



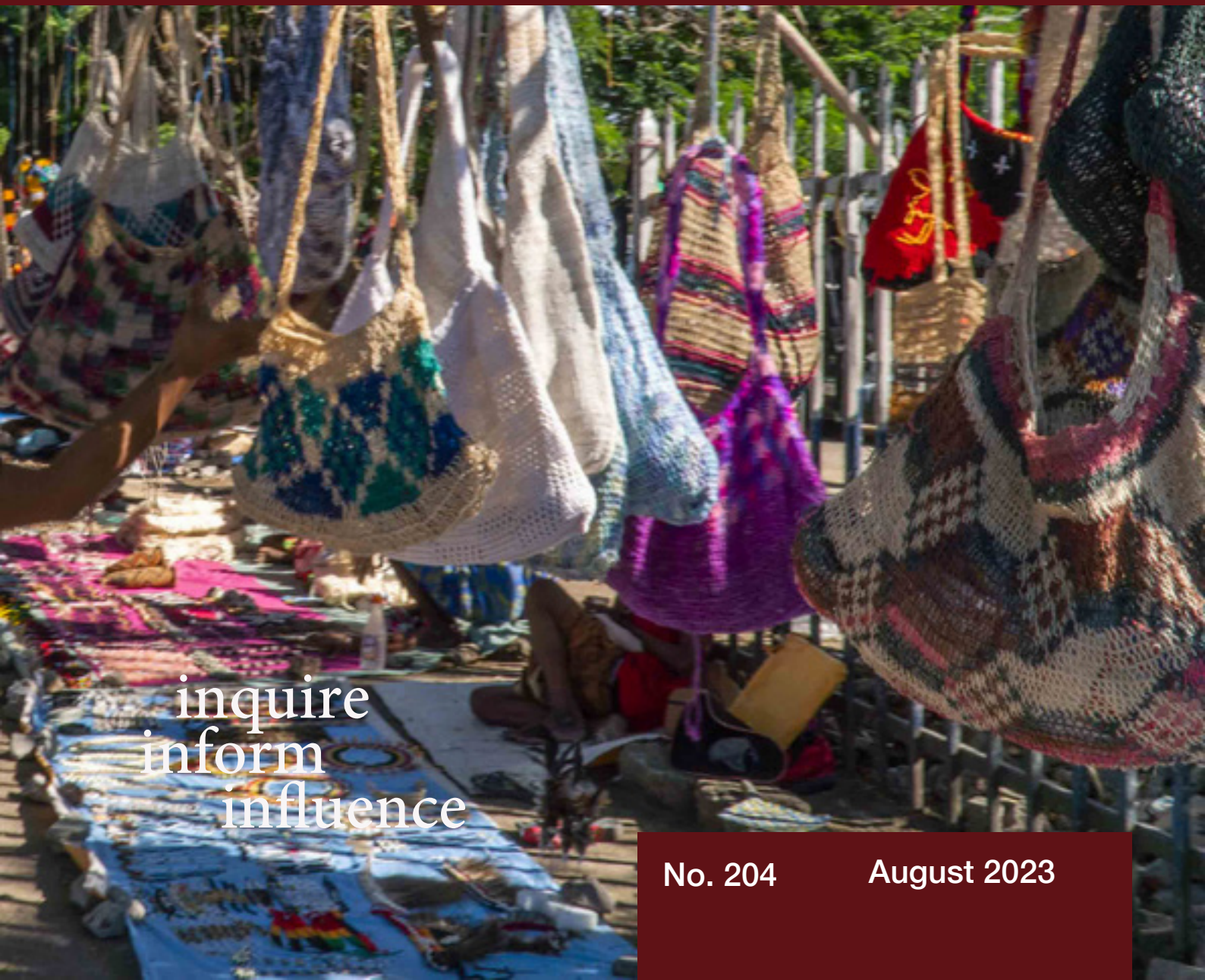
THE NATIONAL
RESEARCH INSTITUTE
PAPUA NEW GUINEA

DISCUSSION PAPER

ACCESS TO FINANCE AS A
POTENTIAL BARRIER TO WOMEN'S
PROGRESS IN THE SME SECTOR IN
PAPUA NEW GUINEA

John Akoten
Francis Odhuno

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Direct any inquiries regarding this publication to:

The Publications Editor
National Research Institute
P.O. Box 5854
Boroko, NCD 111
Papua New Guinea

Tel: +675 326 0300/326 0061; Fax: +675 326 0213

Email: pngnri@pngnri.org

Website: www.pngnri.org

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About the Authors

John Akoten is the Director of Research, Planning and Quality Assurance at the Kenya Anti-Counterfeit Authority. He has over 20 years working experiencing in the private and public sectors (at operational, research and policy-related levels).

Francis Odhuno is the Associate Professorial Research Fellow at the National Research Institute in Papua New Guinea. He is currently the Economic Policy Research Program leader.

Abbreviations and Acronyms

ADB	Asian Development Bank
ANZ	Australia and New Zealand Bank
BSP	Bank of South Pacific
EUI	Economist Intelligence Unit
GDP	Gross Domestic Product
IPA	Investment Promotion Authority
IRC	Internal Revenue Commission
MSME	Micro, Small and Medium-sized Enterprise
PNG	Papua New Guinea

Abstract

Several studies have found that micro, small and medium-sized firms are the majority businesses in some countries, and they greatly contribute to both economic growth and employment. However, challenges with financial access often inhibit their growth potential especially among female-owned firms. Using secondary survey data, this study estimates the impact of access to formal loans as well as the perceived difficulty in accessing loans from financial institutions on the performance of women-owned or women-managed small and medium-sized firms in Papua New Guinea (PNG). Based on 2SLS regressions, the major findings of the study are that access to formal credit does not offer any growth advantage to female-owned firms or to firms whose top managers are mostly female. Similarly, financial access difficulty was insignificant to the growth of female-owned firms, but it offered some growth advantage to firms whose top managers are mostly female. Firms belonging to an industrial association grew faster for all female-owned firms who accessed formal loans but not those experiencing loan access difficulty among female-owned and female top-managed firms. Equally important, the use of professional advisory services was associated with higher employment growth for female-owned firms as well as female top-managed firms. We did not find any significant impact of the age of the firm nor owners' age and education on firm performance among firms in PNG. The paper offers policy prescriptions on the measures to be considered in enhancing access to finance to support female-owned and managed firms in the country.

Introduction

Background

It is believed that micro, small and medium-sized enterprises (MSMEs) have a potential to grow and contribute to economic development, particularly in developing economies (World Bank, 2022). They account for majority of businesses worldwide and are important contributors to job creation and global economic development. About 90 percent of businesses are MSMEs and they account for more than 50 percent of employment worldwide (World Bank, 2022). In terms of the GDP contribution, formal SMEs contribute up to 40 percent of national income in emerging economies and these numbers are significantly higher when informal SMEs are included (World Bank, 2022).

In Papua New Guinea (PNG), information on the current economic contribution of MSMEs is scarce. Estimates from a recent survey suggest that there are between 28,000 and 33,000 MSMEs that employ about 480,000 people (Tebbutt Research, 2014). But it is not clear how much of the 28.5 percent private sector contribution to the country's GDP can be attributed to the MSME sector activities. Still, the Government's commitment to grow and diversify the country's MSME sector is reinforced in the MSME Policy 2016 and its [Implementation] Master Plan 2016-2030 (Ministry of Commerce, Trade & Industry, 2016a, b). The MSME policy has clear targets of increasing, by 2030: (i) the number of indigenous MSME operators to 500,000; (ii) MSME employment to 2 million jobs; and (iii) the share of MSME contribution to 50 percent of the country's GDP.

