

JOURNAL OF APPLIED ECONOMICS AND BUSINESS

VOL. 9, ISSUE 4 – DECEMBER, 2021



Education and Novel Technology Research Association

Journal of Applied Economics and Business

VOL. 9, ISSUE 4 – DECEMBER, 2021

The Journal of Applied Economics and Business (JAEB – ISSN: 1857-8721) is an international peer-reviewed, open-access academic journal that publishes original research articles. It provides a forum for knowledge dissemination on broad spectrum of issues related to applied economics and business. The journal pays particular attention on contributions of high-quality and empirically oriented manuscripts supported by various quantitative and qualitative research methodologies. Among theoretical and applicative contributions, it favors those relevant to a broad international audience. Purely descriptive manuscripts, which do not contribute to journal's aims and objectives are not considered suitable.

JAEB provides a space for academics, researchers and professionals to share latest ideas. It fosters exchange of attitudes and approaches towards range of important economic and business topics. Articles published in the journal are clearly relevant to applied economics and business theory and practice and identify both a compelling practical issue and a strong theoretical framework for addressing it.

The journal provides immediate open-access to its content on the principle that makes research freely available to public thus supporting global exchange of knowledge.

JAEB is abstracted and indexed in: DOAJ, EZB, ZDB, Open J-Gate, Google Scholar, JournalITOCs, New Jour and UlrichsWeb.

Publisher

Education and Novel Technology Research Association

Web: www.aebjournal.org

E-mail: editorial@aebjournal.org

support@aebjournal.org

publisher@aebjournal.org

Editor-in-Chief

- **Noga Collins-Kreiner**, Department of Geography and Environmental Studies, Center for Tourism, Pilgrimage & Recreation Research, University of Haifa, *Israel*

Editorial board

- **Aleksandra Terzić**, Geographical Institute "Jovan Cvijić" Serbian Academy of Sciences and Arts, Belgrade, *Serbia*
- **Alexandr M. Karminsky**, Faculty of Economics, Higher School of Economics, *Russia*
- **Anand Bethapudi**, National Institute of Tourism and Hospitality Management, *India*
- **Bruno S. Sergi**, Department of Economics, Statistics and Geopolitical Analysis of Territories, University of Mesina, *Italy*
- **Dimitar Eftimoski**, Department of Economics, Faculty of Administration and Information Systems Management, St. Kliment Ohridski University, *Macedonia*
- **Evangelos Christou**, Department of Tourism Management, Alexander Technological Institute of Thessaloniki, *Greece*
- **Irena Ateljevic**, Cultural Geography Landscape Center, Wageningen University, *Netherlands*
- **Irena Nančovska Šerbec**, Department of mathematics and computing, Faculty of education, University of Ljubljana, *Slovenia*
- **Iskra Christova-Balkanska**, Economic Research Institute, Bulgarian Academy of Sciences, *Bulgaria*
- **Joanna Hernik**, Faculty of Economics, West Pomeranian University of Technology, Szczecin, *Poland*
- **Ksenija Vodeb**, Department of Sustainable Tourism Destination, Faculty of Tourism Studies - TURISTICA, University of Primorska, *Slovenia*
- **Kaye Chon**, School of Hotel and Tourism Management, the Hong Kong Polytechnic University, *China*
- **Pèter Kovács**, Faculty of Economics and Business Administration, University of Szeged, *Hungary*
- **Ramona Rupeika-Apoga**, Faculty of Economics and Management, University of Latvia, *Latvia*
- **Renata Tomljenović**, Institute for Tourism, Zagreb, *Croatia*
- **Valentin Munteanu**, Faculty of Economics and Business administration, West University of Timisoara, *Romania*
- **Zoran Vaupot**, Faculty of Business Studies, Catholic Institute, *Slovenia*

Content

Khalafalla Ahmed Mohamed Arabi, Dirar Abdulhameed Alotaibi Does Long-Memory Prevail in Saudi Stock Market?	5-20
Ronald B. Larson Raising the Value of Loyalty Program Databases	21-39
Alwell Nteegah, Godwin Uzochukwu Nosiri Government Agricultural Projects and Rural Development in Selected Local Government Areas in Rivers State	40-64
Aaron J. Pacheco, Kristian Braekkan, Shelly Albaum Applying Geographic Models to Examine the Impact of Gross Domestic Product as a Proxy for Economic Well-being	65-88
Akeeb Olushola Oladele, Alwell Nteegah, Okechuku Onuchuku, Monday Olulu Robinson Does Financial Inclusion Alleviate Poverty in Nigeria? A Time Series Analysis	89-108
Wajid Alim, Amjad Ali, Mahwish Rauf Metla, The Effect of Liquidity Risk Management on Financial Performance of Commercial Banks in Pakistan	109-128



DOES LONG-MEMORY PREVAIL IN SAUDI STOCK MARKET?

Khalafalla Ahmed Mohamed Arabi, Dirar Abdulhameed Alotaibi

King Khalid University

Abstract

We intend to explore whether there is a long-memory of Tadawul All Shares Index (TASI) returns and realized volatility for the period 26/1/1994–31/12/2020 as an indication of market inefficiency. Motivated by lack of in-depth analysis of previous studies, we investigated the existence of the long-memory with four models that are the autoregressive fractionally integrated moving average for returns (ARFIMA_R), and for realized volatility (ARFIMA_RV), a heterogeneous autoregressive model (HAR), and a combination of HAR&GARCH, (RARFIMA) for the whole period and up-and-down –trend-subsamples. The estimated long-memory of both raw returns and the realized volatility was positive and observed in all models, while the division of the whole sample into six sup-samples revealed very near positive values, and less than the threshold long-memory values via ARFIMA, and the combination of ARFIMA-HAR models, thus suggesting the marginal effect of the sample size on d values. Moreover, the presence of a long-memory exposed market inefficiency.

Key words: Long-memory, Realized volatility, Sup-samples, TASI returns.

INTRODUCTION

Investigation of long-memory i.e. long-range dependence (LRD) has brought about a multitude of empirics applying various methods of estimation to many areas such as irrigation, climate, trade, statistics, and econometrics to assess behavior and forecasting processes (Graves et al., 2016). Historically, Hurst was the first to detect the irregular range development in the hydrological time series in 1951, using a modified range standardized by sample standard deviation R/S . Hurst spent 62 years in Egypt as a hydrologist in charge of many tasks, studying the properties of the Nile basin and working with his team on the method of water control. The cumulative flows of rivers labeled adjusted range R was analyzed as the difference between the maximum and the minimum sum of random flows normalized by the standard deviation called the Rescaled Adjusted Range R/S . Then examined 690 time series of geophysical phenomena. Hurst's (1951) study in hydrology motivated Mandelbrot's awareness in long memory processes, to bring about the idea of an ideal dam, which entails uniform outflow, always full reservoir, no outflow, and the minimal match

