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DISCONTINUITIES IN EARNINGS DISTRIBUTIONS: EVIDENCE FROM SOUTH AFRICA

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Abstract: *There is increasing evidence that earnings management amongst firms creates discontinuity in the earnings distribution. We have verified the evidence of discontinuity in earnings distribution for 246 Johannesburg Securities Exchange listed firms from 2003 to 2018. The assets-scaled income was used as earnings measure to present the empirical histograms; the standardized difference test of significance was utilized to establish the existence of discontinuities at zero. The result shows discontinuities in distributions for earnings level and earnings-change. In addition, except for the unscaled earnings, the evidence supposes that the sample design does not explain the discontinuity in the earnings (earnings change) distributions.*

Key words: earnings management, earnings discontinuity, standardized difference test, empirical histograms

JEL classification: G14, G30, M40, M43.

1. Introduction

There is growing evidence that regulators, investors, analysts, and boards of directors consider earnings as being the most critical performance measure in financial reports issued by listed firms (Chowdhury, Mollah and Al Farooque, 2018), (Pretorius and De-Villiers, 2013), (Francis, Schipper and Vincent, 2003). Many executives have incentives to manage earnings in parallel periods when reporting financial statements. The pressure to manage earnings annually is much stronger because the year-end provides period opportunistic times for management bonus choices (Chowdhury et al., 2018). Dichev et al. (2013)'s Survey reports that about 99.4 % of CFO's 'believe' that at least some managers manipulate their earnings. Earnings management practices have resulted in some corporate scandals in the global capital market. Some of the notable financial scandals related to earnings management, including companies such as Xerox, Adelphia, Enron, and WorldCom, were exposed in the 2000's.

Earnings management to avoid losses has been associated to the cause of discontinuity in the distribution of earnings (Burgstahler & Dichev, 1997). Existing literature on discontinuity in earnings distribution provides evidence of discontinuity in firms' earnings at prima-facie benchmarks (Pududu & De-Villiers, 2016; Gilliam, Heflin & Paterson, 2015; Kerstein & Rai, 2007; Durtschi & Easton, 2005; Dechow, Richardson & Tuna, 2003; Degeorge, Patel, & Zeckhauser, 1999; Burgstahler & Dichev, 1997). The authors extend a study by Burgstahler

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and Dichev (1997) to argue that the earnings distribution is characterized by a dual jump, in which both the bin frequency distribution includes too few observations immediately below the benchmark and too higher observations immediately above the benchmark than are likely. This pattern of earnings distributions is interpreted as similar to the management theory according to which executives employ economic (real) and accounting (discretionary) decisions to avoid losses.

This study verifies the discontinuity around zero on earnings distribution for listed firms on the Johannesburg Securities Exchange (JSE). South Africa (SA) provides a reference to examine for some reasons. First, the JSE remains the largest stock market in Africa, and would serve a primary base to compare with other global exchanges. Second, the focus on SA contributes to the scanty studies on the distribution of earnings in the country, with only one study available as a precursory (Pududu and De-Villiers, 2016).

Although Pududu and De-Villiers (2016) have indicated that there is no clear jump at zero in the distribution of earnings, there are still several significant issues which are yet to be resolved or addressed in the study. The research design, in particular the equity-scaled profit to ordinary shareholders used as earnings measure, could have influenced the unanticipated results. Pretorius and De-Villiers (2013) have noted that earnings metrics based on ordinary shareholders may present upward biased estimates for managers on equity-dependent remuneration schemes relative to other firms. In addition, the study covers short sample periods (2003–2011) for the cross-sections, and an extension of this to accommodate recent earnings information becomes inevitable. What is more, the study was unable to provide a suitable statistical test of significance to support its conclusion of no discontinuity. Result from empirical test based distributional histogram is considered necessary but evidently not sufficient to prove discontinuity because of the likelihood of graphical misjudgment (Burgstahler & Chuk, 2015).

We have extended the frontier of empirical literature on discontinuity in earnings distribution in many ways. We have re-established the presumption for earnings management through providing sufficient evidence on the presence of a test to establish discontinuity evidence for the JSE firms. As according to other studies (Enomoto & Yamaguchi, 2017; Pududu & De-Villiers, 2016; Gilliam, Heflin & Paterson, 2015; Kerstein & Rai, 2007; Durtschi & Easton, 2005; Degeorge et al., 1999; Burgstahler & Dichev, 1997), we have considered the distribution for the earnings and earnings-change. We have conduct robustness checks by analyzing the presence of discontinuity under three different cases, namely: (a) when alternative scaler or earnings measure (scaling sensitivity) is employed; (b) when all the financial services firms (sample selection sensitivity) are eliminated, and (c) when the scaler in designing the earnings metric ('un-scale' sensitivity) is eliminated. The remainder of the paper is structured as follows: sections 2, 3, 4 and 5 accordingly include the literature review and hypotheses, the data and methodology, results and conclusions.

2. Literature Review and Hypotheses

2.1. Empirical Evidence

The literature contends that if firms manage earnings in order to avoid reporting losses, the earnings distribution may become discontinuous at zero by exhibiting a pattern with unusually too few small losses and unusually too many small profits. Burgstahler and Dichev (1997) have provided empirical regularity with the US data and have estimated that about 30-40% of non-financial firms with small losses do manage earnings to attain small profits. The result has revealed that earnings distribution has significantly too few observations immediately below zero than would normally be anticipated and evidently too many observations closely above zero. Degeorge et al. (1999) have proposed a model to detect managed earnings patterns that produce unique distortions in the distribution of actual

earnings. The model has identified how efforts to surpass certain thresholds induce a specific reference to earnings management. They have noticed that observed earnings that fall closely below the zero thresholds are boosted upwards, while earnings far (either below or above) from the zero thresholds are trimmed downward.
Dechow et al. (2003) have stated that if the observed curve is due to earnings manipulation, it would seem reasonable to assume that managers would use accruals since estimates of accruals and forecasts are more flexible to manipulate than the cash flows. They have explored whether the enhancing of discretionary accruals to report small profit is sensible to justify the ‘kink’ rather than unusual cash flow manipulation of beyond the reference point. They have compared small profit firms (and all other firms) to small loss firms and have directly tested whether increasing discretionary accruals would drive the curve/kink. The result was unable to establish that increasing discretionary accruals was the cause of the kink. Durtschi and Easton (2005) have emphasized that the sample selection criteria, deflation of earnings metrics and the influence of some observations to the left and right of zero are among the factors that could cause the discontinuity. They have revealed that the median price for a company that reports a one-cent loss (profit) is 0.25 (1.31). They have noted that the earnings management game is binary, at least to some extent: a firm that reports losses belong to one valuation model, or if a firm makes a profit, it shall thus be placed in a separate valuation model.
Shuto and Iwasak (2015) have revealed a clear existence of discontinuities at the zero thresholds in the distribution of earnings for Japanese firms. Their study has found that firms with high marginal tax rates and very tight interactions with their respective banks would be more likely to engage in earnings management to report some slightly positive earnings. They have established that such a relationship is more likely pervasive for privately owned firms relative to public firms. Pududu and De-Villiers (2016) have considered distributions of earnings and earnings-change. They have found no evidence that firms managed earnings to avoid small losses or to avoid reporting decreases in earnings. They did note the possibility of analysts and investors being fixated on alternative performance measures.

2.2. Hypotheses Development

Since Burgstahler and Dichev (1997), the evidence of a ‘kink’ around has been well established for advanced economies. For African economies, the issue is scantily studied, and available evidence (Pududu & De-Villiers, 2016) lacks statistical verification. The lack of clarity poses a challenge for establishing a confronting hypothesis. There have been reported cases of accounting anomalies and scandals, including Leisure Net, Master Bond and Regal Bank. Pududu and De-Villiers (2016) assume that executives do not manage earnings to report small profits (or losses) and reveal evidence of discontinuity. We would expect the absence of breaks in the distribution, indicating no clear jump at zero in the distribution of earnings leading to the first null hypothesis:

H1: There is no evidence of discontinuity in the distribution of the earnings.

Some prior evidence reveals that earnings changes have discontinuity around zero (Gilliam et al., 2015; Degeorge et al., 1999; Burgstahler and Dichev, 1997). Pududu and De-Villiers have found the existence of discontinuity in the earnings-change distribution around the zero thresholds. As required (Enomoto & Yamaguchi, 2017; Pududu & De-Villiers, 2016; Gilliam et al., 2015), we examine whether there is a discontinuity in the distribution of earnings change based on the definition put forward by Burgstahler and Dichev (1997). If there are consistent increases in earning management, the distribution of the earnings change may exhibit significant discontinuity, leading to a second null hypothesis, stated as:

H2: There is no evidence of discontinuity in the distribution of the earnings change.

Some studies argued that the discontinuity in earnings around zero might be attributed to research design as scaling or earnings variable measures and sample criteria (Gilliam et al., 2015). As noted by Pududu and De-Villiers, the permissible enforcement in SA decreases the degree of investor protection expected for equity holders. As a result, some earnings metrics or their scaling that are affected by stricter regulations in financial reporting could likely decrease earnings management and reduce the chance of discontinuity. As such, we do not expect that discontinuity in the distribution is due to the scaling or sampling, and therefore, we test the third null hypothesis:

H3: The discontinuity in the earnings distribution is not due to the sample design.

3. Data and Methods

3.1. Data

Existing literature on the discontinuity in earnings distributions use firms' yearly cross-sectional earnings (Enomoto & Yamaguchi, 2017; Gilliam et al., 2015). Consistent with these studies, we have used annual net income scaled by lagged total assets as a proxy for earnings in the primary analysis, and net income scaled by market value of equity for the robustness check. We have obtained a complete initial sample totaling 4,521 annual net income over the period 2003–2018 for the firms with financial records on the McGregor BFA and other consolidated financial statements. We have eliminated missing values up to 585 observations. The final sample provides a total of 3,936 firm-year in order to evaluate H1 (as presented in Table 1). In considering H2, we have obtained the earnings change and the process involves the loss of some earnings observations to 3,690 for the earnings-change variable. We have winsorized the final (Shuto & Iwasaki, 2015) at the first (1st) and penultimate (99th) percentiles before the estimation to control the effects of the outliers. The non-financial service constitutes 3,328, approximately 84.55% of the full sample (Table 2).

Table 1: Breakdown of Sample

Industry	Nobs	#Firms	%Firms
Financial	608	38	15.45%
Non-financial	3,328	206	84.55%
Total	3,936	246	100.00%

Note: *Nobs = No. of firm-year. #Firms = No. of firms, %Firms = Industry percent of firms [#Firms/246].
Source: Authors` own computations

3.2. Methods

3.*2.1. Distributional Approach*

The distribution discontinuity method is well applied to detect the earnings management practices and changes. Since the bin-width controls the smooth characteristic of the baseline histogram, the precise bin-width must be determined using the optimal Bin-width (b^{ω}):

$$b^{\omega} = 2Q_{IR}(X_i)/\sqrt[3]{N} \quad (1)$$

Where, X_i is the random pooled cross-section of reported earnings ($i = 1, \dots, n$), Q_{IR} is the interquartile range Q_3(upper quartile) less Q_1(lower quartile), and N is the Nobs (Number of firm-year observations).

3.2.2. Standardized Difference Test Approach

Different statistical (standardized difference) tests have been proposed to confirm the discontinuity at the benchmark. Burgstahler and Dichev (1997) have proposed an earnings management ($EM1$) statistic that is a ratio of the difference between the actual (AQ_i) and expected (EQ_i) number of observations for the interval immediately to the right of zero over the estimated standard deviation of the difference:

$$EM1 = (AQ_i - EQ_i)/SD_i \tag{2}$$

$$SD_i = [Np_i(1 - p_i) + 0.25N(p_{i-1} + p_{+1})(1 - p_{i-1} - p_{i+1})]^{1/2} \tag{3}$$

Where (3) is the standard deviation of the difference between (AQ_i) and (EQ_i) around interval i; $EQ_i = (AQ_{i-1} + AQ_{i+1})/2$; N is the total number of firm-year observations; $p_i = AQ/N$, is the ratio of the actual Nobs for interval i to the firm-year; $AQ_{i-1}/N = p_{i-1}$ and $p_{+1} = AQ_{+1}/N$.
Degeorge et al. (1999) have provided an alternative test statistic ($EM2$) under the null of no earnings management (i.e., assuming that the distribution is smooth:

$$EM2 = [\Delta p_i - E(\Delta p_{-i})]/SD(\Delta p_{-i}) \tag{4}$$

Where p_i is the proportion of the actual Nobs for interval i to firm-year and change in p_i [$\Delta p_j = p_j - p_{j-1}$]. $E(\Delta p_{-i})$ is the expected (average) value of Δp, excluding p_i and $SD(\Delta p_{-i})$ is the standard deviation of (change in p_i) Δp, excluding Δp_i.

3.3. Evaluation Procedure

To verify the existence of discontinuity evidence, we have applied the following procedures. First, we have depicted the “empirical histogram” of earnings. We have shown the distributional representation of the cross-section of firms’ earnings, where small earnings losses (decreases) are identified as earnings (earnings change) that fall closely below the zero interval. We have applied the default bin-width of $2 \times \mathrm{Q_{IR}}(\mathrm{X_i}) \times \mathrm{N}^{-1/3}$ with the earnings’ interquartile range $[\mathrm{Q_3} - \mathrm{Q_1}]$. Second, we have conducted the standardized difference test. We have computed the standardized difference for interval just left of zero and for the interval just right of zero. Third, we have conducted three sensitivity and robustness checks. We have verified the influence scaling/deflation (alternative earnings measure) and a sample selection (by removing the financial services sector from the sample).
We have started by examining the influence of resampling by excluding the financial firms. We have computed the differences between characteristics of earnings to the left and right of zero and have thus obtained the statistics. We have used total assets to scale the net income earnings’ variables. For further analysis to verify evidence that the jump in the distribution may be due to scaling (H3), we have used an alternative deflator - market value of equity. Lastly, we have used the unscaled net-income measure. Durtschi and Easton (2005) have shown a scaler (e.g., firm size) has different discontinuity effects for small-loss (profit) earnings management. In order to circumvent this and eliminate the discontinuity effect due to scaling, we have explored the earning distributions with unscaled earnings metrics. We have followed Burgstahler and Chuk’s (2015) ‘quartile-partition’ method to split the pooled cross-sectional earnings into four separate partitions based on both earlier deflators: lagged total assets and equity market value. We partitioned, for instance, lagged total assets (and equity market value) into quartile groups, namely into *Q1, Q2, Q3,* and *Qn*. For each Q*i* series, we have obtained the value of the unscaled income and have computed the respective small-loss and the standardized difference of profit.

4. Results

4.1. Sample Statistics

Table 2a reports the sample statistics for the earnings variable (annual assets-deflated net income). After controlling for outliers by winsorizing the earnings series, the expected value of earnings is 0.029, and the standard deviation is 2.375 (Panel A). The non-financial services (financial) industry has mean and spread of 0.103 (0.118) and 0.146 (0.146), respectively. After excluding the periods of the financial crisis (2008 and 2009) periods, the mean of the reported managed earnings with 3,444 observations was still approximate 0.103, with a spread of 0.145. The report shows that small profits (small) reported represent 85.44% (4.56%) of the sample, supposing the likelihood toward positive small earnings increase around the benchmark of zero. We have noticed that for the entire sample, the median of earnings is close to the mean, although the distribution is asymmetric (negatively skewness with -0.346). The Nobs reported for the earnings change reduced to 3,690 (Panel B). The mean and the median of the earnings change are equal and approximately 0.000, and the standard deviation is 0.180. The series is closely symmetric with a relatively low (negative) skewness, and the magnitude of peakedness neighborhood of 3, suggesting mesokurtic and likely normality. Due to the differencing, the number of positive earnings surprises (small earnings Increases) are reduced to 3,170 with a mean of 0.027 and a spread of 0.157, while the amount of negative earnings change reduces to 520 with a mean and standard deviation of -0.161 and 0.221, respectively.

Table 2b (Panel A) reveals that the financial services, despite being well-regulated (Enomoto & Yamaguchi, 2017; Pududu & De-Villiers, 2016; Gilliam et al., 2015), have the highest level of earnings management with a mean of 0.118, and a moderate spread of 0.149 relative to other industries. However, the same could not be observed for the earnings change (Panel B) in the financial services, with a mean of 0.001 and supposing a tendency toward a positive small earnings increase. Table 2c (Panels E and F) shows the statistical characteristics of earnings based on analysis by year. Positive earnings are marked for all the years, with the years 2004 and 2016, on average, having the lowest and highest earnings managed, respectively. We have observed, on average, relatively consistent small earnings decrease (increase) in the years 2009 to 2012 (in 2006, and 2013 to 2018), a relatively large earnings decrease in 2005, 2014 and 2016, and relatively large earnings increase in year 2004, 2008, 2015 and 2017.

Table 2a: Descriptive sample statistics for crisis and non-crisis periods

Category	***N***	$\boldsymbol{\mu}$	***m***	$\boldsymbol{\sigma}$	$\boldsymbol{\tilde{\mu}_3}$	$\boldsymbol{\tilde{\mu}_4}$
Panel A: $\mathrm{Earnings_t}$						
All	3,936	0.105	0.103	0.146	-0.346	2.105
Crisis	492	0.120	0.103	0.154	0.078	1.197
Non-crisis	3,444	0.103	0.103	0.145	-0.424	2.232
Profit	3,363	0.145	0.114	0.107	1.306	1.350
Loss	573	-0.130	-0.087	0.122	-1.079	0.270
Panel B: $\Delta\mathrm{Earnings_{t-1}}$						
All	3,690	0.000	0.000	0.180	-0.178	3.348
Crisis	492	0.004	0.005	0.201	0.148	2.063
Non-crisis	3,198	0.000	-0.001	0.176	-0.253	3.596
Increase	3,170	0.027	0.007	0.157	0.751	2.716
Decrease	520	-0.161	-0.119	0.221	-0.878	0.787

Note: Table 2a shows the statistics (N, $\mu, m, \sigma, \tilde{\mu}_3, \tilde{\mu}_4$) of reported earnings and earnings-change for crisis and non-crisis periods' category. N ≡ No. of observations, μ ≡ Arithmetic mean, m ≡ Median, σ ≡ Standard deviation, $\tilde{\mu}_3$ ≡ Skewness, and $\tilde{\mu}_4$ ≡ Kurtosis.
Source: Authors` own computations

Table 2b: Descriptive sample statistics for financial/non-financial industry

Category	*N*	μ	m	σ	$\tilde{\mu}_3$	$\tilde{\mu}_4$
Panel A: Earnings_t						
Financial	3,328	0.103	0.102	0.146	-0.362	2.062
Non-financial	608	0.118	0.108	0.149	-0.276	2.314
Panel B: $\Delta\text{Earnings}_{t-1}$						
Financial	3,120	0.000	0.000	0.180	-0.187	3.175
Non-financial	570	0.001	-0.002	0.181	-0.126	4.253

Note: Table 2b shows the statistics (N, $\mu, m, \sigma, \tilde{\mu}_3, \tilde{\mu}_4$) of reported earnings and earnings-change for financial/non-financial industry category. *N* ≡ No. of observations, μ ≡ Arithmetic mean, m ≡ Median, σ ≡ Standard deviation, $\tilde{\mu}_3$ ≡ Skewness, and $\tilde{\mu}_4$ ≡ Kurtosis.
Source: Authors` own computations

Table 2c: Descriptive sample statistics base on each year

Category	*N*	μ	m	σ	$\tilde{\mu}_3$	$\tilde{\mu}_4$
Panel A: Earnings_t						
2003	246	0.099	0.115	0.181	-0.462	0.383
2004	246	0.137	0.117	0.178	-0.251	0.782
2005	246	0.109	0.107	0.171	-0.703	1.606
2006	246	0.110	0.111	0.187	-0.782	1.311
2007	246	0.107	0.103	0.159	-0.585	1.635
2008	246	0.125	0.105	0.165	0.051	0.611
2009	246	0.115	0.101	0.142	0.082	1.969
2010	246	0.114	0.106	0.135	-0.098	2.596
2011	246	0.105	0.104	0.130	-0.101	3.106
2012	246	0.096	0.090	0.125	0.063	1.719
2013	246	0.101	0.107	0.134	-0.301	2.555
2014	246	0.089	0.099	0.142	-0.620	2.032
2015	246	0.102	0.109	0.114	-0.298	1.917
2016	246	0.069	0.080	0.111	-1.227	5.669
2017	246	0.098	0.101	0.116	-0.581	2.581
2018	246	0.103	0.098	0.107	0.297	3.243
Panel B: $\Delta\text{Earnings}_{t-1}$						
2004	246	0.038	0.005	0.248	0.080	0.435
2005	246	-0.028	-0.011	0.199	-0.319	2.108
2006	246	0.001	0.000	0.208	-0.719	3.022
2007	246	-0.002	0.002	0.217	-0.284	2.199
2008	246	0.017	0.005	0.220	0.215	1.619
2009	246	-0.010	0.004	0.179	-0.098	2.262
2010	246	-0.001	0.003	0.162	-0.546	4.308
2011	246	-0.009	-0.002	0.154	-0.013	4.209
2012	246	-0.008	-0.009	0.140	-0.285	2.573
2013	246	0.004	0.003	0.151	0.055	2.014
2014	246	-0.012	-0.003	0.165	-1.264	6.118
2015	246	0.013	0.003	0.164	-0.657	4.324
2016	246	-0.032	-0.017	0.139	-0.327	4.679
2017	246	0.029	0.014	0.148	0.353	6.088
2018	246	0.005	0.004	0.148	0.193	5.403

Note: Table 2c show distribution statistics (N, $\mu, m, \sigma, \tilde{\mu}_3, \tilde{\mu}_4$) of reported earnings [$\text{Earnings}_t$] and earnings-change [$\Delta\text{Earnings}_{t-1}$] based base on each year. *N* ≡ No. of observations, μ ≡ Arithmetic mean, m ≡ Median for each category indicated, σ ≡ Standard deviation, $\tilde{\mu}_3$ ≡ Skewness, and $\tilde{\mu}_4$ ≡ Kurtosis.
Source: Authors` own computations

4.2. Distributional and Statistical Evidence of Discontinuity

Figure 1A depicts the distribution of asset-scaled net income earnings for the firms. Here, we have used the entire sample of 3,936 (Table 1) firms, including both financial and non-financial services. Consistent with the optimal bin-width, the empirical histogram interval has widths of 0.021 for the earnings (level) variable. In line with literature, the distribution has a discontinuity (Enomoto & Yamaguchi, 2017; Pududu & De-Villiers, 2016; Gilliam et al., 2015; Degeorge et al., 1999).

The just left of zero exhibits remarkably too low occurrence, while the just immediate right of zero shows too remarkably high frequency. The figure, consistent with the earnings management hypothesis, shows that earnings slightly less than zero occur less frequently as theoretically expected, and the earnings slightly greater than the zero occur too much frequently. This appears to be consistent with the general earnings management hypothesis (Burgstahler and Dichev, 1997) to attain small profits (positive earnings) or, at the least, avoid small- loss (Degeorge et al., 1999; Burgstahler and Dichev, 1997) but contrary to findings by Pududu and De-Villiers (2016). To statistically ascertain that these occurrences are significant, we have obtained the standardized differences to test discontinuity at zero, the result (Table 5) shows that the (small-losses) standardized difference for interval [-0.021, 0.000] just left of zero is -16.430, and significantly negative, while the (small-profit) standardized difference for interval just right of zero [0.000, 0.021] is 5.561, and significantly positive. These results indicate discontinuity and provide compelling statistical evidence of managed earnings, supposing the rejection of the first null.

Figure 1B shows the asset-scaled net income change's earnings distribution, using the entire sample of 3,690 of the earnings-change. The distribution has interval bin widths of 0.025 and visibly, appearing less likely symmetrical at zero but with a bell shape. The just left of zero [-0.025, 0.000] appears more with unusually high frequency relative to the smoothness of the (left part) and, inconsistent with predictions. The just right of zero [0.000, 0.025] indicates earnings slightly greater than zero occurs unusually with less frequency than would be expected.

The standardised difference (Table 3) for interval just left (right) of zero is -3.015, been negative and statistically significant (5.0271, been positive and statistically significantly). In sum, the evidence supports the existence of discontinuity in the earnings distribution at zero, providing sufficient evidence, at least statistically, to refute the second null. Like previous studies, the test offers statistical significance for discontinuities at zero benchmark earnings (Burgstahler & Chuk, 2015). The finding for earnings change is similar to evidence from Pududu and De-Villiers (2016).

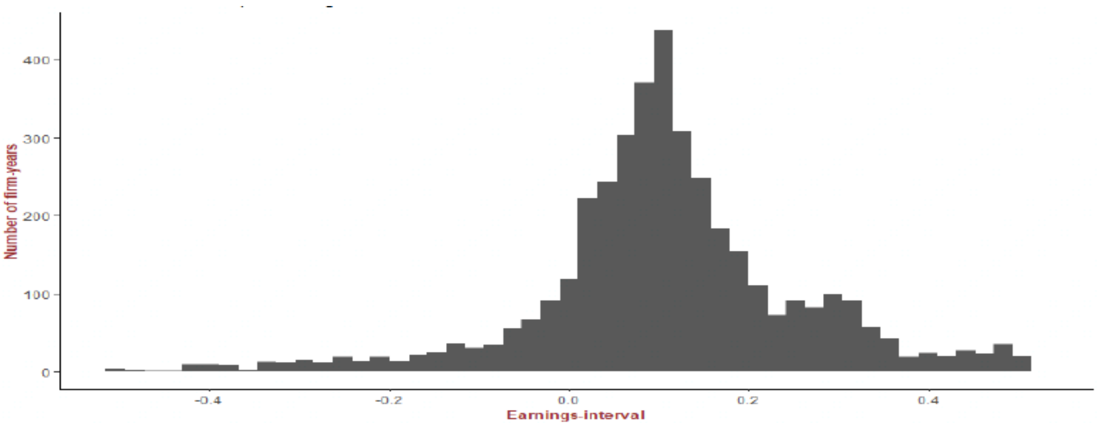

Figure 1A: Distribution of asset-scaled net income earnings
Source: Authors` plot with RStudio

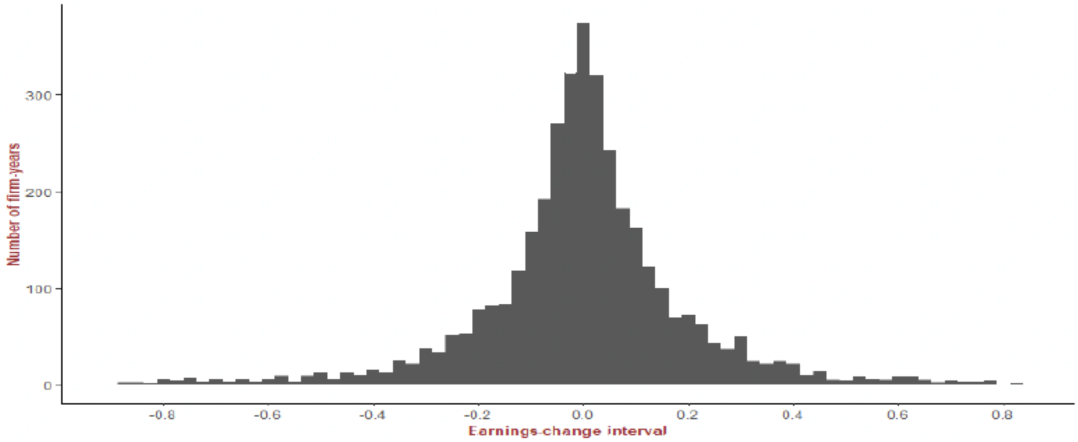

Figure 1B: Distribution of change in asset-scaled net income
Source: Authors` plot with RStudio

Table 3: Discontinuity (standardised differences) test around zero

X_i	StDiff [Loss]	StDiff [Profit]
Earnings_i	-16.430**	5.561**
	StDiff [Decrease]	StDiff [Increase]
$\Delta\text{Earnings}_i$	- 3.015**	5.0271**

Note: ** indicates that StDiff statistics is significance at 5% (one-sided test). StDiff implies Standardised differences.
Source: Authors` own computations

Table 4 reports the standardized differences (StDiff) test for small- loss and profit with the yearly subsamples of each firm's earnings (Panel A) and earnings change (Panel B). According to Gilliam et al. (2015), we have split the full 3,960 observations into separate annual sub-samples to access likely yearly deviation in the discontinuities in the distributions of earnings. The results show that for the earnings (level), all small loss standardized difference are negative and highly statistically significant, except for 2010, which is positive and still significant. The standardized differences for all the small profit (except for 2010 and 2017) are positively significantly. That of 2010 was, however, insignificant. The evidence is sufficient to believe the existence of discontinuity in the earnings distribution for each annual subsample. This explains the possible existence of the discontinuity in the overall (full) samples. For the yearly earnings change we could not admit enough evidence to support discontinuity for all the annual subsample earnings distribution. The standardized differences for the earnings decrease support are negatively significant only in 2006, 2014 and 2016–2017. For the reporting earnings increase or small positive earnings, the test is positive significant in 2005, 2006, 2009–2012 2017. Overall, the intertemporal evidence for earnings changes does support the existence of annual discontinuity.

