-sample Kolmogorov-Smirnov (KS) test is employed to determine if there are any differences in the distribution of females across the two groups. According to the table in Appendix 2, the null hypothesis of equal distribution is rejected. Implying that female share across IT and Non-IT firms does not have the same distribution function.

4. Empirical Analysis

I classified the industry type as IT and Non-IT using the European Classification of Economic Activities (EMTAK) 2-digit code, where IT industries took the values 62 and 63. Pearson correlation coefficient was applied in this study to indicate the relationship between the key variables. I test for multicollinearity using the Variance Inflation Factor (VIF). VIF result was between 1 to 5; hence the data is valid Anjiri (2018). I specified the baseline model for Estonian IT firms and followed a stepwise regression analysis to understand how the result changes using pooled regression, fixed effect, and two-step system GMM. This process consists of the pooled OLS, fixed effects, and two-system GMM method. The fixed-effect method is a consistent estimator (Gallego-Alvarez et al., 2009). The dataset was set as panel data, though our data was unbalanced due to missing observations and missing time values causing gaps in the data. The two-step system GMM model includes AR(2) and the Hansen test. Hansen test is performed to check for the overall validity of the instruments applied in the model; the Hansen test is also selected over the Sargan test to prevent overidentification issues.

As earlier discussed in the paper, the regression model has an endogeneity problem, and we need to solve this. The two-step system GMM model is the best fit because our data contains multiple observations obtained over multiple periods. GMM model controls all unobserved heterogeneity, simultaneity, and dynamic endogeneity and has been commonly used to control endogeneity (Martin-Ugedo et al., 2019; Okoyeuzu et al., 2021). GMM controls the potential reverse causation between financial performance and the independent variable. Lagged variables are used as instruments for the explanatory variables on the panel data. To further test the validity of instruments, we apply an autocorrelation test proposed by Arellano and Bond (1991) that treats the correlation between the error term and the lagged dependent variable.

4.1 Results and Discussions

In Appendix B.1, there is a positive correlation between the share of female managers and the share of females at 48.7%, while the extreme negative correlation is between ROE and ROA at -85.6%. This means more female managers in Estonian IT firms lead to gender diversity. A 1% increase in Estonian IT firms' invested capital negatively affects their total assets. The correlation result also shows that when labour productivity increases, ROA also increases, firm age, size, tertiary education, and foreign ownership. The correlation table shows that as Estonian IT firms employ more individuals with tertiary education, the firm age will increase. Foreign ownership also has a positive relationship with firm size.

Table 4.1: Stepwise Regression - Pooled OLS (2006-2020).

Pooled OLS								
	Model 1		**Model 2**		**Merge 3**		**Model 4**	
	ROA	**ROE**	**ROA**	**ROE**	**ROA**	**ROE**	**ROA**	**ROE**
Blau	-0.20 (-1.32	-0.0066 (-0.07)	-0.21 (-1.32)	-0.0072 (-0.08)	-0.25 (-1.36)	-0.045 (-0.94)	-0.24 (-1.36)	-0.045 (0.94)
Share of females	0.77 (0.35)	-0.0077 (-0.03)	0.18 (0.59)	-0.0026 (-0.01)	0.39 (1.11)	0.088 (0.87)	0.40 (1.12)	0.088 (0.87)

Firm Age	0.45 (1.94)	0.099 (0.56)	0.46 (1.91)	0.10 (0.56)	0.45 (1.58)	-0.17* (-2.01)	0.46 (1.59)	-0.17* (-2.00)
Firm Size	0.066 (1.33)	-0.0022 (-0.02)	0.072 (1.43)	-0.0019 (-0.02)	-0.14 (-1.81)	-0.018 (-0.35)	-0.13 (-1.80)	-0.018 (-0.35)
Foreign	0.41 (1.25)	0.53 (0.92)	0.41 (1.23)	0.53 (0.92)	0.057 (0.47)	-0.032 (-0.24)	0.064 (0.52)	-0.032 (-0.24)
Year Dummies Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Female Managers			-0.50 (-0.87)	-0.025 (-0.13)	-0.31 (-0.50)	-0.060 (-0.43)	-0.31 (-0.51)	-0.060 (-0.43)
Labour Productivity					1.53* (2.02)	0.21* (2.27)	1.53* (2.02)	0.21* (2.27)
Tertiary							-0.79 (-1.70)	0.0013 (0.01)
Constant	29.62 (1.30)	14.46 (1.05)	24.12 (1.35)	14.18 (1.14)	8.087 (0.40)	19.19 (2.60)	9.00 (0.44)	19.19 (2.58)
Prob > F	0.7946	0.7566	0.8481	0.7950	0.2291	0.0170	0.2868	0.0224
Observations	3,278	3,278	3,278	3,278	2,724	2,724	2,724	2,724