with these conditions to determine the optimal height of the dam using Fractional Gaussian Noise (Graves et al., 2016), then Hosking and Granger merged long-memory spectrum into auto-regressive fractionally integrated moving average ARFIMA(p,d,q). The Fractionally Integrated Generalized Autoregressive Conditional Heteroscedastic (FIGARCH) method was introduced by Baillie et al., (1996). However, due to the heterogeneity among traders the Heterogeneous Autoregressive (HAR) model was developed by Corsi (2009), and to address realized volatility to address the shortcoming of fractional difference i.e. non- multivariate process, and mixing between long and short memory. Opschoora and Lucasa (2017) accounting for fat tails presented a covariance matrix dynamics model. Baillie et al., (2019) assessed the contribution of rival explanations through the use of fractional long memory models combined with extended HAR models, and also random coefficient extended HAR models. They established evidence that the statistical modeling of long-memory is generally important in addition to more structural model explanations. However, the existence of long-memory is an indication of an inefficient market, that is the inability of financial markets to represent data on the prices of securities of singular stocks and the stock market as a whole (Malkeil, 2003). Large numbers and rationality of participants are characteristics of an efficient market seeking to foresee future stock values with the current accessibility of information (Fama, 1970).

In 1980 the Saudi Arabian Monetary Authority (SAMA) formed the stock exchange, the real beginning of which was in 1994. A variety of internal and external factors influenced the TASI trend, including price manipulation, cheating in financial reports, technological development, amendment of legislation, reforms, the first and second Gulf Wars, East Asian economic crisis, volatile oil prices, and the September 11 event (Arabi, 2018). The establishment of the Saudi Stock Market (SSM) (Tadawul) was approved by the Council of Ministries on 19/3/2007. The SSM witnessed five phases of development in infrastructure:

Phase (1) the first integrated electronic system for trading, settlements, and clearing (ESIS) was implemented in 1990.

Phase (2) in which the period 1997–2000 witnessed the integration of settlement, de-ownership, and transfer systems into a single platform, and the switching from notices to accounts as a means of proving ownership.

Phase (3) the capital market authority (CMA) launched the Horizon automated trading system, and switched to day-to-day leveling (T+0) instead of (T+1) and replace documents with investment account applications, accompanied by banks systems development, and trading in banks through the Internet, telephone banking and ATMs.

Phase (4) saw comprehensive development of the technical structure, and of all trading systems, the addition of new investment tools as well as the market data



dissemination platform and market monitoring platform labeled (SAXESS, TARGIN, and SMARTS) (Muhammad et al., 2017).

Phase (5) CMA took regulatory actions and administrative reforms. The capital of all listed companies in Saudi Riyal (SAR) 622.72 million. Saudi stock exchange is the largest in the Gulf Cooperative Council. TASI's closing prices rose steadily from the beginning of 1994–2002, followed by a sharp upward trend ending in 2006, tracked by a sharp decline ending in 2010, trailed by oscillations. Despite the apparent consistency of the returns phase, a positive return is a benefit whereas a negative is a loss. Because returns are either trading gains or dividends to the shareholder, this motivates us to test for long-memory, which decides whether there is long-term dependency.

This paper aims to investigate the existence of long-memory in returns data, and its realized volatility, followed by forecast assessment. There are few investigating long-memory studies available on the Saudi stock market including Bin Ateeg (2018) measuring the efficiency of Saudi, Dubai, and Kuwait stock markets via the ARIMA model. Lamouchi (2020) recognized the occurrence of long-memory of TASI daily returns and their realized volatility through ARFIMA only, to test the efficient market hypothesis for the period 1999–2019. However, we were different from Lamouchi in the length of period covered, doing more investigation of six subsamples according to up and downtrends, and using more estimation tools. In addition to taking into account the realized volatility that she ignored. The evidence from these prior studies has shown that the Saudi Stock Market (SSM) is inefficient. The purpose of this paper is to confirm the inefficiency due to the presence of long-memory by extending the analysis through four estimation models spanning the entire period from the beginning of the stock market to the end of 2020, as well as studying the effect of sample size on the magnitude and sign of difference parameter, addressing the following questions does series length affect long-memory presence? Do upward and downward patterns have the same fractional difference in size?

This paper is divided into six sections, starting with the introduction, followed by a literature review, methodology, analytical findings, discussion, and ending with the conclusion.

The awareness of high autocorrelation and dependence of time series led to a plethora of papers scrutinizing the essence of long-memory in these series, dating back to (Hurst, 1951) to Marwan et al., (2019) and Baillie et al., (2019) who point to the importance of long-memory in tying together stationarity and nonstationarity, and its presence by realized volatility. Econometricians have lagged 30 years behind physicists in the use of long-memory models (Baillie, 1996).

Al Zahrani et al., (2020) used monthly readings of patients with diabetes in the AlBaha region of Saudi Arabia to construct a plausible model of ARFIMA(1,0.44,0) as an effective for monthly diabetes data for the period 2006–2016. Their finding raises concerns about the growing number of diabetes patients and the challenge facing the health directorate to put this problem under control. Lamouchi (2020) applied the ARFIMA approach to TASI returns to reach the empirical evidence that the long-memory behavior of TASI returns and historical volatility of the Saudi Stock Exchange violates the efficient market hypothesis. The policy implication of her findings is that the situation encourages investors to make use of this advantage to make abnormal returns.

Marwan et al., (2019) ascertained the superiority of ARFIMA after splitting the sample into crisis and pre-crisis, while the HAR model was less affected by changes. Likewise, Hassler and Pohle (2019) identified the supremacy of ARFIMA when applied to inflation series. Bin Ateeq (2018) linked the efficient market hypothesis and behavior model to study the Saudi, Dubai, and Kuwait stock markets concluding that these markets are inefficient. The main tool of analysis was ARIMA. Moreover, he studied the role of liberalization, crisis, and reform in these markets. Whoever, the Saudi stock market has been strengthened only by reform and neither by liberalization nor by the crisis. The division of data into crisis and pre-crisis was carried out by Caporale et al., (2017) generated insightful financial bubbles and anti-bubbles.

Madouri and Mkidiche (2017) intended to match the results of ARFIMA and ANN applied to the relationship between the exchange rate series of Algerian dinar, the US dollar, the pound, and the euro. ANN outperformed ARFIMA in forecasting the relationship between the dinar and the dollar, while ARFIMA was strong in forecasting the euro and the pound. Then, they have established the role of long-memory in the conditional variance of exchange series using ARFIMA-FIGARCH and ARFIMA-FIAPARCH models. They also set up that long-memory models are strong compared to short-memory models in the sample forecast result.

Sahed and Mkidiche (2014) dealt with the model of oil prices with long-memory models (ARFIMA) to estimate oil prices for the next 12 months starting from January until December 2014. Mensi et al., (2014) study the Saudi exchange rate against major currencies discovering long-memory via ARFIMA and FIGARCH, the planned news does not influence the volatility contrary to unscheduled. Five structural breaks were found. Mohamed et al., (2013) tested the long-memory of precious metals to find them sufficiently explained by the ARFIMA-FIGARCH model, which provides better out-sample forecast accuracy than several volatility models. Fulvio (2009) suggested an additive falls model of volatility mechanisms found over diverse periods and effectively attained the goal of long-memory reactions, fat tails, and self-similarity. Transitional and permanent fluctuation in real output has been studied by Marinko



and Saša (2013) for long memory in real output through ARFIMA indicating that macroeconomic shocks in real output are highly persistent in Croatia.

