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The Impact of Financial Crisis on MFIs Performance in Zimbabwe

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1. Introduction

The philosophies of microfinance originated in Europe with the establishment of the pawn shops in the 15th century as another possibility to usury money-lending. The financial cooperatives were established in Germany in the 1800s by Friedrich Wilhelm Raiffeisen and his followers. These cooperatives had a co-business of improving the well-being of the urban and rural people. In the early 1900s, Latin America and elsewhere witnessed the appearance of savings and credit activities (Helms, 2006). Private Banks and government agencies developed new banks for the poor to promote investments through mobilisation of 'idle' savings. Microfinance in Zimbabwe originated in the 1960s when people formed savings or funds clubs through joining gatherings with the casual acquiring from family and companions (Mago, 2013). In the 2000s, microfinance in Zimbabwe, grew exponentially due to several elements that lead to the solemnisation of the microfinance sector. Zimbabwe has a population of approximately 13 million, of which almost 70% reside in rural areas and no less than 72% reside in poverty, with about 80% rate of unemployment, (Mago, 2013). Currently, the microfinance sector is the biggest employer in Zimbabwe. Financial crisis significantly affects performance of MFIs especially when there is assets and liabilities mismatch in currency which poses severe economic threat. Scholars have researched on MFIs and social performance neglecting the sustainability of such institutions (Hossain & Khan, 2016; Bhanot & Bapat, 2015; Nurmakhanova, Kretzschmar & Fedhila, (2015). The study therefore fills the gap by exploring the effects of financial crisis on MFI performance using the Vector Auto-regression (VAR) Model opposed to previous studies which used simple linear regressions for data analysis. The study is structured as follows: Relevant empirical evidence on MFIs performance and financial crisis and the methodology are covered under section 2 and 3 respectively. Section 4 contains interpretation of the study findings. Lastly, conclusions and policy implications are discussed under Section 5.

2. LITERATURE REVIEW

2.1 Financial performance theories

2.1.1 The Theory of Market Power

The theory of market power advocates that a product's price is determined by forces of supply and demand, (Ito & Reguant, 2016). Firms operating under perfect competition are presumed to have no market power. Hence, each corporate has to admit the existing market

price without trying to control it. This theory also posits that outside market forces enhances profitability and financial operations, (Ito & Reguant, 2016). In addition, it ascertains that firms with well differentiated product portfolios and large market share outdo their competitors and earn monopolistic retains. The theory subdivides into the relative-market power and the structure-conduct performance hypotheses. The relative-market power hypothesis entails that large financial institutions containing brand identification only influences pricing and increase profits compared to the structure-conduct performance proposition which states that concentrated markets results in lower deposit rates and higher loan rates due to reduced competition.

2.1.1.2 Efficiency Structure Theory

Efficiency structure hypothesis opines that greater managerial scale of efficiency cause more profitability through higher concentration. Nzongang & Atemnkeng (2006) stressed that the balanced portfolio theory put forward a dissimilar dimension to the study of financial performance. The theory advocates that of the microfinance bank portfolio composition, its shareholders return and retained earnings are a result of the management's decisions and firm's policy decisions. The theory concludes that internal and external factors impacts on financial performance. The efficiency structure theory has two hypothesis- scale efficiency and the X-efficiency hypothesis. The scale-efficiency proposition states that microfinance banks attain reduced costs due to better scale of operation. Firms grow fast as a result of reduced costs which lead to more profit. The X-efficiency hypothesis states that microfinance banks with improved practices and management regulate costs and raise profits.

2.1.2 Monetarist View of the financial crisis

The Monetarists view financial crisis as a form of appearance of the banking crisis where the stability of the financial system is at risk if the central bank chose not to intervene. Friedman and Schwartz (1963) opine that the state of panic results in banks failures. Bank failure results in a contraction of money supply and reduced public confidence, and this leads to the evolvement of the crisis. So banking crisis usually occurs when financial systems become insolvent or illiquid resulting in acquisitions, fusions and need for government assistance on a large-scale. To solve the crisis, the monetarists advocate for increasing money supply which results in re-inflation of the economy so as to counter the monetary reduction. Therefore, the inflation has been recognized as a monetary phenomenon which cause of financial crisis. The

inflation is related to money supply and interest rates since a growth in inflation culminates in a hike in interest rates.

2.1.3 The hypothesis of financial fragility

Minsky (1992) pioneered the hypothesis of financial fragility. The concept sought to elucidate the problem of indebtedness during a revival period. Kindleberg (1978) opines that there exist shocks in the financial system which greatly impact on profitability in already existing or new sectors. The shocks which expose untapped profit opportunities include events such as the evolvement or the end of a war, a popular new technology, or changes in the monetary policy. The borrower transfers their finances to new areas of profit, financing the economic boom and backing the increase in the money supply. The investors' euphoria appears and thus the financial system begins to become fragile. Bubbles defined as excessive price increases in several areas are created by the irrational behaviour. Minsky advanced Irving Fisher's approach by introducing the fragility concept in an endeavor to elucidate the magnitude of indebtedness in an economic upswing. Minsky (1992) divided crisis into stages, -replacement, euphoria, climax and panic.

2.1.4 Marxist theories

Global recurrent major depressions at the pace of 20 and 50 years have been the catchphrase since Sismondi's (1773–1842) time. Grossman, (2018) critiqued the assumption of the supply and demand equilibrium of the classical political economy. The mature work of Karl Max was centred on coming up with a theory to explain economic crisis. The propensity for the profit rate to fall as outlined in Marx's law borrowed several features of Mill (1848) argument of the propensity of profits to decline. This theory is a consequence of the affinity towards the profits centralization. Capitalist businesses pay lower wages and salaries to their employees as compared to the price at which the products trade on the market. The profit made is initially appropriated towards recoupment of the business initial outlay. Ultimately, for the whole business sector, workers earn less while more is reinvested into the business in the longer term. The extent to which this theory stands depends on the government corporate tax rate, the rate at which the general public benefits from such taxes and the proportion of the employed versus the employers and investors.