t statistics in parentheses, * p<0.05, ** p<0.01, *** p<0.001

Table 4.2: Stepwise Regression - Fixed-Effect (2006-2020).

Fixed-Effect								
	Model 1		**Model 2**		**Merge 3**		**Model 4**	
	ROA	**ROE**	**ROA**	**ROE**	**ROA**	**ROE**	**ROA**	**ROE**
Blau	0.0089 (0.35)	-0.049 (-0.61)	0.0084 (0.33)	-0.053 (-0.66)	-0.0062 (-0.54)	0.0073 (0.22)	-0.0062 (-0.54)	0.0064 (0.19)
Share of Females	-0.19 (-0.85)	-0.21 (-0.46)	-0.19 (-0.86)	-0.22 (-0.50)	0.016 (1.05)	0.15 (1.50)	0.016 (1.05)	0.15 (1.49)
Firm Age	-0.21 (-0.64)	0.21 (-0.24)	-0.21 (-0.64)	0.20 (-0.23)	-0.21* (-2.52)	-0.76** (-2.63)	-0.21* (-2.52)	-0.77** (-2.66)
Firm Size	0.17 (1.08)	0.41 (1.55)	0.17 (1.08)	0.41 (1.53)	0.064 (1.50)	0.38* (2.19)	0.064 (1.50)	0.37* (2.17)
Foreign	1.55 (1.00)	3.09 (0.96)	1.55 (1.00)	3.09 (0.96)	0.058 (0.84)	-0.033 (-0.12)	0.058 (0.84)	-0.030 (-0.11)
Year Dummies Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Female Managers			0.043 (0.52)	0.36 (1.15)	-0.034 (-0.51)	0.064 (0.30)	-0.034 (-0.51)	0.067 (0.31)
Labour Productivity					0.45*** (6.36)	0.44* (2.12)	0.45*** (6.37)	0.44* (2.13)
Tertiary							-0.0079 (-0.12)	0.24 (1.26)
Constant	-3.67 (-0.40)	9.43 (0.54)	-3.40 (-0.37)	11.67 (0.69)	-9.36 (-1.56)	1.43 (0.14)	-9.37 (-1.56)	1.83 (0.19)

Prob > F	0.4161	0.1153	0.4807	0.1116	0.0000	0.0007	0.0000	0.0007
Observations	3,278	3,278	3,278	3,278	2,724	2,724	2,724	2,724
Group	691	691	691	691	582	582	582	582

t statistics in parentheses, * p<0.05, ** p<0.01, *** p<0.001

Tables 4.1, 4.2, and 4.3 are the stepwise regressions for all 4 models estimating pooled OLS, fixed-effect and two-step system GMM. I lagged ROA and ROE by 1 year to show the previous year effect on the current financial performance in the short-run. The industry dummies was excluded from two-step system GMM because the number of instruments was too high which makes industry dummy a weak instrument (Wintoki et al. 2012). The exogenous variables that were used as instruments throughout the model are (log of age, year dummies, and tertiary education). They were selected as instrumental variables because, they are not affected by any of the explanatory variables. The endogenous variables are (lagged roa, lagged roe, blau, share of females, size, foreign ownership, share of female managers, and log of labour productivity). These variables are treated as endogenous because they are affected by other variables in the model.

Table 4.3: Stepwise Regression - Two-Step System GMM (2006-2020).