A new fractionally integrated model based on the long-memory behavior of daily realized kernels and daily return observations for covariance matrix dynamics was presented by Opschoora and Lucasa (2017) justified fat tails, and formulated a numerically efficient matrix recursion that ensures positive definiteness under simple parameter constraints. They built realized covariance kernels by the use of intraday stock data over the period 2001–2012, displaying that the current model beats recent options such as the Multivariate HEAVY model and the multivariate HAR model, explicitly during non-crisis periods of long-memory manner.

Teyssiere and Gilles (2000) concentrated on new semi-parametric tests and estimators, such as the Newey and West Heteroscedastic and autocorrelation consistent (HAC) estimator of variance, the R/S testing non-existence of long-memory, then the KPSS statistic, and the rescaled variance V/S, nonparametric tests.

This paper intersects with other papers in the use of the AFIRMA and HAR models with different variants, and the notion of splitting data for further investigation, but differs in the length of a database, number, and basis of data division, where six sup-samples were obtained based on trend behavior and not crisis and pre-crisis.

METHODOLOGY

The dataset comprises daily observations of the Trade All-Share Index of the Saudi Stock market, its returns, and the realized volatility across the period 26/1/1994–31/12/2020 that is since the launch of the market index until the end year of 2020. Returns are denoted as R is constructed as percentage change using the natural logarithm, while realized volatility RV is the square root of returns variance, the square of returns is denoted RSQ , then LRV indicates the log of realized volatility. Since the ARFIMA approach is primarily a univariate model the returns of the choice of the closing price is the appropriate measure of market efficiency.

ARFIMA

The autoregressive component of the autoregressive integrated moving average (ARIMA and ARFIMA) embodies the residual from the previous observation into the regression model for the current observation, while the moving average assumes that the current disturbance term is a weighted sum of the current and lagged innovations. Baum (2013) stated that autoregressive polynomial, and moving average polynomial are required by ARIMA (ARFIMA as well) to be estimated through (fractionally) differencing to attain stationarity and inevitability.

Granger and Joyeux (1980) defined an autoregressive fractionally differenced moving average (ARFIMA) process $\{y_t\}$ as:

$$\Phi(B)(1-B)^d y_t = \Theta(B)\varepsilon_t \quad (1)$$

where $\Phi(B) = 1 + \varphi_1 B + \dots + \varphi_p B^p$, and $\Theta(B) = 1 + \theta_1 B + \dots + \theta_q B^q$ are

the autoregressive and moving average (ARMA) operators, respectively; The fractional difference term $(1-B)^d = \sum_{j=0}^{\infty} \binom{d}{j} B^j$ has a binomial expansion. The ARIMA process is stationary and invertible second-order assuming that the roots of the polynomials $\Phi(B)$ and $\Theta(B)$ are outside the unit circle, and the absolute difference i.e. $|d|=1/2$. The variance in daily returns is estimated as follows:

$$r_t = \log(P_t/P_{t-1}) \quad (2)$$

where P = TASI closing price, t = period, and the log is the natural logarithm. This approach assumes that the average should be set at zero, taking into account upside and downside trends in the stock price movements.

Realized Volatility

The benefits of realized volatility (RV) include calculation of stability, measurement of changes in time, risk, pricing option, and forecasting method. Its greatest drawback is not forward-looking. The first step in of realized volatility calculation is to estimate the realized variance as a sum of squared returns $\sum_{i=1}^N r_t^2$. Second, take the square roots of the realized variance.

HAR Model

Heterogeneous Autoregressive (HAR) model was recommended by Corsi (2009) as follows:

$$RV_t = c + \beta^{(w)} RV_{t-1}^{(d)} + \beta^{(w)} RV_t^{(w)} + \beta^{(m)} RV_t^{(m)} + \varepsilon_t \quad (3)$$

The response to the information varies, some investors have quick responses, others as insurance companies, commercial banks, and pension funds prefer to respond to a lower rate of recurrence of information, on a weekly or monthly basis, as long-lasting volatility is taken by immediate investors as a measure for future volatility, contrary to the irrelevance of transitory volatility by abiding investors (Dimitrios et al., 2012).

Corsi et al., (2008) estimated the weekly, and monthly averages of realized volatility as follows:

$$RV_t^{(w)} = \frac{1}{5} \left(RV_{t-1}^{(d)} + RV_{t-2}^{(d)} + \dots + RV_{t-5}^{(d)} \right) \quad (4)$$

Monthly Realized Volatility

$$RV_t^{(m)} = \frac{1}{22} \left(RV_{t-1}^{(d)} + RV_{t-2}^{(d)} + \dots + RV_{t-22}^{(d)} \right) \quad (5)$$



The HAR's weekly and monthly terms of the model are structured to accommodate market members with various investment opportunities.

The natural logarithm of the sum of squared returns i.e. realized variance, was taken by Dimitrios et.al (2012) as a proxy for realized volatility $lrv_t = \log(r_t^2)$. Consequently, the HAR model is the following:

$$LRV_t = c + \beta^{(w)} LRV_{t-1}^{(d)} + \beta^{(w)} LRV_t^{(w)} + \beta^{(m)} LRV_t^{(m)} + \varepsilon_t \quad (6)$$

The squared returns are used by a third version of the HAR model as follows:

$$r_t^2 = c + \beta^{(w)} r_{t-1}^2 + \beta^{(w)} r_t^{(w)} + \beta^{(m)} r_t^{(m)} + \varepsilon_t \quad (7)$$

HAR-GARCH(p,q)

Corsi et al., (2008) used the standard HAR terminology to combine HAR and GARCH for realized volatility and provide conditional density and information available at time $t-1(\Omega_{t-1})$ as follows:

$$RV_t = c + \beta^{(w)} RV_{t-1}^{(d)} + \beta^{(w)} RV_t^{(w)} + \beta^{(m)} RV_t^{(m)} + \sqrt{h_t} \varepsilon_t; \varepsilon_t | \Omega_{t-1} \quad (8)$$

$$RV_t = \omega + \sum_{j=1}^q \alpha_j \mu_{t-j}^2 + \sum_{j=1}^p \beta_j h_{t-j} \quad (9)$$

RARFIMA

Baillie et al., (2019) estimated a long memory model by combining the HAR model with the restricted ARFIMA model to produce RARFIMA.

$$(1 - L)^d \lambda(L) RV_t = \varepsilon_t = \phi(L)(1 - L)^d RV_t \quad (10)$$

$$\lambda(L) = 1 - \lambda_1 L_1 - \lambda_2 L_2^2 - \lambda_2 L_2^3 - \lambda_2 L_2^4 - \lambda_2 L_2^5 - \lambda_3 L^6 - \lambda_3 L^7 \dots - \lambda_3 L^{22} \quad (11)$$

$$\phi_1 = \phi_2 = \phi_3 = \phi_4 = \phi_5 \equiv \lambda_2; \phi_6 = \phi_7 \dots = \phi_{22} = \lambda_3 \quad (12)$$

The RARFIMA is a restricted ARFIMA model, that seems to be a reasonable approximation to the dynamic structure of several RV series, which is a HAR model augmented by the fractional difference and capable of reproducing autocorrelation function the hyperbolic decay (Baillie et al., 2019).