Table 4a: Annual discontinuity (standardized differences) tests

	Years [Annual]	StDiff [Loss]	StDiff [Profit]
Panel A: Earnings_t	2003	-2.175*	1.586
	2004	-2.510**	2.171*
	2005	-8.106**	6.197**
	2006	-7.140**	8.083**
	2007	-8.407**	3.826**
	2008	-11.078**	10.429**
	2009	-4.023**	9.505**
	2010	2.114*	-1.483
	2011	-9.454**	2.251**
	2012	-8.319**	3.658**
	2013	-4.816**	4.103**
	2014	-6.35**	4.507**
	2015	-8.607**	2.171*
	2016	-6.246**	5.322**
	2017	-10.044**	-2.107*
	2018	-11.169**	2.248**

Note: ** and * indicate the standardized differences (StDiff) test-statistics is significance at 1%, and 5% for a tailed test.
Source: Authors` own computations

Table 4b: Annual discontinuity (standardized differences) tests

Panel B: $\Delta\text{Earnings}_{t-1}$	Years [Annual]	StDiff [Decrease]	StDiff [Increase]
	2004	-1.040	1.068
	2005	-1.964	3.504**
	2006	-4.322**	2.107*
	2007	-0.921	1.116
	2008	-1.236	1.307
	2009	-0.589	3.914**
	2010	-.0930	6.117**
	2011	1.281	2.313**
	2012	-1.534	2.044*
	2013	-1.453	1.698
	2014	-2.253*	-1.272
	2015	-0.379	-0.218
	2016	-2.358**	1.263
	2017	-2.049*	4.078**
	2018	-0.920	1.951

Note: ** and * indicate the standardized differences (StDiff) test-statistics is significance at 1%, and 5% for a tailed test.
Source: Authors` own computations

4.3. Robustness Evidence: Additional Analyses

4.3.1. Sample Selection: Excluding the Financial Sector

We have manage to realize a resampling by eliminating financial service firms, which are believed to be biased toward reporting losses, and may likely explain the discontinuity evidence (Pududu & De-Villiers, 2016). Figure 2A (2B) depicts a distribution of asset-scaled net income earnings (earnings change) when the financial industry is excluded. Here, the interval bin-widths of 0.028 (0.025) is obtained for earnings (earnings change). Figure 2A

shows evidence of discontinuity, collaborating findings by Pududu and De-Villiers (2016), for earnings of the non-financial sector. The regions just left (right) of zero [-0.028, 0.000] ([0.000, 0.028]) exhibit unusually too low (high) frequency. For earnings change, Figure 2B depicts a distribution with interval bin widths of 0.025. The evidence supposes the existence of discontinuity.
Although untabulated, the standardized difference statistic is -9.621 for the evidence of small losses (region just left of zero), which is negative and significant. The standardized difference statistic of 18.855 for the evidence of small profit (for region just right of zero) is positive and highly significant. The standardized difference statistics for earnings change in regions immediate left and right of zero are negative (-2.825) and positive (3.452), respectively, and are both significant, confirming the hypothesis of discontinuity. The overall results suppose discontinuity and compelling statistical evidence of earnings management for earning-level and earning-change in the non-financial services (Gilliam et al., 2015). The result is consistent with Durtschi and Easton (2009) who have found evidence that sample design does not create discontinuities.

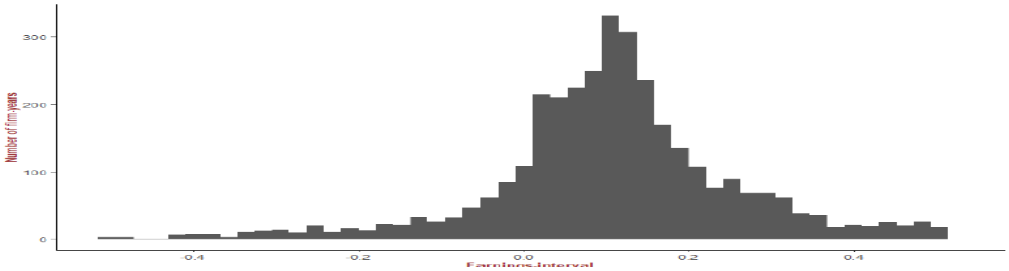

Figure 2A: Distribution of asset-scaled net income earnings for non-financial firms
Source: Authors` plot with RStudio

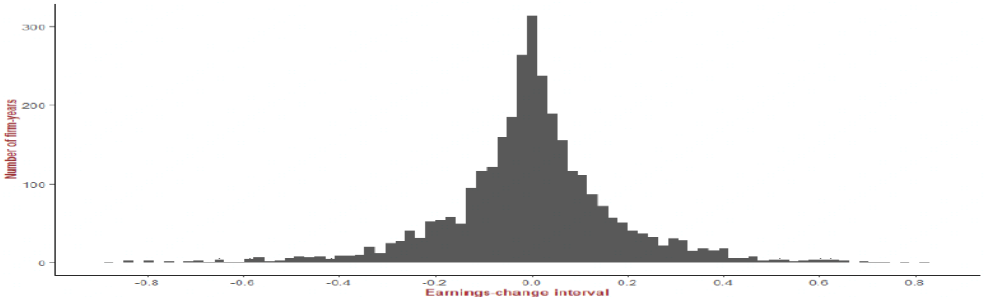

Figure 2B: Distribution of asset-scaled net income earnings change for non-financial firms
Source: Authors` plot with RStudio

4.3.2. Alternative Scaler Effects

Durtschi and Easton (2005, 2009) underline that scaling earnings may be a factor that causes discontinuity in the earnings distributions. So far, the previous earnings and earnings change distributions provide evidence of discontinuity using 'total assets' as a scaler for net income in line with Shuto and Iwasaki (2015) and Gilliam et al. (2015). In this additional analysis, we have used an alternative standard deflator – the lagged market value of equity. Figure 3A (Figure 3B) depicts the distribution of the lagged MVE-scaled net income earnings (earnings-change) for the full sample. Although untabulated, for the earnings the standardized difference statistic for interval immediately the left (right) of zero is -12.05 and significantly negative (16.56, and significantly positive). For the earnings change, the standardized difference statistic for the interval just left of zero is still negative but now insignificant (-1.30). The standardized difference statistic for interval just right of zero remains significantly positive (21.391). The evidence supposes that the discontinuity remains despite deflating the net income with ‘MVE’. Hence, the scaling effect does not preclude the existence of the discontinuity.

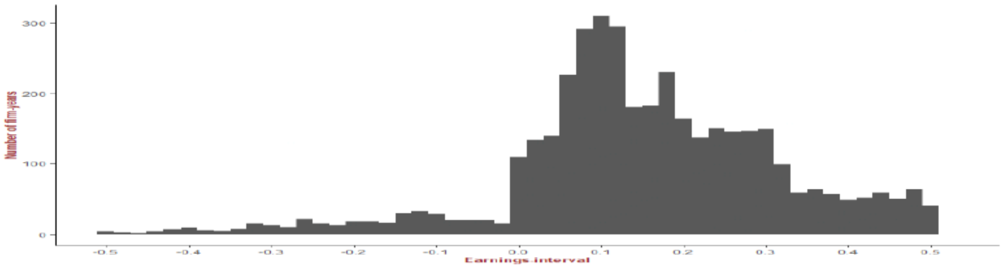

Figure 3A: Distribution of asset-scaled net income earnings based on alternative deflator
Source: Authors` plot with RStudio

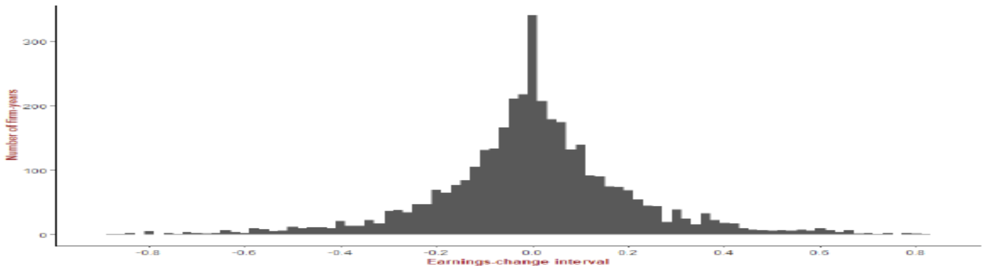

Figure 3B: Distribution of change in asset-scaled net income earnings based on alternative deflator.
Source: Authors` plot with RStudio

4.3.3. Un-scaling (Splitting into Quartiles)

We have performed the unscaling comparative analysis by separating the full samples into quartiles ($Q_i, for\ i = 1\ to\ 4$), according to Gilliam et al. (2015). The first partition is based on lagged total assets, while the second partition is based on the equity market value. Table 5 presents the result of the standardised difference test for small loss (profit) for intervals just left (right) of zero to verify discontinuity for un-scaled earnings based on the ‘asset’ and ‘equity’ quartile partition. The standardized difference tests for reporting small-loss and for loss avoidance (reporting small profit) are significant for all the quartiles partitioned except for the last partition, Q_3 (StDiff for loss) and the first partition Q_1 (StDiff for profit) of the un-scaled earnings based on equity partition. Overall, the evidence shows discontinuities in the distribution of earnings for the unscaled net income suggesting the unscaling does not preclude the existence of discontinuity. However, the result shows no evidence of discontinuity for the earnings change. Following the partitions based on both scalers, the standardised difference test for reporting small loss and reporting small profit are all insignificant for each quartiles partition. The evidence supposes that the discontinuity in the earnings-change distribution no longer remains for the unscaling net income; hence, unscaling does affect the existence of discontinuity.

Table 5: Tests of discontinuity (unscaled earnings based on assets partition)

	Q_i Partitions	**N**	**StDiff [Loss]**	**StDiff [Profit]**
Panel A: Earnings	Assets			
	Q_1	984	-3.231**	7.227**
	Q_2	984	-4.673*	2.105*
	Q_3	984	-2.136*	3.420**
	Q_n	984	-5.199**	3.736**
	Equity			
	Q_1	984	-3.076**	-1.132
	Q_2	984	-2.533**	5.909**
	Q_3	984	-1.078	2.115*
	Q_n	984	-6.813**	4.486**
Panel B: ΔEarnings	Q_i	N	StDiff [Decrease]	StDiff [Increase]
	Assets			
	Q_1	922	-1.273	-0.779
	Q_2	922	-1.051	1.904
	Q_3	923	-2.117*	0.447
	Q_n	923	-1.701	0.612
	Equity			
	Q_1	922	-0.065	0.086
	Q_2	922	-1.021	1.094
	Q_3	923	-1.927	0.442
	Q_n	923	-0.241	0.685

Note: The **Bold** values are StDiff statistics for ‘asset’ partition and the others for ‘equity’ partition.
**, * indicates the statistic is significance at 1%, 5% (one-sided test).
Source: Authors` own computations

5. Conclusions

Several researches confirmed that executives have incentives to manage corporate earnings, when reporting financial statements. The management of small earnings upward (to avoid loss) and the reporting of earnings increase (positive surprise) was identified as the cause of discontinuity in earnings distributions. The present paper offers compelling statistical evidence to verify the evidence of discontinuity in earnings distribution for selected JSE listed firms. The assets-scaled income was used as earnings measure to present the empirical histograms and the standardized difference test of significance was utilized to establish the existence of discontinuities at zero. Consistent with Pududu and De-Villiers (2016), we have obtained evidence of discontinuity in distributions for the earnings at a prima-facie zero-benchmarks. The evidence for the discontinuity in earnings change was in contrast with Pududu and De-Villiers (2016). We have demonstrated that the appearance of discontinuity cannot be attributed to just research design: scaling, sample selection and the unscaling. The scaling or sample selection does not eliminate, at least statistically, the evident discontinuities in earnings distributions.
There are two potential reasons for the results obtained, which offer relevance for the South African market. First, there has been an increase in the use of earnings discretion since the adoption of international accounting standards. This may be effectively connected to increased managed earnings to avoid losses, which drives the excessive discontinuities burden. Second, most firms in South Africa have relatively strong incentives to report

increased earnings to meet or slightly beat zero earnings, since such increased earnings may attract investors. Managing earnings broadly considers converting losses into profits, activating bonuses, or crossing performance benchmarks for other contractual purposes. Third, the firms considered are mostly profit oriented, and the result of the distribution of earnings is consistent with the regular pattern one would expect for profit-orientated firms. Since discontinuities imply significant earnings manipulations, we recommend measures to curb such practices, if they are to be discovered to be done with fraudulent intent to mislead corporate stakeholders.

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FORMAL FINANCING OPTIONS AND SMALL AND MEDIUM SCALE ENTERPRISES PERFORMANCE. THE CASE OF OTA, OGUN STATE NIGERIA

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Abstract: *Many efforts have been made in recent years to increase small and medium-sized performance in the Nigerian economy. Despite the efforts and investments, SME's are still on the chase towards improved growth level. It is important to address this because Micro, Small and Medium Enterprises (MSME's) employ approximately 84.02% of the total workforce, constitute 96% of businesses in Nigeria and contribute 48% to the Gross Domestic Product (GDP) of the nation. Financial resources are scarce for small SME's. As a result, many governments, and donors prioritize interventions that increase small and medium-sized enterprise (SME) access to capital. The study has explored the effect of formal financing options on small and medium-sized businesses in the Ado-Odo Ota, Local Government Area (LGA) of Ogun-State Nigeria. The study has utilized survey methodology via questionnaire and analyzed using the Statistical Package for Social Sciences (SPSS). The Analysis of Variance (ANOVA) and regression results were applied to test the study's hypothesis. The study discovers that formal financing options have significant impact on SME performance in Ado-Odo, Ota, Nigeria at 5% significance level. The finding further showed that a one percent increase in formal financing options would lead to a 1.36 percent increase in SME performance. The study recommends that formal financial resources are considered significant factors influencing the growth and development of SME's in Ado-Odo, Ota, and Nigeria by implication. The study recommends that formal financing institutions which include commercial banks, business angels, venture capital, microfinance banks should be considered as significant sources of finance for SME's. On the other hand, formal financing institutions should assist SME's through friendly interest rates and flexible packages to ensure that SME's find them as attractive options for forcing sourcing for purposes, which include purchase of equipment and others that can enhance SMEs' growth and development.*

Key words: formal financing options, commercial banks loans, SME performance, growth and development.

JEL Classification Codes: L21, L25, M13, O16.

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1. Introduction

Access to finance can be considered from two different sources: internal and external sources. Internal finance source is expressed as that involving savings, retained profits, depreciation and the sale of assets which is key to the survival and development of any enterprise. To be a successful small and medium enterprise (SME), external finance sources are required, sources such as individual-investors, financial banks, venture-capital and crowdfunding. Lawal, Iyiola, and Adegbuyi (2018) noted that external sources are considered absolutely key for expansion and can decisively determine the faith in/of a business. Formal external sources of finance include merchant, commercial and development banks.

Businesses, no matter their size, have the main objective of buying and selling of goods and services for profit. Although some businesses are non-profit organizations with the aim of fulfilling a charitable purpose, most are enterprises trying to create utility for personal or private profit (Okafor, Onifade and Ogbechi, 2018). Small and Medium Enterprises (SME's) innovatively generate employment due to their labor-intensive processes, making them a crucial ingredient for economic integration, hence, unleashing domestic resources which are likely to create a more stable and sustainable pattern of growth (Nwandu, 2016). For example, in industrialized countries such as Taiwan, Malaysia and South Korea, SME's have been noted to significantly drive industrial development policies due to their large share in export earnings overtime (Ehinomen and Adeleke, 2012).

Investment decisions and policy formulation in developing economies like Nigeria, are also increasingly favoring SME's compared to large scale capital-intensive industrial projects due to the evolving knowledge that SME's create small resilient economies that can be a better solid base for development. This is evident as the majority of businesses or enterprises in the Nigerian economy are small and medium sized. However, Okafor, Onifade and Ogbechi (2018) noted that despite efforts by the government to use SME's as the wheel of progress to drive economic growth, most of these efforts have proven to be unfruitful. Issues faced by SME's include the absence of a suitable environment to thrive as well as the fact that SME's require the absence of the appropriate and considerate financial processes to help foster entrepreneurship (Lawal, Iyiola, and Adegbuyi, 2018). Notably, Nigerian SME's are faced with a major constraint such as gaining access to finance, usually resulting from the extreme risk profiling by commercial banks, information asymmetry, lack of collateral, poor record keeping, poor management and loan recovery uncertainty.

The phenomenal lack of financial resources' pass-through to SME's has led to entrepreneurs being forced to find funding sources with high interest rates which have detrimental implications (Bello, Adamu, and Ahmed, 2018). Nigerian Bureau of Statistics (NBS) (2019) has documented that small enterprises only grew by 4.6% between 2013 and 2017 whilst the number of medium sized enterprises decreased significantly from 4,760 in 2013 to 1,793 in 2017, having a 61% drop. NBS (2019) has also revealed that for 55.6% of SME's rely on personal savings as their source of capital, with 11.7% depending on families and only 17.5% making use of loans. This shows that there seems to be a wide gap between the aims of the different financial agencies supporting SME's and their actual success levels.

This is necessary as SME's are regarded as the lifeblood of the economy and their development generally tends to transmit to the development of a nation. However, SME's in Nigeria have been experiencing challenges leading to non-significant performance. Ogun State was ranked as one of the states in Nigeria with the largest SME's, nevertheless, the question of whether formal financing options successfully affects SME performance exists. This study examines the impact of formal financing options on SME's' performance in Ota, Ogun State, Nigeria and to what extent Commercial bank loans' affect SME's' performance.

2. Brief Review of Literature

Several studies have been conducted to assess the influence of SME lending on Nigeria's economic development. Rao et al. (2021) have performed a thorough review of 280 publications from 1986 to 2020 and have discovered that SME finance research includes a wide range of subjects, including publishing patterns, theoretical framework, methodological design, and themes. Bakhtiari et al. (2020) have examined SME’s' financial constraints and performance and have discovered that financial constraints have had a substantial influence on employment, productivity, and remuneration. Gherghina et al. (2020) have discovered that investments and innovation boosted the territorial economic growth of active Romanian enterprises, especially SME’s. According to Bello, Adamu, and Ahmed (2018), SME’s have a favorable influence on Nigeria's economic development. Finance contributes 25% to SME performance, according to Gbandi and Amissah (2014), yet SME’s only contribute 1% to Nigeria's GDP, compared to industrialized nations where the contribution is larger.

Adegbuyi et al. (2016) have discovered that financial support has a considerable influence on SME’s, although it is insufficient. Ogbuabor (2018) has discovered that cash reserve ratios had no influence on SME’s' performance, but short-term and long-term lending-interest rates do. Due to rigorous collateral requirements and high-interest rates, Ugwu-Oju et al. (2019) have discovered that commercial banks are unsympathetic to SME loan requests. According to Lawal et al. (2018), funding constraints are more widespread in industrialized countries, and financial capital is one of the most important elements influencing SME's development and output.

Ilori and Ilori (2015) have discovered that despite initiatives designed to help SME’s, little progress has been made, and SME’s contribute just approximately 1% of GDP. Githaigo and Kabiru (2015) have resolved that long term as well as short term loans diminish financial performance of SME’s. Meanwhile, Kaya and Masetti (2019) have proven that a rise in securitization issuance lessens the likelihood that SME’s would experience credit limitations and lowers the cost of bank financing for companies that are not experiencing such constraints. Our findings show that different types and qualities of securitization have different impacts on the availability of credit to SME’s.

Kersten et al (2017) have discovered that SME financing has a statistically significant beneficial influence on capital investment, firm performance, and employment inside the supported business, while having no effect on overall profitability or salaries. In conclusion, it is not apparent to what degree SME financing aids in economic growth and poverty alleviation.

2.1. Theoretical Framework

This study's argument hinges on the pecking order and financial growth theories. The pecking order theory popularized by Myers and Majluf (1984), states that there is a hierarchical order by which companies prioritize funding resources to meet the financing needs of firms. The theory posits that funding begins with internal sources and as requirement increases, the company moves on to external sources, usually first in the form of debt and then finally external equity (Akpan and Nneji, 2015). It also theorizes a negative relationship between profitability and external borrowing. The theory suggests that the final mixture of debt and equity is something that only occurs after a period. External equity is something that is seen as a last resort whilst debt financing is also something that is carefully considered in regard to the cost of lending. By extension, Holmes and Kent (1991) have stated that a glance at the debt-equity mix of a firm can indicate a quick understanding of the health of that organization. On average, older firms are expected to have more retained earnings that they can use to finance themselves and therefore should have less need for loans. The lack of access to finance and the preference manifested by such enterprises (SME’s) for internal funds leaves small businesses in a unique position (Akpan and Nneji, 2015).

Schumpeter (1911) has advocated for the financial growth theory, which posits that development occurs when the right financial resources are provided to entrepreneurs who have the best and highest probability of success. What this basically means is that the more developed the financial sector of an economy, the better its chances of providing the right resources and gaining correct information. This in turn is seen as key to generating economic growth. The supply-leading response school of thought supports this view and argues for the importance of growth in gaining economic development (Adusei, 2012).

3. Methodology

3.1. Model Specification

The study proposes a model of this research work which expresses small and medium enterprises' performance as a function of formal financing options. The formal financing options utilized by this study include commercial bank loans, business angels, venture capital, microfinance loans and crowdfunding. The implicit model is specified thus:

$$SMEP_i = f(ffp_i) \quad (1)$$

Where: SMEP represents small and medium-scale enterprise performance; 'ffp' represents formal financing options. The explicit model is displayed thus:

$$SMEP = \beta_0 + \beta_1 ffp + u_t \quad (2)$$

Where β_0 represents the intercept of the model; and β_1 represents the coefficients of the estimated parameter.

3.2. Data and Analytical procedure

The study has adopted the descriptive survey research design following the pattern of Igbinoba, Soola, Omojola, Odukoya, Adekeye and Salau (2020). The study's data was sourced based on variables of interest for further analysis. The data was amassed by administering well-structured questionnaires with the aim of garnering a representative population. The study population consisted of 100 small and medium scale enterprise (SME's) owners, partners and employee managers in the Ado-Odo Ota area, Ogun state.
Notably, due to data constraints, there are no clear estimates for the number of SME's residing in this area. This non-availability made it impossible to utilize other types of sampling techniques, hence the use of the purposive sampling technique. This analytical selection comprises of non-probability sampling method where researchers rely on their judgment when selecting members of the population, based on the researcher's understanding of the study to be conducted and prior knowledge of the Local Government Area (LGA). This selected sampling method enabled selections that fit the profile of those that match the purpose of the study to be conducted. The researcher however aimed for a maximum variation of responses across the population to make sure that the SME's in Ota are well represented across the board. The survey questionnaire was carefully prepared to ensure completeness, consistency and accuracy. The collection process was also carefully managed to reduce errors. The analysis utilized to achieve this study's objective includes binary logistic and descriptive statistics.

4. Results

4.1. Demographics

Based on the unit analysis of the study, the demographic information considered necessary were gender, marital status, age range, role in business, the highest level of education and years in the business of the respondents in the organization. An observation of Table 1 showed that the respondents who participated in the study had a gender distribution of 56.7% of the participants as male respondents and 43.3% of the participants as female respondents. By implication, the gender distribution of the respondents was almost evenly balanced. Notably, from the demographic information shown in Table 1, 58.9% of the respondents are married, 40% are within the age range of 36-45, with about 40% of the respondents being the owners of SME businesses. Also notable is the fact that out of the 100 questionnaires administered to the small and medium-scale enterprises in Ado Odo Ota LGA, Ogun State 90 questionnaires were retrieved by the respondents and 10 questionnaires were not retrieved.

Table 1: Socio-demographic features of respondents

Socio-Demographic Characteristics	**Frequency**	**Percent**
Gender		
Male.	59	56.7
Female	31	43.3
Total	90	100
Marital Status		
Single	31	34.4
Married	53	58.9
Divorced	4	4.4
Widow/Widower	2	2.2
Total	90	100
Age Range		
Below 25	18	20.0
26-35 Years	21	23.3
36-45 Years	36	40.0
46 Years and Above	15	16.7
Total	90	100
Role in Business		
Owner	36	40.0
Partner	30	33.3
Employee	24	26.7
Total	90	100
Highest Educational Qualification		
Primary Leaving Certificate/W.A.E.C	16	17.8
NCE/ND	27	30.0
HND/BSc.	44	48.9
M.Sc.	3	3.3
Total	90	100
Years in Business		
(1-5) years	18	20.0
(6-10) years	24	26.7
(11-15) years	22	24.4
16 years and above	26	28.9
Total	90	100

Source: Authors' own computations (2023)

4.2. Research Hypothesis

H_0: Formal Financing Options have no significant impact on SME's performance in Ado-Odo, Ota, Ogun State

As observed in Table 2, the description of the model where the model's modified coefficient of determination (R2) is .95 with adjusted R2 =.96. It means that about 95.9% of the variance in the performance of SME could be explained by the variation in the structured financial options and the remaining 4.1% of the overall variation was explained by other variables not included in the model. Furthermore, the correlation result, shown in Table 2 (R = 0.98) indicates that there is a strong association between the SME's performance and formal finance options. The findings of the correlation and coefficient of determination, thus, imply that there is thus a linear relationship between the formal alternatives for funding and the success of SME's.

The overall significance of the model is presented by the F-test in Table 3. Given that the F-statistics has a value of 3351.70 and a corresponding P value of 0.00, it is evident that the null hypothesis that "there is no significant relationship between Formal finance options and SME's performance" could not be accepted. We assume that a linear association occurs between formal-finance alternatives and SME results by dismissing the (H0) null hypothesis as well as supporting the alternative hypothesis. The regression results in Table 4 further confirm the ANOVA output in Table 3. The t-statistics being greater than 5 confirms that formal financing options impact SME's' performance at a 5% level of significance. The direction of the relationship is further confirmed as positive implying that an increase in formal financing options influences SME's' performance positively. With regard to the magnitude of the impact, the regression result in Table 4 shows that a one-per cent increase in formal financing options influences SME's' performance by 1%.

Table 2: Model Summary for Formal Financing Options - SME's performance Hypothesis

Model	R	R-Square	Adjusted R-Square	Standard Error
1	0.98	0.96	0.95	1.05

Source: Authors' own computations (2023)

Table 2 above shows the model for the study clearly revealing the adjusted R-squared which includes the R value (0.98), R-squared value (0.96), adjusted R-squared value (0.95), and standard error (1.05). This means that formal financing alternatives may explain 96% of the difference in SME performance.

Table 3: ANOVA Output for Formal Financing Options - SME's **performance Hypothesis**

Model	Sum of Squares	Df	Mean Square	F	P-Value
Regression	2348.08	1	2358.08	2091.21	0.00
Residual	98.80	88	1.12		
Total	2446.89	89			

Source: Authors' own computations *(2023)*

Table 3 shows the hypothesis's ANOVA (Analysis of Variance) results, including the sum of squares for the regression (2348.08), residual (98.80), and total (2446.89). The F-value (2091.21) and p-value (0.00) suggest that the hypothesis is statistically significant, implying that formal funding alternatives and SME performance are related.

Table 4: Regression Result for Formal Financing Options-SME’s performance Hypothesis

Model	β	Standard Error	Standardized Coefficients	t-Statistics	P-value Significance
Constant	-3.67	0.40		-9.08	0.00
Coefficient (β)	1.36	0.30	0.980	5.73	0.00

Source: Authors’ own computations *(2023)*
Note: Dependent variable: SME Performance; Predictor: Formal Financing options.

The tables above provide the findings of a regression study on the association between formal funding choices and SME’s' performance. The model is summarized in Table 2, which includes the R value (0.98), R-squared value (0.96), adjusted R-squared value (0.95), and standard error (1.05). This means that formal financing alternatives may explain 96% of the difference in SME performance. The regression findings for the hypothesis are shown in Table 4, containing the constant value (-3.67), the coefficient for formal financing alternatives (1.36), the standard error (0.30), standardized coefficients (0.980), t-statistics (5.73), and the p-value (0.00). A unit increase in formal financing choices is connected with a 1.36 unit improvement in SME performance, according to the positive coefficient of 1.36. This link is statistically significant, according to the t-statistics (5.73) and p-value (0.00). Finally, these statistics indicate that formal financing choices have a considerable and favorable influence on the performance of SME’s.
The positive and significant finding of this study extends with the study by Lawal (2018), who posited that financial resources can be considered to be one of the major factors influencing the growth and development of SME’s. These results corroborate those of previous research by Babu (2017) and Nikaido, Pais, and Sarma (2015), which identified collateral and lending conditions as major obstacles to formal funding. The other major factors can be said to also be highly influenced by the number of financial resources available. A venture's financial management as it moves into the entrepreneurship operation also plays a key role in its development (Lawal, Iyiola, and Adegbuyi, 2018).