Despite their growth potential, MSMEs in developing economies like PNG face significant challenges (Bigsten et al., 2003). Some of these challenges include financial constraints. Quartey et al. (2017) argued that MSMEs in West Africa, for example, suffer from inability to access credit which are connected with MSMEs' lack of collateral, not creditworthiness, small cash flows, inadequate credit history, high risk premiums, underdeveloped bank-borrower relationships and high transaction costs. As discussed in the paragraphs that follows, financial constraint is a challenge that MSMEs in PNG also face.

Overview of SME financing in Papua New Guinea

Despite the presence of sufficient liquidity in the PNG's banking sector, MSMEs still face difficulty in accessing credits to enable them to grow and invest. According to the Tebbutt Research (2014) survey, only 10 percent of male respondents said it is very easy to obtain loan or credit for business, compared to 13 percent of female respondents. Hence, majority of MSMEs owned or managed by both genders do not have access to external finance provided by banks and financial institutions. Among the top 10 obstacles to MSME growth, as reported in the Tebbutt Research (2014) survey, access to finance, loans or capital was ranked second and difficulty dealing with banks was ranked fifth obstacle to expansion and growth. In a 2012 survey, quality and access to financial services was ranked the fifth most important issue that the PNG Government should address to encourage business and investment in the country (INA and ADB, 2013).

While access to finance is one of the major problems facing MSMEs, it is possible that there are gender inequities in access to finance generally (Fairlie and Robb, 2009). Male entrepreneurs often have a finance access advantage compared with their female colleagues because of several reasons, one is that most men own collateral which are key requirements in loan access. Another reason is that men do not face social constraints unlike women who are "forced" by their husbands or male family members to divert part of the loan to other family needs. It has also been established that male entrepreneurs often start with a larger start-up capital than female entrepreneurs (Fairlie and Robb, 2009). Since women-led/owned MSMEs are often hampered by an inability to obtain financial capital for growth and expansion, compared to their male counterparts, comparing male and female-owned enterprises in terms of their performance, conditional on access to finance, would lead to a bias.

The fact that PNG is ranked among the worst five of 128 countries in women's economic opportunity index (EUI, 2012) is concerning, given that the MSME sector has the potential for generating jobs and income for women. Evidence elsewhere points to limited access to finance, due to lack of collateral and complex loan application process, as one of the key factors that hamper women's MSME growth (ADB, 2014). To test this hypothesis, this study departs from previous research by not comparing male and female-owned enterprises in terms of their access to finance and its impact on firm performance. Instead, it attempts to identify and estimate the extent to which access to capital could be impeding the growth of women-owned and women-operated MSMEs as a first step in addressing challenges that bedevil the progress of women entrepreneurs in PNG. The study focuses not only on female-owned enterprises but also on female top-managed firms.

Objective of this study

The main objective of this study is to empirically estimate the impact of access to formal loans or credit and the perceived difficulty in accessing credit on employment growth of MSME firms that are owned or managed by women.

More specifically, the study seeks to:

1. Establish the impact of access to formal loans or credit on the growth of all female or majority female owned and managed MSME firms;
2. Establish the impact of perceived difficulty in accessing finances on the growth of all female or majority female-owned and managed MSME firms.

The rest of the paper is structured as follows. Section 2 reviews the literature on firm performance and its determinants including access to finance or financial constraints. Section 3 introduces the data and data variables. Section 4 presents the analytical framework. Section 5 presents the findings and discusses the results, and section 6 concludes and makes relevant policy recommendations.

Literature Review

Financial challenges facing small and medium enterprises

According to the World Bank (2012), MSMEs play an important role in developing economies. They account for 90 percent of businesses, over 50 percent of employment worldwide and over 40 percent of GDP in emerging economies. This growth potential notwithstanding, SMEs face one major challenge: access to finance – a key constraint to their growth.

Small businesses, especially those in the rural areas in developing economies, have difficulty in accessing formal credit. The problem seems to be worse for female entrepreneurs who tend to be discriminated by banks compared with their male counterparts (Prasad, 2009). This is mainly because of informational asymmetry that leads to failure in the financial market. Credit rationing among firms is largely due to adverse selection (hidden information) because of variability and risks related to the informal sector and moral hazard (hidden action) (Fiamohe et al., 2021). Due to financial constraints, MSMEs fill the gap by obtaining business finance from various sources. This includes finance from friends and family members, rotating savings and credit associations, trade credit, banks, micro-financial institutions and own savings (Akoten, 2007; Akoten et al., 2006).

In the next sub-section, we review the literature on the impact of financial access and other control variables on firm performance. This will guide in the identification of variables to be used in this study.

Determinants of firm performance

Firm performance may be measured using several parameters. These include profits (Fiamohe et al., 2021; Ying and Mei, 2014; Akoten et al. 2006), employment growth (Ezebilo et al., 2019), and firm sales (Cumming and Fischer, 2011). The factors that explain firm performance include firm-specific and owner/manager-specific characteristics such as the age of the firm, size of the firm, age of the owner/manager, education, gender, marital status, among other control variables. Each of the control variables and how it affects the performance variable is explained below.

Access to finance: Fowowe (2017) examines the impact of access to finance on firm performance in African countries. Fowowe (2017) uses two measures of financial access: a ranking of financial access as no obstacle or severe obstacle to business operation, and whether a firm is credit constrained or not. He finds that financial obstacle exerts significant negative impact on firm growth while firms who were credit constrained grow slower than those who were not credit constrained.

Age of the owner: According to Akoten et al. (2006), younger enterprise owners experienced less profitability and employment growth than older managers, signifying the importance of experience in business management as proxied by the age of the owner.

Firm age: Using the data on micro and small enterprises in Kenya, Akoten et al. (2006) found that the age of the enterprise had no impact on firm performance as measured by profitability and employment growth. Ezebilo et al. (2019) found no significant relationship between firm age and employment growth.

Initial firm size: Firm size can be measured in terms of the number of employees and firm sales. The initial firm size has been found to have mixed impacts on firm performance. It is found to have a negative impact on employment growth in PNG (Ezebilo et al., 2019), profitability and employment growth of SMEs in Kenya (Akoten et al., 2006), others find a positive relationship between firm size and firm performance as measured by profitability (Ying and Mei, 2014; Magoutas et al., 2011), which signifies the presence of economies of scale. Other studies have found no significant relationship between initial firm size and firm performance, a phenomenon referred to as the Gibrat's law of proportionate effect (Gibrat, 1931¹) which postulated that the proportional change in the size of a firm is independent of its absolute size. This implies that large and small

¹ As cited in Santarelli et al. (2006).

firms have the same average proportionate rates of growth. Santarelli et al. (2006) provides a literature review of various research work whether the Gibrat's law (Gibrat, 1931) holds or does not hold.

Education: Education has been found to have a positive effect on profitability and employment growth in Kenya (Akoten et al., 2006). Magoutas et al. (2011) found a positive impact of education on firm performance (profitability) in Greece. Ying and Mei (2014) also found a negative relationship between a Chief Executive Officer's education (those with postgraduate degree) and firm performance in Hong Kong. They explain this finding as due to "overconfidence bias" where the CEO's subjective confidence in their judgments is reliably greater than their objective accuracy.

Membership in industry association: Firms in similar sub-sectors willingly enter into industry associations in order to benefit from collective lobbying by their association leadership for favourable policies from government. Unfortunately, not much research has been done to establish the impact of industry association membership on firm performance. Some studies analyse group membership based on ISIC code and others based on other factors. Theuvsen et al. (2010) examined the impact of strategic group membership on firm performance. They consider strategic group membership as industry groupings based on product differentiation, product diversification and vertical integration. In their analysis of the German brewing industry, they found that industry groups exhibit differences in firm performance in terms of beverage output, turnover, profit and return on investment. Holcomb (2007) undertook a similar approach where he examines the impact of industry membership on firm performance. Like Theuvsen et al. (2010), they considered industry membership as environmental/market conditions that were assumed to be idiosyncratic to each industry. They created industry membership by grouping firms based on the 3-digit Standard Industrial Classification codes and found that industry membership was positively related with a firm's financial performance. However, to our knowledge, it is only Cainelli et al. (2022) who defined group membership as an association of like-minded industries who associate to achieve a common goal. In their analysis, they found a short-run growth premium for international group members among Italian and Spanish manufacturing firms. Our research will build on the work by Cainelli et al. (2022) in examining the impact of local industry association on firm performance with specific reference to SMEs in PNG.