RESULTS AND DISCUSSION

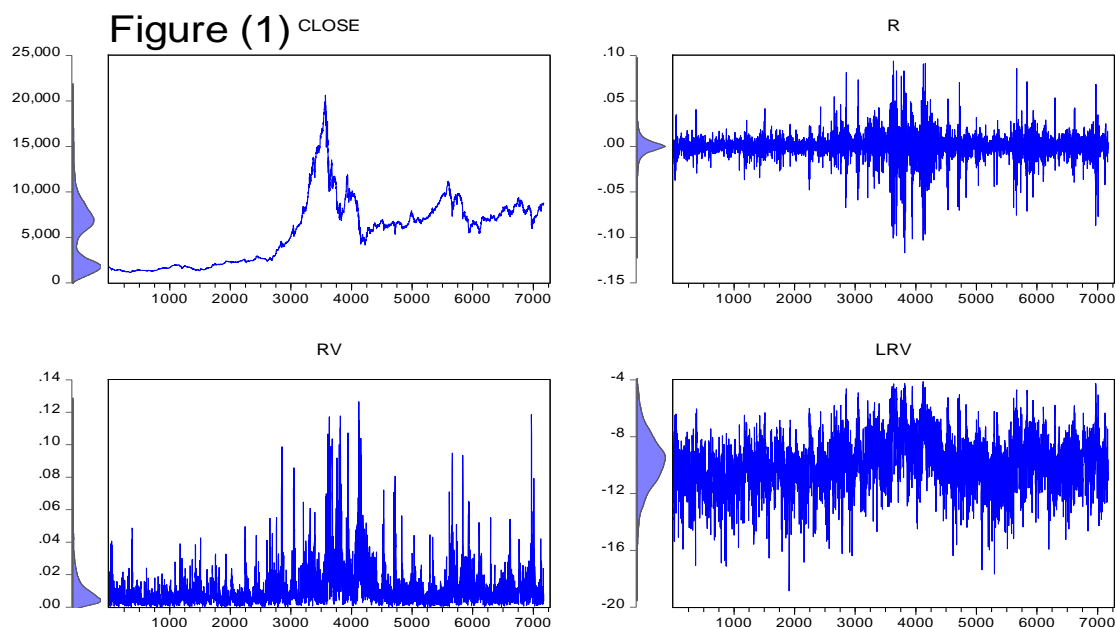
The application of descriptive statistics is critical in describing the characteristics of dataset. They offer brief summaries of the sample and measures. They form the foundation of almost every quantitative data analysis, along with simple graphics analysis.

TABLE 1. DESCRIPTIVE STATISTICS

	Mean	Median	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis
R	.0002	0.0007	0.093907	-0.11729	0.012909	-1.07405	16.9746
RV	0.012	0.0080	0.126416	8.04E-05	0.013641	3.311932	17.8990
LRV	-9.680	-9.6465	-4.13635	-18.8579	1.872419	-0.14909	3.52142
RSQ	0.0002	1.97e-5	0.01376	0.00000	0.00066	9.54509	119.255

The negative skewness of the returns series points to the long left tail. The realized volatility series are leptokurtic since their kurtosis statistic is greater than 3, pointing to fat tail resulting in a more possibility of major positive or negative events. This knowledge help investors measure the level of risk of an asset.

Figure 1 depicts the closing price (close), returns (R), realized volatility (RV), and log realized volatility (LVR).



Stationarity may be the obvious feature of Figure 1 since the daily return, realized volatility, as well as log realized volatility oscillate around a constant means. The kernel density of closing prices is bimodal, daily returns and log realized volatility displays normal curves, while the realized volatility skewed to the left.

The presence of random walk renders the estimated process to be ARFIMA (0,d,0) and encounters four instances, first when the difference operator (d) equals 0.5 the process is non-stationary and invertible; second if (d) lies between zero and 0.5 the process has long memory; third if (d) lies between -0.5 and less than zero, the process has short memory; fourth when (d) is zero the process is white noise. Therefore the test for random walk is necessary. For consistency with previous studies, especially on Saudi subjects, we are checking the presence of unit root by KPSS. The null hypothesis ρ (φ) is less than 1 against the alternative hypothesis $\varphi = 1$.



TABLE 2. UNIT ROOT TESTS

	Returns		Realized Volatility		Realized Variance	
Statistic	Level	Ist. Diff	Level	Ist. Diff	Level	Ist. Diff
KPSS	0.149944***		1.320810	0.017457***	2.270987	0.11966***

As the KPSS test statistic is less than all asymptotic critical values, the hypothesis, cannot be rejected, thus, TASI returns are stationary, while realized volatility and realized variance is integrated of order one I(1). On the other hand, tests in the annex dismiss the random walk hypothesis in both returns and realized series, except for period 2 of the realized volatility.

Estimation results are depicted in Table 3 showing the fractional difference, the autoregressive terms, and the moving average terms. The number of asterisks indicate the significance level, notably all estimates are highly significant at one percent (**).

TABLE 3. ARFIMA RESULTS

Coefficient	ARFIMA_R	ARFIMA_LRV	ARFIMA_RSQ	ARFIMA_RV
C		-9.76732***		
Difference	0.07706**	0.324107***	0.373808***	0.463685***
AR(1)	0.700299***	-0.27555***	-1.21369***	-0.72749***
AR(2)	-0.36882***		-0.97847***	-0.64195***
AR(3)	-0.29669***		-0.43338***	0.288462***
AR(4)	0.574738***			0.092194***
MA(1)	-0.68874***	0.629261***	0.928576***	1.193801***
MA(2)	0.28229***		0.679354***	0.712929***
MA(3)	0.377633***		0.207121***	-0.18709***
MA(4)	-0.62336***		-0.16311***	-0.45713***
MSE	0.017		7.65E-05	0.0094
Akaike	-5.876	3.332	-12.015	-6.601
R ²	0.019	0.533	0.199	0.684

Table 3 portrays the results of four ARFIMA models based on ARMA models selected by the automatic ARIMA forecasting. The first was estimated using raw returns, the second using a log of realized variance, the third fitted results obtained via the squared returns as a proxy for realized volatility, and the fourth using realized volatility calculated as the square root of realized variance. Estimates of the memory parameter and other estimated coefficients are all significant at a 1% level of significance as the stars advocate. The estimated d values range from 0.07 to 0.46 are all positive signifying long-memory. The choice between realized volatility models based on the coefficient of determination, mean square error, and Akaike information criterion, though the estimated ARFIMA favors the fourth model (ARFIMA_RV). Shocks take a longer time to disappear. Strong persistence means that the distant past of the process still strongly influences the present (Hassler & Pohle, 2019).