2.1.5 Coordination games

Financial crisis models anticipate positive feedback from all market actors. This happens when a slight change in economic fundamentals attracts a disproportionate shift in asset values as market participants react similarly and promptly. More specifically, currency crisis models imply that long-term stability in the exchange rate due to a fixed exchange rate system suddenly ends when government funding declines or when economic conditions change. Some theorists suppose that this phenomenon postulates the existence of more than one Nash equilibrium point in an economy. One such point is set when anticipated rise in asset values cause market participants to increase their holding of such assets. Diamond and Dybvig's model of bank runs in which savers who receive bad news, enter panic mode and withdraw their assets from the bank causing others to panic too and trigger a bank run, resonates with financial crisis models, (Diamond, 2007).

2.1.6 Minsky Theory

Minsky's (1992) post Keynesian financial fragility theory best explains a capitalist economy. He said that a closed economy is more prone to a financial crisis. Minsky posited that firms can choose among three financing options in line with its risk tolerance. The first approach is the hedge finance where expected income flows are matched with expected liabilities (both advances and related finance costs) periodically. The second option called speculative finance allows a firm to roll over debt because expected income flows are only sufficient to meet interest costs without paying off the principal amount The third approach is Ponzi finance where expected income flows are not enough to cover interest costs, such that the firm has to supplement its income with more debt or selling off some assets to meet its obligations every period. The income or market value of assets rises until they match periodic obligations. Financial fragility imitates business cycles. Following a recession financial institutions chooses hedging which is the safest. When profits rise due to economic growth, firms engage in speculative financing knowing that proceeds cannot cover all interest at any time.

2.1.7 Performance of Microfinance companies

All organisational activities related to a particular period can be summed up by the term performance, (Kothari, 2003). Microfinance is frequently assessed by outreach performance which is the degree to which MFIs provide financial services to those previously financially excluded (Brown et al., 2005; Rahman and Luo 2010). Breadth of outreach in terms of total number of clients provided with access to financial services, is thus a critical indicator of MFI

performance. This is an advancement in the measurement of MFI performance given that original performance measures were mainly aimed at assessing the achievement of social not financial goals, (Pankaj & Sinha, 2015). MFIs are supposed to ensure equitable distribution of financial resources and poverty reduction. However, the new thrust on measuring financial aspects of MFI performance has little appeal in development finance because it compares MFIs to banking institutions yet they are not supposed to compete with mainstream financial institutions but to stand in the gap left by them. It is criticised for rendering MFIs technically insolvent despite the fact that they meet their social goal. Appreciating that MFIs are social institutions will not require them to be treated as financially viable or sustainable like banks but that they meet their social goals as non-governmental organisations. A study conducted by Zeller and Meyer (2002) led to the "critical triangle of microfinance" concept-the need for MFIs to simultaneously manage the outreach problems (reaching the poor in terms of poverty depth and numbers), financial sustainability (meeting financial and operating costs over the long term) and the impact (having distinct effect upon client's standard of living).

2.2 Empirical literature review

Bela (2011) examined the impact the global financial crisis has on micro-finance in Asia and Central America. They found an inverse relationship between financial crisis and microfinance institutions (MFIs) performance since scarcer borrowing opportunities constrain lending growth, whilst asset quality and profitability are negatively affected by economic slowdown. The study also reveals that MFIs charge comparatively high interest rates to their customers who earn low incomes. In addition, it discloses that MFI performance is also correlated to shifts in global stock market performance. It also contains an empirical study of interest rates with the intention of informing policy decisions.

Boyd, Levine & Smith (2001) investigated the impact of inflation on financial performance. The results show a significant nonlinear negative effect of inflation on MFI performance. As the inflation rate increases, the marginal impact on MFI lending activity and performance decreases. The study reveals that economies with rate of inflation above 15% experienced a discrete drop in financial performance of MFIs.

Loppata and Tchikov (2017) examined the causal relationship between MFIs and economic development using transnational data in Germany for the period 1995-2012. In their study

they investigated the causality relationship between MFIs and economic development using the Vector Autoregressive (VAR) model and the Granger causality test. They obtained data for 952 MFIs from 101 countries from MIX database and annual data used. They found a bi-directional relationship between economic growth and MFIs and performance. They suggested that future empirical research accounts for the geometric causality between microfinance and economic growth. They recommended policy makers to engage progressive and decisive action that considers the causality directions between microfinance and economic growth to alleviate poverty and promote economic growth.

Wagner (2013) explored the link between real credit growth and crisis in microfinance using a baseline panel of 74 countries centered on yearly data from 2000-2009 for 722 MFIs. The researcher used the basic panel regression model in the methodology to analyse the growth trends in real credit of MFIs registered on Mix Market. In the study, credit growth depended on financial crisis, a time dummy. Results indicate that microcredit remain a main driver of credit booms that were dominant in traditional banking. Foreign capital inflows in turn exacerbated the credit boom. In conclusion, the study noted that MFIs have become less resilient to financial crisis by competing with traditional banks in international financial markets.

Wagner and Winkler (2012) examined the exposure of MFIs to financial fragility in times of the global financial crisis using panel regression analysis. The independent variable used is financial crisis a time dummy variable and the dependent variable real credit growth which shows performance of MFIs. The researcher used secondary data obtained from Mix Market (2011) expressed in US dollars. The study provided strong evidence of a significant effect of large-scale financial crisis on the growth of MFI real credit.

Dokulilova, Janda and Zetek (2009) evaluated the exposure of microfinance institutions in financial crisis in Czech Republic. The study was to elucidate the problems of microfinance and the micro-finance institutions (MFI) sustainability in financial crisis. The study reveals that MFIs are often regarded as one of the most flexible and effective strategies in the fight against global poverty.