Use of business advisory services: Business advisory services, also referred to as coaching, have been found to enhance business performance. Cumming and Fischer (2012) established a positive impact of business advisory services on firm's outcomes such as sales growth, patents, finance and alliances for SMEs in Canada. Oteng and Emmanuel (2016) examined the impact of business advisory services on firm performance based on a theoretical framework. Kent (1994) argued that financial performance was positively significantly related to using management advisory services from external advisers when profit and sales growth were used as indicators of financial performance. Other studies found mixed results on the impact of coaching on business performance. For instance, Labrecht and Pirnay (2005), in their study conducted in the Walloon region of Belgium, found no evidence that publicly funded advisory services had a significant impact on net job creation, sales.

Other control factors examined in the literature include gender of the owner, marital status, and location. In our study, we examine the impact of financial access on firm performance among female-owned and female top-managed firms and exclude male-run or male-dominated firms. This study is unique in the sense that it seeks to establish the impact of actual access to formal credit or its inaccessibility to firm performance. Secondly, it seeks to establish the impact of perceived difficulty in accessing finance on firm growth for female-owned and female top-managed firms. Moreover, unlike previous studies, this study seeks to establish whether membership in industrial association confers any significant growth benefit to SMEs. To our understanding, no paper has been published on the impact of industrial membership on firm performance especially on MSMEs in PNG.

Data and Variables

MSME survey dataset

The study used data from the survey of MSMEs collected by Tebbutt Research (2014) to assess the effect of access to formal loans or credit and the perceived difficulty in accessing credit on the performance of MSMEs owned or managed by women. Tebbutt Research (2014) conducted a representative face-to-face survey of 1,117 formal MSME business owners and managers in all the 22 provinces in PNG². Top managers were allowed to participate in the survey in the absence of the business owner(s). Interviews were undertaken between October 28 and December 14, 2013. To be interviewed, Tebbutt Research (2014) generalised the definition and qualifying criteria for MSMEs based on their data scan results: MSMEs are businesses that are registered with the Investment Promotion Authority (IPA), Internal Revenue Commission (IRC) or those that have current borrowing with Bank South Pacific (BSP), the country's dominant commercial bank. In addition to satisfying this formality requirement, only businesses that have between three and 150 paid employees, have a maximum borrowing of PGK1.5 million and annual turnover between PGK100,000 and PGK15 million qualified as MSMEs.

In addition to the composition of gender and management of the MSMEs, the survey also collected information on the number of employees in 2012, expected number of employees in the next 12 months, business access to loans and lines of credit, membership in business associations, business assets, management of business, business ownership, difficulty in accessing loans, whether the business hired an external professional or consultant to assist the business, age of the respondent, highest level of education, among other variables. The construction of these and other variables used in the analysis is explained in the next section.

Dependent variable: firm performance

For purposes of this study, we used employment growth as a measure of firm performance. Employment growth is commonly used because it is free from errors unlike other performance measures such as profits and sales revenue³. The Tebbutt Research (2014) database has only one cross-section. However, there are two variables that capture the number of employees at two different points in time: the number of employees in PNG offices in 2012, and the estimated number of new jobs that will be provided in the next 12 months. Thus, while the survey has only one cross section, we can compute the expected employment growth between the years 2012 and 2013.

There are two methods of calculating enterprise growth: absolute and relative change. Absolute change takes the difference in employment between two points in time while the latter takes this difference relative to the initial size of the firm. The two methods can lead to different results in the sense that absolute growth is biased towards large firms, while relative growth is biased towards small firms (Daunfeldt et al., 2013).

To reduce the biases, the denominator is computed as the average of the employment between the two periods under reference (Reyes, 2018). Thus, the employment growth is calculated as:

$$mpgrowth = \frac{Emp2013 - Emp2012}{0.5(Emp2013 + Emp2012)}$$

Where *mpgrowth* is the midpoint employment growth, Emp2013 and Emp2012 are the number of employees in the year 2013 and 2012, respectively.

² While Tebbutt Research (2014) also surveyed 521 unregistered MSMEs, the raw data for this subsample is not currently available for public use, hence informal MSMEs are not considered in this paper.

³ Firms often understate sales revenue and profits in order to evade paying higher taxes to government authorities.

Independent variables

Loan access (LoanAccess) - SME firms in PNG were asked whether or not they had access to loans or lines of credit from banks or credit organisations. These institutions include the ANZ, BSP, Bank of Papua New Guinea, Credit Corp, Gearing Pacific, National Development Bank, Peoples Micro Bank, PNG Microfinance, Westpac, and First Investment Finance Ltd. Some respondents refused to respond, and others indicated that they did not know. These groups were excluded from the analysis. Those who responded “Yes” for having received a loan from any of the above institutions was coded as “1” while those who responded “No” were coded as “0”. Thus, we developed a dummy variable for loan access that takes the value 1 if a responded received a loan from any of the financial institutions and 0 if not.

Loan difficulty (LoanDifficulty) – One of the constraints that SMEs face is the difficulty in accessing loans or credit when a firm needs it. Indeed, financial constraint is a major challenge that affects the growth of small businesses. In order to test the effect of financial constraints on SMES in PNG, we constructed another variable, LoanDifficulty, to indicate the ease or difficulty in accessing a loan or credit when a business needs it. Managers or owners were asked to rate the easiness or difficulty in accessing a loan or credit when they need it. They responded in form of a Likert scale of four groups as follows: 1= very easy; 2= somewhat easy; 3= somewhat difficult; 4= very difficult. We note that the responses that are adjacent could actually be the same due to approximation. For instance, those who say, “very easy” might actually mean “somewhat easy”. We therefore amalgamated the lower and upper adjacent responses to form two groups. These are: 1= if very difficult or somewhat difficult; and 0= if very easy or somewhat easy.

Firm age (Fage): This is the number of years a firm has been going for.

Owner/manager’s age (Age): This is the age of the respondent in years.

Membership in business association (Membership): This takes the value 1 if a firm is a member of an industry group or association such as the local chamber of commerce, business council, industry association or any other, and zero if otherwise. Among the female-only firms, 1 firm reported “other”, 150 reported “none” and 12 “don’t know”. Those who reported “none” or “don’t know” were excluded from the analyses.

Whether firm hired professional services (Hiredprof): This takes the value 1 if a firm ever hired an external professional or consultant to assist the business, and zero if otherwise.

Whether the owner/manager has some university or university education as the highest level of education (Univ): This takes the value 1 if a manager or owner has some university or university education as the highest level of education, and zero if otherwise.

Model Specification

Structural equation

Firm performance is determined by the initial size of the firm (as measured by such variables as employment), owner- and firm-specific characteristics. Following Ezebilo et al. (2019), the equation that explains firm performance in terms of employment growth can be depicted as follows:

$$Y_{it} = aZ_i + \beta_0 + \beta_1 X_{i1} + \beta_2 X_{i2} + \dots + \beta_6 X_{i6} + u_i \quad (1)$$

Where,

Y_{it} = is the midpoint employment growth for firm i between period t and $t-1$ (*Mpgrowth*)

Z_i = is a dummy for either *LoanAccess* or *LoanDifficulty*. The dummy *LoanAccess* takes the value 1 if a firm accessed a loan or credit from a financial institution and 0 if otherwise. For the dummy *LoanDifficulty*, it takes the value 1 if a firm reported “difficult” or “somewhat difficult” in accessing a loan, and zero if otherwise.