Two-Step System GMM								
	Model 1		**Model 2**		**Merge 3**		**Model 4**	
	ROA	**ROE**	**ROA**	**ROE**	**ROA**	**ROE**	**ROA**	**ROE**
ROA (t-1)	0.013 (0.46)		0.016 (0.61)		-0.011 (-0.52)		-0.0011 (-0.47)	
ROE (t-1)		0.0057 (0.11)		-0.0066 (-0.13)		-0.0011 (-0.13)		-0.0011 (-0.13)
Blau	0.0058 (0.10)	-0.32 (-0.57)	-0.0044 (-0.10)	-0.36 (-0.66)	-0.0098 (-0.15)	-0.069 (-0.56)	-0.0088 (-0.14)	-0.070 (-0.57)
Share of Females	0.084	0.068	0.055	0.077	0.0010	0.41	0.0014	0.041

	(0.68)	(0.31[1])	(0.52)	(0.38)	(-0.01)	(0.29)	(-0.02)	(0.30)
Firm Age	0.20 (0.37)	-0.22 (-0.15)	0.25 (0.48)	0.18 (0.14)	-0.039 (-0.09)	-0.58** (-2.79)	-0.043 (-0.11)	-0.58** (-2.84)
Firm Size	0.41 (0.24)	0.94 (0.17)	-0.17 (-0.12)	-0.81 (-0.16)	0.49 (0.47)	0.51 (0.90)	0.53 (0.50)	-0.53 (0.91)
Foreign	0.28 (0.24)	-0.82 (-0.39)	0.24 (0.21)	-0.24 (-0.12)	0.50 (0.74)	-1.26* (-2.10)	0.52 (0.77)	-1.25* (-2.08)
Year Dummies Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies Effect	No	No	No	No	No	No	No	No
Female Managers			0.053 (0.26)	-0.14 (-0.25)	-0.060 (-0.30)	-0.0084 (-0.04)	-0.64 (-0.32)	-0.0049 (-0.02)
Labour Productivity					1.044 (0.97)	0.96* (1.98)	1.071 (0.99)	0.98* (2.01)
Tertiary							-0.29 (-0.63)	0.12 (0.65)
Constant	1.49 (-0.23)	-0.14 (-0.03)	-0.99 (-0.07)	1.34 (0.38)	-11.0088 (-0.93)	-9.13 (-1.77)	-11.33 (3.72)	-9.92 (-1.90)
Prob > F	0.995	0.925	0.992	0.964	0.998	0.123	0.999	0.102
Observations	3,160	3,158	3,160	3,158	2,635	2,633	2,635	2,633
Groups	675	675	675	675	569	569	569	569
Instruments	30	30	33	33	36	36	37	37
AR (2)	0.260	0.715	0.247	0.886	0.867	0.371	0.972	0.370

[1] Note: I did not include the industry dummies because it is increasing the number of instruments, and the Hansen test is 1.00 (Roodman 2009; Wintoki et al#., 2012).

Hansen p-value	8.48 (0.582)	7.51 (0.677)	9.19 (0.687)	10.25 (0.594)	5.53 (0.977)	17.47 (0.232)	5.58 (0.976)	17.56 (0.227)

t statistics in parentheses, * $p<0.05$, ** $p<0.01$, *** $p<0.001$

After addressing endogenity problem in tabl 4.3, Following the stepwise method, as earlier discussed. There is no statistically significant relationships. There are no relationships found in this model, it corresponds with Ong (2018) who found no relationship between gender diversity and firms'profit in Australia. Lagged ROA and lagged ROE does not have any link with future financial performance, it contradicts the paper by Brahma et al. (2021), who reported a significant positive result 0f lagged values. Result in model 2 with female managers included is also not significant.

Next, in model 3, labour productivity is included. The number of observations dropped because they were missing. There are some significant results shows some statistically significant relationships. Firm agem foreighn structure and labour productivity are sre statistically significant. While the other variables have no relationship with financial performance. Foreign ownership has a significant decreasing effect at 5% on ROE, contradicting the paper by (Meah et al., 2021) that there is no significant effect on the financial performance of firms with foreign owners.

Table 4.4 is the last step of the stepwise regression analysis we added education, there is statistically significant relationship of some variables. I find same results in model 4 with the model 3. in table 4.3. ROA increases as firm size increases, and ROE decreases when firm size increases; the negative results are similar to the papers (Hamilton, 2021; Satria et al., 2020). Overall, the AR(2) results do not suffer from the second-order and serial correlation, and my Hansen test is well above the 5% significance level, which makes the instruments employed valid.