2.3 Conceptual framework

We proposed a model that outlines various variables which explain the impact of financial crisis on performance of MFIs as shown in Figure 1. We expected the relationship between inflation and performance to be nonlinear. Boyd, Levine and Smith (2001) indicate that there is an adverse linkage between inflation and MFI performance. Exchange rates should positively relate to financial performance, (Lagat & Nyadema, 2016). Financial crisis should negatively affect performance of MFIs. Economic growth is expected to positively affect performance of MFIs. The study expects a positive linear relationship between interest rates and performance since an increase in interest rates leads to higher profitability (Ngure, 2014).

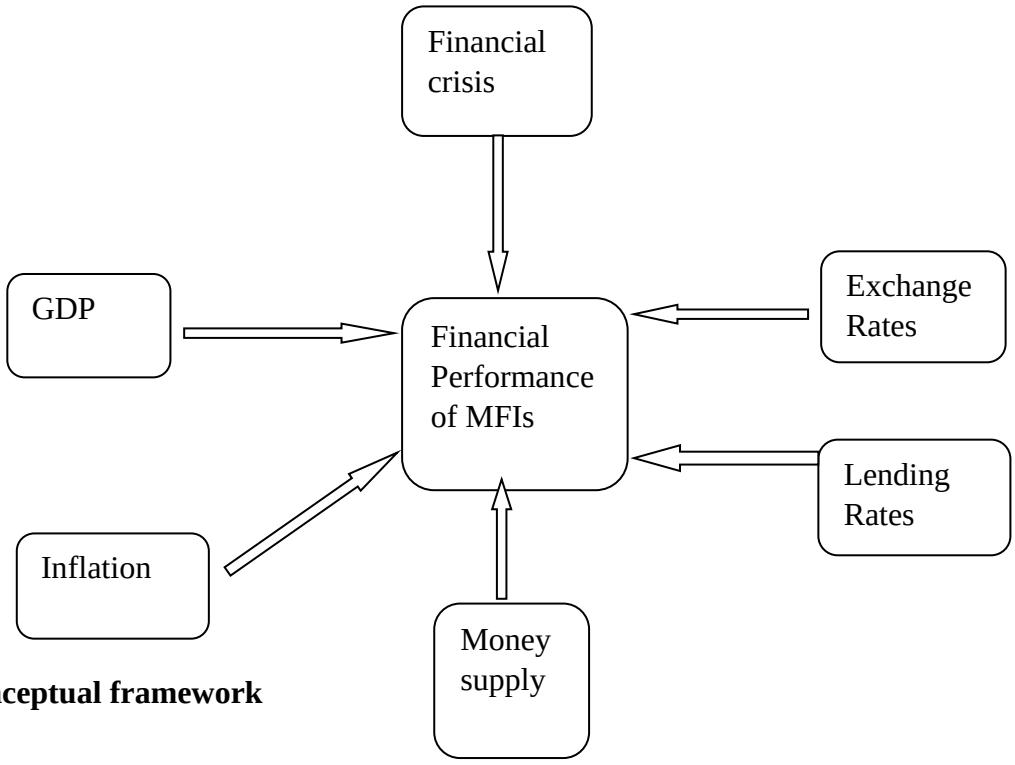


Figure 1: Conceptual framework

3. Methodology and Data

3.1. Diagnostic tests and Model specification

3.1.1. Stationarity tests

It is vital to conduct stationarity tests before conducting VAR model, in order to decide on its appropriateness. Otherwise, the VECM model will be employed. We conducted Augmented Dickey Fuller test to determine the stationarity of study variables. A VECM is ideal if cointegrating equations can be estimated. If the level VAR model is used instead, consistent but inefficient estimates are obtained, (Sims, 1980). This study mainly intends to ascertain causal relationships and to obtain unbiased IRFs and VDs, as opposed to determining long-

run relationship between variables thus the VAR model is preferred. Consistent with the work of Sims, Stock, and Watson (1990) and Amisano and Giannini (2012), we leverage non-stationarity of data than to consider it as one of the main limitations of the VAR methodology.

3.1.2 Other diagnostic and specification tests

We checked for the adequacy of the VAR model using the Godfrey LM test for serial correlation and the Residual Portmanteau Test for Autocorrelations tests on the residuals. Considering the significance of lag-length selection and reliability tests for VAR modelling as emphasised by Canova and Ciccarelli (2009), we selected an optimum lag length using the Akaike Information Criterion and tested for reliability using Cronbach's alpha. To ascertain model stability and correct specification, we performed the Ramsey RESET test.

3.1.3. Model specification

To investigate the effect of financial crisis on performance of MFIs, we used the vector autoregressive (VAR) model for short-term analysis. VAR models allow the recovery of interesting patterns (De Graeve & Karas, 2010). Moreover, VAR allows researchers to combine past, present and future scenarios (Canova & Ciccarelli, 2009) and also house more variables without losing degree of freedom (Raghavan and Silvapulle, 2008). This gives the model superiority over other methods such as generalised method of moments and ordinary least squares. Furthermore, it helps allows splitting of shocks as permanent or temporary (Ramaswamy and Slok, 1998). This study follows the VAR approach of Sims (1980) to study the effect of financial crisis on MFIs performance. Hence, the reduced form VAR can be expressed as:

$$PFMC_t = \beta_0 + a_j FC + \sum_{j=1}^{n} B_j\, INFLN_{t-j} + \sum_{j=1}^{n} \forall_j\, GDP_{t-j} + \sum_{j=1}^{n} \Omega_{\mathrm{j}}\mathrm{LR}_{\mathrm{t-j}} + \sum_{j=1}^{n} \phi_j\, ER_{t-j} + \sum_{j=1}^{n} \lambda_j\, MS_{t-j} + \sum_{j=1}^{n} \gamma_j\, PFMC_{t-j} + \varepsilon_{PFMC} \quad (1)$$