X_{i1} = is the log of employment (numbers) for firm i in the period $t-1$ (*LnEmp*)

X_{i2} = is the log of the age of the firm i in years (*LnFage*)

X_{i3} = is the age of the firm owner in years (*Age*)

X_{i4} = is a dummy that takes the value 1 if a firm is a member of an industry group or association and 0 if otherwise (*Membership*)

X_{i5} = is a dummy that takes the value 1 if a firm ever hired an external professional or consultant to assist the business, and zero if otherwise (*Hiredprof*)

X_{i6} = is a dummy that takes the value 1 if a manager or owner has some university or university education as the highest level of education, and zero if otherwise (*Univ*)

β_0 is the constant, whereas β_{1-6} are the coefficients to be estimated. u_i is the error term.

The variable Z_i is likely to be endogenous if it is correlated with u_i . Z_i would be correlated with u_i if (a) there are omitted variables that are correlated with Z_1 and Z_2 , (b) Z_i is measured with errors, and (c) Z_1 and Z_2 are simultaneously determined. In the Tebbutt Research (2014) data, we suspect that there are omitted variables in equation (1) such as ability to repay a loan which financial institutions consider when determining whether or not to grant a loan to a firm. An OLS regression of equation (1), which is the structural equation, will result in biased and inconsistent estimators of (β_{1-6}) since $E(u_i) \neq 0$ and $Cov(LoanDifficulty/LoanAccess, u) \neq 0$ if *LoanDifficulty/LoanAccess* and ability are correlated. To obtain unbiased estimators, we need to find an instrumental variable for Z_i (*LoanDifficulty/LoanAccess*) which is correlated with Z_i but not u_i .

2SLS Approach and Validity of the Instruments

Since financial institutions consider collateral as one prerequisite for approving loan applications, the collateral is a guarantee to a financial institution so that if the borrower fails to repay the loan, the bank can sell the collateral and obtain the loan amount. Without collateral, a financial institution has no way to get back the money in case of failure of repayment. Collateral can come in the form of assets such as land, buildings, machinery and sales inventory. Therefore, possessing assets increases the chances of a business owner to access credit from a financial institution. However, ownership of assets per se is not a guarantee that a firm will be successful. In the Tebbutt Research (2014) dataset, business owners own land, buildings, machinery, sales inventory and therefore, these can serve as instruments (V) for the variable Z (*LoanAccess* or *LoanDifficulty*).

An observed variable V_i will be a valid instrumental variable if it satisfies the following conditions:

$Cov(V_i, u_i) = 0$ i.e. V_i is uncorrelated with u_i .

$Cov(V_i, Z_i) \neq 0$ i.e. V_i is partially and sufficiently strongly correlated with Z_i , where Z_i is a vector of variables that explain LoanAccess/LoanDifficulty but not employment growth.

The condition that V_i is partially and sufficiently strongly correlated with Z_i can be confirmed by estimating a simple regression between V_i and Z_i as follows:

$$Z_i = \theta_0 + \theta_1 V_i + v, \quad \theta_1 = \frac{Cov(Z_i, V_i)}{Var(Z_i)} \neq 0$$

$E(v) = 0$; $Cov(Z_i, V_i) \neq 0$; and $Cov(Z_i, v) = 0$

Thus, we estimate a reduced form for Z_i as follows:

$$Z_i = \gamma V_i + \pi_0 + \pi_1 X_{i1} + \pi_2 X_{i2} + \dots + \pi_6 X_{i6} + v_i \quad (2)$$

For V_i to be a valid IV, $\gamma \neq 0$. To confirm this, we estimated equation (2) using OLS. The results are shown in Appendix 1.

From these results, the F-value ranges from 1.73 to 3.59 which are significant at conventional levels, confirming that the instruments together with the regressors explain about 11–28 percent of the variation in loan access or difficulty in accessing loans from financial institutions. Moreover, the coefficient γ is significant and different from zero for the seven instruments (land, buildings, machinery, sales inventory, cash in hand, cash at bank and stocks/bonds) in different columns. This confirms that the instruments are valid and can be used in equation 1 to treat the endogeneity problem.

Empirical Results and Discussion

Descriptive statistics

Some basic statistics

A total of 1,117 firms distributed in four regions and 22 provinces were sampled during the World Bank survey. The survey covered four regions: Highlands, Islands, Momase and Southern. The majority of the enterprises sampled were in Highlands (30%), followed by Southern (28.4%), Islands (23.6%) and Momase (18.1%). For purposes of this study, we created two sub-samples based on ownership and top management. Each sub-sample was further divided into three categories: where the majority are women (some men) (for simplicity, herein referred to as Majority), a woman/all women (no men) (All Female), and equal number of men and women (Equal). For the purpose of analysis, sub-sample Majority and All Female were combined to form Majority⁴.

Table 1 shows the number of women-owned firms by ownership and top management. The proportion by ownership and top management in the whole sample of MSMEs is 26 percent and 30 percent respectively, suggesting that most women are involved in top management than in ownership.

Table 1: Categories of firms by ownership and top management

Variable	Ownership		Top Management	
	No.	%	No.	%
Majority are women (some men) (Majority)	12	1.1	15	1.3
A woman/all women (no men) (All)	88	7.9	115	10.3
Equal number of men and women (Equal)	192	17.2	200	17.9
	292	26.1	330	29.5
A man/all men (no women)	750	67.1	578	51.7
Majority are men (some women)	45	4.0	78	7.0
Does not apply/ shareholder organisation, etc.	28	2.5	127	11.4
Don't know	2	0.2	4	0.4
Total	1,117	100.0	1,117	100.0

Source: Calculated from Tebbutt Research (2014).

Table 2 presents the characteristics of the women-owned firms by ownership and top management for the three sub-samples. Panel a) is for a woman/all women (no men) (All Female); b) equal number of men and women (Equal); and c) majority are women (some men) (Majority).

From panel 2a), on average, owners tend to be older, have university education, are members of an industry association, hire professional services to assist the business, have larger initial firm size than top managers. However, top managers tend to have a larger employment size in 2013 and have older firms.

Panel 2b for firms with an equal number of women and men, the results show that top managers tend to be older, have university education, are members of an industry association, have larger initial employment size, and older firms. However, owners tend to have larger employment size in 2013 and they tend to hire professional services to assist their businesses.

Panel 2c shows the data for firms where the majority are women. The results show that owners tend to be older, have university education, are members of an industry association, hire professional services, have larger initial firm size, but have smaller employment size in 2013 and relatively younger firms.

⁴ With three sub-samples each for ownership and management, there will be 12 equations which compounds the analytical explanation. For simplicity, we reduce this to two sub-samples and 8 equations.

Table 2: Characteristics of owners and top managers

	Ownership	Top management
a) A woman/all women (no men) (All Female)		
Age (years)	44.90	44.74
Univ (=1)	0.35	0.26
Membership (=1)	0.30	0.28
Hiredprof (=1)	0.17	0.12
Emp2012 (number)	10.64	9.95
Emp2013 (number)	5.95	6.44
Fage (years)	7.21	7.85
b) Equal number of men and women (Equal)		
Age (years)	43.77	44.46
Univ (=1)	0.29	0.30
Membership (=1)	0.32	0.33
Hiredprof (=1)	0.19	0.16
Emp2012 (number)	14.94	15.58
Emp2013 (number)	12.67	9.70
Fage (years)	7.69	7.89
c) Majority are women (some men) (Majority)		
Age (years)	46.76	45.15
Univ (=1)	0.40	0.26
Membership (=1)	0.38	0.30
Hiredprof (=1)	0.29	0.10
Emp2012 (number)	10.67	9.72
Emp2013 (number)	4.76	6.49
Fage (years)	6.86	6.90

Source: Calculated from Tebbutt Research (2014).