5. Conclusion

Policy measures are vital. OECD (2019) demonstrates that SME’s still struggle to receive financing. The trend suggests that more small enterprises are financially limited and failing to thrive. From the findings, it could be deduced that formal financing options have a significant impact on the performance of SME’s. In conclusion, financial resources are considered to be major factors influencing the growth and development of SME’s. Therefore, policies should be tailored to foster financial support for SME’s in order to contribute positively to the Gross Domestic Product (GDP).
Blancher et al. (2019) have suggested increasing the financial technology (FinTech) sector minimize bank dependence, exchanging credit information, and modernizing bankruptcy legislation and the legal system to promote SME’s. FinTech can provide several services to small firms in emerging and developed nations. FinTechs may help SME’s by streamlining the application process and providing financial services to rural places where internet connection opens up new entrepreneurship opportunities (Nanda, 2018).
The results of this research provide insight into the declining rate of capital creation and the high lending rate banks impose on small and medium-sized enterprises (SME’s) in search of financing. Our estimated model emphasizes the paramount significance of stable financing to the long-term success of Nigeria's small and medium-sized businesses. SME’s should have access to the massive deposit liabilities of banks by having the government guarantee the commercial banks' loans to them and by having the government subsidize the interest rate on such loans.

The research urged stakeholders and the government to take action to help small and medium-sized enterprises (SME’s) increase their access to alternative funding from formal institutions and other options including government affirmative grants. Also, Incentives for traditional banking institutions that create dedicated SME-focused facilities and improve the effectiveness of SME-focused positive funds should be considered by the government. Financing options for SME’s (small and medium-sized firms) are critical to their performance and development, particularly in developing nations. Policymakers must acknowledge the role of SME’s in driving economic growth and provide an environment in which small businesses may get sufficient funding. Policymakers should promote financial literacy and entrepreneurship, support alternative financing sources such as microfinance institutions, crowdfunding, and peer-to-peer lending, and encourage the establishment of a strong banking sector that meets the requirements of SME’s. Governments may also give tax breaks and subsidies to SME’s, as well as guarantee programs to encourage banks to lend to small businesses. Furthermore, policymakers may collaborate with development finance institutions and donor organizations to give SME’s technical support and training to help them access capital and expand their enterprises. Policymakers may boost SME’s' access to funding by adopting these guidelines, which can improve their performance and contribute to overall economic development in developing nations.
Furthermore, based on the findings, banks could assist small and medium-scale enterprises through the provision of an overdraft, soft loans, advisory services, purchase of equipment, and other support that can enhance their growth and development. Small and medium-scale enterprises should seek private investors/business angels to invest their business skills and capital in the business enterprises to achieve economic objectives. Further studies should explore the comparative role of formal and informal financing options on SME’s in Nigeria. This suggestion will give a comparative insight as to the most promising way for SME’s to source funds.
Finally, governments may indirectly help SME’s get financing. Few studies have indicated that government subsidies and grants to small and emerging enterprises boost their chances of market loans and investment. Takalo and Tanayama (2010) have demonstrated in a theoretical environment that government R&D subsidies to small enterprises cut capital costs and transmit a quality signal that makes it simpler for them to get finance. Meuleman and De Maeseneir (2012) found that Belgian R&D tax subsidies improved small enterprises' loan finance. Bakhtiari (2019) shows that Australian government aid increases the likelihood of enterprises securing external financing.

5.1. Limitation of the study and future research focus

SME heterogeneity and policy implications are two major unanswered problems. Is supporting SME’s a good strategy to boost innovation and employment? Also, SME support is minor compared to macroeconomic variations and trends, making this difficult to assess. SME aid on economic aggregates is unclear. Can we meaningfully aggregate micro-, small-, and medium-sized businesses to meet policy goals? Are the "average" SME programs and policies suitable for micro-firms? Do SME’s need distinct policies?

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Bio-notes

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CAN CREDIT SCORES ENHANCE TAX COMPLIANCE IN SOUTH AFRICA?

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Abstract: *A compliance enhancing tax system is crucial for revenue mobilization, administrative efficiency and consequently the realization of national strategic goals. There are several factors, however, which influence a taxpayer's ability to comply with the tax system and these include economic, institutional, demographic and social factors. Against this backdrop, the primary objective of this study is to estimate taxpayers' perceptions towards credit scores and the extent to which credit scores can enhance tax compliance in South Africa. The data collection process involved self-structured questionnaires analyzed by means of descriptive statistics, inferential analysis and binary logit regression. Overall, the findings reveal that the level of educational attainment, perceptions on the state of democracy and difficulty of tax evasion are positively associated with higher probabilities of a tax compliant attitude in South Africa. By contrast, the rate of social influence was found to be negatively related with higher probabilities of a tax compliant attitude. Perceptions on credit scores (being the variable of interest) were found to be positively associated with higher probabilities of a tax compliant behavior. This, to some extent, implies that linking the tax compliance status of individual taxpayers with their credit scores is most likely to yield positive results as far as tax revenue mobilization is concerned. Given these findings, the study recommends a revision of the current credit score framework to include the tax compliance status of taxpayers as this would induce a tax compliant behavior by penalizing the credit score of non-tax compliant individuals.*

Keywords: tax compliance, credit scores, binary logistic regression, South Africa

JEL classification: H24, H26, C51, I21.

1. Introduction

Sub Saharan countries have a history of low levels of voluntary tax compliance and South Africa is no exception (Ali et al., 2013). Riedel 2009 notes that developing countries are the hardest hit by non-tax compliance and this undermines domestic tax capacity. In most cases, tax authorities have to make use of monetary penalties on corporate and individual taxpayers to encourage tax compliance. Several African countries have made efforts to increase both voluntary and non-voluntary tax compliance. For example, the South African government introduced the e-filling system to reduce administration costs and facilitate assessment processing as well as revenue collection (South African Government, 2018). A compliance enhancing tax system is crucial for revenue mobilization, administrative efficiency and the realization of national strategic goals. There are several factors however, which influence a taxpayer's ability to comply with the tax system and these include economic, institutional, demographic and social factors (Adimassu and Jerene, 2016). Taxes are known to be a compulsory contribution to/for the state, in that, there is no direct relationship between a taxpayer's contributions to the state and the extent to which the

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taxpayer receives benefits thereof in the form of public services. In the 21st century however, perceptions about government spending of public funds influence the willingness of taxpayers to settle their tax liabilities. When taxpayers feel that the government is not utilizing public funds in the most economical and efficient way, they become reluctant to pay taxes. Different schools of economic thought view tax compliance differently. For instance, the neoclassical view on tax compliance entails government intervention through the implementation of various instruments that enforce compliance such as tax audits and penalties (Pukelienė and Kažemekaitytė, 2016).
Non-tax compliance in the African continent can be evidenced by the below average tax-to-GDP ratios and high administration costs associated with the collection of taxes. Although this topic has been heavily studied, factors that influence tax compliant behavior differ from country to country and from individual to individual, hence the need for country specific studies. This study has three objectives, which are (i) to estimate taxpayer's perceptions towards credit scores, (ii) to relate credit scores with the tax compliance status and (iii) to investigate if credit scores can enhance tax compliance in South Africa. It is sufficient to note that a low tax-to-GDP ratio is not the sole indicator of non-compliance. High administration costs associated with the tax system are also an indication as well as the value of monetary tax penalties imposed on individuals and corporations. Tax amnesty and the informal sector have also gained attention (Gcabo and Robinson, 2007).
Nonetheless, the findings obtained in this study will contribute to the existing body of knowledge on tax compliance behavior by providing insights on the extent to which credit scores can induce a voluntary tax compliant behavior in South Africa. The study will likewise make a novel contribution to the economics literature by formulating a revised credit score and tax compliance framework. This will help stimulate debates on non-monetary tax penalties that can influence tax compliance. Also, linking the tax compliance framework with the credit score framework will assist in alleviating information asymmetry in the financial sector and enable financial firms to better assess credit applications based on a broader scope of factors. The use of credit scores has been steadily increasing, from being used by banks to employers and landlords. The incentive for individuals to become tax compliant will thus be high given that the majority of South African households apply for credit, employment and accommodation more frequently. The rest of the study will be arranged as follows: whereas Section 1 has provided an introduction to the study and outlined the aim and objectives of the study, Section 2 will briefly discuss literature on the determinants of tax compliance as well as a summary of findings from empirical studies. Section 3 will detail the data collection process and methods that were utilized in the study. Section 4 will briefly summarize the main findings of the study while Section 5 will comprise of the conclusion and recommendation.

2. Literature Review

This section begins by discussing the conventional determinants of tax compliance. The second leg of the section entails a discussion of empirical literature on the determinants of tax compliance.

2.1. Theoretical Literature

2.1.1. Determinants of tax behaviour

a) *Economic factors*

Economic factors include tax rates, income level, perceptions on government spending as well as tax audits. An ideal tax system is one that promotes fairness and equity. That is to say, higher income earners should face higher tax rates while lower income earners should face lower tax rates. As one moves along the income bracket, so should the level of tax rate they face. Thus, when individuals feel that their tax rate is too high, they tend to be less reluctant to pay taxes and consider avoiding and/or evading taxes. A study by Kosgei and Tenai (2014) has explored the impact of economic factors on tax compliance in Kenya. The study revealed that tax rates, fines, penalties and audits have a strong positive impact on tax compliance whereas the level of income and tax incentives have a weak positive impact on the level of tax compliance. Other studies such as Mannan et al. (2020) have found that perceptions on government spending, tax fairness and penalties have a positive and statistically significant impact on tax compliance while, on the contrary, referral groups have a negative impact on tax compliance decisions in Kenya.

b) Institutional factors

A simple tax system is one that encompasses well-defined tax regulations and processes and enables taxpayers to complete or file their tax returns without much hassle or the need for a third party (Palil, 2010, Adimassu and Jerene, 2016). The more taxpayers find it difficult to file their returns or calculate their tax liability, the less tax compliant they will be. Tax knowledge remains one of the barriers to voluntary tax compliance. Loo and McKerchar (2010) have argued that a lack of appropriate tax knowledge may lead to intentional or unintentional noncompliance behavior. It is also worth noting that unintentional compliance may be exacerbated by a lack of technological literacy since most tax systems are digitalized. Fiscal exchange also serves as an institutional determinant of tax compliance. Simply put, fiscal exchange refers to tax payments by local taxpayers in exchange for the provision of quality public services. The theory of fiscal exchange relates tax compliance with the provision of public goods and services. Bandara and Weerasooriya (2019) explain that the government can enhance the level of tax compliance by providing public goods and services more effectively and efficiently. This will instill trust in the society and improve the tax morale of corporate and individual taxpayers.

c) Social factors

Social factors include equity, fairness and certainty. These factors are based on personal judgement of the tax system as well as the environmental culture. When an individual believes that a tax system is fair and equitable, there more likely they are to be tax compliant. Simply put, equality of taxation means equality of sacrifice. An individual’s tax contributions should be in line with the income they earn and individuals within the same income bracket should face the same tax burden. Subramaniam et al. (2019) have investigated the influence of social factors such as moral, cultural, religious and ethical background on tax compliance in Malaysia by means of a multiple regression analysis. The study has found that all variables employed have a strong positive and statistically significant impact on tax compliance. A similar study by Sritharan et al. (2020) explored the effect of social factors on tax compliance in Malaysia. Having employed the multiple regression technique, the findings indicated that referral groups, changes in government policies and political affiliation are significant in explaining the tax compliant attitude of local taxpayers in Malaysia.

d) Demographic factors

Demographic factors in research include age, gender, level of education, location and race, among others. Several studies (i.e., Hasseldine and Hite, 2003; Mohamad, Mustafa and Asri, 2007) have investigated the role of gender in tax compliance. The results, however, remain ambiguous since other studies found females to be more tax compliant than males while others found males to be more tax compliant than females. Fredrick and Peter (2019) have analyzed the impact of demographic factors on tax compliance in Uganda using survey data on individual taxpayers who are small business owners. The results indicated that gender is statistically significant in explaining variations in tax compliance while education and age are statistically insignificant. A similar study by Al-Mamun et al. (2014) has examined the influence of demographic factors on tax compliance attitude in Malaysia. The study found selected demographic factors including ethnic group, gender and educational attainment to be statistically significant in explaining variations in tax compliance.

2.1.2. Revised Credit Score Framework

The proposed study attempts to link credit scores with the tax compliance status of personal income taxpayers and corporates. This will help alleviate information asymmetry by providing a greater scope of factors to be considered in assessing the credit worthiness of debtors, especially registered taxpayers given that they make use of credit facilities for several purposes, including to finance large scale assets such as vehicles and mortgage bonds. It is sufficient to note that consumers are always looking for ways to improve their credit score since good credit scores guarantee better credit offers. When consumers have a non-tax compliant status, this will negatively affect their credit record, thereby inducing them to be tax compliant. The South African Revenue Services considers four elements in the determination of the overall tax compliance status, which include tax registration, submission of annual tax returns, debt and submission of relevant supporting documents.

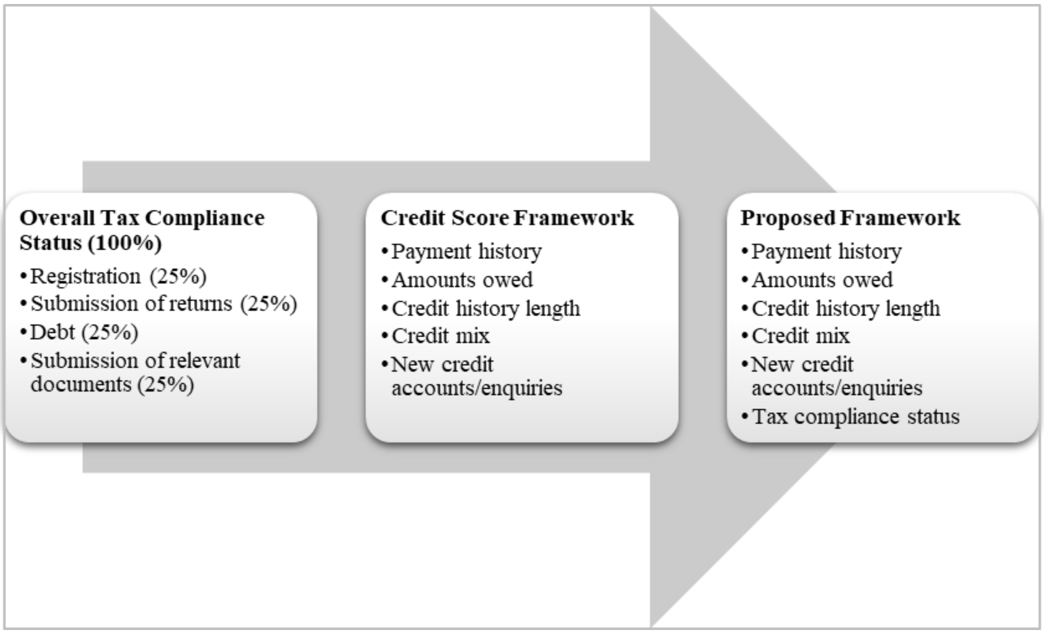

Figure 1: Proposed Credit Score Framework
Source: authors' analysis using information from Experian & SARS (2022)

The tax compliance status is particularly important to businesses trading with the government as this forms part of the minimum requirements for conducting business with the government. For personal income taxpayers, however, the tax compliance status is relatively less significant given that it is not required in most instances. This can easily induce personal income taxpayers to exhibit a non-tax compliant behavior. Thus, by linking the tax compliance status with the credit record, this will induce taxpayers to exhibit a tax compliant behavior. Furthermore, this will generate awareness about the importance of filing tax returns and maintaining a tax compliant status. The lack of tax awareness may create a backlog of outstanding tax refunds and liabilities.

2.2. Empirical Literature

This sub-section provides a detailed summary of empirical findings on the determinants of voluntary and non-voluntary tax compliance. A study by Adimassu and Jerene (2016) has assessed the influence of various economic, social, individual and institutional factors on tax-payers compliance in Ethiopia. The authors have made use of the Pearson correlation matrix and logistic regression method to analyze primary data of self-structured questionnaires from a sample of 377 Category “A” taxpayers. The findings have revealed that perceptions on government spending, a fair and equitable tax system as well as the probability of audit, are strong determinants of tax compliance in Ethiopia.

A similar study by Bandara and Weerasooriya (2019) has made use of econometric modelling to establish the link between tax compliance and several explanatory variables in Sri Lanka. The findings have revealed that the rate of tax, tax information and taxpayers' attitude were positively correlated with tax compliance while the legal framework and cost of compliance were negatively correlated with tax compliance. The study has further revealed that the rate of tax has a negative impact on tax compliance in that an increase in the tax rate would lead to a decline in tax compliance. Furthermore, tax knowledge was found to have a positive impact on tax compliance. When information about taxes is readily and easily accessible, taxpayers become more tax compliant. By contrast, the legal framework was found to have a negative impact on tax compliance. This is because when tax laws become complex to taxpayers, their willingness and ability to be tax compliant is reduced.

Tilahun (2018) has investigated the factors influencing voluntary tax compliance behavior in Bahir Dar city. The study has revealed that factors such as individual perceptions on government spending, tax compliance costs, the level of tax rates, penalties and fairness of the tax system are significant determinants of voluntary tax compliance in Bahir Dar city. Shiferaw and Tesfaye (2020) have observed the factors influencing voluntary tax compliance behavior of Category A and B taxpayers in Ethiopia. The study has found that voluntary tax compliance is greatly influenced by demographic factors including age, level of education and gender. Also, the study has found that economic and social factors such as the tax rate, penalties, observed fairness of the tax system, absence of tax audits, tax knowledge, organizational structure and turnover as well as government spending trends significantly affect tax compliance in Ethiopia.

Pukelienė and Kažemekaitytė (2016) have scrutinized the impact of several determinants of tax(non) compliance behavior in European union countries for the period 2003 and 2014. The study finds that tax morale, social and cultural factors as well as the relationship between taxpayers and tax authorities are statistically significant in explaining variations in tax compliance. Akinboade (2015) has analyzed the factors that correlate with tax compliance in a sample of 575 small and medium companies in Cameroon. The study has revealed that time consuming processes and high compliance costs discourage tax compliance among small and medium business in Cameroon. In addition, the study revealed that perceptions on corruption and poor leadership discourage tax registration and the filling of annual returns. Sapiei, Kasipillai and Eze (2014) have investigated the factors that determine a tax compliant behavior in Malaysia with regard to corporate income tax. The findings have revealed that tax complexity, tax liability and business age discourage a tax compliant behavior in the areas of over-claiming expenses, under-reporting income and overall tax compliance.

A comparative study by Ali, Fjeldstad and Sjursen (2013) has explored the factors that determine tax compliant behavior in Kenya, South Africa, Tanzania and Uganda. The study made use of the 2011/12 Afrobarometer survey data which captures results from the national sample surveys on the reactions of citizens in selected African countries towards the state of democracy, civil society, markets and other aspects of development. The study has revealed that the provision of public goods and services is positively correlated with tax compliance in the four countries. In addition, the study has found that tax knowledge and awareness induce a tax compliant behavior among citizens in the four selected countries. On the contrary, perceptions on the unequal treatment among ethnic groups by the government as well as frequent payments to non-state actors in exchange for security were found to be negatively correlated with tax compliance. Inasius (2015) has estimated the impact of selected tax compliance variables on the tax compliant rate in a sample of 319 individual retailers in Indonesia. The selected variables have included referral groups, perceptions on the tax rate, tax knowledge and the probability of being audited. The results have revealed that perceptions on the income tax rate have a negative impact on the tax compliant rate while perceptions of being audited, tax knowledge and referral groups have a positive impact on the tax compliance rate. These findings are in line with Laffer (2009)'s hypothesis that higher tax rates discourage taxed economic activities including investment, labor and output.

Cummings et al. (2005) have conducted laboratory experiments in different countries to explain the differences in tax compliance levels among countries. The experiments have revealed that differences in perceptions on fiscal exchange, overall attitude towards respective governments and perceptions on the fairness of tax administration can help explain differences in tax compliance levels. Chandarasorn (2012) has analyzed the determinants of tax compliance in Thailand by using a mixed methods approach comprising of face-to-face surveys with 1,148 local taxpayers and 15 face-to-face interviews with Thailand tax experts. The findings have revealed that demographic characteristics, perceptions on the fairness of the tax administration system, tax knowledge and perceptions on enforcement are major determinants of tax compliance in Thailand. Plumley (2003) has investigated the determinants of voluntary tax compliance of personal income taxpayers in Washington D.C. The findings have revealed that voluntary tax compliance is largely associated with criminal tax convictions, non-filer notices, probability of audit and marginal tax rates. Innasamy and Bidin (2017) have employed the Deterrence theory as the foundation for analyzing the occurrence of excise duty non-compliance, taking into account the tax rate, penalties and fairness of the tax system in Malaysia. The study has made use of surveys as a data collection technique in a sample of 500 excise duty offenders. The findings have revealed that perceptions on tax penalties and tax rates are positively associated with excise duty non-compliance while, on the contrary, tax fairness is negatively associated with excise duty non-compliance in Malaysia.

3. Methodology

3.1. Research approach
This study was quantitative in nature, in that the researchers made use of primary data collected by means of self-structured questionnaires. The data was examined through descriptive and inferential analysis. Although several sampling techniques exist, the most suitable sampling technique for this study was the simple probability sampling technique. Under the simple probability sampling technique, participants in the population group are sampled by a random process, usually by a random number table or random number generator (Taherdoost, 2016). The target population consisted of South African permanent residents above the age of 18 years and who are registered for income tax at SARS.

3.2. Data Analysis
The data analysis process was comprised of descriptive statistics, inferential analysis (i.e., Pearson correlation) and binary logistic regression. The techniques are explained below.

3.2.1. Descriptive analysis
Descriptive analysis forms the basis of econometric modelling as it provides a summary of the type of data the researcher is dealing with. In general terms, descriptive statistics is the process of describing the main characteristics of a dataset which can either be a representation of either the sample of the study or population at large (Sharma, 2019). There are several factors which distinguish descriptive statistics from inferential statistics. For example, descriptive statistics, unlike inferential statistics, aim to summarize information about variables while inferential statistics on the other hand, aims to explain the association

between two or more variables. In addition, while inferential statistics are based on probability theory, descriptive statistics are not.

3.2.2. Pearson Correlation test

The Pearson correlation test attempts to estimate the presence and strength of a linear relationship between two variables (Mukaka, 2012). The presence of a linear association between two variables is given by the probability value, usually at the 1%, 5% or 10% interval levels. The strength of the linear relationship between two variables is given by the coefficient value. Cohen (1988) has noted that a coefficient value below 10% indicates that there is weak linear association between two concerned variables, while a coefficient value between 10% and 30% indicates that there is a moderate linear association between two concerned variables. Any coefficient value above 50% is indicative of a strong linear association between two concerned variables. The formula for calculating the correlation coefficient for any two continuous variables is given by:

$$r = \frac{\sum_{i=1}^{n}(x_i - x)(y_i - y)}{\sqrt{[\sum_{i=1}^{n}(x_i - \bar{x})^2][\sum_{i=1}^{n}(y_i - \bar{y})^2]}} \qquad (1)$$

Where x_i and y_i are values of x and y for the i_{th} individual. Mukaka (2012) has stated that one of the conditions of using the Pearson correlation test is that the variables should be normally distributed.

3.2.3. Binary Logistic Regression

The logistic regression model has been widely used by researchers (e.g., Peng et al., 2002; Mertler & Vannatta, 2005) to obtain odds ratio in the face of categorical variables. The technique aims to model the chance of an outcome based on individual characteristics (Peng et al, 2002). The technique works in a similar fashion as the linear multiple regression technique except that the outcome variable is binary (Sperandei, 2013). One advantage of using the logistic regression model over other econometric techniques is that it allows the researcher to use continuous independent variables with ease and it can handle more than two independent variables simultaneously. A simple logistic regression model can be expressed mathematically as follows:

$$log\left(\frac{\mu}{1-\mu}\right) = \alpha_1 X_1 + \alpha_2 X_2 + \ldots \alpha_n X_n \qquad (2)$$

Where μ indicates the possibility of consequences for each event, α_i represents the slope coefficients associated with the reference group and the X_i independent variables. Unlike discriminant analysis, the logistic regression model does not assume that the explanatory variables are normally distributed. This technique is best situated for this study given that the response variable is binary.

3.3. Model specification

The estimation model was guided by earlier studies with a few modifications to put it in line with the objective of the study. The following model was estimated:

$$tc = \alpha_0 + \alpha_i \vartheta_t + \alpha_i \rho_t + \alpha_i \omega_t + \varepsilon_t \qquad (3)$$

Where tc is a binary tax compliance variable taking a value of 1 for compliance and 0 for non-compliance, α_0 is the constant term, ϑ_t is a vector for individual level characteristics of the respondent: age, gender, education, employment status and ethnicity. ρ_t is a vector for control variables such as economic deterrence, political legitimacy, perceptions on government, social influence etc. ω_t is the variable of interest, which is perceptions on credit scores and ε_t is the idiosyncratic error term.

Table 1. Description of Variables

Gender	**Male and female**
Age	Ranging between 18 – 65 years
Level of education	No education, matric, undergraduate, postgraduate
Employment sector	Private sector, public sector, informal sector
Employment status	Employed, unemployed, self-employed
Reason for evasion	Unfair tax system, taxes are too high, government steals money, I know I won't get caught
Difficulty of evasion	Very easy, easy, neither easy nor difficult, difficult, very difficult
Fiscal exchange	Taxpayer's benefit from public services in exchange for taxes
Tax morale	If the quality of public services inspires the taxpayer to settle their tax liability
Trade-off	The trade-off between higher tax rates and quality public services or lower tax rates and poor-quality services
Social influence	If the perceived compliance of others influences the taxpayer to settle their tax liabilities
Corruption	Perceptions on the level of corruption
Trust in government	Perceptions on the trust in government
State of democracy	Perceptions on the state of democracy
Linkage	Would linking your tax compliance status with your credit record induce you to become tax compliant (yes/no)

Source: author's own computations

3.4. Ethical considerations

Fleming and Zegwaard (2018) have noted that when dealing with fundamental ethical research that involves human participation, it is important to consider the ethical dilemmas that might play out. The study and data collection instruments were designed in such a way that they take into consideration the possibility of harm to participants. In addition, the study did not pose any psychological or physical harm to participants. Further to this, the study has carried no potential for legal or social harm since no information about a participant's behavior to illegal activities or substance abuse was collected. Ethical clearance was obtained from the Wits Ethics Committee.

4. Findings and Discussions

This section discusses the various statistical tests performed in estimating taxpayers' perceptions towards credit scores. This includes descriptive analysis, statistical inference, and binary logistic regression. The Social Sciences Statistical Package (SPSS) was utilized in this regard.

4.1. Descriptive Analysis

The first point of analysis was to examine the individual characteristics of the variables including the range, mean, standard deviation and skewness of the data. The findings are provided in table 2.

Table 2. Descriptive Statistics

	Minimum	Maximum	Mean	Std. Deviation	Skewness	
					Statistic	Std. Error
Tax compliance	0	1	.33	.47	.75	.19
Gender	1	3	1.65	.49	-.45	.19
Education level	1	4	2.66	.57	-1.22	.19
Age	2	7	2.87	.77	1.82	.19
Employment status	1	3	2.15	.49	.36	.19
Employment sector	2	4	2.67	.81	.66	.19
Reason for Evasion	1	4	2.72	1.11	.13	.19
Difficulty of Evasion	1	5	3.45	.96	-.15	.19
Fiscal exchange	1	2	1.63	.48	-.56	.19
Tax morale	1	2	1.16	.37	1.89	.21
Trade-off	1	2	1.65	.48	-.65	.19
Social influence	1	2	1.37	.48	.56	.19
State of Corruption	1	2	1.04	.20	4.73	.19
Trust in government	1	2	1.04	.19	4.99	.21
State of Democracy	1	2	1.27	.45	1.03	.21
Linkage	1	3	2.52	.65	-1.03	.19

Source: author's own computations

The total number of observations is 150 with the exception of several variables including reason for evasion (148), ease of evasion (148) and tax morale (133), corruption (149), trust in government (137) and state of democracy (132). All the variables have lower mean values ranging between 0 and 4 given that they are categorical variables with low ranges. In addition, the standard deviation for all the variables is low, ranging between 0 and 2. This implies that the data points are closer to the mean.