$$INFLN_t = \beta_0 + a_j F + \sum_{j=1}^{n} B_j\, INFLN_{t-j} + \sum_{j=1}^{n} \forall_j\, GDP_{t-j} + \sum_{j=1}^{n} \Omega_{\mathrm{j}}\mathrm{LR}_{\mathrm{t-j}} + \sum_{j=1}^{n} \phi_j\, ER_{t-j} + \sum_{j=1}^{n} \lambda_j\, MS_{t-j} + \sum_{j=1}^{n} \gamma_j\, PFMC_{t-j} + \varepsilon_{INFLN} \quad (2)$$

$$GDP_t = \beta_0 + a_j FC + \sum_{j=1}^{n} B_j\, INFLN_{t-j} + \sum_{j=1}^{n} \forall_j\, GDP_{t-j} + \sum_{j=1}^{n} \Omega_{\mathrm{j}} \mathrm{LR}_{\mathrm{t-j}} + \sum_{j=1}^{n} \phi_j\, ER_{t-j} + \sum_{j=1}^{n} \lambda_j\, MS_{t-j} + \sum_{j=1}^{n} \gamma_j\, PFMC_{t-j} + \varepsilon_{GDP} \quad (3)$$

$$LR_t = \beta_0 + a_j FC + \sum_{j=1}^{n} B_j\, INFLN_{t-j} + \sum_{j=1}^{n} \forall_j\, GDP_{t-j} + \sum_{j=1}^{n} \Omega_{\mathrm{j}} \mathrm{LR}_{\mathrm{t-j}} + \sum_{j=1}^{n} \phi_j\, ER_{t-j} + \sum_{j=1}^{n} \lambda_j\, MS_{t-j} + \sum_{j=1}^{n} \gamma_j\, PFMC_{t-j} + \varepsilon_{LR} \quad (4)$$

$$MS_t = \beta_0 + a_j FC + \sum_{j=1}^{n} B_j\, INFLN_{t-j} + \sum_{j=1}^{n} \forall_j\, GDP_{t-j} + \sum_{j=1}^{n} \Omega_{\mathrm{j}} \mathrm{LR}_{\mathrm{t-j}} + \sum_{j=1}^{n} \phi_j\, ER_{t-j} + \sum_{j=1}^{n} \lambda_j\, MS_{t-j} + \sum_{j=1}^{n} \gamma_j\, PFMC_{t-j} + \varepsilon_{MS} \quad (5)$$

$$ER_t = \beta_0 + a_j FC + \sum_{j=1}^{n} B_j\, INFLN_{t-j} + \sum_{j=1}^{n} \forall_j\, GDP_{t-j} + \sum_{j=1}^{n} \Omega_{\mathrm{j}} \mathrm{LR}_{\mathrm{t-j}} + \sum_{j=1}^{n} \phi_j\, ER_{t-j} + \sum_{j=1}^{n} \lambda_j\, MS_{t-j} + \sum_{j=1}^{n} \gamma_j\, PFMC_{t-j} + \varepsilon_{ER} \quad (6)$$

Where ε_{PFMC} , ε_{ER}, ε_{MS}, ε_{LR}, ε_{INFLN} and ε_{GDP} are error terms with to each variable.

3.1.4. Other analytical approaches

In addition to the VAR, we also went on to determine the magnitude, sensitivity, timing and direction of MFI performance in response to a change in the study variables both in the short and long-run using impulse response analysis, forecast error variance decomposition analysis and Johansen's cointegration test..

3.2. Variable Description and Data sources

The study used seven variables, which are, MFIs performance, proxied by return on equity (ROE), inflation represented by the natural logarithm of consumer price indices (INFL), exchange rates (ER), financial crisis proxied by a dummy variable considered to be 0 for the pre-crisis period (1990-1996) and 1 for the crisis period (1997-2018) (FC), the rate of economic growth proxied by the natural logarithm of GDP (GDP), money supply (M3) and lending interest rates (LIR). We expected an inverse relationship between inflation, financial crisis and MFIs performance. Exchange rates, economic growth and lending interest rates are expected to positively affect MFIs performance. Data on these variables was obtained from

ZAMFI, Mix Market, World Bank (economic research) and ZIMSTATS databases which contains substantial details on the variables under study. Therefore, the selection of countries was largely determined by data availability. We used annual time series for the period 1990–2018.

4 Estimation Results

4.1 Descriptive Statistics

We conducted a preliminary examination of the data employed so as to give a brief description of the basic and features of the variables understudy. The summary of descriptive statistics is illustrated in Table 1. The mean economic growth (GDP) in Zimbabwe is 1.224% which is moderate. Lending rates, money supply and inflation have a mean of 19.6%, 33.3% and 15.1% respectively. The variables also indicate high levels of disparities as witnessed by great differences between the maximum and minimum values. Financial crisis, GDP and exchange rates have a positive mean of 0.75, 1.22 and 5.7 respectively.

Table 1: Descriptive Statistics

	PFMC	**LIR**	**MS**	**FC**	**INFLN**	**GDP**	**ER**
Mean	16.84929	19.56679	33.30679	0.750000	15.12403	1.223747	5.709593
Maximum	23.14000	94.73000	151.5500	1.000000	76.70727	16.33247	13.54000
Minimum	9.690000	6.350000	4.600000	0.000000	-7.500000	-17.66895	0.002500
Std.Dev.	1.947304	19.42289	27.60544	0.440959	21.54749	8.473628	4.720391
Probability	0.000000	0.000000	0.000000	0.034377	0.009337	0.756212	0.369697
Observations	29	29	29	29	29	29	29

Source: Authors' computation from the data, 2019.

4.2 Diagnostics and Specification Tests

4.2.1 Lag Length Selection

Using the LogL, FPE, LR, AIC, SC and HQ selection criterion we found one as the lag length based on the AIC which outperforms the other criterions.