Sources of loans and lines of credit to SMEs in PNG

Some SMEs in PNG had outstanding loans from various lines of credit as shown in Table 4. The first column (all sample) under panel a) on the source of outstanding loans, the table shows that the majority of SMEs had outstanding loans from commercial banks in PNG (10.4%), followed by MFI (5.6%) and commercial loans from offshore foreign banks (1.1%). The rest of the sources (supplier credit, informal lenders, family members or friends and personal savings) had less than 1 percent while there were no loans from employees. The proportion of SMEs that had loans at the time of the survey was 14.5 percent.

With regard to ownership, the proportion of firms with outstanding loans from commercial banks in PNG was highest among female majority firms (16.7%), followed by all female firms (16.1%) and lastly by equal ownership firms (9.0%). Loans from MFIs came second after commercial loans, followed by loans from supplier credit and from informal lenders. There were no loans from employees, while loans from family members or friends, personal savings and commercial loans from offshore foreign banks were minimal. With regard to top management, the trend was the same. The majority of loans came from commercial banks in PNG (ranging from 10.6% to 12.4%), followed by loans from MFIs (ranging from 4.9% to 7.6%), loans from family members or friends (1.2% to 2.1%), loans from supplier credit (1.2% to 1.5%), and loans from informal lenders (0.4% to 0.7%). There were no personal savings nor loans from employees.

Panel b) shows the proportion of firms who currently have loans or credit lines from banks or credit organisations. On average, 14.5 percent of all firms had loans. With regard to ownership, Majority were 26.2 percent followed by All Female firms (18.6%) and Equal ownership (14.9%). All Majority firms, which is a combination of All Female and Majority ownership, were 18.5 percent. On management, Majority firms were 18.6 percent, followed by Equal managed firms (15.8%), and All Female-managed firms (15.1%). All Majority managed firms were 15 percent.

The finding in Table 4 shows that, contrary to the belief that MFIs were established to provide loans to SMEs, most SMEs borrow loans from commercial banks. This is true whether firms are owned or managed by female entrepreneurs. This suggests that MFIs in PNG do not meet the financial needs of SMEs perhaps due to a cap on the maximum size of loans they disburse to loanees.

Difficulty in accessing loans or credit

Entrepreneurs were asked to rate how easy or difficult it was in getting a loan or credit for the business when they needed it. The ranking was based on a Likert scale of 1=very easy; 2=Somewhat easy; 3=Somewhat difficult; and 4=very difficult. Table 4 below show the number and proportion of respondents who responded to the question.

As it can be seen in Table 3 the majority of firms (34.2%) indicated that accessing loans or credit when a business needs it was somewhat difficulty, followed by those who said it was very difficult (27.7%), somewhat easy (26.2%) and last by those who said it was easy (12.0%). Due to approximation, the adjacent responses could actually be the same. For instance, those who said “very easy” might actually mean “somewhat easy”, and those who said “somewhat difficult” might actually mean “very difficult”. By combing the adjacent groups, the proportion of those who said very easy or somewhat easy is 38.2 percent, while the proportion of those who said somewhat difficult or very difficult is 61.8 percent. The latter group are the majority, indicating that most of them experience difficulty in accessing loans or credit from financial institutions.

Table 3: Difficulty in accessing loans or credit when the business needs it

Level	Description	Freq.	Percent	Cum.
1	Very easy	128	11.99	11.99
2	Somewhat easy	280	26.22	38.2
3	Somewhat difficult	365	34.18	72.38
4	Very difficult	295	27.62	100
Total		1,068	100	

Source: Calculated from Tebbutt Research (2014).

Table 4: Current outstanding loans and lines of credit from various sources

All sample		Ownership				Top management			
		Majority (1a)	All Female (1b)	Equal (1c)	All majority (1d)	Majority (2a)	All Female (2b)	Equal (2c)	All majority (2d)
Variable	Mean (%)	Mean (%)	Mean (%)	Mean (%)	Mean (%)	Mean (%)	Mean (%)	Mean (%)	Mean (%)
Sources of outstanding loans									
Commercial loan from banks in PNG	10.38	16.67	16.10	9.01	15.38	12.41	11.02	10.61	10.77
Commercial loan from offshore foreign banks	1.07	0.00	0.00	0.90	0.00	0.69	1.22	1.52	1.15
Loan from MFI	5.64	9.52	3.39	6.76	3.85	7.59	4.90	6.67	5.38
Loan from supplier credit	0.81	2.38	1.69	1.80	1.54	1.38	1.22	1.52	1.15
Loan from informal lenders	0.90	2.38	0.85	0.45	0.77	0.69	0.41	0.61	0.38
Loan from employees	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Loan from family members or friends	0.98	0.00	0.00	1.35	0.00	2.07	1.63	1.21	1.54
Personal savings	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Those who currently have loans or credit lines from banks or credit organisations									
Those who currently have loans	14.50	26.19	18.64	14.86	18.46	18.62	15.10	15.76	15.00
No. of observations	1,117	42	118	222	130	145	245	330	260

Source: Calculated from Tebbutt Research (2014).

Notes:

1. Sub-samples 1d and 2d are obtained by adding sub-samples 1a and 1c, and 2a and 2c, respectively.
2. Columns 1a/2a=female majority; 1b/2b=all female; 1c/2c=equal number of male and female; 1d/2d=all female majority (i.e. columns a+b)
3. The number of observations were different across sub-samples because of missing data in several variables.

Empirical statistics: Determinants of firm growth

The objective of this paper is to determine the impact of access to finance or difficulty in accessing finance on the performance of female-owned and female-managed firms. As noted in the previous section, we created two main sub-samples for analyses which are based on ownership and top management.

We divided the samples as follows:

1. Ownership
 - a. All female-owned firms, see column 1b (All Female) in Table 4.
 - b. All majority firms, i.e. a combination of majority female-owned firms and those where firms are equally owned between male(s) and female(s), i.e. 50 percent of owners of a firm are women. See column 1d (All Majority) in Table 4.
2. Top management
 - a. All female top-managed firms. See column 2b (All Female) in Table 4.
 - b. All majority top-managed firms, i.e. a combination of majority female-managed firms and those where firms are equally managed between male(s) and female(s), i.e. 50 percent of top managers of a firm are women. See column 2d (All Majority) in Table 4.

We estimated eight OLS and eight 2SLS regression models to examine the impact of access to formal loans and difficulty in accessing finance and other variables on employment growth for female-owned firms and female top-managed firms. Each of the female-owned and female top-managed firms was further sub-divided into all female firms and majority female firms. Tables 10 to 13 present the results of the analysis.

The F value for the OLS models range from 5.36 to 11.85 and are statistically significant at the 1 percent level, suggesting that the results from our models had overall significance. The R-squared, a statistical measure that determines the proportion of variance in the dependent variable that can be explained by the independent variable, ranges from 6 percent to 45 percent, meaning that the maximum variability by the explanatory variables is 45 percent. Since our two variables of interest – LoanAccess and LoanDifficulty are endogenous, we fixed the endogeneity problem by estimating the 2SLS models. The Wald chi-square returned values that range from 13.04 to 64.12 with a significance level ranging from 1 percent to 10 percent. This confirms that all independent variables in the 2SLS models are collectively statistically significant. Therefore, we restrict our discussion on the 2SLS regression results.

Firm's ownership

a) Impact of access to formal loan or credit

Table 5 shows the regression results for the determinants of employment growth between the years 2012 and 2013. Columns 1(a) and 1(b) show the results for all female-owned firms. Columns 2(a) and 2(b) show the results for the all majority female-owned firms.