4.2. Correlation Analysis

This subsection discusses findings from the Pearson correlation test as part of inferential statistics. The outputs are presented in tables 3, 4 and 5. The first table provides correlation coefficients between tax compliance and demographic factors.

Table 3. Pearson Correlation (demographic factors)

	Tax compliance	Gender	Education	Age	Employment status	Employment sector
Tax compliance	1	-.02	.19**	-.05	-.04	-.12
Gender	-.02	1	-.05	.01	.14*	.06
Education	.19**	-.05	1	.13	-.18*	-.18*
Age	-.05	.01	.13	1	-.16*	-.06
Employment status	-.04	.14*	-.18*	-.16*	1	.74**
Employment sector	-.12	.06	-.16*	-.06	.74**	1
*Asterisks **,* denote statistical significance at the 1% and 5% level respectively*						

Source: author's own computations

Amongst all the demographic factors including gender, educational level, age, employment status and employment sector, only the level of education was found to be positively associated with tax compliance. In addition, the association was found to be statistically significant. A positive and statistically significant association was also found between gender and employment status as well as between employment sector and employment status. On the contrary, a negative correlation was established between educational level and employment sector as well as between age and employment status. Table 4 indicates the correlation between tax compliance, social and economic factors.

Table 4. Pearson Correlation (social and economic factors)

	Tax compliance	**Reason for evasion**	**Difficulty of evasion**	**Fiscal exchange**	**Tax morale**	**Trade off**	**Social influence**
Tax compliance	1	.02	.67**	-.01	.05	-.03	-.12
Reason for evasion	.02	1	.04	.01	-.19*	.05	-.05
Difficulty of evasion	.67**	.04	1	-.08	.11	.02	-.05
Fiscal exchange	-.01	.01	-.08	1	.23**	-.03	.26**
Tax morale	.05	-.19*	.11	.23**	1	.02	.25**
Trade-off	-.03	.05	.02	-.03	.02	1	.06
Social influence	-.12	-.05	-.05	.26**	.25**	.06	1
*Asterisks **,* denote statistical significance at the 1% and 5% level respectively*							

Source: author's own computations

A strong positive and statically significant correlation was found between tax compliance and difficulty of evasion, implying that individuals who find the tax system difficult to evade are most likely to be tax compliant. A similar trend was observed between tax morale and fiscal exchange, implying that taxpayers' morale increases with increased access to government services. It is worth noting that this correlation doesn't account for the quality of government services provided. In contrast, we find a negative correlation between tax morale and reasons for tax evasion, which indicates that as taxpayers have more reasons to evade taxes, their willingness to pay taxes decreases. The association was likewise found to be statistically significant. Table 5 presents the correlation between tax compliance and institutional factors.

Table 5. Pearson Correlation (institutional factors)

	Tax compliance	**Level of Corruption**	**Trust in government**	**State of Democracy**	**Linkage**
Tax compliance	1	.08	.03	.14*	.14*
Level of corruption	.08	1	.53**	.19*	-.06
Trust in government	.03	.53**	1	.23**	.022
State of democracy	.14*	.19*	.23**	1	.08
Linkage	.14*	-.06	.02	.08	1
*Asterisks **,* denote statistical significance at the 1% and 5% level respectively*					

Source: author's own computations

A positive and statistically significant association was found between the state of democracy and tax compliance. When taxpayers believe that they have the authority to deliberate and decide legislation as well as to choose governing officials or parties, they are more likely to be tax compliant given that they have vested their trust in the government of the day. Similarly, a positive and statistically significant correlation was established between tax compliance and credit scores. The link between the tax compliance status and credit scores will play a significant role in alleviating information asymmetry and providing credit assessors with a broad variety of factors that determine an individual’s compliant behavior. Nonetheless, the correlation between the level of trust in government and democracy was found to be positive and statistically significant. In a democratic state, individuals have trust in the public officials that they have voted for and would thus believe in their ability to develop and execute public policies.

4.3. Binary Logistic Regression

This subsection discusses findings from the binary logistic model. This includes perceptions on the influence of credit scores in enhancing tax compliance. The results are provided in Table 6. Interestingly, the coefficient for linkage is 51.9%, which suggests that linking the tax compliance status of individual taxpayers with their credit scores is associated with higher probabilities of a tax compliant behavior. Also, the association was found to be statistically significant.

Table 6. Model 1 (demographic factors)

	B	S.E.	Wald	df	Sig.	Exp(B)
Linkage	.52	.31	2.92	1	.09*	1.68
Gender	-.10	.38	.07	1	.79	.91
Level of education	1.1	.43	5.84	1	.02**	2.82
Age	-.24	.28	.76	1	.38	.78
Employment status	.79	.67	1.38	1	.24	2.19
Employment sector	-.57	.37	2.37	1	.12	.56
Constant	-3.12	2.29	1.88	1	.17	.04
Omnibus Tests of Model Coefficients (.063) Hosmer and Lemeshow Test Sig (.830) Asterisks **,* denote statistical significance at the 5% and 10% level respectively						

Source: author’s own computations

As regards demographic factors, the findings indicate that gender, age and the employment sector are negatively associated with higher probabilities of tax compliance although the coefficients were found to be statistically insignificant. In contrast, educational attainment and employment status were found to be positively associated with higher probabilities of tax compliance. Also, the coefficient for educational attainment was found to be statistically significant. This indicates that education positively influences individuals to make rational choices, including filing their returns and settling their tax liabilities. Mascagni and Santoro (2018) have likewise indicated that citizens with better tax education are able to navigate complex tax systems and can avoid overpayment due to intricate reporting requirements. They may be more encouraged to comply voluntarily. The next table presents findings from model 2, which incorporates social and institutional factors.

Table 7. Model 2 (institutional and social factors)

	B	S.E.	Wald	df	Sig.	Exp(B)
Linkage	.58	.34	2.96	1	.09**	1.79
Level of corruption	1.03	1.19	.76	1	.38	2.81
Trust in government	-.20	1.38	.02	1	.89	.81
State of democracy	.89	.47	3.60	1	.06**	2.42
Social influence	-1.15	.48	5.66	1	.01*	.32
Constant	-1.23	1.72	.51	1	.45	.29
Hosmer and Lemeshow Test Sig (.470) Omnibus Tests of Model Coefficients (.056) Asterisks *,** denote statistical significance at the 1% and 10% level respectively						

Source: author's own computation

Social influence was found to be negatively associated with probabilities of higher tax compliance and this association was found to be statistically significant. Social norms influence compliance indirectly through internalization. This finding is in line with Govind and Iyer (2016) who investigated the role of social influence on tax compliance in the United States. Nonetheless, democracy was found to be positively associated with higher probabilities of tax compliance in South Africa. This is because, in a democratic state, citizens believe that they have the authority to deliberate and decide legislation as well as to choose governing officials or parties and as a result, they are more likely to be tax compliant given that they believe in the tax framework developed by the government they voted for.

Table 8. Model 3 (economic factors)

	B	S.E.	Wald	df	Sig.	Exp(B)
Linkage	.55	.33	2.71	1	.10	1.73
Fiscal exchange	-.27	.44	.37	1	.54	.76
Tax morale	.34	.53	.42	1	.52	1.41
Trade-off	-.38	.39	.91	1	.34	.68
Constant	.04	1.71	.01	1	.98	1.04
Omnibus Tests of Model Coefficients (.471) Hosmer and Lemeshow Test Sig (.519)						

Source: author's own computations

Model 3 incorporates economic factors such as fiscal exchange and tax morale. Fiscal exchange and trade-off were found to be negatively associated with higher probabilities of tax compliance while tax morale and linkage, on the contrary, were found to be positively associated with higher probabilities of tax compliance. It is sufficient to note that all the coefficients were statistically insignificant and as such, no further discussion can be made. Lastly, the results from Model 4 are provided in table 10 below. The model incorporated other economic factors.

Table 9. Model 4 (economic factors cont.)

	B	S.E.	Wald	df	Sig.	Exp(B)
Linkage	.53	.48	1.21	1	.27	1.69
Reason for evasion	.36	.27	1.75	1	.19	1.43
Difficulty of evasion	3.26	.56	34.59	1	.00*	26.10
Constant	-16.44	3.41	23.35	1	.00*	.00
Omnibus Tests of Model Coefficients (.000) Hosmer and Lemeshow Test Sig (.000) Asterisk * denote statistical significance at the 1% level						

Source: author's own computations

While reasons for evading taxes were found to be positively associated with higher probabilities of a tax compliant behavior, the association was found to be statistically insignificant. In addition, the findings from model 4 revealed that the level of difficulty in evading taxes is positively associated with higher probabilities of a tax complaint attitude and this association was found to be statistically significant. This implies that as taxpayers find it difficult to evade taxes, they become more tax compliant.

5. Conclusion

This study was aimed at estimating taxpayers' perceptions towards credit scores and the extent to which credit scores can enhance tax compliance in South Africa. The empirical strategy of the study was largely influenced by the theoretical framework. The study was quantitative in nature, having utilized statistical analysis. The findings from the binary logistic model have revealed that educational attainment, state of democracy and difficulty of evasion are positively associated with higher probabilities of a tax compliant attitude in South Africa. In contrast, social influence was found to be negatively associated with probabilities of a higher tax compliant attitude. The findings have further revealed that linking the tax compliance status of individual taxpayers with their credit scores is positively associated with higher probabilities of a tax compliant behavior. Given these findings, the study recommends a revision of the current credit score framework to include the tax compliance status of taxpayers as this would induce a tax compliant behavior in South Africa by penalizing the credit record of non-tax compliant individuals. In order to improve their credit scores, taxpayers would ensure that they are tax compliant at all times by constantly submitting their tax returns and settling outstanding amounts.

6. Future research

Researchers may replicate the study in other countries given that the interrelations between credit scores and tax compliance have only been tested in South Africa to date. Researchers may also explore other methods and research instruments in line with the economic and institutional fundamentals of their countries.

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EDUCATION AND TRAINING: AN IMPERATIVE FOR ENTREPRENEURIAL SUCCESS FOR WOMEN

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Abstract: *This study has analyzed education and training as an imperative for entrepreneurial success for women in Edo State, Nigeria. The major aim of the study was to examine if education and training of women entrepreneurs determined success in their business. The research design by which data was collected from a selected sample of respondents was an exploratory survey that employed the use of a questionnaire. A purposive sampling technique was adopted for the study to obtain a sample size of 384 women entrepreneurs operating across the three senatorial districts in Edo State. Data analysis was done with the use of descriptive and inferential statistics through frequency distribution tables and regression analysis. Our findings have shown that education and training played significant roles in supporting women in SME's. The higher the level of education and training in business, the more chances of recording success in their business endeavor. Thus, this study has recommended that stakeholders such as the government, academia, and the private sector need to assist women in business through policies, entrepreneurial academic and industry programs and support through sponsorship to acquire the relevant education and training in order to succeed in their various businesses.*

Keywords: women, education, training, entrepreneurship, development, business

JEL classification: M1, M13, M130.

1. Introduction

Inadequate business skills and an imperfect or non-existent business plan make it complicated for many women to attract investors, obtain finance and get the necessary resources to run an enterprise. Generally, the majority of business enterprises are in an early phase of development and a lot of them do not even have a complete developed model which, at an early stage, makes it difficult for sponsors to invest in their business (Ambepitiya, 2016; Bawa, et al, 2017). Women business owners may not be at an advantage in their bid to get various entrepreneurial financial supports due to certain factors and limitations such as personal backgrounds, business experiences and the cultural and socio-economic background in which their businesses operate (Yahya, Bala, and Girei, 2022). In Nigeria, most women entrepreneurs are often underestimated, overlooked and hindered due to economic and socio-cultural barriers. Adequate education and training in

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areas of entrepreneurship can increase the opportunity in starting and managing successful enterprises. This opportunity can help minimize these barriers (Tende, 2016).
Education and training for the entrepreneurial woman requires training that involves developing entrepreneurial skills and converting accessible resources into business opportunities in emerging economies such as Nigeria particularly at and from the local levels (Odia and Odia, 2013; Hammawa and Hashim, 2016). Women who naturally have the ability to conceive, nurture, organize and manage, need the necessary education and training in business in order to succeed and in turn contribute to the economic wellbeing of themselves, their immediate community and the nation at large. Having these capabilities are important for establishing a business by this category of women entrepreneurs (Hussain, Bhuiyan and Bakar, 2014). However, negotiating styles of women entrepreneurs have been shown to be different and it has been established that these are considerably more beneficial to business success in the long run. The performance of organizations formed and managed by women fare better because of their capacity to communicate with employees, suppliers and customers due to the unique qualities of their gender as women, namely empathy, domestic and social abilities (Tende 2016; Orser and Elliot, 2020).
Challenges in managerial skills and professional strengths in dealing with people and generating ideas are usually experienced by less educated women entrepreneurs. In addition, these women entrepreneurs may experience financial or human capital constraints which limit their success in their chosen businesses (Oguntimehin and Nwosu, 2014). According to a number of studies, the rise in women's participation in entrepreneurial activities is mostly due to economic pressure and awareness occasioned by increase in their levels of education. These reasons together with existing challenges make it possible for women entrepreneurs to venture into various entrepreneurial activities that generate socio-economic opportunities and freedom (Ebhote, 2015; International Labour Organisation, 2015; Yahya, et al, 2022). Subsequently, this study is guided by the following research question: Do education and training of women entrepreneurs improve success in their businesses?

Objective of the study
The main objective of this study was to examine the importance of education and training as an imperative for entrepreneurial success for women in Edo State, Nigeria.

Hypotheses of the study
The hypotheses formulated for this study are stated in the null form, namely:

> *H_{01}: Education and training does not significantly affect women entrepreneurs' success in business.*
> *H_{02}: Demographic attributes do not significantly influence women entrepreneurs' success in business.*

2. Literature Review

2.1 Theoretical framework: Human Capital Theory
Human Capital Theory primarily developed by Gary Becker and Theodore Schultz in the 1950s/1960s states that individuals are capable of improving their capacity to be more productive through the acquisition of education and training in various skills (Ross, 2021). This assertion focuses mainly on human resources in creating value through economic development which can be an advantage of operating sufficiently in society (Adelakun, 2011). Human capital encompasses education, technical skills, experience, problem-solving skills, communication skills, creativity and personal resilience (Ross, 2021). This theory argues that, the higher the number of educated and skilled workers, the easier it is for an

organization to adopt and use new technologies thereby regaining investments made in acquiring education and training. This theory states the way education allows the advancement in productivity and efficiency of workers is by increasing the level of their cognitive skills. Hence the precondition of acquiring education is advised as an imperative investment in human capital (Adelakun, 2011). This theory provides a foundation and theoretical background for education and training as a criterion variable in this study.

2.2 Education and training for entrepreneurial success

Entrepreneurship education was initiated in the developed Western societies as early as 1947 and it picked up as a fast-growing discipline in tertiary institutions. A few varying preliminary courses were offered in the curriculum of universities in the United Kingdom and the United States of America among others. Its inclusion in tertiary education curriculum of advanced countries arose from the need to drive innovation and train students to become graduates with the necessary skills and knowledge to start and manage business enterprises (Yahya, et al, 2022). In Nigeria, entrepreneurship education was introduced during the middle of the 1980's when the economy was at its lowest ebb due to volatility and irregularities in the political sphere and in the socio-economic policies of consecutive governments during that period (Odia and Odia, 2013). The negative effect these circumstances had on youths' and graduates' economic engagements brought about the need to institute entrepreneurship education in universities in order to produce individuals that would be self-reliant and hence reduce unemployment and poverty. Thus, graduates from tertiary institutions received the relevant business skills through adequate entrepreneurial training and education (Bawa, et al, 2017).

Education and training involve providing suitable knowledge and skills for entrepreneurs before setting up their business enterprises; at the start of their entrepreneurial venture and in cases of business change or challenges with the assurance of attaining success in business. The entrepreneurial know-how and skills are usually provided by government agencies and institutions such as the Entrepreneurship Development Centre (EDC), academic institutions through entrepreneurial courses and degrees and Non-Governmental Organizations (NGOs). On such example is the Tony Elumelu Foundation (TEF) for entrepreneurship founded in 2010 that provides programs, sponsorship and networks to empower women and men across the continent (Odia and Odia, 2013; Sharma, 2013; Tony Elumelu Foundation (TEF), 2022).

2.3 Entrepreneurship for women

The ability to enable an initiative towards self-reliance and a practical means that seriously helps in reducing employment problems through the gaining of skills and training capacities is the core aspect of entrepreneurship (Bruin, Brush and Welter, 2007; Alstete, 2008). The exploitation of opportunities to create value and generate wealth is the fundamental feature of entrepreneurship (Akinola, 2013). An entrepreneurial individual or enterprise constantly engages in innovation, improvement in products and services, and reevaluation of its fields of operation through high and calculated risks. These risks encompass the entrepreneur's equity, time and/or career commitment (Che-Ha and Mohd-Said, 2012; Eriki and Asemota, 2017). Entrepreneurship is often a challenging venture as a high number of novel enterprises irrespective of size become unsuccessful. Activities under entrepreneurship are considerably diverse depending on the sort of business that is being started. Entrepreneurial ventures vary in size from single-person projects to partnerships in a bid to create various job opportunities, solve a community need and ultimately make profit (Orser and Elliot, 2020).

The growth of the economies of many nations is as a consequence of the growing involvement of women in entrepreneurial activities (Odebrecht, 2013). The guidance and counselling extended to women, especially in rural areas, to realize and apply their unexploited entrepreneurial abilities by providing skills, knowledge, training and sensitizing them to the socio-economic standing in society is the resultant effect. Thus, the ability to take on challenges and ventures and the determination to become economically independent can transform a woman into an entrepreneur (Ali and Ali, 2013; Chepurenko, 2015). Apart from this, successful entrepreneurship provides employment for other women and solves the problems of women in rural communities; it is also able to enhance the leadership qualities of the women entrepreneur (Padmavathi, 2011; Bawa, et al, 2017).

2.4 Entrepreneurship development in Nigeria

During the last six decades, starting with the 1960’s, entrepreneurship development began by the government through its agencies and institutions from programs such as the Entrepreneurship Development Centre (EDC), National Directorate of Employment (NDE), National Youth Service Corps (NYSC), Small and Medium Enterprise Development Association of Nigeria (SMEDAN), Centre of Management Development (CMD), National Economic Empowerment Development Strategy (NEEDS), National Open Apprenticeship Scheme (NOAS), Small and Medium Enterprises Equity Investment Scheme (SMEEIS) and so on. The Small and Medium Industries Development Act 2003 established SMEDAN to stimulate the development of the Micro, Small and Medium Enterprises (MSMEs) sector of the Nigerian economy and their access to resources necessary for growth, training and development. SMEDAN, just like the other institutions mentioned above, initiated programs for entrepreneurship development and skills acquisition in Nigeria (Odia and Odia, 2013; Mosuro, 2017). Secondly, SMEEIS is an initiative of the Nigerian banking industry set up to support the Federal Government’s efforts towards encouraging economic growth, evolving indigenous technology, and creating employment through suitable entrepreneurial development policies (Iyiola and Azuh, 2014). The National Directorate of Employment (NDE) established in 1986 provides training and financial support to young unemployed individuals and retired people in vocational skills, agricultural employment programs, the small-scale industries and the graduate employment scheme (Odia and Odia, 2013). These institutions, through their various processes, have the similar efforts through their programs to stimulate entrepreneurship skills and reduce the rate of unemployment and poverty. However, in recent times, it is more pertinent to acquire the needed education and training in entrepreneurship considering the low availability of white-collar jobs, increased economic challenges and stagnation in major infrastructure development, such as electricity needed to run businesses (Hasan, et al, 2017). In the academic sphere, the development of entrepreneurship education and its consequent addition as a course into many universities’ curricula, have been linked to the overall need to aid the innovative requirement of enterprises and to produce graduates with transferable skills for businesses (Yahya, et al, 2022).

2.5 Demographics and women entrepreneurship

In exploring education and training as a significant cause, the demographic variables of age, education, ethnicity, marital status, and religion are considered in this study.
Age: the profile and various age groups provide a measure to examine the frequency of this study’s sample of businesswomen. The chances of getting into entrepreneurial ventures are different for the various age groups (Padmavathi, 2011).
Education: education comprises quality education that helps strengthen the capabilities and business skills acquired by women entrepreneurs in managing their businesses (Ezeibe, et al, 2013). Quality education decreases the high number of women with low levels in the use of technology (Iyiola and Azuh, 2014).
Ethnicity: ethnicity involves women in small and medium scale businesses from different ethnic backgrounds as observed nationally and internationally (Hammawa and Hashim, 2016).

Marital status: the different groups of the marital status of women entrepreneurs consist of being single (unmarried), married, divorced, or widowed.
Religion: religion such as Christianity, Islam, and others as practiced in many parts of the world point out the degree to which women engage in economic activities that grants them an entrepreneurial advantage (Chinonye, et al, 2015).

2.6 Empirical review

Research works related to this study have examined the issues concerning the education and training of women in businesses for entrepreneurial success. These researches have underscored the importance of gaining relevant entrepreneurial education and training to manage a chosen business enterprise. Some of the studies have taken on a theoretical approach while others, using primary data, have carried out quantitative and qualitative research techniques. Findings from researchers such as Bushell (2008); Ezeigbe, et al (2013); Okoye (2013); Oguntimehin and Nwosu (2014); Chinonye, et al (2015); Shah and Saurabh (2015); Tende (2016); Orser and Elliot (2020); and Yahya, et al (2022) have shown that women empowerment involved acquiring and strengthening their skills and capabilities through quality education and training in entrepreneurship. The findings have revealed that differences in educational backgrounds and entrepreneurial skills acquisition have shown differences in entrepreneurial activities. These entrepreneurial activities have however added to the economic growth of their societies in terms of innovation, creation of employment/reduction in unemployment and poverty alleviation.
These studies have recommended business and management training as possible ways to encourage entrepreneurial development for women.

3. Methodology

This study was carried out in Edo State, Nigeria across the three Senatorial Districts (S.Ds). The research design was comprised of an exploratory survey on a population of 3853 women who own and operate small and medium scale enterprises (Businesslist, 2022). The research instrument used in obtaining information from the selection of women entrepreneurs was a questionnaire. In selecting from each of the three senatorial districts, simple random sampling was used in picking four local government areas. Thereafter, stratified sampling technique was used in determining the 32 respondents who were selected from each of the 12 randomly selected local government areas (see Table 1). A situation whereby the over-all population is characterized as women in SMEs, this form of sampling is stratified (Osaze and Izedonmi, 2008). For that reason, the population of women was a main element of the research. Furthermore, in choosing a sample of 384 women entrepreneurs a purposive sampling technique was employed. This technique was considered in order to let the researcher choose the respondents who can offer the best information to achieve the study’s purpose.

Table 1: Purposively selected women entrepreneurs in Edo State

S/N	Senatorial districts (S.D.s) and Local Government Areas (L.G.A.s)	Simple randomly selected L.G.A.s	Number of L.G.A.s per S.D.s	Purposively selected women entrepreneurs/ L.G.A.s	Total no. per S.D.s
1.	Edo North: Akoko-Edo, Etsako East, Etsako Central, Etsako West, Owan East, Owan West	Etsako Central Akoko-Edo Owan East Etsako East	4	32 32 32 32	128
2.	Edo Central**:** Esan central, Esan North-East, Esan South-East, Esan West, Igueben	Igueben Esan South-East Esan Central Esan West	4	32 32 32 32	128
3.	Edo South: Oredo, Orhionmwon, Ovia North-East, Ovia South-West, Egor, Uhunmwode, Ikpoba Okha	Oredo Egor Orhionmwon Ikpoba-Okha	4	32 32 32 32	128
Total			12		384

Source: authors' own computations

Consequently, Cochran's (1977) formula for sample size determination was used in calculating the sample size for the quantitative study.

$N = Z^2 p (1 – p)/E^2$

Where, N = sample population; Z^2 = statistical level of confidence (1.96^2); p = expected prevalence (0.50); 1 = constant; E^2 = marginal error (0.05^2)

$$N = 1.96^2 \frac{(0.50)(1-0.50)}{0.05^2}$$

$$= 3.8416 \frac{[(0.50)(1-0.50)]}{0.0025}$$

$$= 384.16$$

Therefore, 384 was the number of research respondents and sample size for the study.
Data analysis and interpretation were carried out by using descriptive-analytical tools such as simple percentages and frequency distribution tables. To ascertain the role of education and training on entrepreneurship for women operating in SMEs, the hypotheses were tested by means of multiple regression analysis. The decision rule for the hypotheses is balanced on a probability (p) value of 0.05, such that if the p-value is less than 0.05 the null hypothesis is rejected; or else, it is accepted. The research instrument was a five-point Likert scale; interpreted to the three levels of high, moderate, and low. High ranged from 2.68 – 5.00; moderate ranged from 2.34 – 2.67; and low ranged from 1 – 2.33. This study highlighted education and training as a combined factor which affects the developmental success of women entrepreneurs in their businesses.

4. Data Presentation and Analysis of Results

The objective of this study is to examine the importance of education and training as an imperative for entrepreneurial success for women in Edo State, Nigeria. This study was guided by the research question: Do education and training of women entrepreneurs in small and medium enterprises in Edo State improve success in their businesses? Hence, the hypotheses formulated for this study stated in the null form are,

H_{01}: Education and training does not significantly affect women entrepreneurs' business success.

H_{02}: Demographic attributes do not significantly influence women entrepreneurs' business success.

Data was presented showing the important levels of academic attainment of respondents as shown in Table 2 below:

Table 2: Level of Education of Respondents

Level of Education	Frequency	Percentage
Primary	23	6.4
Secondary	84	23.5
Tertiary	251	70.1
Total	358	100.0

Source: authors' own computations

With reference to Table 2 above, the highest level of education of respondents showed that 251 respondents representing 70.1% had obtained some form of tertiary education, while 23.5% which consisted of 84 respondents of this study's population had attended secondary school. The results further revealed that 23 respondents constituting 6.4% had acquired basic primary education. Hence, the results revealed that most of the respondents were women entrepreneurs who had acquired high academic qualifications in formal education. On the other hand, the lowest number of 23 respondents at a rate of 6.4% only had primary school education.

To examine if education and training of women entrepreneurs determines developmental success in their businesses and the resultant percentage, respondents were required to point out their views regarding business skills, training, academic qualifications and experience. The research question was answered using the available data and was analyzed using mean (ẍ), standard deviation, and a weighting scale of high, moderate, and low. The result is presented in Table 3 below:

Table 3: Analysis of Education and Training of Women Entrepreneurs in Small and Medium Scale Enterprises from Respondents

SN	Items on Education and Training	Mean	Std. Deviation	Decision
1	Ability to acquire training and education to improve on business	2.11	1.02	Low
2	Academic qualification provides an advantage for business management	2.12	1.12	Low
3	Amount of knowledge acquired is useful to type of business	2.07	0.98	Low
4	Create skilled efforts to improve on businesses	1.81	0.81	Low
5	Satisfied with the overall condition of business	2.40	1.20	Moderate
6	Possess the necessary skills and experience to better manage finances	1.91	0.90	Low
7	Ability to attract qualified employees as an acquired skill of a businesswoman	2.11	0.95	Low
8	Fears in making wrong business decisions	2.61	1.23	Moderate
9	Educated and enlightened women entrepreneurs attract and retain good business partners	1.68	0.78	Low

Source: authors' own computations

The result from Table 3 showed has shown the mean rating to which education and training of women entrepreneurs affect their success in business. It indicated at a low rating that 'educated and enlightened women entrepreneurs attract and retain good business partners at 1.68 out of 5. Other factors such as the ability to create skilled efforts to improve on businesses, possess the necessary skills and experience to better manage finances and amount of knowledge acquired is useful to the type of business were also rated low with mean values of 1.81, 1.91, and 2.07 respectively. In addition, ability to acquire training and education to improve on business, ability to attract qualified employees as an acquired skill of a businesswoman, and academic qualification provides advantage for business management had mean values of 2.11, 2.11, and 2.12 respectively. Being satisfied with the overall condition of the business (2.40); fears in making wrong business decision (2.61) were moderate to the extent by which education and training of women entrepreneurs in small and medium scale enterprises affect improvement in their businesses.