Table 2: Determination of lags

Lag	LogL	FPE	LR	AIC	SC	HQ
0	-658.8438	6.21e+12	NA	49.32177	49.65772	49.42166
1	-545.4236	5.97e+10*	159.6284*	44.54990*	47.23756*	45.34908*

**indicates lag order selected by the criterion, LR: sequential modified LR test-statistic at 5% level. AIC: Akaike information criterion, FPE: Final prediction error, SC: Schwarz information criterion, HQ: Hannan-Quinn information criterion.*

Source: Author's' computation from the data, 2019

4.2.2: Reliability Statistics

Table 3: Reliability test

Number of Items	Cronbach's Alpha	Cronbach's Alpha based on Standardized Items
7	0.741	0.737

Source: Authors' computation from the data, 2019.

The results of the reliability tests gave a Cronbach's alpha of 0.741 which is greater than 0.7 proving that the data used in the study is reliable in line with Pallant, (2010).

4.2.3 Unit Root Stationarity test

The preliminary results from Table 4 indicate that the rest of the variables became stationary at 1(first differencing except inflation which is stationary at levels or 1(0). We proceeded to perform the Johansen (1988) cointegration test on those variables integrated of order one.

Table 4: Augmented Dickey-Fuller (ADF) test results

Variable	T-Statistics	Test Critical Value (5%)	Probability*
D (Exchange rates)	-4.000582	-2.991878	0.0055
D(Economic Growth)	-6.257714	-2.981038	0.0000
D (Financial Crisis)	-5.099020	-2.981038	0.0003
Inflation	-5.195631	-2.976263	0.0002

D (Lending rates)	-5.633903	-2.986225	0.0001
D (Money Supply)	-5.028934	-2.986225	0.0004
D (performance)	-7.253743	-2.981038	0.0000

Source: Authors' computation, 2019

4.2.4 VAR model checking

The p-values of the Godfrey LM test in Table 5 are less than 0.05 therefore the null hypothesis of no serial correlation is rejected. We also tested for the autocorrelation using the Residual Portmanteau Test and we found no autocorrelation in errors since 0.1095>0.05 as shown in Table 6.

Table 5: Results of VAR test for serial correlation

Null hypothesis: no serial correlation at lag h

Lag	**LRE*stat**	**Prob**	**Df**
1	56.88228	0.0148	49
2	68.97997	0.0008	49

Source: Authors' computation, 2019

Table 6: Autocorrelations

Lags	**Prob***	**Q-Stat**	**Adj Q-Stat**	**Df**
1	---	64.35374	66.92789	---
2	---	126.4365	134.1843	---
3	0.1095	172.0277	185.7221	49

*Test is valid for lags larger than the VAR lag order only. Degrees of freedom for chi-square distribution.

The following results show model stability.

Table 7: Ramsey RESET

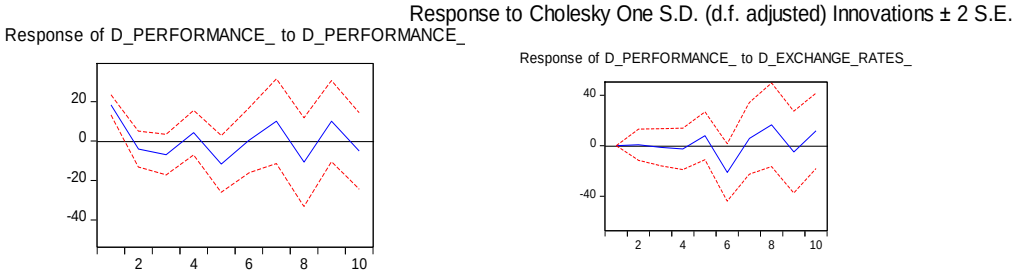
	df	Value	Probability
t-statistic	21	0.918702	0.3722
F-statistic	(1,21)	0.853319	0.3722
Likelihood ratio	1	1.170071	0.2552

Source: Authors' computation, 2019

The F and t probabilities of the Ramsey RESET test confirms the stability and correct specification of the model as they are both greater than 0.05.

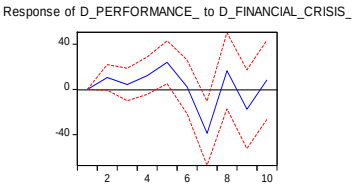
4.3: Impulse Response Functions (IRF)

We executed impulse response analysis to determine the relationship between the variables in the long run. One standard deviation shock in performance to performance creates strong fluctuations as performance is decreasing and the fluctuations show that performance becomes negative in period 10. An initial response of performance to a shock in exchange rates creates significant fluctuations from initially being negative in period 1 to a positive in the tenth period. One standard deviation shock to financial crisis causes performance to fluctuate slightly in the first periods but oscillations increase starting from period 5 up to period 10 as performance becomes negative. GDP was initially positive in period 1 but witnessed oscillatory movements from positive to negative after 10 years. An initial response of performance to a shock in lending rates creates slight fluctuations which tend to die off after 10 years into the future. In response to a one standard deviation shock in money supply, MFI performance reacts by oscillating to a positive value in year 3, a negative in year 4 and finally becomes negative in year 10 into the future but it tends to dies off. One standard deviation change given to inflation causes performance to increase in year 2 where it becomes positive and the fluctuations are now dropping and in year 7 it is negative which dies off up to year 10.