Table 4.4: Future Time Effects with Baseline Model (2006-2020).

Model 5								
	Pooled OLS				**Fixed Effect**			
	ROA (t+1)	**ROA (t+2)**	**ROE (t+1)**	**ROE (t+2)**	**ROA (t+1)**	**ROA (t+2)**	**ROE (t+1)**	**ROE (t+2)**
Blau	-0.15 (-1.06)	-0.81 (-1.22)	0.000012 (0.00)	5.27 (0.86)	0.013 (0.26)	-0.84 (-0.92)	0.17 (1.00)	9.23 (0.77)
Share of Females	-0.27 (-0.84)	-2.72 (-0.80)	-0.057 (-0.20)	-4.74 (-0.87)	-0.24 (-0.87)	-3.11 (-0.63)	-0.55 (-0.94)	-0.90 (-0.69)
Firm Age	0.34 (1.34)	0.69 (0.87)	0.20 (0.80)	-5.69 (-0.90)	-0.71 (-1.08)	-4.55 (-1.75)	-0.78 (-0.70)	33.94 (1.06)
Firm Size	0.23 (1.92)	0.22 (0.52)	0.17 (0.94)	-5.47 (-1.04)	0.73 (1.34)	2.65 (1.74)	0.94 (1.38)	-12.54 (-1.18)
Foreign	-0.39 (-1.05)	1.20 (0.80)	-0.34 (-0.77)	21.05 (1.02)	-0.0046 (-0.05)	-0.37 (-0.07)	1.46* (2.10)	1.39 (0.77)
Year Dummies Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	28.62 (0.89)	-142.75 (-1.26)	22.36 (0.89)	339.11 (0.93)	-16.98 (-1.02)	-45.04 (-0.99)	-9.80 (-0.41)	260.82
Prob > F	0.7600	0.9861	0.6848	0.9992	0.7422	0.9915	0.5535	0.9950
Observations	3,159	2,940	3,159	2,941	3,159	2,940	3,159	2,941
Groups					658	622	658	622

t statistics in parentheses, * p<0.05, ** p<0.01, *** p<0.001

Table 4.4 presents how Estonian IT firms will be doing financially in one year and in two years using current values of the gender diversity measures. Overall, in both methods and time periods, there is no statistically significant effect of gender diversity on future financial performance. ROE in the first year is mostly negative, but in the second year it is positive and increasing. Generally, no relationships exist, implying that current gender effect is still not a good indicator for future financial performance.

Table 4.5: Nonlinear Effect with Baseline Model (2006-2020).

Model 6						
	Pooled OLS		**Within Estimator**		**Two-Step System GMM**	
	ROA	**ROE**	**ROA**	**ROE**	**ROA**	**ROE**
ROA (t-1)					0.016 (0.39)	
ROE (t-1)						-0.0041 (-0.08)
Blau	-0.39 (-1.23)	0.031 (0.12)	0.20 (0.99)	0.26 (0.57)	0.050 (0.13)	-0.59 (0.73)
Share of females	0.11 (0.37)	-0.036 (-0.11)	-0.23 (-0.92)	-0.29 (-0.57)	0.041 (0.42)	0.11 (0.61)
Blau^2	-0.015 (-1.39)	0.00047 (0.05)	-0.0011 (-0.33)	-0.0066 (-0.60)	0.0043 (0.52)	0.032 (1.00)
Share of females^2	-0.31 (-0.10)	0.11 (0.39)	0.68 (1.37)	1.38 (1.28)	0.041 (0.42)	-0.23 (-0.19)
Firm age	0.46 (1.89)	0.094 (0.53)	-0.21 (-0.63)	-0.19 (-0.23)	0.17 (0.23)	-0.26 (-0.25)
Firm size	0.076 (1.41)	-0.0021 (-0.02)	0.16 (1.04)	0.40 (1.53)	-0.12 (-0.06)	0.26 (0.07)
Foreign	0.40 (1.22)	0.53 (0.91)	1.55 (1.00)	3.10 (0.97)	0.13 (0.09)	-0.83 (-0.56)