Table 4: Regression Analysis of the Roles of Education and Training of Women Entrepreneurs in SMEs using Demographic Variables

Variable	Coefficient	Std. Error	t	p-value
Age	0.208	0.279	0.747	0.455
Education	-3.372	0.420	-8.030	0.000
Ethnicity	0.232	0.122	1.893	0.059
Marital Status	0.124	0.316	0.393	0.695
Religion	0.008	0.529	0.015	0.988
Constant	26.107	1.607	16.214	0.000

Dependent variable: women business success
Note: R^2 = 0.181; Adjusted R^2 = 0.169; F = 15.54; and $p < 0.001$
Source: Researcher's Field Work

Table 4 has presented the results of the roles of education and training on women in SMEs. The model revealed that education and training played significant roles in supporting women in SMEs ($F = 15.540$; $p < 0.001$). The table has also revealed that the women's educational level was significant ($\beta = -3.372$; $t = -4.911$; $p < 0.001$), while age, ethnicity, marital status and religion were not significant ($p > 0.05$). It implied that education played a significant role in women's business success. The adjusted R^2 of 0.169 has shown that education and training accounted for the 16.9% variances in supporting women in SMEs. The effect was reasonably moderate. Thus, the overall model has implied that the factor of education and training significantly played a role in supporting women in SMEs.

5. Discussion

This study's main objective was to examine if education and training of women entrepreneurs in SMEs in Edo State, Nigeria improve their businesses and hence success in their businesses. The research findings begin by indicating that majority of respondents, 251 had acquired some form of tertiary education. This shows a relatively high level of education among the women entrepreneurs. Demographic variables were also considered for instance age, education, ethnicity, marital status, and religion. In terms of the regression analysis, findings show that education and training played significant roles in supporting women in SMEs ($F = 15,540$; $p < 0.001$). The adjusted R^2 of 0.169 showed that education and training accounted for 16.9% variances in supporting these women entrepreneurs; that was relatively a moderate effect. Hence, obtaining the necessary education and training is of significance to the enterprise of women in SMEs. In addition, our findings have revealed that the age, ethnicity, marital status, and religion of these women entrepreneurs did not affect their success in business hence irrespective of demographics, education and training showed to be important for business success.

Indices on education and training were mostly low on all extents with the least mean value of 1.68 regarding "educated and enlightened women entrepreneurs to attract and retain good business partners" which did not support the assertion by Tende (2016) that managerial skills and qualifications in dealing with people and creating ideas are typically experienced by less educated women in business. However, a mean rating above the benchmark of 2.34 concerning the respondents being satisfied with the overall condition of their business show a value of 2.40 which supports the claim by Orser and Elliott (2020) that the performance of enterprises formed and managed by women fare better because of their capacity to communicate with employees, suppliers and customers due to the unique qualities of their gender as women in social ability and empathy.

Negotiating styles of women entrepreneurs have been shown to be different and it has been established that these are considerably more beneficial to business success in the long run (Yahya, et al, 2022). Furthermore, according to this study's findings, fears in making wrong business decisions on their part show an above average value of 2.61. Majority of the indicators show a low importance of training, education, and academic qualifications. These findings show that education is important but the required training in business skills is imperative for operating an enterprise. These showed low amount of knowledge acquired is useful to the type of business, ability to attract qualified employees as an acquired skill or a businesswoman and that academic qualification provides an advantage for business management. However, having the capabilities of education and training are important for establishing a business by this category of women entrepreneurs.

6. Conclusion

In conclusion, findings from this study highlights that being educated and trained in the relevant business skill(s) is important for potential and existing women entrepreneurs who own and operate various business enterprises. The higher the level of education and training the better they are at knowing how to attract prospective investors, manage their capital, assets, customers, and the entire business operation. Furthermore, the acquisition of relevant education and training in business by women entrepreneurs irrespective to the demographic variables of these women in business, allows for productivity, efficiency and hence business success. Thus, with regards to future perspectives, investment in human capital in terms of acquiring the needed education and training is an imperative for the entrepreneurial success of women in business.

7. Recommendations

The recommendations below are as a result of this study's findings:

- Stakeholders in government, private sector and academia need to create policies and programs that would assist new and existing female businesswomen to acquire the relevant education and training in business skills in order to set up and run successful enterprises respectively. In turn, women, their families, communities and their nation can benefit economically and thrive better.
- Women in business need to acquire the relevant academic training in their desired area of business in order to be adequately educated and trained to know how to manage capital for business, customers, investors and the entire business operation.
- Government needs to create and implement gender-sensitive policies and programs to support women's enterprise and the growth of women-owned enterprises in institutions of education and training.
- Academia and researchers especially in fast growing economies globally need to replicate the analysis, interpretations and comparability of the results of this study in order to escalate the importance of education and training for women in business.
- Further research can be carried out on a comparative study of the challenges faced by female entrepreneurs as against male entrepreneurs in terms of education and training for business success.

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ANALYSING THE IMPACT OF FISCAL POLICY ON UNEMPLOYMENT IN NIGERIA

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Abstract: *Fiscal policy has been a tool for economic stabilisation in developing economies for decades. Ever since the Great Depression, fiscal policy has been in the frontline of policy actions. This study investigates the impact of fiscal policy tools on unemployment rate in Nigeria between 1991 and 2021 using the autoregressive distributed lag model. The study has found the presence of cointegration among the variables. Additionally, taxation was found in the long-run to have no impact on unemployment rate while government spending in the long-run worsens unemployment largely due to unproductive and wasteful spending. In the short run, both taxation and government spending worsen the unemployment situation in Nigeria. It, therefore, indicates that the tax system in Nigeria may not be very effective over time. It is thus recommended that the government should consider cutting down expenses and accomplish an expenditure switch from more recurrent spending to more capital and infrastructural spending which will encourage job creation. Furthermore, the government should consider selective taxation on those lucrative sectors with less job-creation capacity in order to give to those sectors with more job creation potential. Additionally, taxation should be logically applied to imported goods to discourage consumption whilst encouraging local production and incentivising local producers through fiscal policy.*

Keywords: fiscal policy, unemployment, taxation, government spending, Nigeria.

JEL classification: H2, H5, J6.

1. Introduction

1.1 Background and Problem Statement

The macroeconomic aim of every country is the achievement of a three-pronged goal - reduction of unemployment, maintenance of general price stability and maintenance of a steady rate of growth (Saad and Ahmad, 2019). The fiscal policy is a way to achieve these goals. It could either be expansionary, when aimed at increasing the available liquidity and individual purchasing power, or contractionary, when it is aimed at reducing the level of credit available in the economy (Unal, 2015).
Abdon et al. (2014) has stressed that in the short-run, counter-cyclical fiscal expansion could improve aggregate output and economic growth during cyclical economic slumps. Meanwhile, fiscal contraction has a cooling-down effect on an economy with an unsustainable growth pace and as such, is exposed to overheating. More so, this implies that the use of fiscal policy has consequences for the rate of unemployment in the medium and long-run.
As an economic stabilisation tool, fiscal policy has spawned a number of economic discussions on issues bordering around its application, applicability and relevance to

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particular macroeconomic situations (Omran and Bilan, 2020). A major debate exists as to the manner in which the fiscal policy mechanism affects the labour market and the economy at large. On one end, the New-Classical Real Business Cycle proponents posit that increase in government spending and tax cut encourages investment and discourages private consumption (Baxster and King, 1993). While on the other end, the IS-LM theorists argue that a positive shock to state spending supports consumption and wages (Omran and Bilan, 2020). These variations in investment, real wages and private consumption have been identified as some of the key determinants of economic growth and unemployment rates (Abubakar, 2016; Obayori, 2016; Selase, 2019).

The employment of taxation to influence the rate of unemployment has been a strategy adopted by even the most developed countries of the world. For instance, to reduce the United States of America (USA) unemployment rate during the 2008-2009 financial crisis that resulted in a rise in global unemployment rate, the USA government passed an $830 million expansionary policy in early 2009 involving cuts in taxes and increased government spending, which resulted in the subsequent decline of the unemployment rate. Likewise, the United Kingdom (UK), during the same period, cut the Value Added Tax (VAT) and increased government spending in a bid to curtail the rising rates of unemployment in the country (Peter et al., 2021).

Observing the modern-day Nigeria and its fiscal space, it is discernible that there have been various tax reforms, including the recent reform in 2020. It is clear that the Federal Government of Nigeria (FGN) has increased its efforts towards improving revenues generated from tax sources. For instance, VAT was increased from 5% to 7.5% in February 2020 Federal Inland Revenue Services (FIRS, 2020). In addition, in November 2020 a progressive Company Income Tax (CIT) was introduced.

Also noteworthy is that the Nigerian government has made significant efforts at improving employment in Nigeria. This is evident from the creation of the National Directorate for Employment (NDE) in 1986, which was aimed at reducing unemployment in the country by creating jobs for youths. Other efforts include the Agricultural Development Programme, PAP, SURE, YOUWIN, NAPEP among others (Obayori, 2016). More recently, the FGN launched the N-power scheme which to date has provided over 500,000 Nigerian youths with two years of employment with support for self-employment afterwards (Ikechukwu et al., 2021). Despite these efforts, the unemployment rate in Nigeria continues to increase. As of 2018, the combined unemployment rate for Nigeria was at 30%. With the worsening situation caused by the COVID-19 crisis, more people were expected to become unemployed by the end of 2022 with the projected unemployment rate at about 32% (Federal Ministry of Youth and Sports Development, 2021).

Rising unemployment has impacted the socioeconomic space in Nigeria. It impedes economic progress in many ways ranging from economic waste of productive resources to political and social unrest perpetrated by restive youths (Obayori, 2016). The unemployment situation in Nigeria, according to Obumneke (2012) is a call for concern as the economy is unable to absorb the teeming/overflowing labour force. This has continually contributed to the upsurge in crimes, violence, vandalism and other social vices witnessed in every part of the country today. This is in spite of the ever-rising government expenditure which accounted for 11.9% of GDP in 2018, 12% of GDP in 2019, 11.9% of GDP in 2020 and recently, 13% of GDP in 2021 (World Bank, 2022). Despite this continuous increase, however, little improvement has been made in terms of infrastructural development like quality of transportation, communications, and power, and this has reduced the attractiveness of the economy to investment both from within and outside the country (Ebuh et al., 2019). Due to the decadent state of infrastructure in the country, foreign direct investment (FDI) inflow to Nigeria has declined over time. Net FDI inflow as a percentage of GDP was 1.09%, 1.64%, 1.66% and 0.55% for the years 1990, 2000, 2010 and 2020 respectively (World Bank, 2022).

This implies that, despite high rates of expenditure along with new tax measures being levied, the efforts have yet to yield considerable returns as regards the reduction of unemployment rates. This could be due to the component of public spending, in which about 86% of the total spending goes to recurrent spending such as overhead costs, administrative cost and debt servicing, leaving only a meagre part for infrastructural development, as according to the Central Bank of Nigeria (CBN, 2022). Consequentially, this leads to capital flight as many producers move their factories elsewhere due to high cost of production and this inevitably creates job losses for the teeming labour force (Ibrahim, 2016). More so, the high import rate has led to the debilitating state of the industrial sector, which suffers from low-capacity utilisation as increase in aggregate demand through the ever-rising consumption does not translate into increase in local production. Hence, a thorough re-examination of the effects of fiscal policy on unemployment in Nigeria becomes necessary.

Previous studies have used a mix of fiscal policy instruments across different time periods and different results have surfaced. For instance, Ikechukwu et al. (2021) have found insignificant relationship between fiscal policy and unemployment in Nigeria while Onwuka (2021) has found that expansionary or contractionary fiscal policy may reduce unemployment rate depending on the instruments applied. This study is however different from others in that it considers the transmission mechanism involved in the effect of fiscal policy tools on unemployment rate in Nigeria.

1.2 Objective of the Study

The main objective of this study is to analyse the impact of fiscal policy on unemployment in Nigeria, the specific objectives are:

i. To analyse the impact of government spending on unemployment in Nigeria.
ii. To analyse the impact of taxation on unemployment in Nigeria.

1.3 Hypothesis

H_{01}: Government expenditure has no significant impact on unemployment in Nigeria.

H_{02}: Taxation has no significant impact on unemployment in Nigeria.

1.4 Structure of the Paper

This paper is structured into five sections as follows: Introduction, which presents the background, objectives and hypothesis; the Literature Review part considers the theoretical underpinning of the study along with the review of relevant related studies; the Methodology part exposes the empirical strategy employed for analysis, describes the model and data used; Results, which presents and discusses the findings; and, Conclusion, which concludes the study with policy recommendations.

2. Literature Review

2.1 Theoretical Framework

The Keynesian theory argues for government intervention for sustainable economic growth through fiscal policy measures. Keynes (1936) has posited that the decline in demand for labour mostly results from low levels of consumption. According to Keynes (1936), government intervention through infrastructural spending reduces cost of production and increases investment attractiveness, which will lead to increase in domestic investment and foreign direct investment, and therefore, more demand for labour. Contrarily, a generous tax regime will encourage more production and employment of labour to increase production. An illustration is given below:

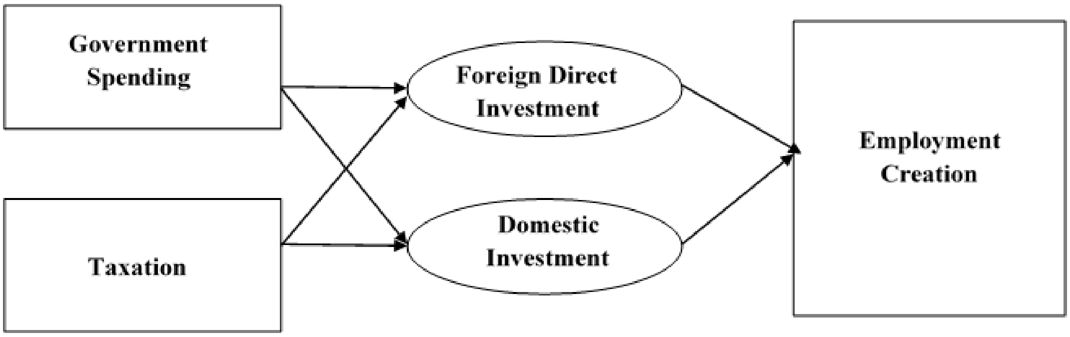

Figure 1: Linkage between Fiscal Policy and Unemployment
Source: Author's own Conceptualisation

Figure 1 depicts the process through which the government's fiscal policy influences employment generation. It can be deduced from the pathway that taxation and public spending pass through investment to create jobs in an economy. Taxes and expenditure applied as expansionary or contractionary fiscal measures could either increase or decrease unemployment. Therefore, job creation through fiscal policy depends on the level of physical investment in the country. The transmission channels are a key aspect of the analysis.

2.2 Empirical Literature

Akeerebari (2022) has applied the Vector Error Correction Model (VECM) to Nigerian data from 1985 to 2020 and has found that government spending and tax have insignificant impact on unemployment. Similarly, Enyoghasim et al. (2022) have studied the Nigerian economy using an Autoregressive Distributed Lag (ARDL) technique and have found that capital expenditure reduces unemployment whereas recurrent expenditure increases unemployment during the 1981 to 2011 period. Similarly, Peter et al. (2021) have analysed data covering the 1994 to 2020 period using the same method for Nigeria and have observed that value added tax increases unemployment rate while corporate tax and customs duties reduce unemployment.

In their study, Ikechukwu et al. (2021) have applied the ARDL technique to Nigerian data covering the 1990 to 2020 time period and have found that taxation, public spending and debt were insignificant determinants of unemployment. Again, by employing a different approach, Onwuka (2021) has made use of Nigerian data covering 1981 to 2020 by using the Vector Autoregressive (VAR) technique and has found that public spending and tax decreases unemployment rate.

Omran and Bilan (2020) have examined the effect of Egyptian fiscal policy on unemployment rate between 1976 and 2018 by using the Structural VAR and impulse response function. The results have revealed that unemployment responds to a shock in taxation negatively in the short-run while it becomes a positive response in the long-run. Meanwhile, unemployment rate responds negatively to expenditure shock throughout the period. Udeze et al. (2020) have investigated the impact of government spending, government revenue, fiscal deficit and public debt on urban unemployment rate in Nigeria. Using time series data spanning from 1981 to 2018, they have applied the Generalised Linear Model (GLM) for analysis. Their results have shown that capital expenditure and revenue have significant negative impact on urban unemployment in Nigeria. Moreover, recurrent expenditure and fiscal deficit insignificantly affect urban unemployment.

Examining annual Jordanian data from 1990 to 2019, Saraireh (2020) has employed the ARDL technique, and the results show that government spending reduces unemployment in the long-run, while in the short-run, it increases unemployment. Onuoha and Agbede (2019) have examined the same relationship for 20 African countries between 2000 and 2017 by using the two-step system General Method of Moments (GMM). The results have showed that defense and health spending increase unemployment whereas education expenditure decreases unemployment. Meanwhile, Alphonsus (2019) has used Nigerian data from 1981 to 2017 to implement the OLS technique in their study. They found that company income tax, personal income tax and customs and excise duty have inverse relationship with unemployment in Nigeria, while value added tax showed positive relationship.

3. Methodology and Data

3.1 Model Specification

Following the Keynesian postulates of the tendency of fiscal policy to affect the rates of unemployment, the model for this study was adopted from Ikechukwu et al. (2021). However, it was further refined to account for the channels through which fiscal policy are perceived to influence unemployment. The linear specification of the model is thus presented as follows:

$$UNE_t = \alpha_0 + \alpha_1\, LogTAX_t + \alpha_2\, LogGEX_t + \alpha_3\, LogDIN_t + \alpha_4\, LogFDI_t + \alpha_5\, LogCON_t + \mu_t \quad (1)$$

Where: *UNE* is unemployment rate; *Tax* is government tax revenue; *GEX* is government spending; *DIN* is domestic investment; *FDI* is foreign direct investment; and *CON* is private consumption expenditure. The data obtained for all variables are of secondary sources and cover the period between 1991 and 2021. Specifically, data for unemployment rate and foreign direct investment were taken from the World Bank (2022) World Development Index while data for government expenditure, tax revenue, domestic investment and domestic consumption has been obtained from the Central Bank of Nigeria (CBN, 2022) Annual Statistical Bulletin.

The model specified in equation (1) is a log-linear model because of the difference in measurement. While unemployment rate is measured in percentages, the other variables are measured in billions of Naira. The basis of this to avoid the problem of multicollinearity and to make the estimates easy to interpret.

3.2 Analysis Technique

The ARDL technique by Pesaran et al. (2001) was used for the analysis. It is preferred to other conventional cointegration methods by Engle and Granger (1987), and Johansen and Juselius (1990) because of its ability to handle data regardless of the order of integration as long as it is below second differencing; ability to perform well with small sample size; and its combination of long-run and short-run relationship in one reduced form model (Ibrahim & David, 2022; Ibrahim et al., 2021; Omoke et al., 2022).

To determine the presence of a long-run relationship after having conducted the test for stationarity, equation (1) was transformed into the following ARDL model:

$$UNE_t = a_0 + \alpha_1 \sum_{i=0}^{n} \Delta UNE_{t-i} + \alpha_2 \sum_{i=0}^{n} \Delta LogTAX_{t-i} + \alpha_3 \sum_{i=0}^{n} \Delta LogGEX_{t-i} + \alpha_4 \sum_{i=0}^{n} \Delta LogDIN_{t-i} + \alpha_5 \sum_{i=0}^{n} \Delta LogFDI_{t-i} + \alpha_6 \sum_{i=0}^{n} \Delta LogCON_{t-i} + \delta_1 LogTAX_{t-1} + \delta_2 LogGEX_{t-1} + \delta_3 LogDIN_{t-1} + \delta_4 LogFDI_{t-1} + \delta_5 LogCON_{t-1} + \mu_t \quad (2)$$

Where α denotes the coefficients of short-run while δ denotes the long-run coefficients. The F-statistic derived from estimating equation (2) is compared with the critical values by Pesaran et al. (2001) to determine the presence of cointegration. Where the F-statistic is greater than the upper bound value at 5%, there is cointegration while if it falls below the lower bound, there is no cointegration. After establishing the presence of cointegration, the long-run and short-run estimates were determined using the following equations:

$$UNE_t = a_0 + \delta_1 LogTAX_{t-1} + \delta_2 LogGEX_{t-1} + \delta_3 LogDIN_{t-1} + \delta_4 LogFDI_{t-1} + \delta_5 LogCON_{t-1} + \mu_t \quad (3)$$

$$\Delta UNE_t = a_0 + \alpha_1 \sum_{i=0}^{n} \Delta UNE_{t-i} + \alpha_2 \sum_{i=0}^{n} \Delta LogTAX_{t-i} + \alpha_3 \sum_{i=0}^{n} \Delta LogGEX_{t-i} + \alpha_4 \sum_{i=0}^{n} \Delta LogDIN_{t-i} + \alpha_5 \sum_{i=0}^{n} \Delta LogFDI_{t-i} + \alpha_6 \sum_{i=0}^{n} \Delta LogCON_{t-i} + \gamma\varepsilon_{t-1} + \mu_t \quad (4)$$

Where equation (3) represents the long-run model, equation (4) represents the short-run model with the error correction component $\gamma\varepsilon_{t-1}$ which shows the speed of adjustment towards long-run equilibrium in the case of any short-term disturbance to the system.

4. Results and Discussion

4.1 Preliminary Analysis

In Table 1, unemployment displays a mean value of 4.87% with a standard deviation of 1.94%. Accordingly, tax revenue, government expenditure, foreign direct investment, domestic investment and private consumption have mean values of ₦1,646.18 billion, ₦3,291.72 billion, ₦3232.39 billion, ₦10,479.25 billion and ₦34,140 billion respectively with foreign direct investment having a higher deviation from the mean. The skewness statistics show that tax revenue and private consumption are negatively skewed while the other variables are positively skewed. The Jarque-Bera statistics show that unemployment, government expenditure, and domestic investment follow a normal distribution pattern.

Table 1. Descriptive Statistics

	UNE	**TAX**	**GEX**	**FDI**	**DIN**	**CON**
Mean	4.87	1646.18	3291.72	3232.39	10479.25	34140.10
Std. Dev.	1.94	1718.65	3297.45	2638.49	13245.30	37593.49
Skewness	1.68	0.99	1.09	0.75	2.17	0.84
Kurtosis	4.10	3.12	3.39	2.32	7.46	2.20
Jarque-Bera	16.19	5.08	6.40	3.47	49.93	4.48
Probability	0.00	0.08	0.04	0.18	0.00	0.11

Source: Author's own computation from E-views 10

From Table 2, the stationarity test results show that following the decision rule of non-stationarity where the test statistic is less than the critical value at 5 percent, consumption is stationary at levels while all other variables are stationary at first difference. The level of integration of the variables are in line with the requirements of the ARDL bounds testing procedure for cointegration.

Table 2. Stationarity Test

Variables	Levels		First Difference		Order of Integration
	Test Statistic	Critical Value	Test Statistic	Critical Value	
UNE	1.25	-2.96	-4.34	-2.97	I(1)
TAX	-2.79	-2.97	-6.92	-2.97	I(1)
GEX	-2.86	-2.99	-7.94	-2.97	I(1)
FDI	-1.73	-2.96	-6.53	-2.97	I(1)
DIN	-1.50	-2.96	-3.61	-2.97	I(1)
CON	-4.26	-2.96	-4.04	-2.97	I(0)

Source: Author's computation from E-views 10

The bounds test result presented in Table 3 shows the ARDL bounds test result. The f-statistic derived from the procedure is 3.82, which is greater than the upper bound critical value of 3.38 at 5%.

Table 3. ARDL Bounds Test

F-statistic	K=4		
3.82	Level of Significance	I(0)	I(1)
	10%	2.08	3.00
	5%	2.39	3.38
	2.5%	2.7	3.73
	1%	3.06	4.15

Source: Author's own computation from E-views 10

Hence, following the decision rule earlier stated, it can be concluded that there is cointegration between unemployment rate and the fiscal policy variables included in the model, as well as the control variables. This sets the ground for the long-run and error-correction estimation.

4.2 Empirical Results and Discussion

Having established the presence of cointegration among the variables, the results of the long-run and short-run estimates are presented in Table 4. Tax revenue in the long-run carries a negatively signed coefficient of -7.52, thus suggesting a negative impact of taxation on unemployment in the long-run. However, it is uncertain what the impact really would be since the relationship is an insignificant one judging from the probability value of 0.46 corresponding to a t-statistic of -0.81. Hence, in the long-run, tax revenue has no significant impact on unemployment rate in Nigeria. This finding supports the findings of Abouelfarag and Qutb (2020) and Nepram (2021). On the other hand, government expenditure (GEX) shows a coefficient of 3.49 with a probability value of 0.04 thus implying that a unit increase in government spending leads to 3.49 percent increase in the long-run unemployment rate.

Table 4. Regression Estimates

Variable	Coefficient	T-statistic	Prob.
C	-55.91	-0.95	0.39
TAX	-7.52	-0.81	0.46
GEX	3.49	2.54	0.04
FDI	-1.18	-3.23	0.03
DIN	-28.86	-2.34	0.05
CON	33.46	0.76	0.49
D(UNE(-1))	1.16	5.29	0.01
D(UNE(-2))	1.01	4.42	0.01
D(TAX)	3.22	4.82	0.01
D(TAX(-1))	1.53	2.95	0.04
D(TAX(-2))	2.35	4.59	0.01
D(GEX)	-0.31	-0.47	0.67
D(GEX(-1))	7.41	6.41	0.00
D(GEX(-2))	1.74	2.30	0.08
D(FDI)	0.52	2.36	0.08
D(FDI(-1))	-3.42	-6.85	0.00
D(FDI(-2))	-3.47	-6.04	0.00
D(DIN)	-3.35	-4.07	0.02
D(DIN(-1))	4.71	5.28	0.01
D(DIN(-2))	3.56	4.98	0.01
D(CON)	-0.36	-0.42	0.69
D(CON(-1))	3.90	4.54	0.01
D(CON(-2))	3.86	5.15	0.01
ECT	-0.39	-7.26	0.00
R-squared		= 0.88	
D-W Stat.		= 1.98	
Prob. Serial Correlation		= 0.09	
Prob. Heteroskedasticity		= 0.50	
Prob. Jarque-Bera		= 0.54	
Prob. Ramsey RESET		= 0.51	

Source: Author's own computation from E-views 10

Foreign direct investment (FDI) and domestic investment (DIN) show long-run coefficients of -1.18 and -28.86 respectively with probability values of 0.03 and 0.05 respectively. This implies that both FDI and private domestic investment have negative impact on unemployment in the long-run. This is in line with the expected relationship where both domestic and foreign investment expand the employment capacity of the economy through expansion of output. Private consumption expenditure on the other hand, has a coefficient of 33.46 with a non-significant probability value of 0.49 which implies that domestic private consumption has no actual impact on unemployment rate in the long-run. This could be true because Nigeria is a net-importer of consumer goods and hence, increase in consumption does not drive an increase in domestic output or unemployment.

In the short-run, unemployment rate in the short-run increases current unemployment. This could happen through the low income of unemployed persons thus reducing active demand and thus, reduction in demand for labour. Furthermore, current tax and lagged taxation in the short-run increase the level of unemployment. This could be because of the unproductive usage of tax revenues, which reduces incomes to firms and individuals and thus, reduces demand for labour. This result aligns with the finding of Godslove and Wobilor (2016) as well as Unal (2015), while it contradicts the findings of Ozoh et al. (2016) and Zirgulis and

Sarapova (2017). Likewise, lagged expenditure in the short-run has a positive impact on unemployment rate, meaning that increase in government spending causes increase in unemployment rate. The spending priorities of the Nigerian government over time has been more of recurrent rather than capital, hence, is only marginally productive. There is also the issue of high rate of corruption which leads to syphoning funds expended by the government for infrastructural purposes, which is supposed to attract investment, boost production and increase employment. This is similar to Abouelfarag and Qutb (2020) and Nepram et al. (2021) but contradicts Bilan (2020) who found a negative impact.

Also from Table 4, lagged FDI and current period domestic investment reduces unemployment rates. This is expected because the increase in FDI complements domestic investment and boosts production. However, lagged domestic investment appears to exhibit a positive impact on unemployment possibly due to the large-scale investment done in the easy money sectors such as the oil sector, which employs only a fraction of the labour force but happens to be a very lucrative sector. Additionally, private domestic consumption has a positive short-run impact on unemployment rate like in the long-run. This is due to the consumption nature of the economy. Rather than have an expansion of domestic production, the high private consumption expands the outputs of other countries from which goods are imported.

Again, the adjustment coefficient of the model is -0.39 with a probability value of 0.00 and a corresponding t-statistic on 1.98, which implies that it satisfies the dual conditions of negative coefficient and significance. By the coefficient size, shocks to the system which lead to a disruption are adjusted towards long-run equilibrium at a speed of 39%. This is a good fit for error correction considering the nature of the Nigerian economy and the relatively inadequacy of fiscal policy measures. The coefficient of multiple determination (R-squared) value of 0.88 shows that up to 88% of the variations in unemployment are determined by fiscal policy measures and the control variables included in the model. Moreover, the model diagnostic tests of heteroscedasticity, autocorrelation, and normality of residuals all show that the model is adequate and does not violate the classical assumptions. Additionally, the plots in Figure 2 confirm the stability of the model over time.