The TASI movement will be examined by dividing the entire periods according to periods of ups and downs, where the first and the second numbers brackets in Table 4 indicate the month and year of the spike or trough.

TABLE 4. SUP-SAMPLES

	Spike	Spike	Trough	Spike	Trough	Spike
ARFIMA	0.368	0.364	0.409	0.374	0.399	0.372
RARFIMA	0.494	0.490	0.418	0.447	0.488	0.487
Observations	2616 (11/2002)	964 (2/2006)	656 (7/2009)	1382 (9/2014)	515 (9/2016)	1053 (9/2017)

The SSE witnessed rapid development in infrastructure and legislation. The steady upward trend was a response to the publishing of prices, corporate announcements, and financial reports, integration of settlement, clearance, and transfer system. Moreover, banks developed their systems and began trading online, banking telephone, and ATM. The sample period of realized volatility was divided into 6 sup-samples of varying sizes according to the trend pattern, where an upward trend was marked as a spike and downward as a trough. The number of observations, the month in which troughs and spikes occurred, as well as d values, revealed in Table 4 for ARFIMA & RARFIMA. It is clear that the length of the sample period has very little effect on the size of the fractional difference, and does not alter its sign. The first period lasted over 2000 days, from 1994 to the end of November 2002, followed by a slowdown from December 2002 to January 2006, then an upward trend for 964 days, then a downward trend for 656 days, an upward trend for 1,382 days, a slowdown for the next 515 days, and finally an upward trend for the remaining period, i.e. 1,053 days. It has been observed that days of upward trends outnumber days of downward trends. Despite this, the difference estimates are not significantly different from one another, with a slight increase in d values during downward trends. Caporale et al., (2017) used the idea of splitting the entire sample period into sub-periods to generate insightful financial bubbles and anti-bubbles. Similar insights are obtained by dividing the entire period into six sub periods based on the recognized ups and downs and their effect on the estimated fractional difference.

TABLE 5. ESTIMATION RESULTS OF HETEROGENEOUS MODELS

Coefficient	HAR_LRV	HAR_RSQ	HAR_RV	RARRIMA	HAR-GARCH
Constant	-1.07394***	0.000109***	0.003181***	0.005965***	0.002419***
RV(-1)	0.536064***	0.136908***	0.627148***	0.38953***	0.607815***
Weekly RV	0.06373***	0.266301***	2.062568***	2.565826***	3.040062***
MonthlyRV	0.2892***	0.394281**	6.011209***	5.200225***	7.802264***
Daily RV				0.248907***	
Constant					1.56E-06***
RESID(-1) ²					0.160515***
GARCH(-1)					0.83585***
MSE			0.0088	0.007	0.0030
AIC	3.227	-10.373	-5.961	-6.729	-5.86
R ²	0.56	0.191	0.531	0.625	0.613



Table 5 shows the significance levels of HAR, RARFIMA, and HAR-GARCH components estimates at 5% (**) and 1%(***). Except for the monthly RV of HAR RSQ at 5%, all estimates are highly significant at the 1% level.

Following Corsi (2009) OLS is enhanced by the option Bartlett kernel, Newey-West covariance correction to eliminate any potential autocorrelation (Feng et.al 2019). The stationarity of HAR residues points to the adequacy of the model. The estimated parameters are significant on the 1% significance level, including the positive d values of the RARFIMA model. The impact on current realized volatility in the standard HAR model is dominated by the lagged realized volatility, and monthly average, while the weakly average component has a low impact indicating a declining impact of the monthly component. The components therefore can be used as a proxy for market weights. Matching the results of the standard HAR model with HAR-GARCH similarity is noted for Corsi et al., (2008) when combining HAR and GARCH models together, the constant and weekly volatility parameters increased, the lagged realized volatility decreased. As well as an improvement in the goods of fit based on the Akaike information criterion. The output of HAR-GARCH is also similar to that of Dimitrios et al., (2012). The RARFIMA indicated the important role of monthly and weekly averages on realized volatility compared to ARMA terms.

The selection criteria are all in favor of RARFIMA models with significant estimated and positive parameters. The monthly average has a dominant impact on the realized volatility followed by the weekly average. The comparison between HAR-GARCH and RARFIMA shows similar results.

Starting with the closing price, the gradual increase in the curve over the first thirty two months was attributed to the improvement of the Saudi economy following the liberation of Kuwait, improved oil prices, and the decline in interest rates. Then the rapid rise in closing price was triggered by the increase in corporate capital, the merger of banks, the listing of companies in the Saudi Stock Market (SSM), and the development in technological infrastructure. The slowdown was triggered by the economic crisis that occurred in East Asia, which hurt petrochemical firms, a decline in oil prices, and a rise in interest rates. The decline in oil production has led to a major jump in oil prices, followed by opening the door to investment in the Saudi market for foreign investors through local equity funds. Besides, the EU accepted the accession of the Kingdom to the world trade organization, the big return of money invested abroad, the functioning of the Capital Market Authority and the executive management, the Cabinet allowed Gulf Cooperative Council GCC citizens to trade banking and insurance shares, the release of new rules: the listing of more companies, and licensed persons, as well as, oil prices continued to rise. In addition, news have

played an obvious role in the price movement, as exemplified by the Minister's of Finance incorrect comment of on stock overvaluation at the beginning of the 1990s, which led to a sharp fall in the stock market, the rise of collective sales, bankruptcy of many senior and small shareholders, and the loss of market faith, which continued this decline until the beginning of June of 1995. In addition to the incorrect decisions, the capital market in the light of regulatory initiatives for the assessment of electricity fluctuations, stopping manipulations by examining the reasons for the substantial increase in stocks, contributed to a decline in their shares.

The construction of returns and realized volatility of the closing price and the application of ARFIMA, HAR, and RARFIMA models have revealed the long term nature to emphasize past dependence, thus refuting the efficiency of the stock market. Lamouchi (2020) obtained this result with the application of ARFIRMA solely for returns. Our results support Bin Ateeq (2018) findings of market inefficiency. Kumar (2014) reached a conclusion that the Saudi stock market is not weakly inefficient which coincides with our results since we obtained a difference operator greater than zero, while the market weak efficiency requires a fractional difference to be set to zero. Many reasons can be attributed the inefficiency of the market, including the domination of the board of directors, poor corporate management, speculation, and manipulation of movement of prices. Gains were made to segment of investors from the rather large difference between the first offer and the first order, where they benefited from this ratio by making small gains only by buying from the nearest order and selling on the first offer. However, results indicate that the monthly average's effect on the realized volatility is twice the role of the weekly average's position, highlighting that large investors prefer slow investment actions. Results obtained by dividing the whole period into six samples according to surges, and downturns showed that the magnitude of the difference fraction values varies but in a very narrow range, which means that the sample size has a marginal effect on the d value.