Year Dummies Effect	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies Effect	Yes	Yes	Yes	Yes	No	No
Constant	30.17 (1.33)	0.000061 (0.00)	-3.35 (-0.37)	9.32 (0.60)	0.14 (0.10)	0.20 (0.008)
Prob > F	0.8663	0.7834	0.3984	0.0108	1.000	0.931
Observations	3,278	3,278	3,278	3,278	3,160	3,158
Groups			691	691	675	675
Instruments					36	36
AR (2)					0.289	0.858
Hansen **p value**					9.73 (0.782)	14.27 (0.429)

t statistics in parentheses, * $p<0.05$, ** $p<0.01$, *** $p<0.001$

Model 6 provides the non-linear relationship between gender diversity measures and financial performance of firms. The exponent of the predictor variable is taken, to quantify the relationship between Blau and the share of females. Table 4.6, tells us no statistically significance. Also theer are no nonlinearity between gender diversity and financial performance, which is consistent with the paper by Garanina and Muravyev (2019) reporting nonlinear relationships. The model explains that it is not inverted U-shaped. I find the same argument with Ferrary and Deo (2019)'s research that the effect of gender diversity on profitability is not an inverted U-shaped using Blau as the independent variable. Though our model didn't produce a nonlinear relationship, however, nonlinear relationships could potentially be important. Nguyen (2018) identified the change in gender diversity could produce a different result. For example, how gender diversity affcet perfromance based on how many females are working with the firm. This is a nonlinear relationship because it will change the proportion of effect on financial performance.

Table 4.6: Moderating Effect of Manufacturing IT and Service IT Firms on Financial Performance (2006-2020).

Model 7				
	Pooled OLS		**Fixed Effect**	
	ROA	**ROE**	**ROA**	**ROE**
Blau	-0.0029 (-0.48)	0.0027 (0.79)	–0.0091 (-0.55)	-0.0096 (-0.55)
Share of Females	-1.36 (-1.35)	0.039 (0.10)	-1.82 (-0.98)	-0.35 (-1.02)
Manufacturing IT Firms	2.21 (1.73)	0.94 (1.01)	2.09 (0.73)	-1.50 (-1.07)
Blau * Manufacturing IT Firms	-3.21 (1.62)	-0.84 (-0.64)	-2.32 (-1.15)	-0.32 (-0.29)
Share of Females * Manufacturing IT Firms	0.98 (1.05)	0.055 (0.12)	1.65 (1.01)	0.25 (0.69)
Firm Age	0.71 (1.05)	-0.46 (-0.99)	-2.00 (-1.61)	0.43 (0.47)
Firm Size	0.86** (2.62)	0.29 (1.26)	1.93* (2.03)	0.32 (0.65)
Foreign	-0.82 (-0.68)	-1.035 (-0.93)	-5.81 (-1.00)	-5.00 (-0.85)
Year Dummies Effect	Yes	Yes	Yes	Yes
Industry Dummies Effect	Yes	Yes	Yes	Yes
Constant	-3.75 (-2.66)	-0.29 (-0.55)	-2.08 (0.74)	0.96 (0.55)
Prob > F	0.5689	0.0667	1.000	0.9824
Observations	155,834	155,838	155,834	155,838

Groups			29,076	29,080

t statistics in parentheses, * p<0.05, ** p<0.01, *** p<0.001

Dummy takes the value of 1 for Manufacturing IT firms and otherwise for Service IT firms.

Table 4.6 displays the interaction term with gender diversity to examine the gender balance and diversity of structure of manufacturing IT firms in comparison with service IT firms. The interaction variable was created by multiplying the share of females by the dummy variable for manufacturing IT firms, so we get the female share of employees in the IT sub-sector. Insignificant relationships are reported. According to the results, the Blau index is negative and insignificant in both models; the effect of manufacturing IT firms on Blau is between gender diversity and financial performance, it complements the findings on gender diversity. The effect of manufacturing IT firms on the share of females is positive in both models, though not significant. However, it explains that manufacturing IT firms are keen on firms' financial performance, but the predictor variable share of females does not contribute to it. This is the same result in the studies (Meah et al., 2021).