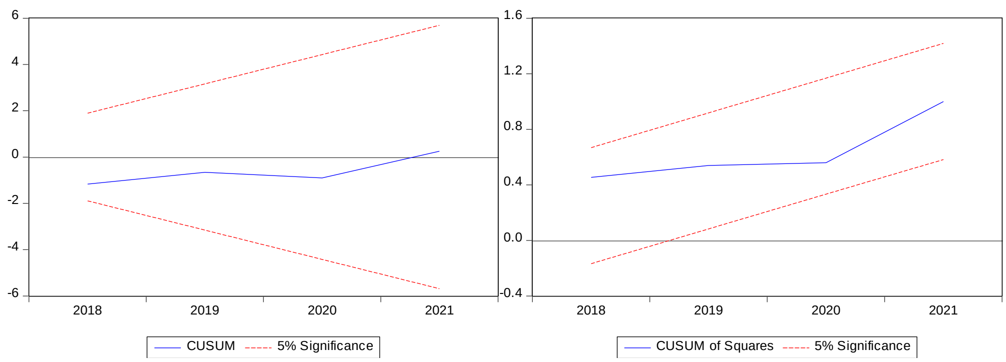

Figure 2: CUSUM and CUSUM of Squares Plots
Source: Author’s own computation from E-views 10

5. Conclusion

This study has examined the impact of fiscal policy on unemployment rate in Nigeria, with consideration of other control variables, which are perceived channels through which fiscal policy effects are passed unto unemployment rates. Analysis done with ARDL on data from 1991 to 2021 has shown that the efficiency of fiscal policy in controlling inflation depends on the tools used and how it is applied. It thus, is recommended that a combination of taxation

and government spending should be considered in the fight against unemployment. Accordingly, an expenditure switch should be considered to ensure that there is less unproductive expenditure and more productive spending for the government. Meanwhile, selective taxation should be explored, where sectors with lesser job creation capacities could be taxed more than those with more capacities to ensure resource availability.
The findings of this study can be tested using new dataset or Nigeria or other countries, or by applying more efficient techniques that are superior to the techniques employed in this research. Similar results are expected to be obtained for countries that are similar to Nigeria. This study has faced some limitations in terms of little scope of unemployment data available, and the unavailability of tax revenue data. This has limited the researcher's freedom to explore a wider aspect of the nexus. It is suggested thus that future studies could attempt the analysis of fiscal policy on unemployment based on demographic categories such as females, youths, among others.

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THE SELF-CARE IN PAYG PENSION SYSTEM OF STUDENTS

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Abstract: *Financial security during retirement years is a burgeoning issue in Europe. The role of self-care is becoming more significant, by the escalating number of people joining pension funds or starting other savings. In the future, the role of these institutions will be even more valued due to demographic changes. The trends are clear: pensions will be a significant issue in the upcoming decades. By contrast, the level of interest exhibited by the youth remains limited regarding pension funds. The research was oriented towards to answer the following question: given the current pension system, what are the attitudes of Hungarian students/young workers aged between 18-25 – who will form the basis of the labor market in the future – towards self-care. Quantitative, questionnaire-based survey research designs were adopted to provide the attitudes, financial awareness and self-care level of students.*

Keywords: pension system, PAYG, self-care, pension funds, retirement.

JEL classification: G53.

1. Introduction

The most critical resource of a country is its citizens (Tomka, 2009). Europe has been a significant world power since the early Middle Ages. At the end of the 16th century, its population was around 61.6 million (Stearns, 2020), it represented 13% of the world's population at that time (Aaron, 2019). This resource was particularly important in times of war as it was a measure of power and military prowess (Bárdos and Féltoronyi, 2012). Today, Europe's role in world politics has declined, and its nation-states are struggling with the ageing of their population. The life expectancy in Hungary between 1900 and 1970 has increased by more than 30 years, from 37.3 years to 69.1 years (Augusztinovics, Gál, Matits, Máté, Simonovits and Stahl 2002). According to the Population Research Institute under the worst-case scenario Hungary's population could fall to as low as 6 million 920 thousand people in 40 years (Kapitány and Rohr, 2013). This will fundamentally challenge the current pension system. It is foreseeable that, in addition to the state system, a more significant role will be given to self-sufficiency and, within this, to voluntary pension funds. The top 12 pension funds currently have 995,000 members and EUR 3.350 million in assets paid by their members. The research was oriented towards to answer the following question: given the current pension system, what are the attitudes of students/young workers aged between 18-25 – who will form the basis of the labor market in the future – towards self-care?

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2. Literature review

The negative impact of an aging population is currently difficult to perceive in welfare societies. However, over the long run, it will emerge, and by that point, the financing of the health and pension systems will become challenging. The development of the Hungarian pension system goes back a long time: it is not well known, but even in the time of Maria Theresa, there was already a rudimentary pension (Kozári, 2012). In fact, even in the early societies, the protection of the weak, children and the elderly was observed, and social risk communities were forged. Later on, multigenerational households served the same purpose, however, as the state's role in people's lives became more significant, pensions became the primary means of support for the elderly (Harari, 2015).

The current pension system is based on the assumptions of Paul A. Samuelson, i.e. the elderly are dependent on the active working population, and the ongoing contributions cover pension payments (Samuelson, 1958). The pay-as-you-go system can also be observed to be founded on intergenerational care, similar to that observed in traditional societies, and fostering the creation of social risk community (Bozsik and Paczolai, 2007). The greatest weakness of this system is the decline and ageing of the population. It upset the balance if the system and the active labor force are put under too much pressure. Loužek (2007) points out that the balance of the PAYG system depends on the equation:

$$s * w * N = p * D,$$

where:

- s stands for the contribution rate,
- w for the average wage,
- N for the number of workers,
- p is the average pension, and
- D is the number of pensioners.

It is easy to see that population decline affects the two sides of the equation in opposite directions. Therefore, it creates a greater unbalance. This can already be seen in the current data: if in 1970’s five workers contributed to the pension of one retiree, in 30 years' time, two workers will have to do the same (Szabó, 2018). It can be observed that the trends are not pointing in the right direction, and it will become increasingly challenging to cover the payment obligations. We can thus pose the question: Why has the transition to private pension funds not been made yet? Based on Aaron’s (1966) equation:

$$m + g > r,$$

where:

- m is population growth,
- g is the wage growth rate, and
- r is the rate of return on the private pension funds.

Basically, the left side gives the return rate of the PAYG system, so if r is bigger than that, it means that the private pension funds are a better choice. Nevertheless, one of the biggest problems of the current pension system is that it is practically impossible to convert any savings into another form of savings without harming the current pensioners (Slavik 2006). The best solution would be to have multiple pillars, and the transition should be undertaken continuously over a longer period. It is certain that the current pension system and its stakeholders will encounter significant challenges in the near future.

3. The aim of the empirical research

After a review of the relevant literature, a detailed understanding of the issue, and a thorough mapping of the market situation and environment, the design and conduct of the primary research began. The research was conducted using a self-administered, pretested standardized questionnaire based on a written, online survey. As the primary research method, the questionnaire survey has been chosen given that it is one of the best known and most frequently used quantitative research methodologies.
The population is essentially the same as the target group that is the focus of this paper. Therefore, the sample was composed of young people aged 18-25 years. The research aims to understand the target group's mindset, financial awareness, and goals, which will later form the basis for the construction of a marketing plan. Based on this, the following overarching research question was formed:
Given the current pension system, what are the attitudes of young students/workers aged 18-25, who will form the basis of the labor market in the future towards self-sufficiency, what are their pension aspirations and what steps are they taking to achieve these goals?

At the beginning of the research, the following hypotheses have been put forward:

1. Young people aged 18-25 do not believe that the state pension will be enough for their retirement.
2. Young people aged 18-25 currently have no pension savings, but their medium to long-term plans include savings for their retirement.

4. The applied methodology

During the research, the objective was to investigate the research question on a sufficiently large sample, to be able to reproduce the results later, to avoid overgeneralization and to get a clearer picture of the target group's thoughts and behavior, especially of their self-care tendencies.
The survey was conducted online. Respondents only needed an internet connection and a device to navigate through the questions and answer them. The questionnaire survey was anonymous.
The questionnaire consists of three sections: the first section (10 questions) gives an idea of the respondents' financial knowledge. The survey included some questions on general economic literacy, such as retirement age, average income, and others requiring basic economic and mathematical calculations. There are also gaps in the knowledge of respondents in areas that are considered commonplace. In addition to general financial knowledge, more specific areas such as inflation, the difference between the real and nominal value of money or more precise areas related to pensions were also assessed. These revealed respondents' knowledge of the minimum contributions for pension fund membership and the level of contribution support provided by the state.
The second section (10 questions) focused on respondents' financial awareness, including how conscious they were about their money and their retirement needs. One of the main aspects was to find out what their ideal retirement is and, within this, how realistic they are about the amount they need to save to reach their ideal payout. In the context of the two parts, it can be seen that those with a more comprehensive financial knowledge are more aware of how they spend their money.
The last section of the questionnaire (11 questions) contains demographic data. The questions include questions on the highest level of education, type of studies completed or in progress and type of residence. The extent to which these factors influence financial awareness were investigated, and who is the group most open to broadening their financial knowledge.

Answers that contained incomplete or irrelevant data were not included in the sample when the questionnaire was evaluated. On this basis, 416 of the 459 respondents were finally analyzed after filtering and cleaning. The survey did not contain any open questions, i.e. the 31-question questionnaire consisted entirely of closed questions, where respondents were allowed to choose from a set of defined answers for better evaluation.

4. Results

In the first question, respondents were asked what the average life expectancy is in Hungary. Based on Loužek's equation, it is clear that this data is crucial. The bigger life expectancy is there are more pensioners in the pension system. To see the pension system's issue, it is essential to be aware of this data. Respondents were given five predefined options to choose from. Based on the responses, the five answers were finally divided into three groups: correct answers, smaller answers and bigger answers. Less than half of the respondents, 48.6% to be precise, knew what the correct life expectancy in Hungary is, and almost a third of those who completed the questionnaire thought that the it is lower by ten years than the correct value.

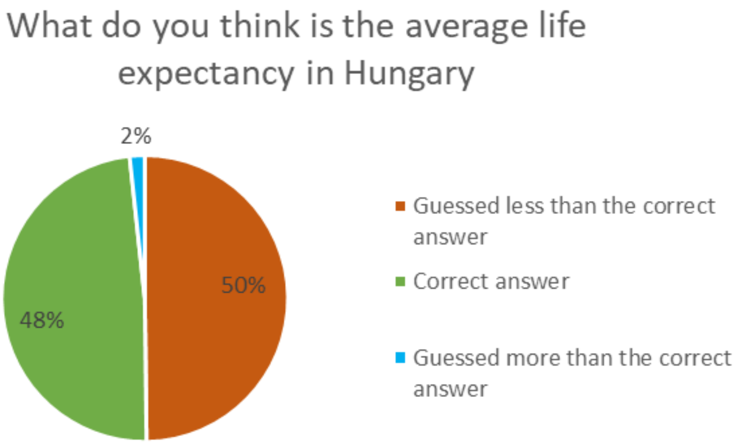

Figure 1: Average life expectancy in Hungary answers, n=416
Source: Authors' own construction

The next question was about the retirement age. This data is crucial in the equation as mentioned above as well because it is highly affecting the number of pensioners. Lower retirement age means a higher rate of beneficiaries in the pension system. As the state will be forced to make cuts to the pension system due to the crisis in the pension system, it is expected that the size of the pension and the starting date for payment will change. 79.8% of respondents knew what the current retirement age in Hungary is, and 26 respondents thought that the retirement age was the same as their life expectancy, so they are marked higher than the actual value.

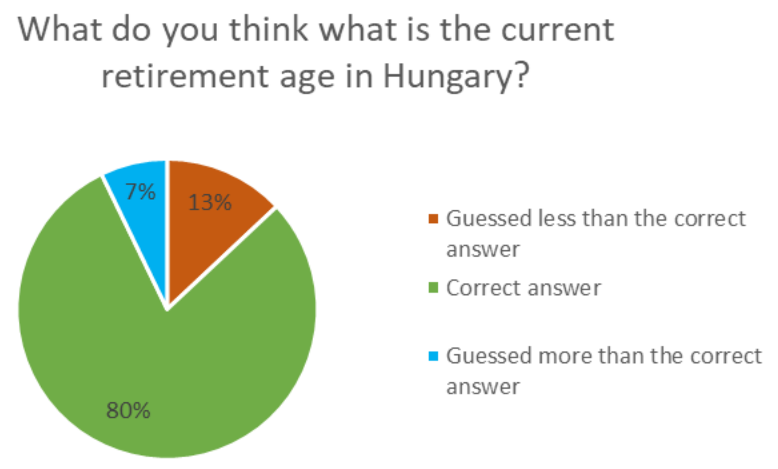

Figure 2: Retirement age in Hungary answers, n=416
Source: Authors' own construction

The themes identified in these responses show that the repliers know when they can expect their retirement years, and many of them replied with higher numbers, which can represent the future trends. It is certain that the entry age for retirement will not be reduced in the near future.
The wage was one of the elements of the equation as well. Therefore, we wanted to know how aware are the responders of the average wage. They were asked regarding that in the following question, and they could choose between six options. The answers were scaled into three correct answers, bigger and smaller. Nearly four-fifths of respondents do not know the average gross salary in Hungary, 78.6% think the amount is below the actual figure, and only a total of 15.7% gave the correct answer.

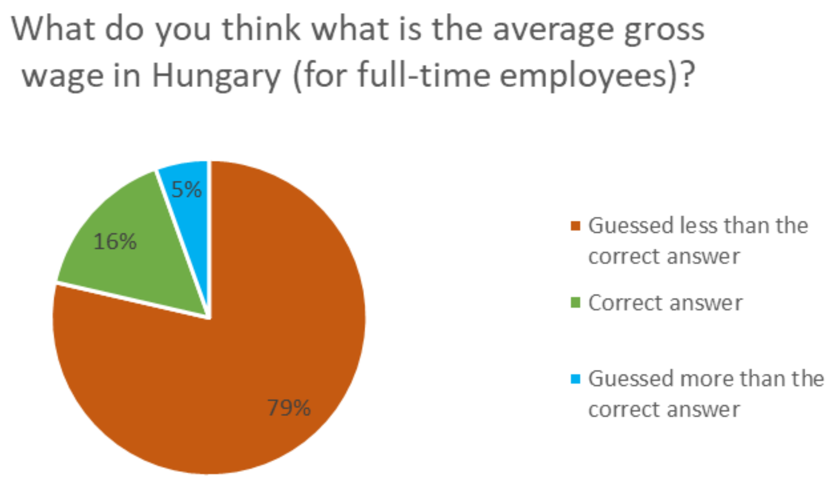

Figure 3: Average gross wage in Hungary answers, n=416
Source: Authors' own construction

The first step to understanding the financial process is to understand the process of money depreciation. This will show that the amount you put aside at home is losing its actual value. Those who are familiar with the concept of inflation will find it easier to understand why it is important to invest. Most of the time, the aim of investing is not to increase wealth but to avoid the effects of inflation. In long-term investments, the aim is to ensure that the money set aside does not depreciate in value at the end of the investment but retains, and in some cases even increases, its payment value. Understanding the concept of inflation or compound interest is essential to understanding the risk and return of saving in a pension fund or any investment. The first step in self-care is to recognize that it is not enough to put money aside; you need to ensure that it does not lose value. Just over half of respondents, 57%, were aware of inflation and its exponential accumulation, but many did not see how the value of their savings held at home had declined over the years. Knowing the effects of inflation, it is worth knowing the benefits of saving in a pension fund. It is worth starting as soon as possible, as pension funds offer other schemes in addition to the ones mentioned above, which allow you to increase the value of your savings even further, depending on the level of risk. According to an article in Moneycentre (2021), only one in three people know that the state subsidies their membership in a pension fund. Two-thirds of the respondents were aware that it is possible to join pension funds with contributions as low as a few thousand forints but were more skeptical about state support and did not know what contribution the state provides. The results obtained mirror the research mentioned earlier. Knowing the value of the discount is essential as it is one of the main advantages of pension funds.

In the case of the question on the value of the pension, the answers were evenly distributed between the three pre-selected options: this led to the conclusion that the majority of the population surveyed was not aware of the number of pension payments. According to the data collected, respondents tended to lean towards smaller pensions, thinking of pensions as much lower payments. Despite this, most responses were for the correct average pension of EUR 350.

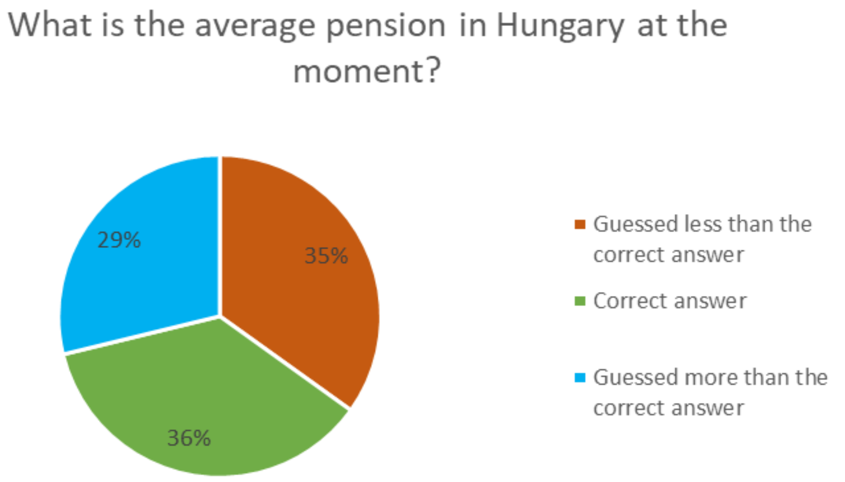

Figure 3: Average pension in Hungary answers, n=416
Source: Authors' own construction

After asking how much the average pension is, the ideal pension payment for the general population was dealt with. Based on the respondents' answers, the median value was the

pension payout group of EUR 550-650, with an average sum of around EUR 650. Most respondents would like to receive a pension of over EUR 750.
Based on the current average pension, this would require a minimum monthly pension supplement of EUR 350. This means that a pension fund would require a monthly saving of EUR 55 from the time of the first job or from the age of 25. The average pension requires savings of EUR 37,5. The later individuals start saving, the larger the amounts that need to be set aside to reach the ideal payout. There is a difference of EUR 200-250 between the ideal pension of the completers and the state pension. This seems to confirm the first hypothesis that young people aged 18-25 do not believe that the state pension will be sufficient for their retirement.
58.7% of the target group surveyed would start saving less than 20 years before retirement or perhaps not save at all. A high proportion of respondents would consider it appropriate to start saving for retirement 30-40 years before retirement.

5. Conlusions

It can be seen that the results obtained in this research support the results obtained in the literature research. Young university students are not yet fully aware of the financial basics and do not currently have any savings in pension funds. t is not an issue, as the findings indicate that the majority of them currently lack a stable income, making long-term financial planning challenging. Nevertheless, in a few years, they are expected to have a steady income. The responses further suggest that retirement savings are part of their future plans. The first hypothesis is supported by the fact that 84% of the respondents think that they need to save separately for their retirement, as the state pension will not be enough for them. This, in conjunction with the earlier presented data, implies that the first hypothesis is valid, indicating that young people aged 18-25 do not hold the belief that the state pension will be adequate for their retirement. Furthermore, the timing of when they started saving shows that 84% of respondents have pension savings as a medium to long term goal, which supports the second hypothesis that young people aged 18-25 do not currently have pension savings but have medium to long term plans to save for their retirement.
The current pay-as-you-go pension system will face severe problems in the near future, and the role of self-care will become more critical. The changes will mostly be felt by the current young generation in retirement. The state has little room for maneuver to prepare the pension system for demographic changes so that the emphasis will be on self-care by the individuals. The responses to the questionnaire show that respondents are aware of the limitations of the pension system. Despite this, they do not have any pension savings, which are included in their medium to long-term plans. The challenge is to make young people realize that the sooner they start saving for their retirement, the easier it will be for them to achieve their financial goals. The key findings were consistent with the literature presented. Education is a crucial factor regarding pension savings, and young adults first need to understand basic financial processes related to pension savings. Otherwise, they will not understand the long-term problems of the pension system.
Most importantly, they need to understand that saving earlier leads to a more prominent and more secure pension supplement. You do not need tens of thousands of forints a month to start saving, and you can start with as little as a few thousand forints and build up savings over the years, changing the amount you put in at any time. The other root cause of young people's lack of access to the pension system is that most financial information comes from their parents. The issue with this is that the voluntary pension scheme is relatively new, and many parents have only just started to get involved. See the example of Slovakia, where the time for pension savings has been fully extended to the last ten years of working life. The aim is to break the tendency to make retirement savings a critical thing to do only when approaching retirement age because by then, it is too late and difficult to save the necessary

amounts in the last years. Based on the results and the literature review an educative campaign could be beneficial to reach the younger generation. By increasing self-care and pension funds, it would make a secure retirement more widely available. Whether it is a centralized social campaign by the government or advertising by market players. It could be a catalyst and help to attract the younger generation to voluntary pension funds. The results of the research presented here are suitable to start the preparation of a specific marketing strategy to engage the target group.

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Bio-notes

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DO PEOPLE MIGRATE DUE TO CLIMATE CHANGE? A COMPARATIVE ANALYSIS FOR ROMANIA AND POLAND

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Abstract: *Nowadays people from all over the world have to face climate change. This issue can take different forms like changes in temperatures, sea level increases or natural disasters (floods, droughts, earthquakes, hurricanes, tsunami, heat waves). Throughout this paper we test the impact of climate change (proxied by the level of precipitations) on international migration from Romania and Poland to the main destinations from the European Union by testing the gravity model of migration. Due to the fact that both countries taken into consideration are exposed to extreme weather events like floods, it is important to find out how people deal with these problems. They adapt locally or migrate abroad? Policymakers need to know how people react to climate change because they have to develop specific adaptation policies. One significant novelty in our study is that we consider new and up-to-date reasons for migrating abroad from Romania and Poland. In this way we fill the gap on this topic related to Romania and Poland as origin countries. By applying a Poisson Pseudo Maximum Likelihood Estimator on a balanced panel database for the 2001-2018 time period we have found that Romanian people are more prone to emigrate because of climate reasons rather than Polish people.*

Keywords: international migration, climate change, Romania, Poland, gravity model.

JEL classification: F22, Q59, C23.

1. Introduction

Climate change is one of the most major problems that people have to face nowadays. Emissions of carbon dioxide make temperatures hotter, increase the level of sea and oceans or intensify the number of natural disasters (floods, droughts, earthquakes, hurricanes, tsunami, heat waves). Every country will have to face climate change and in some cases will exist voluntary or forced migration due to climate issues (Burzyński et al., 2022).
Moreover, people displaced by climate change can move internally or internationally (Kaczan & Orgill-Meyer, 2020). According to United Nations Development for Economic and Social Affairs (2017), 750 million people across the globe have been displaced at internal level; at international level approximately 250 million people were registered. Across time studies exist which take into consideration one country or more to see if climate change affects migration of people and results of internal or international migration because of this reason were obtained. To offer only a few examples, people migrate internally due to rainfall in Sub-Saharan Africa (Barrios, et al., 2006), interregional migration is induced by environmental changes on short distances in Italy (Biagi, et al., 2011), in Vietnam internal migration on the short-term is influenced by natural disasters (Gröger & Zylberberg, 2016)

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and in South America climate variability increases the chance of migration between provinces in the region (Thiede, et al., 2016). On the other hand, international migration from 142 sending countries influenced by increases in temperature in the origin country was obtained by Backhaus, et al. (2015), unusual temperature and precipitation patterns contribute to an increase in urbanization, which leads to more international migration between 222 countries (Maurel & Tuccio, 2016), and the intensity of hazards in the origin location leads to increases in bilateral migration from 162 countries (Gröschl & Steinwachs, 2017).

In this research, we take as origin countries Romania and Poland. Our motivation for choosing them is that they are relatively similar countries from economic and geographical aspects. Over time, Romania and Poland were in the attention of researchers for testing the migration behavior using the gravity model (Iancu et al. (2017), Stancu & Popescu, (2018), Iordache & Matei (2020), Pietrzak et al. (2012)). In these studies, Romania and Poland were taken as origin countries. As control variables we have used economics and geographical factors and the results show that emigration is negatively influenced by the distance between the two locations and by the growth of GDP from the origin country and the growth of unemployment from destination country. On the other hand, emigration is positively influenced by the growth of unemployment in the origin country and the growth of GDP from the destination country.

With this study, we want to test the following hypothesis: climate change induces international migration. We have used an extended version of gravitational model of migration which catches both economic and climate reasons (Khamis & Li, 2020). Migration is induced by more reasons like economic ones, political factors, spatial related reasons and climate change factors (Radel et al., 2018). Sas such, our paper contributes to the existing literature by including more reasons which induce labor migration from Romania and Poland to countries from the European Union. For Romanian emigrants we have the following destinations: Austria, Belgium, Czechia, Denmark, Finland, France, Germany, Greece, Hungary, Italy, Luxemburg, Netherlands, Poland, Portugal, Slovakia, Spain, Sweden. And the following destinations countries for Polish emigrants: Austria, Belgium, Czechia, Denmark, Finland, Germany, Hungary, Italy, Luxemburg, Netherlands, Slovakia, Spain, Sweden.

The relevance of the study comes from the fact that the results inform policymakers about specific challenges faced by Romania and Poland. To be more specific, policymakers can develop adaptation policies in accordance with people’s needs. Also, the results of this work can help countries which have similar problems to develop strategies for facing the phenomenon of climate migration.

The paper is structured in five sections, including this one with some introductory notions. It is followed by section 2 where we make a brief overview of the current literature on the climate migration topic. Section 3 describes the model and in the next section are information about the data used and results obtained. The last section (section 5) comprises conclusions based on the results of the study.

2. Literature review

In 2050 it is predicted that the number of people which migrate due to climate change will be between 200 million and 1 billion. The number of migrants will be higher because of storms, floods, heat waves, rises in temperature, precipitations and sea level (Tacoli, 2009).

In Europe people migrate mostly because of economic reasons and not because of the quality of life. For example, a study was conducted taking into account the interregional migration from Italy. The migration phenomenon can be split in two categories: migration on long distances and migration on short distances. This was done in order to obtain clearer results about the migration behavior. The results indicate that on long distances the

economic variables play an important role in the decision of migration. People go in areas with higher values of GDP per capita and small unemployment rate. The vulnerable category is that of age between 20 and 39 years (they migrate for higher salaries). Of course, areas which ensure a better education is preferred by immigrants and for migration on long distances the climate factors are not taken in consideration. On the other hand, as concerns migration on short distances people go in small areas, with a better quality of life. Economic variables don't play an important role in the decision of migration. As robustness check, we have applied the instrumental variable approach and two-stage GMM estimator. In this regard other control variables are included: the performance of football players, industry mix employment rate and number of ATM machines per 10000 inhabitants in 1996. The results are unchanged: migration on longer distances is correlated with high income and small unemployment rate and on short distances migration is influenced by environmental changes (Biagi et al., 2011).
Another research was made on the interregional migration from Italy, and it was obtained that emission of gases have a positive impact on migration. Moreover, criminality has a negative impact on migration. The study started form Harris-Todaro model of migration and with some improvements like including the costs involved by the moving of a person from a region to another; climatic changes (following the suggestion of Greenwood (1985, 1997), Knapp and Graves (1989)) measured by CO2 emissions and criminality. A dynamic panel two-step difference generalized method of moments (GMM) estimator was implemented. The period included in the study was 1985-2006 and for the empirical testing it was split in two sub-periods: 1985-1995 and 1996-2006. As dependent variable we have taken into account the net migration flow (calculated as outflows-inflows) of region "I" with individuals with the same qualifications and with the same educational level. Following this, the control variables were included: EM-employment rate; W and H - relative wage and price houses; A1 and A2-CO2 emissions and delinquency, and GDP per capita. The Harris-Todaro model was not enough to explain migration in the case both sub-groups. In the first case, when the prices of houses were taken in consideration the results were more conclusive about migration. Due to data availability the CO2 emissions and criminality wasn't included in the first sub-group, but for the second one was taken in consideration. So, the conclusions reached were the ones stated at the beginning (Bonasia & Napolitano, 2012).
In 2020, Sedova & Kalkuhl have researched rural India to see how climate change influence migration and, moreover, to find out the destination for these kinds of migrants. The panel data used in the study was a combination on data from the European Centre for Medium Range Weather Forecasts and from the India Human Development Survey for the following time intervals: 2004-2005 and 2011-2012. Climate change was proxied by temperature level and precipitations. The empirical estimation consisted in applying a linear probability model and, also, a multinomial logit model. We have obtained that extreme weather events lead to migration from rural to urban areas in the same state and, at the same time, to a decreasing in rural-to-rural migration and international migration. A possible explanation can be that people don't go to closer rural zones due to the fact that they are similar when it comes to weather shocks. Moreover, Indian people from rural areas don't migrate internationally because of liquidity constraints. However, we have found that high level of precipitation can lead to international migration and, also, to urban areas from the same country. In addition, we have found that people who migrate because of climate change are more likely to be unskilled migrants and to come from a household which depends on agriculture.
Mikula and Pytlikova (2021) have studied the case of Czech Republic as concerns migration influenced by air pollution. They have constructed an unbalanced panel database for the intervals of time 1971-1989 and 1990-2003. The empirical estimations were made by using a difference-in-difference estimator and it was obtained that exists a positive relationship between air pollution and migration.