CONCLUSION

The paper examined the occurrence of long-memory in the return series, and its realized volatility for the period 1994–2020 using 7,182 observations estimated by ARFIMA, HAR, a combination of both, and a combination of HAR-GARCH models. In the first step, we explored the existence of long memory in returns and realized volatility through the ARFIMA model. The return series unveiled a long-memory of 0.07, while realized volatility long-memory ranged between 0.32–0.46. In the second stage, we confined our analysis to realized volatility. Three types of the realized series as dependent variables that is a log of the realized variance, the square root of the realized variance, and the squared returns. Selection criteria preferred the combination of ARFIMA and HAR referred to as RARFIMA. To answer the questions posed above, further inspection by dividing the entire sample into six sub-samples, suggesting that sample length and upward and downward patterns have little



influence on changing the magnitude of fractional difference. The ultimate result is that the SSM is marked as inefficient due to many internal and factors that require rigorous measures to be taken. This result is confirmed by the run test with zero test value of returns, 1,533 cases less than the test value, 1736 greater than the test value, and the asymptotic significance rejects the hypothesis of randomness. Many internal and external factors were behind the inefficiency. Since we reached the same conclusion of market inefficiency as Lamounchi (2020), we confirm her policy implication that this situation encourages investors to make abnormal returns. Moreover, the presence of a long-memory exposed market inefficiency. More effort should be made to increase the proportion of investors, to increase influence over the work of boards and executives, to introduce more governance, to eliminate market manipulations in the movement of prices, and easing requirements for international investors.

REFERENCES

- Al Zahrani, S., AlRahman Al Sameeh, F., Musa, A.C.M. & Shokeralla, A.A.A. (2020). Forecasting Diabetes Patients Attendance at Al-Baha Hospitals Using Autoregressive Fractional Integrated Moving Average (ARFIMA) models. *Journal of Data Analysis and Information Processing*, 8, 183–194.
- Arabi, Khalafalla Ahmed Mohamed. (2018). What drives Tadawul All Stock Index of the Saudi Stock Market? *Archives of Business Research*, 6(4), 176–190.
- Baillie, Richard T., Fabio Calonaci, Dooyeon Cho & Seunghwa Rho. (2019). How Important is Modeling Long Memory in Realized Volatility? School of Economics and Finance, Working Paper 881.
- Baum, Christopher F. (2013). ARIMA and ARFIMA models, Boston College.
- Bin Ateeq & Yazeed Abdulaziz I. (2018). Assessing for the Volatility of the Saudi, Dubai and Kuwait Stock Markets: Time Series Analysis (2005–2016), Ph.D. Thesis Manchester Metropolitan University.
- Caporale Guglielmo Maria, Luis Gil-Alana & Alex Plastun. (2017). Is market fear persistent? A long Memory Analysis, Working Paper.
- Creal, D., S.J. Koopman & A. Lucas. (2011). A dynamic Multivariate Heavy-Tailed Model for Time-Varying Volatilities and Correlations. *Journal of Business and Economic Statistics*, 29, 552–563.
- Corsi Fulvio. (2009). A Simple Approximate Long-Memory Model of Realized Volatility. *Journal of Financial Econometrics*, 7(2), 174–196.

- Dimitrios P. Louzis, Spyros Xanthopoulos-Sisinis & Apostolos P. Refenes. (2012). Stock index realized volatility forecasting in the presence of heterogeneous leverage effects and long-range dependence in the volatility of realized volatility. *Applied Economics*.
- FAMA, E. F. (1970). Efficient Capital Markets: A Review of Theory and Empirical Work. *Journal of Finance*, 25(2), Papers and Proceedings of the Twenty-Eighth Annual Meeting of the American Finance Association New York, N.Y. December, 28-30, 1969, 383-417.
- Feng Ma, Xinjie Lu, Ke Yang & Yaojie Zhang. (2019). Volatility forecasting: long memory, regime-switching, and heteroscedasticity. *Applied Economics*.
- Fulvio Corsi, Stefan Mittnik, Christian Pigorsch & Uta Pigorsch. (2008). The Volatility of Realized Volatility. *Econometric Reviews*.
- Granger, C. W. J., & Joyeux, R. (1980). An introduction to long-memory time series models and fractional differencing. *Journal of Time Series Analysis*, 1, 15-29.
- Graves Timothy, Robert B. Gramacy, Nicholas W. Watkins† Christian L. E. Franzke. (2017). A brief history of long memory: Hurst, Mandelbrot, and the road to ARFIMA. *Entropy*, 437.
- Hassler Uwe & Pohle Marc-Oliver. (2019). Forecasting under Long Memory and Non-stationarity. Cornell University.
- Kasman, Adnan & Torun, Erdost. (2007). Long Memory in the Turkish Stock Market Return and Volatility. *Central Bank Review*, Central Bank of the Republic of Turkey.
- Kumar, Anoop S. (2014). Testing Long Memory in Volatility in the Indian Foreign Exchange Market. *Economic Analysis*, LIX(203).
- Lamouchi, Rim Ammar. (2020). Long Memory and Stock Market Efficiency: Case of Saudi Arabia. *International Journal of Economics and Financial Issues*, 10(3), 29-34.
- Limam, I. (2003). Is long memory property of thin stock markets? International evidence using Arab countries. *Review of Middle East Economics and Finance*, 1(3), 251-266.
- Madouri Hadda & Mkidiche Mohamed. (2017). A Comparative Study of ARFIMA and Artificial Neural Networks to Forecast Exchange Rate of Dinar. *Algerian Journal of Economic and Financial Research*.
- Malkiel, Burton G. (2003). The Efficient Market Hypothesis and Its Critics.
- Marinko Škare & Saša Stjepanović. (2013). A Fractionally Integrated Model for the Croatian Aggregate Output (GDP) Series. *Economic Research-Ekonomska Istraživanja*, 26(2).
- Malkiel, Burton G. (2003). The Efficient Market Hypothesis and Its Critics.