Source: Authors' computation, 2019

Figure 1. 1 Impulse Response Ananlysis



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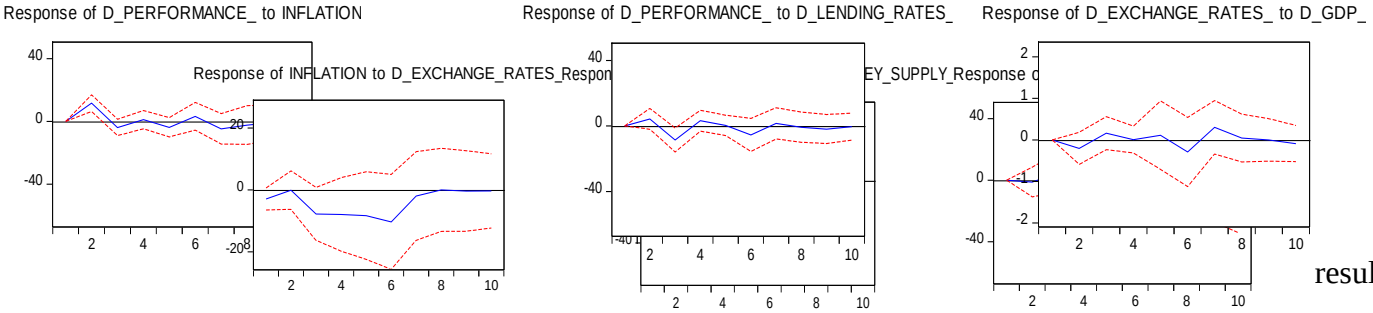

results of the study shows a bi-directional causality between inflation rates and exchange rates as shown by strong oscillatory response of inflation rates to a shock in exchange rates and vice versa. Lastly, the response of exchange rates to a unit shock in GDP creates strong oscillations, implying how GDP impacts exchange rates and not the opposite.

4.4: Vector Autoregression Results

Table 8: VAR Results

	D_pfmc	D_ER	D_FC	D_GDP	D_LR	D_MS	D_INFLN
D_pfmc(-1)	-.55225	.00571	.00135	-.02558	.03218	-.02697	-.06302
	(.1513)	(.0066)	(.0020)	(.0900)	(.0470)	(.1232)	(.0816)
	[-3.6490]	[.86854]	[.67651]	[-.28422]	[.68428]	[-.21889]	[-.77228]
D_pfmc(-2)							
	-017815	.006425	.001767	-.008006	.053623	.002366	-.044632
	(.14068)	(.00611)	(.00187)	(.08365)	(.04372)	(.11454)	(.07585)
	[-.12664]	[1.05086]	[.94666]	[-.09570]	[.99782]	[.02065]	[-.58842]

D_ER (-1)	21.71690	.280005	-.095905	-1.820302	.102462	5.570567	6.801122
	(4.9837)	(.21660)	(.06612)	(2.96359)	(1.54881)	(4.05769)	(2.68713)
	[4.3576]	[1.29271]	[-1.45042]	[-.61422]	[.06615]	[1.37284]	[2.53100]
D_ER (-2)							
	-2.74604	0.241087	-.096194	-2.466127	-3.33453	9.444419	-7.184858
	(4.6826)	(.20352)	(.06213)	(2.78455)	(1.45525)	(3.81255)	(2.52480)
	[-.58643]	[1.18460]	[-1.54832]	[-.88565]	[-2.29139]	[2.47719]	[-2.84571]
D_FC (-1)	60.75358	1.084652	.058820	1.377408	52.75462	-1.379827	22.10489
	(20.979)	(.91180)	(.27834)	(12.4753)	(6.51979)	(17.0810)	(11.3116)
	[2.8959]	[1.18957]	[.21132]	[.11041]	[8.09146]	[-.08078]	[1.95418]
D_FC (-2)							
	-9.79885	2.512578	.071178	-1.012393	-79.88447	-42.10255	31.76388
	(34.076)	(1.48103)	(.45211)	(20.2636)	(10.5900)	(27.7445)	(18.3734)
	[-.28756]	[1.69650]	[.15743]	[-.04996]	[-7.54335]	[-1.51751]	[1.72880]
D_GDP (-1)	1.596498	-.004978	-.002238	-.528600	.012921	1.116399	.460777
	(.58708)	(.02552)	(.00779)	(.34911)	(.18245)	(.47799)	(.31654)
	[2.7194]	[.19496]	[-.28732]	[-1.51414]	.07082]	[2.33560]	[1.45566]
D_GDP(-2)							
	-.607443	.017406	-.018638	-.714891	-.416430	.200042	.003354
	(.83741)	(.03640)	(.01111)	(.49797)	(.26024)	(.68181)	(.45152)
	[-.72539]	[.47824]	[-1.67751]	[-1.43562]	[-1.60015]	[.29340]	[.00743]

D_LR(-1)	-.259939	-.061458	-.004971	-.135775	.444766	.488268	-.024284
	(.43837)	(.01905)	(.00582)	(.26068)	(.13623)	(.35691)	(.23636)
	[-.59297]	[-3.22572]	[-.85476]	[-.52086]	[3.26475]	[1.36804]	[-.10274]
D_LR(-2)	.121747	.044058	-.008362	-.228267	-.321964	.049332	.276820
	(.38991)	(.01695)	(.00517)	(.23186)	(.12117)	(.31746)	(.21023)
	[.31225]	[2.59986]	[-1.61650]	[-.98451]	[-2.65706]	[.15540]	[1.31674]
D_MS(-1)	.081073	-.019711	.005609	.227090	.104948	-.445834	.079712
	(.34656)	(.01506)	(.00460)	(.20608)	(.10770)	(.28217)	(.18686)
	[.23394]	[-1.30964]	[1.21979]	[1.10193]	[.97443]	[-1.58004]	[.42659]
D_MS(-2)	.821473	-.013288	.002959	.059781	.124696	-.428633	.241909
	(.22044)	(.00958)	(.00292)	(.13108)	(.06851)	(.17948)	(.11886)
	[3.7265]	[-1.38694]	[1.01156]	[.45605]	[1.82021]	[-2.38822]	[2.03530]
INFLN(-1)	2.158947	.027672	.004887	.219713	.137349	.908887	.772460
	(.39789)	(.01729)	(.00528)	(.23661)	(.12365)	(.32396)	(.21454)
	[5.4259]	[1.60018]	[.92579]	[.92859]	[1.11074]	[2.80556]	[3.60060]
INFLN(-2)	-2.49043	-.029573	-.007005	-.389298	-.219249	-.376197	-.064897
	(.52437)	(.02279)	(.00696)	(.31182)	(.16296)	(.42694)	(.28273)
	[-4.7494]	[-1.29763]	[-1.00690]	[-1.24847]	[-1.34540]	[-.88115]	[-.22954]
C	-2.77519	.117236	.171075	5.203858	3.683799	-13.20780	1.802761
	(8.3452)	(.36270)	(.11072)	(4.96254)	(2.59349)	(6.79462)	(4.49962)
	[-.33255]	[.32323]	[1.54508]	[1.04863]	[1.42040]	[-1.94386]	[0.40065]

The interpretation below is for significant variables which have t-statistics >2

Performance: Findings show that the lag 1 MFI performance strongly influences itself significantly as indicated by a t-statistic of 3.649011 > 2. This implies that a 1% increase in performance in the previous year cause a 0.552% decrease in performance. The findings shows an inverse relationship between lag 2 inflation and performance with a t-statistic of 4.749361 which is significant entailing that a 1% increase in inflation reduces performance by 2.49% .