Migration induced by climate change was also studied by Helbling & Meierrieks (2021). The dataset included 121 origin countries and 20 OECD destination countries for the interval of time 1980-2010. By using a long-difference approach was found that increases in temperature and precipitations levels affect the migration process. More precisely, low-skilled migration is influenced by increases in temperature and precipitation levels. Precipitation levels leads to migration of low-skilled labor force on both short and long-run, and in the case of the effect of temperature on international migration of low-skilled labor it is present only on the long-run.

On a global scale Burzyński et al. (2022) studied the impact of climate change on labor migration. Climate change was proxied by temperature changes, sea level rise and the number of natural disasters. The authors followed a micro model, which is the Random Utility Maximization Model, for modelling the decision of migration. Results show that climate change affects more rural areas. So, both internal and international migration will exist due to climate change at global level, even though this kind of migration is very costly.

Azumah & Ahmed (2023) conducted a study in Ghana to see if in the case of maize farmers climate change influenced them to migrate. The data were collected through questionnaires and focus group discussions. The analysis consisted of of two parts: the first one with qualitative data analyzed by Qualitative Content Analysis and the second one with quantitative data analyzed by a Heckit probit regression model. The results obtained are the following: migration is not influenced by floods and soil fertility, but droughts and decreases in rainfall are push factors of migration.

Another research was made by Duijndam et al. (2023) in Netherlands to find out how people adapted to severe floods from the year of 2021. Usually, people use in situ adaptation or migration when are dealing with extreme floods. The data were collected through questionnaires. By using regression analysis, it was found that people prefer to adapt locally rather than to migrate. Nevertheless, it is predicted that migration will increase in time due to the increasing number of floods.

Bannor et al. (2023) took in consideration 35 countries from sub-Saharan Africa to study the phenomenon of migration induced by climate change. The study consisted in analyzing a panel dataset for the 1990-2017-time interval through a country-pair fixed effects estimator and a Generalised Method of Moment. The results indicate that temperature positively influences emigration from regions in sub-Saharan Africa that are dependent on agriculture. The robustness check was made by changing the proxy for climate change, instead of the mean monthly temperature was used the long-run variability of temperature. Robust results that indicate that temperature variability increase emigration have thus been obtained.

Considering the existing literature, we can say that countries from all over the world have to face with climate change and with migration of people due to this reason. Along with the phenomenon of climate migration comes some implications. The first one is of economic nature. The displacement of people impacts both the origin and destination countries. The origin country is affected by the loss of labor force and the destination country gains through the fact that increase the demand for local services and resources. The second one is the pressure on urban areas, people have the tendency to go in cities because there they have more job opportunities and resources. Another implication can be the decrease of agricultural productivity in the origin country, due to the migration of people from rural zones affected by climate change.

3. The Gravity Model

The gravity model is used to study the labor migration. Both economic and geographical reasons are included in this model in order to explain labor migration (Beine et al., 2021). The basic gravity model of migration is represented in the following mathematical expression (Cseres-Gergely, 2005):

$$M_{ij}=C*\frac{P_i^{\beta 1}*P_j^{\beta 2}}{d_{ij}^{\beta 3}} \quad (1),$$

where
M_{ij} is the number of migrants from origin country “i” to destination country “j”, C is a constant, $P_i^{\beta 1}$ is the total population from origin country “i”, $P_j^{\beta 2}$ is the total population from destination country and $d_{ij}^{\beta 3}$ is the distance between origin and destination countries.

In the linear form, equation 1 has the following expression:

$$\ln M_{ij} = \alpha + \beta_1 \ln P_i + \beta_2 \ln P_j - \beta_3 \ln d_{ij} \quad (2)$$

We use an extension of this model which include besides the factors mentioned above, also the climate factors as affecting labor migration (Khamis & Li, 2020; Abel et al., 2019).

4. Data Description and Empirical Results

The present research consists in the comparative analysis of Romania and Poland, both from the perspective of generators of emigrants. The reason for choosing these countries is that are two similar countries from more perspectives. From the economic point of view, in both countries are registered very closely values of GDP per capita (see *Figure 1*). Other similarities come from the perspective of climate. Both countries have temperate climate and are exposed to floods, the most frequently natural disaster in these countries according to EMDAT (The international disasters database).

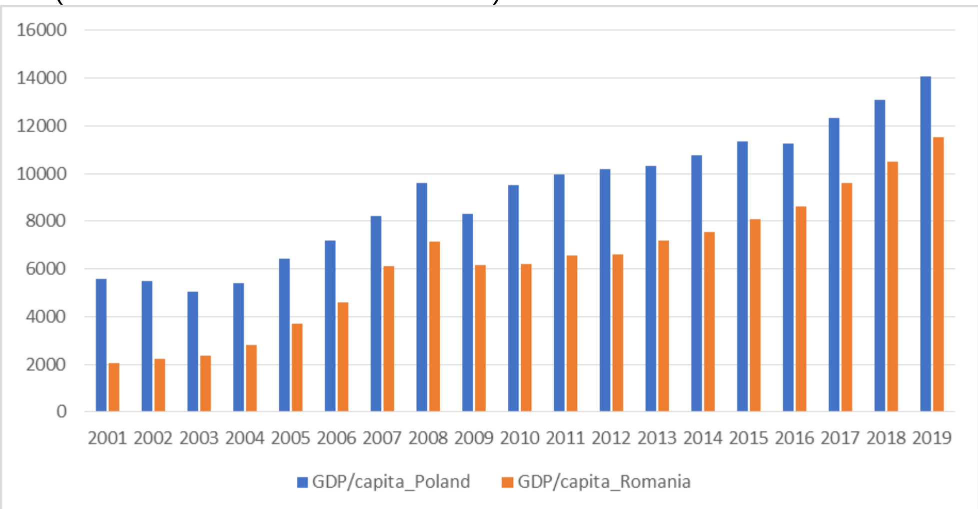

Figure 1. GDP per capita from Romania and Poland.
Source: Figure made by the author based on Eurostat data.

In order to test the impact of climate change on labor migration in Romania and Poland we follow the extended version of the gravity model. In the first case we take Romania as origin country and as destinations we include countries from European Union which receive the most Romanian emigrants (Austria, Belgium, Czechia, Denmark, Finland, France, Germany, Greece, Hungary, Italy, Luxemburg, Netherlands, Poland, Portugal, Slovakia, Spain, Sweden). For the second case we take as origin country Poland and the following countries from European Union as destinations for Polish emigrants: Austria, Belgium, Czechia, Denmark, Finland, Germany, Hungary, Italy, Luxemburg, Netherlands, Slovakia, Spain, Sweden.

We have constructed a balanced panel database for the interval of time 2001-2018 which contain the migration level measured here by the emigration level from origin country to every destination country, population from origin and destination countries, transport costs measured by distance between origin country and every destination country, climate change proxied by precipitation level in origin and destination countries and some economic variables such as gross domestic product per capita and unemployment level from origin and destination countries. All data were extracted from Eurostat, INSSE (Romanian National Institute of Statistics), OECD (The Organization for Economic Co-operation and Development) and POWER (The Prediction of Worldwide Energy Resources). According to Khamis & Li (2020) a Poisson Pseudo-Maximum Likelihood estimator (PPLM) is suitable to be applied on these data to avoid the heteroscedasticity problems and the presence of null values for labor migration.

$$Migration_{ij}=\beta_0+\beta_1 lnpop_i+\beta_2 lnpop_j+\beta_3 lndistance_{ij}+\beta_4 lnclimate\_change_i + \beta_5 lnclimate\_change_j+\beta_6 X \quad (3),$$

where $Migration_{ij}$ – measured by number of emigrants from origin country to destination country.

$lnpop_i$ – logarithm of population from origin country “i”

$lnpop_j$ - logarithm of population from destination country “j”

$lndistance_{ij}$ – logarithm of the distance between origin country “i” and destination country “j”

$lnclimate\_change_i$ – logarithm of the climate change proxied by precipitation registered in the origin country “i”

$lnclimate\_change_j$ – logarithm of the climate change proxied by precipitation registered in the destination country “j”

X – logarithm of economic variables: GDP per capita from origin and destination countries, number of total unemployed people from origin and destination country and geographical variable proxied by the percent of agricultural land from origin and destination countries

Firstly, we test the general form of gravitational model. So, emigration is the dependent variable, and the independent variables are population from both origin country and destination country, distance from origin country to the destination country and the level of precipitation from origin and destination countries. The results show that the level of precipitations from Romania has a positive and significant impact on emigration and the sign from the perspective of Poland is negative. This means that Polish people are not influenced by climate change when they decide to migrate. So, our hypotheses tested is accepted only in the case of Romania. When it comes about the distance, both in Romania and Poland we obtain that remoteness matter. That means that they will migrate abroad if the destination country is relatively closer to the origin country.

Table 10. Results of general form of the gravitational model

Variable/Country	Romania	Poland
lnpopulation_origin	-5.332769 (0.0000)	-98.72887 (0.0000)
lnpopulation_partner	1.508523 (0.0000)	1.830590 (0.0000)
Lndistance	-0.153739 (0.0000)	-2.038943 (0.0000)
lnprecipitation_origin	0.421011 (0.0000)	-0.388676 (0.0000)
lnprecipitation_partner	-0.430273 (0.0000)	0.404151 (0.000)
Constant	74.79349 (0.0000)	1585.351 (0.0000)
Variables	306	234
R-squared	0.424153	0.965281

Source: Author's own calculation in EViews.

Secondly, to the basic model tested we add some economic variables for the robustness check according to Agliardi et al. (2019): gross domestic product and unemployment level from origin country and destination country. In Table 2 we can see the results are robust in the case of Romania. When we control for other reasons besides climate ones the coefficient obtained for precipitation level (1.054443) is higher than the one from the basic model (0.421011). Also, in the case of Poland results are better. That means the Polish people can be influenced by climatic reasons. However, the value obtained is higher in the case of Romania (1.054443) rather than Poland (0.540035), which means that Romanians are more exposed to climate migration.

Table 2. Results for the extended gravitational model

Variable/Country	Romania	Poland
lnpopulation_origin	8.943691 (0.0000)	140.6519 (0.0000)
lnpopulation_partner	2.562743 (0.0000)	0.106960 (0.0000)
Lndistance	-0.320948 (0.0000)	-2.375299 (0.0000)
lnprecipitation_origin	1.054443 (0.0000)	0.540035 (0.0000)
lnprecipitation_partner	-1.073712 (0.0000)	-0.547936 (0.0000)
lnunemployment_origin	0.838483 (0.0000)	0.528605 (0.0000)
lnunemployment_partner	-1.108696 (0.0000)	1.320785 (0.0000)
lnGDP_origin	1.255973 (0.0000)	0.618005 (0.0000)
lnGDP_partner	0.721214 (0.0000)	3.951691 (0.0000)
Constant	-196.1813 (0.0000)	-2502.978 (0.0000)
Variables	306	234
R-squared	0.625164	0.987788

Source: Author's own calculation in EViews.

5. Conclusions

Through this paper we have contributed to the existing literature with a new perspective to international migration when it comes about two countries from Europe: Romania and Poland. In general, developing countries are faced with migration induced by climate change. Moreover, both countries are dealing with the same climate issues, and it is important to test if people move due to this reason.

The migration decision is influenced by climate change in the case of Romanians rather than Polish people. Particularly, it is determined by the precipitation level. The higher the level of precipitation is, more people will emigrate. This was obtained by applying a Poisson Pseudo Maximum Likelihood Estimator.

So, the government should take into account the climate reasons when considering labor migration. For example, a possible solution for having control on floods can be to implement a system that incorporate the storage of water from precipitation and to make use of it.

This analysis should be interpreted by taking into account its limit. We didn't proxy climate change with other relevant variables for Romania and Poland. As further research an analysis which takes into consideration also internal migration because of climate change in these countries could be employed.

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THE EFFECT OF CSR ON THE FINANCIAL PERFORMANCE OF NIGERIAN BANKS: THE MODERATING EFFECT OF CUSTOMER LOYALTY

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Abstract: *Numerous studies have been conducted to investigate how corporate social responsibility (CSR) affects corporate financial performance (CFP), but this direct relationship appears to be complex. As a result, the main aim of this study is to investigate how customer loyalty shapes the association between CSR and financial performance. Previous studies propose using an intermediate variable known as a mediating or moderating variable to strengthen the link between CSR and CFP. From the perspective of Nigerian commercial banks, this study empirically explores the moderation of customer loyalty on the correlation between CSR and corporate financial performance. This study relied on secondary data from the annual report as well as primary data from questionnaires. A total of 446 questionnaires were surveyed from the customers of nine commercial banks listed on the Nigerian stock exchange. This study adopted structural equation modelling to test the established hypotheses. The result proves that CSR enhances corporate financial performance. Similarly, customer loyalty serves as a moderating factor to further solidify this relationship. Using a moderating variable, this research has strengthened the connection between CSR and financial performance, adding to the body of knowledge. Additionally, the research findings have provided valuable insight that is critical in making key decisions.*

Keywords: corporate social responsibility, corporate financial performance, customer loyalty.

JEL classification: G21, M14, D11.

1. Introduction

Over the years, several research has focused on CSR and how it affects CFP (Petrenko et al., 2016; Coelho, et al. 2023; Zhou et al. 2021; Ramzan et al. 2021; Tulcanaza-Prieto et al. 2020; Jahmane and Gaies 2020; Ho et al. 2019; Szegedi et al. 2020; Liu et al. 2021; Mangantar, M. (2019). Several studies, however, have found inconclusive and ambiguous results when examining the "direct relationship between CSR and organizational performance" (Singh & Misra 2021).
Consumers have become increasingly concerned in recent years about environmental and social behavioral practices and the ethical standpoint of organizations (Sun et al. 2020). Companies strive to develop relationships with their customers that foster long-term patronage. The desire of a customer to do business with a company over time is known as

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customer loyalty. Customer loyalty toward companies is defined as committing to doing business with them long-term or making repeated purchases from them. It can be characterized as customer preference for and loyalty to a specific brand (Naqvi, 2013).
Because businesses operate in a highly dynamic and competitive environment, their primary goals, regardless of industry, size, or nationality, seem to be profit maximization and survival (Hichri and Ltifi, 2021; Chondough. 2023). For businesses, maintaining loyal customers is a profitable strategy and a strategic advantage (Liu et al., 2019). One method for building relationships is to demonstrate social responsibility. As stated by Farooq and Salam (2020), the body of literature has shown that consumers factor firms' CSR efforts into their purchasing decisions. For businesses, keeping a solid customer base is essential, and the best way to do this is by increasing the number of loyal customers (Sun et al., 2020).
CSR is defined as an organization's efforts to achieve commercial success while embracing practices that value and support communities, societies, people, and the environment as a whole (McWilliams & Siegel, 2001). It refers to the initiative taken by a firm to have a positive impact on society through its initiatives for the benefit of its consumers, the environment, local communities and a wider stakeholder. Mohr et al. (2001) defined CSR as a commitment made by businesses to minimize any negative effects, increase wealth, and have a long-term positive impact on society. Because CSR appears to have a favorable effect on consumers' behavioral responses, businesses have grown to be more interested in CSR (Sen & Bhattacharya, 2001).
CSR programs are more likely to increase customer retention rates and foster favorable perceptions of the company (Han 2019). Jensen (2001) has asserted that organizations seeking to understand the correlation between CSR and CFP should look at the strategic perspective. The foundation of a successful business and its long-term expansion is customer satisfaction. Customers are particularly interested in the topic of CSR in the banking sector (Ogunmokun & Timur, S. 2022). Consumers' concerns about business ethics and environmentally friendly practices have increased in recent years. Every business aspires to develop a relationship with customers that will persuade them to continue purchasing its goods over time (Sun et al., 2020).
Firms that engage in CSR are rewarded for their commitment through customer loyalty (Kim and Lee, 20219). Consumers must understand the company's efforts because, only after learning about the company's CSR policy can they develop a positive attitude (Ahmed et al., 2020). In the banking sector, customers' long-term use of their accounts and recommendations to buy their products are indicators of loyalty (Purwanto et al., 2020). As a result, banks use a variety of tactics to draw in and keep customers in order to survive and expand. Numerous studies have looked into customer loyalty, which is regarded as a crucial element of customer satisfaction, particularly in the service sector (Rizan et al., 2020). Customer loyalty depicts an ongoing, passionate relationship between a company and its customers. It is manifested in the degree a customer is eager to patronize a company.
Several investigations have been conducted to examine the direct relationship between CSR and a company's CFP, but this direct relationship appears bogus and ambiguous. As a result, the primary goal of this study is to explore how customer loyalty influences the relationship between CSR and CFP. Prior research has suggested that the link between CSR and CFP should be investigated by adopting an intermediate variable known as a mediating or moderating variable (Ali et al. 2020).

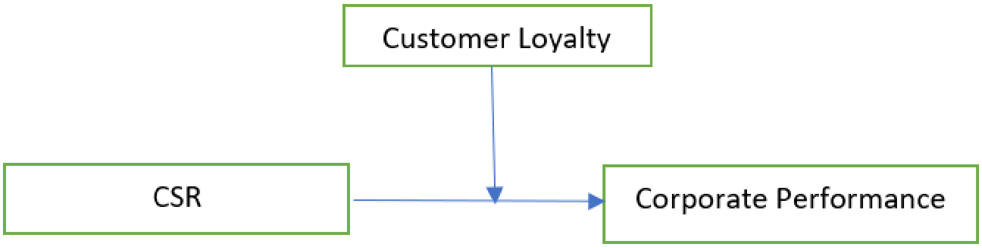

Figure 1: Conceptual Framework
Source: Author's Composition, 2023

2. Literature Review

The stakeholder theory underpins previous studies investigating the relationship between CSR and CFP. According to stakeholder theory, firms can increase the value of their stakeholders by engaging in CSR activities (Donaldson and Preston, 1995). Improved stakeholder relations encourage businesses to develop intangible assets, which boosts financial performance. Waddock and Graves (1997) assert that businesses gain from CSR initiatives because the gains outweigh the costs. Customers are the main focus of the banking system, and every action is geared towards satisfying them and getting their attention (Zanjirchi et al., 2010). CSR initiatives have been used to address social issues that consumers have, build a positive reputation, and foster goodwill among stakeholders and customers (Khan et al., 2017). According to Tulcanaza-Prieto et al. (2020), CSR initiatives have a significant impact on how customers view the quality of the services they receive. Customers choose banks that take environmental protection measures to preserve the surroundings in which they operate (Liket & Maas, 2015). Promises and expectations must be fulfilled in order for customer satisfaction to be high. This involves the company's capacity to comprehend customer expectations and consistently perform well. An organization's profits could rise dramatically with just a small improvement in customer retention (Norazah, 2015). In accordance with the stakeholder theory, firms stand to benefit financially from CSR engagement (Ongsakul et al. 2020). The ability to meet the expectations of stakeholders leads to reputational benefit (Csapóné, 2015). This results in an increase in FP and risk management as the company's reputation grows. CSR strategies could directly or indirectly yield additional income.

Van et al. 2022 analyzed the impact of CSR on the performance of Vietnamese banks from 2012 to 2019. The regression result showed a positive interaction between environmental, employee responsibility and CFP when using environmental, employee, and community responsibility as proxies for CSR. However, no statistically significant evidence was found to support the hypothesis that community responsibility will improve the performance of Vietnamese commercial banks. Hichri and Ltifi (2021) measured the moderating role of customer loyalty on the correlation of CSR and CFP of Swedish companies. The result of using ordinary least squares revealed a significant moderation of customer loyalty on the interaction between the variables. Similarly, Galdeano et al. (2019) investigated the interaction of CSR on the performance of banks in Bahrain. The structural equation modeling results revealed that CSR has a significant impact on the performance of the financial sector in Bahrain. CSR initiatives have a better chance to increase sales, retain customers, and foster a favorable perception of the company (Han 2019). Furthermore, businesses must maintain a strong consumer base, and increasing the number of loyal customers is the most cost-effective strategy (Malik and Ahsan 2019). It is evident that a socially conscious company's relationship with its clients ensures consistency (Kim, and Lee, 2019). Siueia et al. 2019 used regression analysis to investigate the impact of CSR on the financial performance of the banking sector in Mozambique and South Africa

from 2012 to 2016. The findings revealed statistically significant positive results, implying that CSR engagement can help banks improve their performance.
In contrast, Saadaoui and Ben Salah (2022) found that CSR had a statistically negative effect on the CFP of French banks from 2010 to 2018. Thus, proves that CSR and the CFP of the French banks move in opposite directions, implying that an increase in CSR will result in a decrease in the financial performance of French banks.

H1: *CSR significantly affects corporate performance.*
H2: *CSR significantly affects customer loyalty.*
H3*: Customer loyalty significantly moderates the interaction between CSR and corporate performance.*

3. Methodology

This research adopted both secondary data from the examined firms' annual reports and primary data with the use of questionnaires. Purposive sampling was used to collect primary data from customers of the following Nigerian banks: "Zenith Bank PLC, Fidelity Bank PLC, FCMB Group PLC, Guaranty Trust Bank, Access Bank, Ecobank, Union Bank, United Bank For Africa, First Bank Of Nigeria". CSR, as measured by social and environmental responsibility, represents the independent variable of this investigation. Social and environmental responsibility encompasses issues such as labor practices, human rights, society, environmental concerns, material, energy, water, and emission (Usman and Amran, 2015). CSR data was obtained from the annual reports of the banks under consideration. Corporate performance as the dependent variable is proxied by ROA and ROE, consistent with numerous studies on corporate performance. ROA is measured as the "net profit divided by total asset". Return on equity (ROE) is measured as the "net profit divided by the shareholders' equity". The environmental and social responsibility checklist is driven by the global reporting initiative guideline, which measures the number of items disclosed by a firm to the total number of items available per indicator. The data is therefore coded using a scale of "0" and "1" (0 indicating no disclosure and 1 for every disclosure).
To assess customer loyalty, 446 questionnaires were distributed to customers of nine commercial banks listed on the Nigerian stock exchange. 24 questionnaires were found to be incomplete and had to be discarded. Customer loyalty was assessed as a moderating variable using four items adapted from Sirdeshmukh et al. (2002) and Islam et al (2021). A 5-point Likert scale with scores ranging from 1 (strongly disagree) to 5 (strongly agree) was used.
The study adopted structural equation modelling (SEM) with the use of Smart PLS to test the proposed hypothesis. To begin, a measurement model is used to assess the dependability and validity of the items under consideration.

3.1. Descriptive Statistics

Descriptive statistics present a summary and description of the study's dataset. Using 446 observations, the descriptive statistics is presented in Table 1, 2 and 3, detailing a summary of the respondents' gender, age and educational background.

Table 1: Gender Statistics

	Frequency	Percent	Valid Percent	Cumulative Percent
Male	287	64.3	64.3	63.3
Female	159	35.7	35.7	100
Total	446	100	100	

Source: Author's own computation

Table 2: Age Statistics

Years	Frequency	Percent	Valid Percent	Cumulative Percent
18 to 30	173	38.8	38.8	38.8
31 to 40	247	55.4	55.4	94.2
41 & above	26	5.8	5.8	100
Total	446	100	100	

Source: Author's own computation

Table 3: Respondents' Level of Education

Years	Frequency	Percent	Valid Percent	Cumulative Percent
Bachelors	312	70	70	70
Masters	124	27.8	27.8	97.8
PhD	10	2.2	2.2	100
Total	446	100.0	100	

Source: Author's own computation

As shown in Tables 1-3 above, the descriptive statistics have shown that approximately 64.3% of the respondents are male, while the remaining 35.7% are female. The majority of the respondents fall between the age of 35 to 40 years, which is about 55.4% of the respondents. For the level of education, those with a bachelor's degree were over 3 times in number, accounting for 70% of the respondents. 27.8% of respondents have a master's degree while the remaining 2.2% are PhD holders. The respondents' educational background is crucial because it shows whether they are well-educated enough to comprehend the main idea of the study and be able to discuss the subject matter.

3.2. Reliability Test

Fornell and Larcker (1981) and Hair et al. (2013) both recommend that the value of each individual item under investigation be equal to or higher than 0.50. CSR, corporate financial performance, and customer loyalty have shown AVA values of 0.749, 0.732, and 0.840, respectively, when using AVA to assess the convergent validity of constructs. These values exceed the 0.50 threshold, indicating that the variables under consideration are reliable. Furthermore, Bagozzi and Yi (1988) proposed that the composite reliability of each construct be greater than 0.70. This study's composite reliability was 0.931, 0.897, and 0.797, indicating that it passed the reliability test. Table 4 contains the pertinent information. Cronbach's Alpha is also used to test for reliability. Based on the rule of thumb, Cronbach's Alpha values for all the constructed variables exceed the 0.7 threshold, giving enough evidence to accept that all the constructs are reliable.

Table 4: Reliability of Instrument

	Cronbach's Alpha	rho_A	Composite Reliability	AVE
CSR	0.825	0.827	0.931	0.749
CFP	0.817	0.911	0.897	0.732
CL	0.984	0.803	0.797	0.840

Source: Author's own computation

3.3. Discriminant Validity Test

As stated by Hair et al., 2019, "The model has sufficient discriminant validity if the AVE root for each construct is greater than the correlation between the constructs and other constructs in the model". According to Chin (1998), a cross-loadings table compares each latent construct's square root of AVE values to the reflective loadings of other constructs. Thus, "the square roots should be higher than the compared reflective loadings," as stated by (Galdeano et al., 2019:1536). Additional information is provided in Table 5, which shows that the square root values of the AVE scores for each latent construct ranged consisting of 0.883, 0.891 and 0.8849 respectively, indicating adequate discriminant validity.

Table 5: Discriminant Validity (Fornell-Larcker Criterion)

	CSR	**CFP**	**CL**
CSR	0.883		
CFP	0.782	0.891	
CL	0.695	0.672	0.884

Source: Author's own computation

4. Structural model

The regression model is presented below to analyze the relationship between the examined variables.

$CFP_{it} = \beta_0 + \beta_1 CSR_{it} + \beta_2 CL_{it} + E_{it}$ (1)

$CL_{it} = \beta_0 + \beta_1 CSR_{it} + \beta_2 CFP_{it} + E_{it}$ (2)

Where:
CSR = Corporate Social Responsibility
CFP = Corporate Financial Performance
CL = Customer Loyalty
β_0 = Intercept
β_1 and β_2= Coefficient of the independent and moderating variables
E = Error term.
it = Subscript for Panel Data

4.1. Test of Hypotheses

This research empirically tested 3 hypotheses which are proposed below:
H1: CSR significantly affects corporate performance.
H2: CSR significantly affects customer loyalty.
H3: Customer loyalty significantly moderates the interaction between CSR and corporate performance.

Table 6: path coefficient for direct effect

Hypotheses	**Relationship**	**Original Sample (O)**	**Standard Deviation**	**T Statistics**	**P Values**
H1	CSR -> CFP	0.731	0.069	10.868	0.001
H2	CSR -> CL	0.471	0.085	5.053	0.000

Source: Author's own computation

Table 6 presents the path coefficient result of the direct effect between CSR, CFP and CL. The PLS bootstrapping technique was used to analyze the research hypothesis, which reveals the t-statistic and p-value values for each hypothesis. Based on the p-value of 0.001, which is less than the 5% significance level, the results of this analysis demonstrated a positive and statistically significant effect on corporate financial performance. This has provided sufficient evidence to accept hypothesis one, which proposed that CSR has a significant impact on corporate performance. Both variables are moving in the same direction. By implication, an increase in CSR could potentially benefit the company through improved financial gain. Additionally, CSR appears to have a positive impact on customer loyalty. With a p-value of 0.000, the result is statistically significant at the 5% threshold. This suggests that as businesses become more involved in CSR, more customers become committed to doing business with them in the long run, either by repeatedly patronizing or recommending the companies to others. The findings of this investigation, which are presented in Table 7, support the stakeholder theory and those made by other scholars (Rossi et al., 2021; Chouaibi and Chouaibi 2021). According to the stakeholder theory, among other things, meeting stakeholder expectations enhances the company's reputation and image. As a result, an improvement in reputation permits an improvement in financial performance and better overall risk management for the company (Chouaibi and Chouaibi 2021).