- Marwan Izzeldin, M. Kabir Hassan, Vasileios Pappas & Mike Tsionas. (2019). Forecasting realized volatility using ARFIMA and HAR models, *Quantitative Finance*, 19(10).
- Mensi Walid, Shawkat Hammaoudah & Seong Min Yoon. (2014). Structural breaks and long memory in modeling and forecasting volatility of foreign exchange markets of oil exporters: The importance of scheduled and unscheduled news announcements, 30, 101–119.
- Mohamed El Hedi Arouri, Shawkat Hammoudeh, Amine Lahiani & Duc Khuong Nguyen. (2013). Long memory, and structural breaks in modeling the return and volatility dynamics of precious metals.
- Muhammad Mahboob Ali, Aviral Kumar Tiwari & Naveed Raza. (2017). Impact of return on long-memory data set of the volatility of Dhaka Stock Exchange market with the role of financial institutions: an empirical analysis. *Banks and Bank Systems*.
- Onour Ibrahim. (2010). North Africa Stock Markets: Analysis of Unit Root and Long Memory Process API/WPS 0906.
- Opschoora Anne & Andr e Lucasa. (2017). Fractional Integration and Fat Tails for Realized Covariance Kernels and Returns.
- Sahed Abdulghadir & Mkidiche Mohammad. (2014). Use of Long Memory for forecasting Oil Prices. *Journal of Economic and Financial Research*.
- Tayefi Maryam & Ramanathan T. V. (2012). An Overview of FIGARCH and Related Time Series Models. *Austrian Journal of Statistics*, 41(3), 175–196.
- Teyssiere G. (2000). Long-Memory Analysis. In: *XploRe® — Application Guide*. Springer, Berlin, Heidelberg.

ANNEX

Null Hypothesis: R is a martingale				
Date: 01/11/21 Time: 16:56				
Sample: 1 7282				
Included observations: 7180 (after adjustments)				
Heteroskedasticity robust standard error estimates				
User-specified lags: 2 4 8 16				
Joint Tests		Value	Df	Probability
Max z (at period 2)*		13.32935	7180	0.00
Individual Tests				
Period	Var. Ratio	Std. Error	z-Statistic	Probability
2	0.56166	0.032885	-13.3294	0.00
4	0.263749	0.05848	-12.5897	0.00
8	0.134912	0.086637	-9.98523	0.00
16	0.06676	0.119882	-7.78468	0.00

Null Hypothesis: RV is a martingale				
Date: 01/11/21 Time: 17:00				
Sample: 1 7282				
Included observations: 7180 (after adjustments)				
Heteroskedasticity robust standard error estimates				
User-specified lags: 2 4 8 16				
Joint Tests		Value	Df	Probability
Max z (at period 4)*		9.718701	7180	0.00000
Individual Tests				
Period	Var. Ratio	Std. Error	z-Statistic	Probability
2	0.971443	0.019899	-1.43509	0.15130
4	0.550888	0.046211	-9.7187	0.00000
8	0.306883	0.075476	-9.18321	0.00000
16	0.177995	0.110084	-7.46709	0.00000



RAISING THE VALUE OF LOYALTY PROGRAM DATABASES

Dr. Ronald B. Larson

Mid-America Consultants International, Fargo, ND, USA

Abstract

Many marketers have invested in loyalty programs to direct incentives at key buyers and to analyze customer transactions. Because many buyers do not join the programs, incomplete customer databases may result in poor business decisions. This research uses a literature review and two direct mail surveys to find options for encouraging people to join more programs. Prior literature was reviewed to identify challenges faced by loyalty programs and possible tactics for enhancing program participation. Direct mail surveys of consumers in the Midwest region of the US and ordered probit regressions were used to identify variables related to higher loyalty program participation by consumers. Education and income were positively linked to participation while technological anxiety was negatively related. If marketers can reduce customer technological anxiety and encourage more buyers to participate (especially less-educated and lower-income customers), database coverage and the quality of decisions based on the data would improve.

Keywords: Privacy concern, Technology anxiety, Information protection, Frequent customer program, Frequent shopper card.

INTRODUCTION

Many firms use loyalty programs to encourage customers to buy their goods and services. Consultants who worked with retailers and their loyalty programs believed that the data generated by these programs has been particularly valuable for customer relationship management initiatives (Martin et al., 2020). The perceived benefits contributed to a sharp increase in programs. For example, memberships in US electronic grocery loyalty programs grew from 135.5 million in 2006 to a peak of 173.72 million in 2010. However, they fell to 142.4 million in 2016, the last year of the Colloquy Loyalty Census (Fruend, 2017). Part of this decline was due to program cancellations by some supermarket chains including Albertsons, Shaw's, Star Market, Acme, Jewel-Osco, Pathmark, and Waldbaum's (Karolefski, 2015). These chains apparently were disappointed with the direct effects and believed that their customer databases did not offer enough value to compensate.

Studies have found that loyalty programs can change consumer choices (Lundberg & Lundberg, 2010; Huang & Chen, 2010; Marques et al., 2017; Rossi, 2018; Alshurideh,

2019; Yoo et al., 2020). The widespread use of loyalty programs creates a presumption that they are profitable. When firms introduced loyalty programs, their stock prices tended to rise (Faramarzi & Bhattacharya, 2021). Case studies and profit comparisons over time suggest that programs can be profitable (Lal & Bell, 2003; Chaudhuri et al., 2019). A few grocers adopted a controversial strategy: boost purchases by their best buyers and reduce transactions by lower-volume shoppers by rewarding only at high-volume buyers (i.e., firing their worst customers; Young, 2003; Gallagher, 2004). However, changing high-volume buyer behavior is difficult. Volume gains generated by programs usually come from light buyers (Lal & Bell, 2003; Liu, 2007; Allaway et al., 2014). Therefore, loyalty program sponsors may want to adjust their incentives to attract more light users.

Several US supermarkets with loyalty programs claimed that members were responsible for between 60–90% of their sales (Raphel, 1990; Nannery, 1999; Lal & Bell, 2003; Moses, 2005; Camron, 2020). One report put the average for US grocers at 55% (Stoneback, 1997). If similar results were found in other industries, a significant portion of sales (and much of it to light buyers) would not be covered in customer databases.

Some loyalty programs produced disappointing results (Dowling & Uncles, 1997; Skogland & Siguaw, 2004; McEwen, 2005; Meyer-Waarden & Benavent, 2006; Nunes & Dreze, 2006; Lacey, 2009; Kim et al., 2009; Murthi et al., 2011; Lin & Bennett, 2014; Filipe et al., 2017). In a survey of 325 marketing executives about their loyalty programs, using a zero to ten scale, only 16 % rated their programs a 9 or a 10. About 27% said their programs deserved a score of 5 or less (International Institute for Analytics, 2014). Many consumers have tired of the concept, almost 90 % of social media sentiment on loyalty programs was negative (Taylor et al., 2015).

The first eight items in Table 1 summarize some reasons why programs underperform expectations. Marketers may underestimate program costs. If they make changes to limit their expenses or shut down programs, customers may be disappointed. Program operators often focus on sales revenue, rewarding those who currently spend the most and ignoring customers who are profitable but are not heavy buyers or who may be profitable in the future (e.g., small firms, young families). It is difficult to select incentives that appeal to heavy users without angering those who fail to qualify. Programs may raise top customer expectations for more rewards and better service in the future. If competitors also have programs, reward costs may escalate to keep the best customers. Heavy buyers often join multiple programs and select the best offers from each, reducing the benefits from each program.