At lag 1, exchange rates positively influences MFI performance with a t-statistic of 4.357567 suggesting that a 1% rise in exchange rates results in a 21.717% rise in performance. Equally, financial crisis positively influence MFI performance at lag 1 with a t-statistic of 2.895899 implying a 1% increase in financial crisis accounts for 60.754% increase in performance. One lag of GDP positively affects MFI performance having a t-statistic of 2.719395. This implies that a 1% increase in GDP causes a 1.596% increment in performance. The lag 2 of money supply significantly affects performance with a t-statistic of 3.726539 which suggests that money supply predicts MFI performance. A percentage increment in money supply accounts for 0.821% increase in MFI performance. Money supply has a positive correlation with performance at lag 2 showing that if money supply increases, performance also increases.

Inflation equation: Results indicates a significant strong influence of inflation lag 1 (3.600595>2) entailing that 1% increase in inflation in the lagged period resulted in a 0.772% increase in inflation. A 1% increase in exchange rates lag 1 lead to a 6.8% increase in inflation rates whilst a 1% increase in exchange rates lag 2 resulted in a 7.18% decrease in inflation rates. A 1% increase in money supply lag 2 resulted in a 0.24% increase in inflation rates.

Exchange rates: Results shows that a percentage increase in lending rates caused a 0.061% significant decrease in exchange rates and lending rates lag 2 significantly influences exchange rates (2.599862>2) which is significant and entails that a percentage increase in lending rates causes a 0.044% increase in exchange rates.

Lending interest rates: Findings shows that a percentage increase in exchange rates accounts for 3.334% decrease in lending rates and the result is significant (2.291389 >2). Also findings reveal a significant positive effect of financial crisis lag 1 on lending rates (8.091464 > 2). A percentage increase in financial crisis accounts for 52.75% increase in

lending rates. Financial crisis lag 2 influences lending rates and the effect is significant (7.543354 > 2).A 1% increase in financial crisis caused a 79.88% decrease in lending rates. Lending rates lag 1 significantly influences itself (3.264751 > 2). A percentage increase in lending rates resulted in a 0.44% increase in lending rates.

Money supply: The findings indicate that inflation lag 1 influences money supply and has 2.805556 > 2 which is significant. A 1 percentage increase in inflation caused 0.909% increase in money supply whilst a 1% rise in exchange rates caused a 1.38% fall in money supply. A 1% increase in GDP influenced a 1.116% increase in the money supply. Money supply lag 2 impacted itself and 2.388216 > 2 which is significant and suggests that a percentage increase in money supply caused a 0.429% decrease in the money supply.

4.5: Forecast Error Variance Decomposition Analysis

Table 9: Variance decomposition of D_Performance

Variance period	S.E	D_pfmc	D_GDP	D_FC	INFLN	D_ER	D_MS	D_LIR
1	18.3588	100.000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
2	24.9306	56.8895	2.93802	15.1790	13.3560	11.4111	0.08471	0.14170
3	30.0587	42.2755	2.91913	13.1640	14.4876	10.4431	12.5722	4.13854
4	35.0587	34.1439	3.52087	20.2852	14.1486	8.09122	16.1116	3.69871
5	45.7318	26.5313	4.39437	38.7256	12.1517	5.08408	10.7621	2.35100
6	52.4841	20.1472	4.62113	29.5842	18.4643	12.8830	11.0548	3.24543
7	67.3201	14.4737	7.00861	45.6970	14.3284	8.90918	7.35277	2.23386
8	72.3076	14.7289	10.2064	43.3466	14.2586	8.59440	6.93227	1.93784
9	75.3122	15.3645	11.1012	44.2009	13.1462	7.96704	6.40019	1.82000
10	77.3726	14.9816	14.6706	42.2276	12.5576	7.61714	6.22061	1.72488

Source: Authors' computation, 2019

Presented in Table 9 are the variance decomposition outcomes. We employed the analysis as further proof presenting additional detailed information relating the variance amongst performance and selected macroeconomic variables. We employed year 1 and year 2 to denote the short run period while year 10 represented the long-run.

To comprehend the results in Table 9 above, we broke the analysis into short-run and long-run dynamics. In the short-run, 100% forecast error variance in the performance is accounted for by performance itself showing that the other variables in the model have no effect on performance. This means that, they have a strong exogenous impact. 56.89% of forecast error variance in performance in year 2 is significantly predicted by performance itself. The influence of other variables is increasing gradually but exogenous reveals a weak influence predicting performance in the future. 14.98% of forecast error variance of performance in the long run is influenced by performance and also by financial crisis which influences by 42.23%. So performance and financial crisis shows strong influence in the short-run and long run but as performance decreases other variables are increasing and dropping gradually but overall the influence is weak and insignificant in the long term. Hence, GDP is significant in the long run since it is increasing gradually, whilst money supply, performance, lending interest rates, financial crisis, exchange rates, and inflation are insignificant since they show an opposite trend.