Table 7: Effect Size and Predictive Relevance

Endogenous Construct	R Square	R Square Adjusted	Effect size
Corporate Financial Performance	0.837	0.831	Strong
Customer loyalty	0.796	0.794	Strong

Source: Author's own computation

R-square indicates how much the independent variable influences the dependent variable. It has a value between 0 and 1, indicating the significance of the independent variables in affecting the value of the dependent variable. R-square is a measure of how much an independent latent variable has an impact on a latent dependent variable. According to the findings of numerous studies, a strong R-square value is one that is greater than 0.7. Table 7 shows a strong correlation between the dependent and independent variables, with R-square values of 0.837, 0.796, and adjusted R-square values of 0.831 and 0.794 all above the threshold of 0.7.

Table 8: path coefficient for the indirect effect

Hypotheses	Relationship	Original Sample (O)	Standard Deviation	T Statistics	P Values
H3	CSR_CL -> CFP	-0.085	0.070	3.462	0.000

Source: Author's own computation

The result from the test of hypothesis for both direct and moderating effects has provided sufficient evidence to accept the proposed hypotheses, which shows a statistically significant relationship between CSR engagement and corporate financial performance. Similarly, customer loyalty has a statistically significant impact on the association between CSR practices and corporate financial performance, thereby strengthening the connection between the independent and the dependent variables. A summary of the results is shown in Table 9 below.

Table 9: Result Summary

HYPOTHESES		P-Values	FINDINGS		DECISION
H1	CSR-CFP	0.001	+	Significant	Accepted
H2	CSR-CL	0.000	+	Significant	Accepted
H3	CSR-CL-CFP	0.000	+	Significant	Accepted

Source: Own edition

5. Conclusion

The current study aimed to investigate how financial performance could be improved in the financial industry. The study's goal was to determine whether CSR activity could be used to forecast financial results. The study also examined how customer loyalty affects the

relationship between CSR and CFP. The hypothesis testing results strongly supported all three hypotheses. According to the findings of this study, CSR significantly and positively affects the financial performance of the examined banks in Nigeria. By implication, the independent and the dependent variable move in the same direction. This means that an increase in CSR will boost the financial performance of the examined banks in Nigeria. Furthermore, customer loyalty moderates the association between CSR and CFP.
This research has increased the empirical literature providing evidence to indicate a significant positive relationship between the moderation of customer loyalty in strengthening the link between CSR and financial performance. This is especially important in the case of a developing country with limited empirical evidence. Firms can recognize the significance of CSR and ensure that corporate business practices align with the core values of sustainable policies, potentially increasing customer loyalty and financial performance. This study suggests that appropriate regulatory enforcement and environmental impact analysis should be seriously considered over voluntary measures if companies are to behave in a socially responsible manner. this will prompt companies to integrate CSR as a crucial part of their operations. While a short-term negative impact is to be expected, the long-term benefit outweighs the cost of being socially responsible. It is therefore recommended that banks improve their CSR initiatives and disclose such related obligations to reap the reward associated with social and ethical behavior.

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ANALYSIS OF THE OPTIMAL LOCATION OF BANK AUTOMATED TELLER MACHINES (ATMS) IN TURKMENISTAN

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Abstract: *In recent years, Automated Teller Machines (ATMs) have become one of the most profitable areas of the banking system but at the same time they also represent an area of much debate regarding the future of the financial-banking industry. Placing ATMs in the right locations has become one of the main problems in present day society. For this reason, banks have started to study this issue from a scientific point of view, in order to validate and assess other criteria considered when making decisions regarding specific localization, criteria such as target market characteristics, visibility, security, competition, social considerations, a rigorous analysis must be conducted. Researchers have developed and proposed several models and theoretical approaches to solve this problem. In this article, a method of solving the problem of placing ATMs in effective locations is proposed and calculations are made on the basis of a regulatory analysis of ATMs operating in a specific country, namely Turkmenistan. The monthly income of an ATM in an optimal location is about 2.96 times higher than the monthly income of an ATM in a non-optimal location. The results of our research show that the loss of an ATM placed in a non-optimal location is approximately 66% of its total income for a certain period of time.*

Keywords: Automated teller machine, bank income, optimal location, Turkmenistan

JEL classification: C02, C10, G21

1. Introduction

The use of cash versus cashless payments has been a longstanding debate that has managed to span over several decades. It is important to objectively analyze these topics in order to determine the best path forward. Recently, themes such as sustainability, potential obsolescence of physical currency, financial exclusion, and erosion of privacy have gained momentum and prominence, igniting enthusiasm and concern across the global population. Undoubtedly, there are countries, especially those highly developed such as Norway, Finland, New Zealand, Hong Kong, Sweden, Denmark, the United Kingdom, and Singapore,

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that are nearing an entirely cashless society, where cash withdrawals via cards account for less than 10% of transactions. On the opposite side of the spectrum lie countries such as Bulgaria, Romania, and the Czech Republic in Europe, Morocco, Egypt, Kenya, and Nigeria in Africa, Peru, or Mexico in the Americas, as well as the Philippines, Indonesia, or Kazakhstan in Asia, countries that continue to show a significant dependence on physical currency (Rolfe, 2022).

As per the Worldpay Raport (2023), global cash transactions have declined significantly in recent years, exceeding initial expectations, and the COVID-19 pandemic has accomplished to expedite this drop by about three years. Although the decline is noticeable, various arguments suggest that at least 15% of the global population will primarily or exclusively rely on cash over the following ten-year period. Consequently, financial service providers (as well as central banks) must consider cash operations, including those conducted through ATMs.

Even more so, other recent reports and surveys have pointed that even in economically developed countries with an educated population and widespread possession of bank cards and internet usage, there are preferences (which are somewhat surprising) for the use of cash, such as in Germany (46% of respondents) or Spain (39%). (Euronet, 2022a).

A deduction arising from these analyses is that the use of cash should not be solely associated with the level of economic development or financial literacy of the population. The analysis should be expanded to consider elements such as the location and profile of communities, particularly small and isolated ones, the age of cash and card users, the relationship between customer expectations and the efficiency measures of banking locations, prudence, privacy-related aspects, as well as more sensitive issues such as preventing financial exclusion and, consequently, social exclusion of certain demographic groups. Lastly, the existence and normal functioning of communities and population groups should also be taken into account. Furthermore, a series of research studies argue that the choice of payment method for goods and services should be left to the discretion of the consumer and should not be guided by merchants (Payments Europe, 2021), (Euronet, 2022a).

2. The Future of ATMs - Opportunities or Obsolescence?

An automated teller machine (ATM) is an automated electronic device designed to receive and dispense cash by means of a plastic card and, at the same time, to realize payments for various services, repay loans and carry out other banking operations without the presence of a bank employee/bank teller (Tadesse, 2018).

Currently, ATMs are divided into three main types in terms of cash collection (Yu, 2012):

- Salary withdrawal ATM's – in the case of these types of ATMs, once a monthly salary has been paid, fixed assets are withdrawn within 2-3 days. This type of ATM greatly differs from the other ATM types given that it can store a large sum of cash.
- Street ATMs - this type of ATM is mainly placed in crowded places, in front of shopping centers, near residential complexes and in settlements. The main feature of outdoor ATMs is that their outer part is made of protective metal and equipped with a special air exchange system that ensures proper functionality at any given time.
- Weekday restricted ATMs - These ATMs are specific to a particular industry or institution and are usually located inside the building or institution.

ATMs prove more useful when the distance between two bank branches is long. Today, ATMs are located in various settlements of regions, cities, districts and towns and serve customers 24 hours a day. ATMs are equipped with the possibility of cashless payment of loans received from the country's banks and accrued interest, as well as payments for mobile communication services, CDMA mobile communication services, home telephone, Internet communication, Wi-Fi, household services, money transfer systems, etc.

Each customer is charged by the respective bank branch for the service and repairs/maintenance of the ATMs. ATM withdrawals are one of the main sources of income for a bank. For this reason, every banking institution tries to place its ATMs in various active points of cities, districts, towns, markets, shopping centers, in its own bank building, railway stations, airports, shops and residential complexes.

Thus, the question arises as to whether, in the context of digital expansion, the immense influence exerted by the payments industry toward a digital wallet mentality, as well as the pandemic experience that has limited direct interactions, there still exists a significant place for ATMs in the payments landscape.

ATMs have evolved in line with the social expectations and technologies of their times since the mid-20th century. However, they must now confront the realities of virtual banks, cardless cash withdrawals, and the proliferation of increasingly distant cashless mobile services and applications.

According to research by Euronet (2022) this could only mean that ATM providers, together with the choice regarding the places where they are to be placed, should consider several objectives:

- ATMs must take into account technological advancements to meet the demand for new payment technologies. Cash withdrawals are perhaps the most well-known service provided by these networks, but the functions of an ATM extend beyond cash distribution, encompassing balance inquiries, PIN changes, and the potential to offer a wide array of financial services.
- The ATM should have a more pleasant and attractive appearance, one that is closer to the functionality of a smartphone and contemporary designs.
- ATMs must keep pace with the rapid and widespread changes in payment technologies, embracing more functionality, taking advantage of the reduction in the number of physical bank branches, and even replacing them (to a certain extent). The ATM should transcend its status of a cash dispenser and provide the capability to make deposits, accept checks, process bill payments, dispense tickets, provide e-card services, and more. ATMs can read barcodes, QR codes, and numerical codes to initiate cash withdrawals, especially in emergency situations when card payments are not available.
- To secure a place as an integral part of the future of the banking system, the ATM must evolve into a multifunctional apparatus, complementing and diversifying payment options and technologies in an era of digitalization. It should be transformed into an intelligent device, aiding financial institutions and meeting the expectations of their clientele.

3. Theoretical background regarding optimal location for ATM

As mentioned earlier, one of the most important revenue streams for the banking system in recent years has been the service revenue generated by ATMs. Effective management of any ATM includes installation, programming, cash management, security, efficient location, remote monitoring and proactive customer service. Currently, scientists have developed and proposed several models and theoretical data to solve the problem of placing ATMs in the optimal location, which is one of the main problems. Many unique approaches to this problem have been proposed by existing literature.

According to the research conducted by Sadeghi & Farokhian (2011) or Trang et al (2019), the ATM network stands as one of the most crucial banking facilities, as it enables continuous customer access to their accounts and cash withdrawal. However, this advantage becomes inconsequential when the nearest ATM location exceeds a certain distance. In other words, one of the key advantages of ATMs is their accessibility or convenience. This assertion holds true, up to a certain point, for banks as well; through ATM networks, they can keep their customers in proximity (either physically or psychologically) and reduce their costs compared to a full-fledged branch (Genevois, et al., 2015), it retains its traditional clientele while also attracting younger individuals interested in technology (Awaghade, et al., 2014), they can increase their visibility and promote their products. Clearly, not every location is conducive to these criteria, as visible and secure places are preferred, along with those that are convenient and accessible, with significant commercial, business, or recreational traffic (Awaghade, et al., 2014) (Genevois, et al., 2015).

The determination of optimal locations for the placement of equipment such as ATMs, in order to meet demand requirements as well as efficiency standards of providers, generates significant interest among researchers and practitioners. This interest spans a diverse spectrum of disciplines, ranging from geographers and urban planners to engineers and architects, from economists and systems analysts to managers and policymakers (Mitra & Fortenberry, 1986), (Mourad, et al., 2012).

The Location-Allocation (LA) problem holds significant importance within the banking industry, as it is tasked with addressing constraints related to minimizing customer transportation costs to and from the respective equipment, as well as profitability, safety elements, social policies, and other related factors. Indeed, an ATM placed in a highly trafficked area, serving a substantial number of customers, can generate increased visibility in the target market for the respective bank. It can be regarded as a component of the network expansion strategy or a point for the collection of consumer information and preferences, among other functions (Gehrung, 2021).

The attention given to the finding of proper locations of/for ATMs has been somewhat uneven over time. Initially, it was deemed that the first ATMs should be primarily located within bank branches (Wilson, 1999), (Badulescu & Morutan, 2016); this has considerably delayed the research in finding other optimal locations. The increase in the number of ATMs parallel to the rise in the ownership of bank cards among the population has revived these concerns but has also placed banks in competition with each other. On numerous occasions, due to various constraints, banks have relinquished the management of ATM networks, outsourcing certain operations (maintenance, cash replenishment, etc.), or even the entire network, to specialized non-banking companies. The allocation of ATMs in a given territory requires a specific strategy, and the factors determining the (optimal) location of an ATM vary from one country to another, from one bank to another, and depend on a multitude of objectives and criteria, including market selection, visibility, ease of access, security of use, economic development level, ATM allocation cost, the presence of competition, proximity to companies using payroll cards, social considerations, and more (Mourad, et al., 2012), (Awaghade, et al., 2014).

Mourad et al. (2012) propose a solution to the location-allocation problem of ATMs by suggesting the utilization of a hybrid optimization model that incorporates ranking methods such as Analytic Hierarchy Process (AHP) and Location Set Ranking (LSR) in conjunction with the p-median optimization model. It contends that, following verification and refinement, the model can be successfully employed in a large city, citing the example of the city of Alexandria, Egypt. (Mourad, et al., 2012).

When choosing a location for a specific activity, such as the distribution of financial or banking services, but not limited to them, various factors are taken into consideration. These factors include the size and characteristics of the target market, the incomes of existing and potential customers, the complexity of the services provided, growth potential, costs (acquisition or rent), competition, and so forth (Awaghade, et al., 2014). Similarly, when installing an ATM in a particular location, these aspects must be taken into account, including the number of residents and businesses in the area, individual income levels and expenditures, consumption preferences, habits, as well as the services offered by the specific ATM, competition in general, and the number and placement of other ATMs in the same area. For example, Trang et al. (2019), by investigating a significant number of ATM users, have revealed that the characteristics of ATM locations are positively correlated with their usage, confirming the relationship between consumers' attitudes and intentions, and the utilization of ATM services. Kubra et al. (2015) point out that it is necessary to increase the number of ATMs and to place them in efficient locations, by taking into account the interests of customers in their work. Their contribution notes that statistical methods such as factorial, cluster, regression and correlation are more suitable for the decision-making process regarding the placing of ATMs in the optimal location. As a result, the researchers choose the method of correlation and standard regression analysis to place ATMs at active points and to determine the operating points for ATM’s by using this method (Kübra, et al., 2015). Somnath. et al (2017) offer two equally effective local and global models to solve the problem of efficient deployment of ATMs in hotspots. There is no common function linking the proposed models. I Putu et al. (2022) solve the problem of placing ATMs in efficient locations using K-means and intelligent analysis methods. A large database is required to solve the problem of determining the optimal location, and the method is controlled by specially developed software (I Putu, et al., 2022). Genevois et al. (2015) approach this problem in a fundamentally different way, creating a function that determines the movement of cash in ATMs based on the location of the ATMs. The article proposes a two-step approach to solving this problem. The first step is to determine the optimal location of ATM’s, and the second step is to solve the cash management problem (Genevois, et al., 2015). Golabi et al (2017) propose to solve the problem of placing ATMs at optimal locations using a linear mathematical model. Using the model proposed by the researchers, it is expected that ATMs will reduce costs when placed in certain locations.

4. The use of ATMs and financial banking modernization trends in Turkmenistan

The development of the financial banking system in the Turkmenistan is a crucial objective of state policy. There are numerous programs intended to fully digitize the country's banking system, to develop the national economy and to launch a qualitatively new phase of economic policy implementation aimed at bringing it (the banking system) to new heights. Programs such as: "Program of the President of Turkmenistan for the socio-economic development of the country in 2022-2028" and "Revival of a new era of the powerful state: The National Program of Social and Economic Development of Turkmenistan in 2022-2052" are a clear demonstration for this engagement (Ministry of Finance and Economy of Turkmenistan, 2023). The financial base of Turkmenistan’s banking system has been strengthened and develop, being nowadays equipped with innovative digital technologies that meet modern standards (Akmyradov & Nokerov, 2022) (Akmyradov & Nokerov, 2023). ATMs are one of the main technical bases of the banking system, which is being improved during the transition of the national economy to the digital system.

Customers can carry out their necessary banking transactions at banks offering different services. At a first glance, it can be said that the more bank branches, the better it is for customers. However, in order to meet the needs of customers, many bank branches cannot be opened in cities, villages and other places from the point of view of security and prevention of inappropriate spending. But they can certainly be replaced by ATMs, which are an integral part of banks.

The Central Bank of Turkmenistan, SCB "Turkmenistan", SCB "Dayhanbank", JSCB "Senagat", JSCB "Rysgal", JSCB "Halkbank", JSCB "Türkmenbashi", “Turkmen-Turkish JSCB” and “SB for FEA” have all installed their own ATMs to provide banking services to citizens and business in different locations throughout Turkmenistan. As of 1st of May 2013, a total number of 2139 ATMs have been installed in the country (Figure 1). If in January 2016 there were 924 ATMs to provide banking services to citizens in different parts of Turkmenistan, a 132% growth has been achieved since the 2016 time interval (Central Bank of Turkmenistan, 2023), (Turkmenportal, 2023). This will be depicted in in Figure 2.

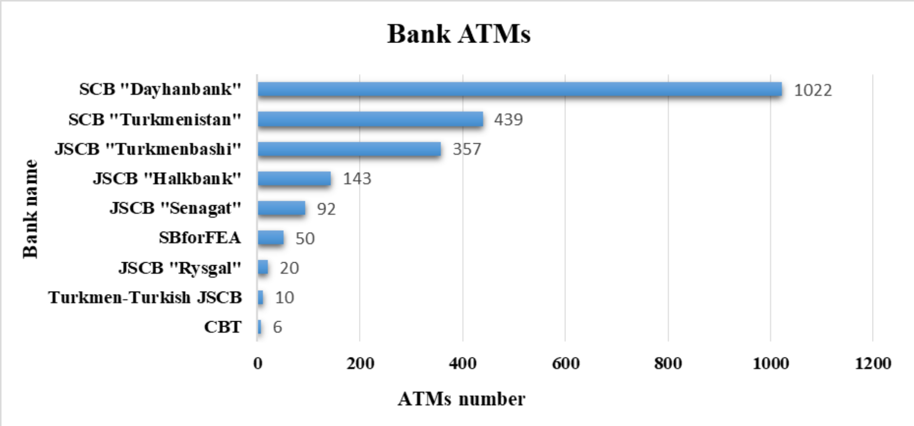

Figure 1: Number of ATM's per bank in Turkmenistan in 2023
Source: Author's analysis based on data from the database of Central Bank of Turkmenistan

As can be seen from the graph in Figure 2, following an accelerated growth in the 2016-2019, the total number of ATMs installed in the country decreases after 2020. There are two main reasons for this. Firstly, the number of ATMs installed in the country prevails, and secondly, it is a question of placing ATMs in the corresponding optimal locations. Therefore, it is important to carry out the calculations and their analysis in order to place the ATMs in the corresponding optimal locations. In this work, the problem of increasing the profitability of ATMs depends on many factors. Taking into account the number of customers who will use ATMs, the cases that will bring the most profit are determined by making appropriate calculations.

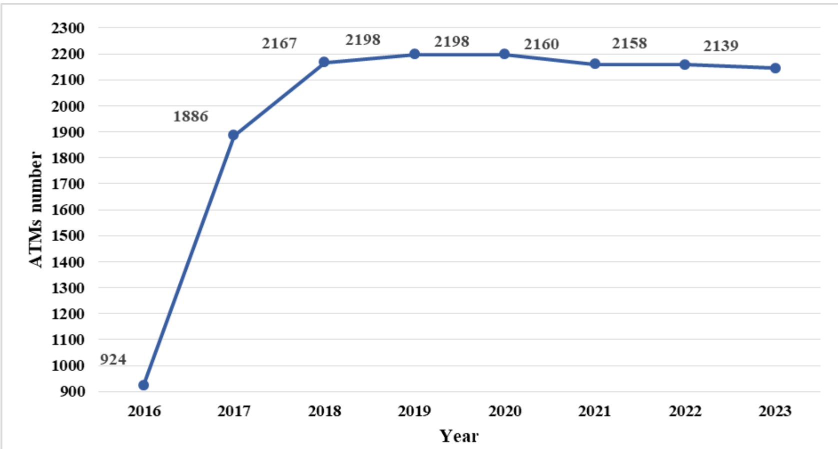

Figure 2: Annual growth dynamics of the number of ATMs in Turkmenistan in the 2016-2022 time period
Source: Author's analysis based on data from the database of Central Bank of Turkmenistan

It follows from the above literature review that the parameters used in the proposed models to solve the problem of determining the optimal point of placing ATMs depend on the area in which the ATM is to be installed. In this article, a regression analysis method is proposed and appropriate calculations are made to solve the problem of placing ATMs at the optimal points throughout Turkmenistan. The article shows the necessity of placing ATMs at efficient points by means of special calculations and determines the efficiency coefficient of ATMs for optimal and non-optimal points.

5. Methodology

Every bank tries to locate its ATMs in the best possible locations to maximize the return on its investment. This phenomenon depends on the popularity of the location to be installed, the location in a densely populated area, the number and types of operations that can be performed at the ATM, the security conditions, the economic status of the location, and several other factors.

If the ATMs are placed in non-optimal locations, then its nailing down will also be low, in which case it is necessary for the bank to be active. In a scientific study of the positions of ATMs, it can be seen that the location of the ATM is the main criterion for its income. If ATMs are placed in sub-optimal locations, it can be assumed that revenues will fall sharply. This raises the problem of finding and placing ATMs in more active locations in order to obtain a large amount of income from ATMs. This problem can be solved using the mathematical method of regularization analysis (Tsyganov, 2018).

Below is the calculation sequence of the methodology for the effective placement of ATMs. In the calculation, the commission/fee for services provided by ATMs operating throughout the country is the same, as is the amount of cash withdrawn, which is assumed to be 0.86%. The maximum profit from the use of ATMs has been taken into account and the data used in the calculations are self-selected prices.

Let us consider two situations, during the same period of time:

a. a high volume of customers served;

b. a situation in which significantly fewer customers are served than in situation a.

In this study, the calculations were carried out separately for each of the above two cases and compared with each other. The ATMs considered in both cases are technically sound and sophisticated. Let us move forward with the analysis by assuming that these ATMs are in two different locations with different frequencies of customer visits. The calculations take into account the monthly income from the ATMs (Tsyganov, 2018).

6. Results and discussions

To simplify the calculations, we have assumed that ATMs are only used to withdraw cash from plastic cards. Assume that 13190 customers use a heavily loaded ATM and 4450 customers use an unloaded ATM in one month. Suppose that for the service of withdrawing the largest amount of cash from an ATM, a deduction of 6.88 Turkmen manats is made from the customer's personal account. The total income to be received for using the ATM service during the month can be calculated using the following formula:

$$J_i = P_i \cdot Q_i$$

Where J_i is the total income from the ith ATM for one month (in manats- Turkmen currency), P_i is the average commission for the service of withdrawing the largest amount of cash from an ATM (in Turkmen manats), Q_i is the total number of customers served at the ith ATM during the month. For loaded ATMs with a large number of customers and unloaded ATMs with a small number of customers, formula (1), previously presented, takes the following form:

$$J_k = P_k \cdot Q_k \quad (2)$$

$$J_a = P_a \cdot Q_a \quad (3)$$

Where $J_k,\ J_a$ are the total income (in Turkmen manats) of an ATM with a high and low number of customers, respectively, $P_k,\ P_a$ are the average cost of the service (in Turkmen manats), Q_k, Q_a are the total number of customers served at ATMs with more and less customers, respectively.
For formula's (2) and (3), together with their corresponding calculations, are presented in Table 1.

Table 1: Comparison of ATMs with high and low customer base

Multi-client (loaded) ATM	**Low-client (unloaded) ATM**
Q - total number of clients	
13190	4450
P is the maximum income from a customer using an ATM (Turkmen manat)	
6.88	6.88
J, gross profit (Turkmen manat)	
90747.2	30616

Source: own calculations

Moving forward with our analysis, we have compared the efficiency of ATMs located at the first point with a large number of customers and at the second point with a small number of customers. The efficiency formula (4) can be written as follows:

$$I = \frac{P \cdot Q}{P_0 \cdot Q_0} \tag{4}$$

Here is the efficiency factor I is variable size, $P,\ P_0$ are the ratio is taken to serve an ATM with a high and low number of customers, respectively (Turkmen manat) Q, Q_0 are variable sizes and represent the total number of customers served at ATMs with high and low number of customers, respectively.
There are mutual efficiency coefficients for 3 different situations of location of ATMs in the first and second points.
The efficiency coefficient of changing the capacity of the ATM and the number of customers is presented below:

$$I_{PQ} = \frac{P_k \cdot Q_k}{P_a \cdot Q_a} = \frac{6{,}88 \cdot 13190}{6{,}88 \cdot 4450} = \frac{90747{,}2}{30616} \approx 2{,}96$$

The efficiency factor for changing the throughput of an ATM is given below:

$$I_P = \frac{P_k \cdot Q_k}{P_a \cdot Q_k} = \frac{6.88}{6.88} = 1$$

The efficiency ratio as a function of the number of customers is given below.

$$I_Q = \frac{P_a \cdot Q_k}{P_a \cdot Q_a} = \frac{13190}{4450} \approx 2{,}96$$

As can be seen from the mutual efficiency coefficient of ATMs located in the first and second points, the efficiency coefficient increases by about 2.96 times when ATMs are located in an effective active point. As can be seen from the efficiency coefficient of ATMs by changing the capacity standard and the efficiency coefficient by changing the number of customers, it increases by a factor of 1 only when the capacity standard is changed and by a factor of 2.96 when only the number of customers is changed.
The percentage of "lost revenue" that an ATM owner can lose by placing ATMs in the wrong, i.e. non-optimal, location can be calculated using formula the following formula (5):

$$X_J = \frac{J_k - J_a}{J_k} \cdot 100\ \% \qquad (5)$$

Here, X_J is the lost profit ratio (cashing account), J_k is the total income from an ATM with a large number of customers (Turkmen manat), J_a is the total income from an ATM with a small number of customers (Turkmen manat).
The following result is obtained when the calculations are performed by substituting their numerical values into magnitudes:

$$X_J = \frac{J_k - J_a}{J_k} \cdot 100\% = \frac{90747{,}2 - 30616}{90747{,}2} \cdot 100\% = 66{,}26\ \%$$

As can be seen from the calculations, if an ATM is placed in the wrong location, the amount of the bank's losses from ATM expenses is 66.26% of its monthly income.
If ATMs are placed in non-optimal locations with a low number of customers, the percentage of customer volume loss as the total number of customers decreases can be determined from formula (6) below:

$$X_Q = \frac{Q_k - Q_a}{Q_k} \cdot 100\ \% \qquad (6)$$

Where X_Q is the customer loss coefficient, Q_k is the total number of customers served in a multi-user ATM and Q_a is the total number of customers served in a small-client ATM.
If the calculations are carried out by replacing their numerical values with magnitudes, the following result is obtained.

$$X_Q = \frac{Q_k - Q_a}{Q_k} \cdot 100\% = \frac{13190 - 4450}{13190} \cdot 100\% = 66{,}26\ \%$$

If the number of customers that use the services of ATMs is reduced from 13190 to 4450, as can be seen from the results of our calculation, the bank's loss from ATMs will be 66.26 % of the total income for the month.
What can be taken from the results of the above calculations is that by placing an ATM in the wrong place can lead to a decrease in the deposit income of the corresponding bank. In this case, the problem of placing ATMs in efficient locations arises.

6. Conclusion

The aim of this study is to propose an integrated decision support system for ATM management which will aid management team in banking services and make decision making easier with a scientific methodology in a trustworthy way. Based on the regulatory analysis conducted in the article regarding the optimal placement of ATMs within local conditions, it has been determined that such placement holds the potential to generate significant revenue for the banking system. The findings of our calculations reveal that the efficiency ratio, resulting from regression analysis, when altering the throughput ratio of ATMs, is approximately 1.02. This implies that optimizing the placement of ATMs can yield a considerable increase in their overall efficiency.
Furthermore, our analysis demonstrates that an ATM situated in an optimal location can generate a monthly income roughly 2.96 times higher than that of an ATM located in a non-optimal location. Conversely, the financial loss incurred by an ATM in a non-optimal location is estimated to be approximately 66.26% of its total monthly income. These conclusions underscore the critical importance of strategic placement for ATMs to enhance their financial performance within the local banking context. As mentioned earlier, there is a

scarcity of studies and researches about ATM management. The cash flow of ATMs depends on their efficient location. Therefore, we need a two-step solution for ATMs. The first step is to effectively locate ATMs. The second step should be a cash flow problem. Because these issues are deeply interconnected. As a result, the location of ATMs at an active location reveals the problem of cash flow in ATMs. Solving this problem will be one of our next goals.

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