Columns 1(a) and 2(a) show OLS regression results, while columns 1(b) and 2(b) show the 2SLS regression results. We will concentrate on the latter results for discussion. In column 1b, the coefficient of LoanAccess is negative but insignificant, suggesting that for all female-owned firms, those who had access to formal loans and those who did not has the same employment growth rate. The same result can be seen in column 2b where the estimator for LoanAccess is insignificant. Hence, loan access did not offer any growth advantage to all female-owned firms and all majority female-owned firms. This finding, which is contrary to the finding by Fowowe (2017), could be because of the lenders' risk-minimising measures such as the amount of loans, repayment terms, and the type of funds allocated, which may not favour women-run enterprises (Fiamohe et al, 2021).

Table 5: Regression estimates of employment growth and loan access (ownership)

Variable	All female-owned firms		All majority female-owned firms	
	OLS 1a	2SLS 1b	OLS 2a	2SLS 2b
LoanAccess (=1)	-0.12 (-0.86)	-0.33 (-0.75)	-0.21** (-1.98)	-0.59 (-1.16)
LnEmp2012 (number)	-0.45*** (-5.64)	-0.66*** (-5.69)	-0.33*** (-6.28)	-0.38*** (-4.30)
LnFage (years)	0.04 (0.52)	0.02 (0.20)	0.01 (0.22)	-0.01 (-0.09)
LnAge (years)	0.02 (0.12)	0.24 (0.84)	0.11 (0.73)	0.29 (1.14)
Membership (=1)	0.36*** (2.98)	0.37*** (2.63)	0.11 (1.28)	0.13 (0.92)
Hiredprof (=1)	-0.02 (-0.15)	0.35* (1.66)	0.04 (0.36)	0.36** (2.00)
Univ (=1)	-0.23* (-1.97)	-0.12 (-0.80)	-0.05 (-0.52)	0.09 (0.69)
Constant	0.27 (0.35)	-0.20 (-0.19)	-0.18 (-0.32)	-0.75 (-0.84)
F statistics	6.26***	N/A	7.37***	N/A
R-squared	0.32	0.45	0.17	0.09
Wald chi2	N/A	64.12***	N/A	19.86***
Sample size	102	57	263	139

Numbers in parentheses are t-statistics for OLS regression and z-statistics for 2SLS regression.

*, **, *** represent significant at 10%, 5%, and 1% levels, respectively.

Source: Calculated from Tebbutt Research (2014).

Another reason access to finance does not have an impact on firm performance of female-owned firms in PNG could be due to a phenomenon referred to as expropriation (Babbitt et al., 2015). This is a phenomenon where funds received by women is more likely to be expropriated by other family members or diverted towards other family needs due to the pressure by their husbands or other family members. This finding is also supported by the work of Buvinić and Furst-Nichols (2016) who argued that if a loan accessed by a female entrepreneur is insufficient, it may not promote the growth of female-owned enterprises.

Initial firm size has a significant and negative impact on growth for all types of firms. A 1 percent increase in the initial firm size leads to a 0.66 percent decrease in growth rate for all female-owned firms and a 0.38 percent reduction in the growth rate for majority female-owned firms. Thus, larger firms have a slower growth rate which is inconsistent with the Gibrat's law (Gibrat, 1931) which states that initial employment is not related with the employment growth rate. According to this law, large and small firms have the same average proportionate rates of growth. This finding supports the results of previous research work such as those of Ezebilo et al. (2019) and Akoten et al. (2006).

The coefficient associated with the age of the firm is statistically insignificant. This suggests that, taking all other variables constant, older and younger female-owned firms have the same growth rate. The same applies to the age of the owner – younger and older owners experience the same growth rate. This is contrary to the findings by Ezebilo et al. (2019).

However, being a member of an industry association offers an advantage to all female-owned firms but not majority female-owned firms. Member firms experience faster growth rate by 37 percent which is significant at 1 percent level than non-member firms for all female-owned firms. This finding is in congruence with the finding by Cainelli et al. (2022) who found a positive association between industry membership and firm growth. Membership by firms in industry association is something that is common in many countries. Firms form an association in order to address challenges they collectively face such as lobbying for a favourable policy from government.

It is believed that advisory services to SMEs is beneficial. Indeed, several firms in PNG use or hire professional services to advise the SMEs. According to the results in columns 1b and 2b, those who use such services grow faster by 35 percent and 36 percent, respectively for all female-owned firms and majority female-owned firms. The coefficients are significant at 10 percent and 5 percent, respectively. These results are in support of the findings by Oteng and Emmanuel (2016), Cumming and Fischer (2011) and Kent (1994).

Finally, all things held constant, education does not offer any significant growth advantage to female-owned firms. Previous studies reported mixed effect of education on firm growth. For instance, Magoutas et al. (2011) found a positive relationship between education and profitability, while Ying and Mei (2014) found a negative relationship between a firm's CEO education and firm performance. The fact that university education is not statistically associated with MSME growth in PNG may be explained by the fact that there was no significant variation in the university education levels among female-owned and managed firms in PNG.

b) Impact of difficulty in accessing loans

Turning to the impact of the difficulty in accessing loans to firm growth, Table 6 shows the OLS and 2SLS regression results for all female-owned firms and majority female-owned firms. Again, we concentrate on the 2SLS results. From columns 1b and 2b, the coefficient of LoanDifficulty is positive but insignificant at conventional levels. This suggests that those firms who reported having difficulty in accessing loans and those that did not register the same employment growth. Again, due to possible expropriation of funding obtained from a lender by their husbands or family members, women with financial difficulties and those without may not differ in firm performance (Babbitt et al., 2015).

Like in Table 5, the coefficient associated with the initial firm size is negatively related with firm growth, again invalidating the Gibrat's (Gibrat, 1931) law of proportionate effect. Thus, smaller firms grow faster than larger firms among female-owned firms. The growth rate is 0.67 percent and 0.40 percent faster for all female-owned

firms and majority female-owned firms, respectively. This means that the growth is faster for all female-owned firms than majority female-owned firms. The impacts in both cases are statistically significant at the 1 percent level.

Our results also suggest that the age of the firm, the age of the owner as well as membership in industrial association are insignificant in explaining employment growth among female-owned firms in PNG. However, the use or hiring of a professional or consultancy advisory services is associated with a 39 percent and 29 percent higher growth for all female-owned firms and majority female-owned firms, respectively. The impacts are statistically significant at the 10 percent level.

Like in Table 5, education does not seem to offer any significant growth advantage to the female-owned firms in PNG.

Table 6: Regression estimates of employment growth and loan access difficulty (ownership)

Dependent variable: midpoint employment growth (Mpgrowth)

Variable	All female-owned firms		All majority female-owned firms	
	OLS	2SLS	OLS	2SLS
	1a	1b	2a	2b
	Coef. (t)	Coef. (z)	Coef. (t)	Coef. (z)
LoanDifficulty (=1)	0.09 (0.77)	0.12 (0.20)	0.06 (0.70)	0.34 (0.59)
LnEmp2012 (number)	-0.47*** (-5.56)	-0.67*** (-3.86)	-0.33*** (-6.10)	-0.40*** (-3.81)
LnFage (years)	0.02 (0.20)	-0.02 (-0.18)	0.01 (0.30)	0.01 (0.09)
LnAge (years)	0.00 (0.01)	0.15 (0.45)	0.11 (0.71)	0.15 (0.57)
Membership (=1)	0.36*** (2.83)	0.30 (1.50)	0.11 (1.25)	0.17 (0.87)
Hiredprof (=1)	0.02 (0.09)	0.39* (1.73)	0.06 (0.57)	0.29* (1.70)
Univ (=1)	-0.23* (-1.85)	-0.11 (-0.69)	-0.04 (-0.43)	0.11 (0.66)
Constant	0.35 (0.43)	0.11 (0.09)	-0.25 (-0.42)	-0.52 (-0.57)
F statistics	6.01***		6.11***	
R-squared	0.32		0.15	
Wald chi2			41.5***	
Sample size			54	
			249	
			133	

Numbers in parentheses are t-statistics for OLS regression and z-statistics for 2SLS regression.