Table 10: Variance decomposition of D_FC

Variance period	S.E	D_pfmc	D_GDP	D_FC	INFLN	D_ER	D_MS	D_LIR
1	0.24357	6.70639	10.6406	82.653	0.0000	0.0000	0.0000	0.0000
2	0.28168	5.70232	14.9470	62.830	8.2997	4.2035	3.6113	0.4059
3	0.28589	5.87504	14.8879	61.485	8.6717	4.5802	4.0135	0.4860
4	0.29384	5.61618	16.5005	58.826	9.2819	5.0040	4.2172	0.5540
5	0.29636	5.54638	16.8175	58.775	9.2263	4.9363	4.1503	0.5473
6	0.29769	5.52834	16.9870	58.481	9.4142	4.9131	4.1185	0.5571
7	0.29806	5.54377	17.0348	58.344	9.5034	4.9028	4.1146	0.5558

8	0.29954	5.50068	17.0820	58.2758	9.62763	4.87132	4.07965	0.56286
9	0.30029	5.48921	17.1340	58.1219	9.72774	4.85210	4.11441	0.56063
10	0.30063	5.47735	17.0960	58.0531	9.78563	4.88351	4.12398	0.58040

Source: Authors' computation, 2019

82.65% of forecast error variance in financial crisis in period 1 is explained by financial crisis itself and is strongly endogenous signifying a strong influence from its own variation. The other variables are exogenous and strong implying weak influence on financial crisis. In period 2, financial crisis is also forecasting itself into the future with 62.83% of forecast error variance. Other variable's influence is still significantly weak in the period 2, implying that they contribute less in the future. In period 10, 58.05% of forecast error variance of financial crisis is strongly influenced by financial crisis. This entails that in the long run financial crisis continues to have influence on itself and other variables have an insignificant influence in this variable.

4.6: Long-run analysis

Table 11: Johansen cointegration

		Trace			**Maximum Eigenvalue**		
Hypothesized No. of CE(s)	**Eigen value**	**Critical Value 0.05**	**Trace Statistic**	**Prob****	**Max - Eigen statistic**	**Critical value 0.05**	**Prob****
None*	0.99758	125.615	326.218	0.0000	156.584	46.2314	0.0000
At most 1*	0.93877	95.7537	169.634	0.0000	72.6201	40.0775	0.0000
At most 2*	0.87163	69.81889	97.01398	0.0001	53.37283	33.7869	0.0001

Source: Authors computation 2019

Since the trace and max statistics exceeds 0.05, we reject the null hypothesis and conclude that there is cointegration among the variables as shown in the Table 11 above. This shows the presence of a long-run relationship amongst the study variables.

Table 12: Normalised Cointegration Coefficients

Performance	MS	LIR	INFLN	GDP	FC	ER
1.000000	1.129862	11.90746	-7.861845	1.07816	277.6148	-22.79190
	(0.26413)	(0.30087)	(0.28052)	(0.32802)	(14.0899)	(1.49281)

Source: Authors' computation 2019

The normalised cointegration coefficients results show that GDP, Financial crisis, interest rates negatively affects MFIs performance in the long run. Inflation and exchange rates positively influences MFIs performance in the long run.

4.7: Discussion of Findings

Our study found an inverse relationship between lag 2 inflation and performance signifying that if inflation increases performance decreases and vice versa. These results are consistent with Boyd, Levine and Smith (2001) who also found a nonlinear relationship between the two variables.

We found a complementary relationship between the first lags of exchange rate and performance in line with Lagat and Nyadema (2016). The positive relationship between exchange rates and performance reflects how the fluctuations and volatile exchange rates have contributed to the profitability of microfinance banks. The relationship between lag 1 financial crisis and performance was positive implying that an increase in financial crisis enhances performance. These findings contradict (Bela, 2011) who found a `negative linkage between the variables. This implies that financial crisis impacted adversely on MFI lending which suffered from scant borrowing opportunities, while financial crisis adversely affected asset quality and profitability.

We found a positive relationship between lag 1 economic growth and performance which implies an increase in GDP increases MFI performance and vice versa in line with Sultan and Masih (2017). This reignforce results from a study by Loppata and Tchikov (2017) which also confirmed causal linkages running in both directions between economic growth and performance. According to their findings, progressive and purposeful action that considers the directions of causality between MFIs and economic growth verified in their study is taken to alleviate poverty and promote economic growth.

The second lag of money supply positively impacted on performance signifying that as money supply is increased, performance increases and/or as money supply decreases,

performance decreases. These findings approve findings of Meshak and Nyamute (2016) who concluded a positive relationship between money supply and performance. We also observed that interest rates have a direct relationship with performance and the results affirm the findings of Ngure (2014) who found a linear positive relationship between interest rates and performance. However in this study the positive relationship is insignificant negative at lag 1 since the t-statistic is less than 2, so this relationship is not considered.

5.0: Conclusions and policy recommendations

Several conclusions can be drawn out of our study. The findings implies that in the short-run performance influences itself because other variable's influence is strong exogenously which shows a weak influence on our dependent variable performance. In the second year of short-run forecast error variance of financial crisis is 15.18% and in the long-run, the influence of financial crisis is 42.2% on performance. Findings from VAR entail an inverse relationship between lagged financial crisis and MFIs performance implying that an increase in financial crisis reduces microfinance performance and vice versa. Lagged exchange rates, money supply and GDP relate positively with performance showing that a rise in these variables causes MFI performance to increase and vice-versa. We found an inverse relationship between lag 2 of inflation and performance implying that a 1% increase in inflation reduces microfinance performance and vice versa.

We recommended policy makers to enforce comprehensibility in MFIs so as to expose any form of earnings manipulation in their financial statements. This help to avoid a crisis especially given that performance influences itself to a greater extent. Tightening regulation of MFIs will also go a long way in ensuring their success. For MFIs to benefit from the positive impact of the exchange rate, the government needs to work on reviving the value of the Zimbabwean dollar and make it more competitive internationally. For instance, the government may boost domestic production which reduces exchange rates and inflation thereby increasing MFIs performance.

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