5. Conclusion

The paper examined the impact of gender diversity on the financial performance of IT firms in Estonia. Unlike previous researchers who measured gender diversity at the board level, I used IT firms in Estonia because it's not only a fast-growing industry, but it is also the industry with the highest job vacancies. The OLS, fixed-effect, and two-step system GMM were used to analyze and control for endogeneity issues. Stepwise analysis was used to understand how the model changes when variables are added, Time effect analysis to see how current gender diversity affects the future financial performance, and nonlinear regression analysis was done to see if there were any changes in the proportion of effects, and lastly, interaction variable was created to moderate the effect between manufacturing IT and Service IT firms.

The findings of this study explain that gender diversity has no significant relationship with the financial performance of IT firms in Estonia. Our study provides a strong base for future research on gender imbalance in the IT profession. For this reason, analysis of gender diversity should research in the social context, exploring the role of the broader gender differences. The contribution of this paper is not limited to what has already been studied. It would also be good to extend the research beyond what was covered previously and in this paper.

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Appendices

Appendix A. Acronyms

IT	**Information Technology**
OLS	**Ordinary Least Squares**
GMM	**Generalized Methods of Moments**
EMTAK	**Estonian**
ROA	**Return on Assets**

ROE **Return on Equity**

Table B.1: Pearson Correlation Coefficient

	ROA	ROE	Blau	Share of Females	Firm Age	Firm Size	Share of Female Managers	High skilled white-collar	Tertiary	Foreign	Log of Labour Productivity
ROA	1.00										
ROE	-0.86	1.00									
Blau	0.002	-0.0013	1.00								
Share of Females	0.016	-0.0170	0.056	1.00							
Firm Age	-0.0047	0.0052	0.018	0.068	1.00						
Firm Size	0.021	0.0056	0.012	0.0023	0.19	1.00					
Female Managers	-0.020	0.0009	-0.027	0.49	0.052	0.027	1.00				
Tertiary	-0.0089	-0.031	-0.019	0.017	0.17	0.067	0.047	0.16	1.00		
Foreign	-0.024	-0.021	-0.047	0.047	-0.060	0.278	0.014	0.016	0.083	1.00	
Labour Productivity	0.137	0.022	-0.008	-0.066	0.119	0.224	-0.047	0.23	0.19	0.10	1.000

** & * indicates that Correlation is significant at the 0.01 & 0.05 levels (2-tailed). This table reports the Pearson Correlation Matrix.

Table B.3: Two-sample Kolmogorov-Smirnov test for equality of distribution functions

Smaller group	D	P-value
0	0.000	1.000
1	-0.1612	0.000
Combined K-S	0.1612	0.000

Soolise mitmekesisuse mõju ettevõtte finantstulemustele Eesti infotehnoloogia ettevõtete näitel

Kokkuvõte

Soolise mitmekesisuse seost ettevõtte majandustegevusega on varasemalt uuritud eelkõige läbi soolise mitmekesisuse ettevõtte juhatuses, kuid vähem on teada mitmekesisuse rollist kogu ettevõtte töötajaskonna tasemel ning spetsiifilistes majandusharudes ja riikides. Käesolevas magistritöös on laiendatud soolise mitmekesisuse analüüsi ettevõtte töötajate tasemele ja analüüsitud selle mõju Eesti infotehnoloogia ettevõtete finantstulemustele. Analüüsis kasutatakse ühendatud töötajate ja tööandjate paneelandmeid, sealhulgas Eesti Maksu- ja Tolliameti sotsiaalmaksu deklaratsioonide andmeid, Eesti Äriregistri andmeid, Rahvastiku statistilise registri andmeid, Töötasu Struktuuriuuringu andmeid ning Rahva – ja Eluruumide loenduse 2011. aasta andmeid, ühendatud andmed katavad perioodi 2006-2019. Analüüsis rakendatakse erinevaid mikroökonomeetrilisi mudeleid, sealhulgas kasutatakse endogeensuse arvesse võtmiseks üldistatud momentide meetodiga hinnatud dünaamilist paneelandmete Arellano-Bond hinnanguid. Tulemused näitavad, et ei ole statistiliselt olulist seost soolise mitmekesisuse ja Eesti infotehnoloogia ettevõtete finantstulemuste vahel.

Võtmesõnad: sooline mitmekesisus, infotehnoloogia, ettevõtete finantstulemused, Eesti

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