*, **, *** represent significant at 10%, 5%, and 1% levels, respectively.

Source: Calculated from Tebbutt Research (2014).

Firm's top management

a) Impact of access to formal loan or credit

Next, we examine the impact of access to formal loans or credit on the growth of female top-managed firms, whether they are all female top-managed, or majority female top managed. The estimation results are presented in Table 7.

From our results in columns 1b and 2b, the coefficient of LoanAccess is negative but insignificant at conventional levels. This implies that access to formal loans or credit did not benefit female top-managed firms in a significant way. In a study on the impact of meso-credit on female-owned enterprises in Ethiopia, Alibhai et al. (2018) argued that micro credit given to women entrepreneurs in Ethiopia did not have any significant effect on firm growth. There is a likelihood that female entrepreneurs in PNG equally received insufficient credit which did not provide any meaningful impact on their performance.

Contrary to the Gibrat's law (Gibrat, 1931), initial firm size is negatively associated with firm growth for both

all-female top-managed firms and majority female-managed firms. The impact, which is highly significant at the 1 percent level, is negative 0.39 percent for the former firms and negative 0.33 percent for the latter firms. That suggests that all female top-managed firms grow faster than majority female top-managed firms. It appears that when top managers are wholly women, they are able to agree faster and make the right business decision to grow their business than when the top managers are composed of both men and women. This finding is also in consonant with those of Ezebilo et al. (2019) and Akoten et al. (2006).

Firm age, age of the owner, membership to an industry association, use of professional services to assist businesses and education are insignificant determinants of firm growth among female top-managed firms in PNG.

Table 7: Regression estimates of employment growth and loan access (top management)

Dependent variable: midpoint employment growth (Mpgrowth)

	All female top-managed firms		All majority female top-managed firms	
	OLS	2SLS	OLS	2SLS
	1a	1b	2a	2b
Variable	Coef. (t)	Coef. (z)	Coef. (t)	Coef. (z)
LoanAccess (=1)	0.03 (0.27)	-0.15 (-0.34)	-0.04 (-0.40)	-0.22 (-0.46)
LnEmp2012 (number)	-0.37*** (-5.78)	-0.39*** (-3.85)	-0.35*** (-8.10)	-0.33*** (-3.82)
LnFage (years)	0.05 (0.89)	0.01 (0.23)	0.02 (0.41)	-0.01 (-0.15)
LnAge (years)	-0.18 (-1.05)	-0.02 (-0.04)	0.01 (0.10)	0.10 (0.36)
Membership (=1)	0.17* (1.89)	0.09 (0.54)	0.14** (2.08)	0.12 (0.87)
Hiredprof (=1)	0.00 (0.03)	0.21 (0.90)	-0.12 (-1.25)	0.03 (0.14)
Univ (=1)	-0.13 (-1.35)	-0.03 (-0.23)	-0.01 (-0.10)	0.15 (1.24)
Constant	0.89 (1.38)	0.34 (0.23)	0.20 (0.42)	-0.15 (-0.15)
F statistics	5.39***		11.85***	
R-squared	0.15	0.14	0.19	0.13
Wald chi2		17.87**		23.06***
Sample size	217	102	371	179

Numbers in parentheses are t-statistics for OLS regression and z-statistics for 2SLS regression.

*, **, *** represent significant at 10%, 5%, and 1% levels, respectively.

Source: Calculated from Tebbutt Research (2014).

b) Difficulty in accessing finance

Lastly, we examine the effect of the difficulty in accessing finance to firm growth among female top-managed firms. The estimation results are presented in Table 8. The result in column 1b shows that firms that experienced difficulty in accessing loans grew slower by 1.57 percent for all female top-managed firms but there was no significant growth disadvantage for majority female top-managed firms. The coefficient of LoanDifficulty in column 1b is significant at the 5 percent level. It appears that financial difficulty did not affect majority female top-managed firms in PNG than it did for all female top-managed firms. Firms that had a mix of both genders in top management appeared to address loan difficulty in a more efficient manner than firms where top managers are wholly female. The finding that access to finance has a negative and significant impact on growth is consistent with the findings of Fowowe (2021) for the case of SMEs in Africa.

The initial firm size is negative and insignificant in column 1b but negative and significant at 1 percent level in column 2b. This finding is consistent with the finding of Ezebilo et al. (2019) and Akoten et al. (2006). Thus, Gibrat's law (Gibrat, 1931) holds for all female top-managed firms but not for majority female top-managed firms. In the case of the former, both small and large firms' growth with the same rate but small firms grow faster than large firms in the case of the latter, the majority female top-managed firms.

Table 8: Regression estimates of employment growth and loan access difficulty (top management)

Dependent variable: midpoint employment growth (Mpgrowth)

Variable	All female top-managed firms		All majority female top-managed firms	
	OLS	2SLS	OLS	2SLS
	1a	1b	2a	2b
	Coef. (t)	Coef. (z)	Coef. (t)	Coef. (z)
LoanDifficulty (=1)	0.07 (0.74)	-1.57** (-2.33)	0.06 (0.91)	-0.31 (-0.73)
LnEmp2012 (number)	-0.37*** (-5.75)	-0.10 (-0.53)	-0.35*** (-7.89)	-0.31*** (-3.45)
LnFage (years)	0.04 (0.78)	0.12 (1.01)	0.02 (0.39)	0.02 (0.28)
LnAge (years)	-0.24 (-1.35)	0.17 (0.33)	-0.01 (-0.04)	0.10 (0.41)
Membership (=1)	0.19** (2.06)	-0.29 (1.02)	0.16** (2.22)	0.04 (0.25)
Hiredprof (=1)	0.04 (0.30)	0.43 (1.26)	-0.13 (-1.26)	-0.11 (-0.59)
Univ (=1)	-0.11 (-1.08)	-0.14 (-0.57)	0.00 (0.00)	0.06 (0.45)
Constant	1.07 (1.62)	0.07 (0.03)	0.22 (0.45)	-0.01 (-0.01)
F statistics	5.36***		11.43***	
R-squared	0.16	0.06	0.19	0.08
Wald chi2		13.04*		22.67***
Sample size	209	98	356	171

Numbers in parentheses are t-statistics for OLS regression and z-statistics for 2SLS regression.

*, **, *** represent significant at 10%, 5%, and 1% levels, respectively.

Source: Calculated from Tebbutt Research (2014).

Firm age, age of the owner, industrial membership, hire of professional advisory services and education do not seem to matter in firm growth among female top-managed firms in PNG. Owner's age is positive but insignificant, contrary to the finding of Fowowe (2021) who found a negative and significant impact of owner's age on firm growth in Africa.

In sum, financial access and difficulty in accessing formal loans do not offer any growth advantage to majority female-owned firms in PNG. The impact is also insignificant on access to formal loans for female top-managed firms. However, financial access difficulty appears to affect only female top-managed firms and not majority female top-managed firms. Smaller firms' growth is faster than larger firms, whether you control for loan access or loan difficulty, among female-owned firms and female top-managed firms. However, majority female top-managed firms did not suffer employment growth from experiencing loan access difficulty.

Industrial membership was important for all female-owned firms who accessed formal loans, but not with those experiencing loan access difficulty among female-owned firms and female top-managed firms. The age of the firm and both owner's age and education generally do not have any impact on firm growth. However, hiring of professional advisory services has a positive growth impact on female-owned firms with formal loan access or experiencing loan difficulty than among female top-managed firms.

Conclusion and policy recommendations

Conclusion

Although many studies have established that women's MSMEs have multiple obstacles than men's in accessing MSME financial services offered by microfinance institutions, commercial banks and non-bank financial intermediaries, few studies have looked beyond this gender disparity to examine how access to finance or credit, or lack of it affects the growth of female-owned and female-managed MSME firms. This paper sought to establish the impact of access to formal loans or credit, on one hand, and the difficulty in accessing finance, on the other hand, on the growth of female-owned and female-managed firms.

Based on secondary data collected by Tebbutt for the World Bank and the Government of Papua New Guinea, the study treated the endogeneity of loan access and loan access difficulty variables by estimating eight 2SLS regression equations. The major findings are that access to formal credit or loan does not offer any growth advantage to female-owned firms as well as female top-managed firms. Similarly, financial access difficulty was insignificant to the growth of female-owned firms, but it offered a growth advantage to female top-managed firms.

This study also established that membership to industrial association conferred growth benefits to all female-owned firms who accessed formal loans but not those experiencing loan access difficulty among female-owned and female top-managed firms. Equally important, the use of professional advisory services was associated with higher employment growth for female-owned firms as well as female top-managed firms.

However, we did not find any significant impact of the age of the firm nor owner's age and education on firm performance among firms in PNG. Our findings on the applicability of the Gibrat's law was mixed: the law applies for all female top-managed firms facing loan access difficulty, but not for majority top managed firms facing loan access difficulty, female-owned and female top-managed firms with access to formal credit or those facing financial access difficulty. In sum, financial constraints negatively affect the growth of female-owned firms in PNG which points to the fact that the Government of PNG and development partners should develop targeted financial solutions that meet the requirements of female-owned businesses.

Policy recommendations

This study makes the following policy recommendations:

1. **Promote the use of business advisory services:** There is a positive correlation between the hire of business advisory services and employment growth. The use of business advisory by SMEs may help to inject fresh ideas on what to do to propel the SMEs to more growth. To encourage more firms to use business advisory services, the government may consider the provision of credit and business advisory services as a package to SMEs.
2. **Development of business-friendly policies to enhance SME growth:**
 - a. Targeted financing particularly for women entrepreneurs. Although some female firm owners accessed formal loans, it is important for financial institutions to meet the credit requirements and growth prospects for female-owned firms considering that some of them were still facing credit constraints to expand their businesses. Indeed, firms experiencing loan access difficulty grew slower than those not experiencing any difficulty. Therefore, providing credit in the desired quantity would enable SMEs to inject the much-needed capital into their business, thereby enabling the firms to grow faster. Still, women entrepreneurs should learn not to divert the loans or credit obtained for business away from the intended purpose.
 - b. Promotion of assets as collateral for business financing. SMEs in PNG had access to different forms of assets such as land, buildings and cash. It was not clear from the secondary data

by Tebbutt (2014) whether or not financial institutions in PNG considered these assets as collateral for purposes of loan disbursement and whether these assets (such as land and buildings) had titles that can be used to access loans. Financial institutions should be sensitised to consider different forms of assets to serve as collateral for business loans.

- 3. Business association:** Firms that belong to a business association tend to do better in terms of employment growth. Thus, the government should develop a policy to encourage the formation of business associations and encourage firms to join them. When firms are organised, they can demand for better services for their members. Business associations can reduce information asymmetry in the credit market by providing credit information about their members to financial institutions.

Future research areas

This study recommends that future research should consider the following issues:

- A study of industrial clusters in PNG and their effect on firm performance.
- A study on the quality of assets on access to formal loans or credit. It is possible that SME owners might have land or buildings, but these assets cannot be used to access formal loans because of lack of titles or challenges associated with asset ownership.

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Appendix 1: First-stage OLS estimates

Variable	Ownership						Top Management					
	LoanAccess		LoanDifficulty		LoanAccess		LoanDifficulty		LoanAccess		LoanDifficulty	
	All Majority female	All female	All Majority female	All female	All Majority female	All female	All Majority female	All female	All Majority female	All female	All Majority female	All female
Coef.	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.
	1a	1b	1c	1d	2a	2b	2c	2d				
Land (=1)	0.02 (0.01)	-0.16** (-2.06)	0.18 (0.72)	0.00 (-0.03)	-0.20 (-1.10)	-0.11 (-1.28)	-0.03 (-0.18)	-0.13 (-1.39)				
Building (=1)	0.26 (1.53)	0.24*** (3.04)	0.14* (1.70)	-0.06 (-0.49)	0.33* (1.97)	0.23*** (2.93)	0.31* (1.79)	0.21** (1.97)				
Machinery (=1)	-0.28** (-2.19)	-0.17	0.20 (1.09)	0.08 (0.74)	-0.09 (-0.93)	-0.18** (-2.27)	-0.01 (-0.07)	0.13 (1.42)				
Sales inventory (=1)	-0.13 (-0.92)	-0.07 (-1.01)	0.08 (0.43)	0.08 (0.71)	-0.09 (-0.79)	-0.09 (-1.26)	0.04 (0.36)	0.10 (0.99)				
Cash in hand (=1)	0.25 (0.54)	0.24 (1.38)	0.06 (0.09)	-0.04 (-0.13)	0.25*** (2.74)	0.16** (2.43)	-0.19 (-0.77)	-0.05 (-0.28)				
Cash at bank (=1)	-0.02 (-0.07)	-0.11 (-1.01)	-0.33 (-1.04)	-0.07 (-0.43)	-0.02 (-0.17)	-0.14 (-1.29)	0.04 (0.22)	0.12 (0.68)				
Stocks or bonds (=1)	0.06 (0.66)	0.04 (0.74)	-0.06 (-0.46)	0.14* (1.80)	0.06 (0.77)	0.05 (1.02)	-0.13 (-1.32)	-0.16** (-2.25)				
LnEmp2012 (number)	-0.02 (-0.29)	-0.02 (-0.49)	0.21* (1.94)	0.04 (0.66)	-0.09* (-1.80)	-0.02 (-0.57)	0.20** (2.53)	0.01 (0.23)				
LnAge (years)	-0.06 (-0.94)	-0.03 (-1.02)	0.07 (0.79)	0.03 (0.64)	-0.03 (-0.70)	-0.05* (-1.71)	0.01 (0.18)	0.04 (0.90)				
LnAge (years)	0.29* (1.81)	0.20* (1.92)	0.15 (0.46)	0.15 (0.95)	0.51*** (2.81)	0.31*** (3.38)	-0.06 (-0.25)	0.13 (0.92)				
Membership (=1)	0.03 (0.26)	0.06 (1.10)	-0.09 (-0.56)	-0.19** (-2.11)	0.13 (1.43)	0.07 (1.16)	-0.22** (-2.04)	-0.18** (-2.29)				
Hiredprof (=1)	0.07 (0.50)	0.12 (1.60)	-0.11 (-0.53)	-0.10 (-0.89)	0.00 (-0.03)	0.13 (1.52)	0.16 (1.36)	-0.07 (-0.67)				
Univ (=1)	-0.01 (-0.11)	0.06 (1.09)	-0.16 (-1.05)	-0.13 (-1.40)	0.09 (1.03)	0.12** (2.24)	-0.10 (-0.84)	-0.16** (-1.98)				
Constant	-0.97 (-0.97)	-0.60 (-1.39)	-0.43 (-0.30)	0.09 (0.14)	-1.77** (-2.56)	-0.87** (-2.46)	0.49 (0.51)	-0.11 (-0.20)				
F-statistics	2.18*	2.34***	1.73*	1.85*	2.57***	3.23***	3.59***	2.91***				
R-squared	0.28	0.17	0.21	0.11	0.24	0.19	0.20	0.13				
Sample size	64	158	61	152	113	207	109	199				

Notes: Numbers in parentheses are t-statistics; *, **, *** represent significant at 10%, 5%, and 1% levels, respectively. Source: Calculated from Tebbutt Research (2014).



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