TABLE 1. LIMITATIONS WITH ELECTRONIC CUSTOMER LOYALTY PROGRAMS

1. Marketers may underestimate the high setup and operation costs (Cigliano et al., 2000; Tenser, 2006).
Data acquisition and maintenance costs can be high.
To cover program costs, product price increases put firms at a competitive disadvantage.
Key lessons learned early from customer data, but firms must bear long-term program costs.
2. Programs are difficult to change or shut down (McCall & McMahon, 2016; Melnyk & Bijmolt, 2015).
3. Marketers may have difficulty identifying and attracting profitable prospects.
Firms focus on heavy users instead of targeting light users who may be more profitable (Wansink, 2003).
The profit potential of “butterflies” and “barnacles” is ignored (Reinartz & Kumar, 2002).
4. Programs may look backward (e.g., overemphasize retention, underemphasize acquisition), use the metrics that are not associated with profits (Brierley, 2012), or confuse past customer profitability with future profit potential.
5. Marketers may be unable to change the long-term purchase behaviors of heavy users (Sharp & Sharp, 1997; Magi, 2003; Meyer-Waarden & Benavent, 2009; Allaway, et al., 2014).
6. Designing effective program rewards that satisfy members is challenging (Jang & Mattila, 2005; Wendlandt & Schrader, 2007; Demoulin & Zidda, 2009).
Rewards may lack aspirational value, be too hard to earn, or be too difficult to receive.
Incentive inequity can create betrayal and jealousy effects (Feinberg et al., 2002; Lacey & Sneath, 2006).
7. Loyalty programs raise customer expectations and create long-term liabilities (Shugan, 2005).
8. Programs by competitors may generate reward escalation, reducing the net benefits from a program (Liu & Yang, 2009).
Customers may join many programs and “cherry-pick” (Bellizzi & Bristol, 2004).
9. Program databases do not reflect the preferences of all customers (Cortinas et al., 2008; Azeem et al., 2018; Vuorinen et al., 2020).
Inaccurate entries on applications and other missing data create biases.
10. Programs encourage customers to tradeoff benefits for privacy concerns (Sayre & Horne, 2000; Gomez et al., 2012; SDL, 2014; Rainie & Duggan, 2015; Sides et al., 2019).
Privacy concerns may limit participation and add costs to protect data security.

If high-quality customer data help firms make smarter decisions, this could compensate for program underperformance. Data issues, the last two items in Table 1, are the focus of this study. Customer data analyses usually omit transactions by non-members. For example, a supermarket chain in the Southwest region of the US had 57,650 loyalty program members (i.e., customers who used their loyalty card on multiple shopping trips) that were divided into six segments (Allaway et al., 2006). However, purchases by non-members (customers who did not request a card and nearly 20,000 shoppers who only used their loyalty card once) were excluded. Researchers have found that non-members have different preferences and buying patterns than members (Smith et al., 2003; Demoulin & Zidda, 2008; Meyer-Waarden,

2008; Azeem et al., 2018). Omitting non-members creates data coverage issues and may introduce biases. A study of 10 categories sold by a Spanish hypermarket demonstrated that member purchases were not good proxies for the average shopper (Cortinas et al., 2008). For this store, the estimated effects of price discounts based on member data were too high in three categories and too low in two categories. Brand preference estimates were too low in five categories and too high in two categories. Preferences for smaller sizes were underestimated in five categories. Rains and Longley (2021) noted that many members of a UK loyalty program shopped at competitors or failed to use their cards, limiting generalizations based on the data. If programs are modified to attract more non-members and encourage members to spend a larger share of their wallet at the retailer, database coverage would improve. Otherwise, analyses of loyalty program databases may recommend product assortments, merchandising, promotions, and prices that would not appeal to many non-members.

This research identifies factors that could raise loyalty program participation by members and non-members and improve database coverage. The lessons learned from analyzing more complete customer databases could help justify any additional program costs. An extensive literature review and two surveys are used to identify measures that are related to program memberships and develop tactics to boost participation. The next section reviews the prior research on information sharing, loyalty program participation, and analyses of customer databases. Then the methodology for the surveys is described. After the analytical results are presented, their implications and lessons from other studies are reviewed in the final section.

LITERATURE REVIEW

Information Sharing and Privacy Concerns

Studies in the US and Europe found that consumers weighed the benefits (e.g., monetary incentives) and the risks when making disclosure decisions (Olivero & Lunt, 2004; Gabisch & Milne, 2014; Roeber et al., 2015). A review of privacy research gave this tradeoff concept high ratings for predicting actual disclosures (Gerber et al., 2018). The willingness to share information may also be linked with some demographic measures. Jai and King (2016) found that willingness to share personal data varied by gender and age. Another US study found that privacy concerns limited disclosures and that women were less willing to share information (Leon et al., 2015). A German study confirmed the importance of privacy concerns and found that none of the demographics was significant (Krafft et al., 2017).

Attitudes about privacy may influence many consumer decisions. For example, Inman and Nikolova (2017) found that perceptions about a store technology with potential privacy effects can influence retail patronage. However, other research found a disconnect between the privacy concerns expressed in surveys and their actual



behavior (Kehr et al., 2015; Hallam & Zanella, 2017; Bandara et al., 2020; Larson, 2020). This “privacy paradox” suggests that some information-sharing decisions may be made without considering the tradeoffs.

Most studies on loyalty programs measured privacy concerns with a single construct, often developed from several questions. One used a four-item privacy concern scale to build an index and found it was negatively related to receptivity to join a relationship marketing program (Ashley et al., 2011). Another used a two-item scale and found that privacy concerns reduced loyalty program participation (Gomez et al., 2012). In the Netherlands, 88% of households belonged to at least one supermarket program and 53% participated in more than one (Leenheer et al., 2007). The only factor linked to joining programs was privacy concern, which was measured with a single question. A Belgian study used a two-item privacy scale and found that privacy concerns, gender, age, income, marital status, and home ownership were associated with loyalty program memberships (Van Doorn et al., 2007). They also tested several nonlinear relationships between memberships and privacy and did not find large improvements over a linear model.

In a review of privacy concern scales, Preibusch (2013) described the 15-item Smith et al. (1996) scale as the most “influential.” Stewart and Segars (2002) confirmed this scale’s reliability and validity and concluded that computer anxiety, measured with five items attributed to Parasuraman and Igarria (1990), was independently linked to privacy concerns. Hinz et al., (2007) used the Smith scale and the Parasuraman and Igarria scale in their survey. Components of the Smith scale were intended to measure different concerns, but the authors collapsed it into a single index. People were less likely to join programs if they had high privacy concerns and if they had high levels of computer or technology anxiety. Technology anxiety influences other consumer behaviors (e.g., use of self-checkouts, Larson, 2019). Hinz et al., (2007) also found that program members were more concerned about privacy than non-members and that age and income were important. Taylor et al., (2015) used questions similar to the Smith scale and divided privacy concerns into three factors. Although the authors surveyed students (whose responses may not generalize to the adult population, see Larson & Kinsey, 2019), they found that concerns about information collection were negatively related to loyalty program attitudes, concerns about data errors were positively related to program attitudes, and concerns about unauthorized secondary use of the data were not significant. These results raise questions about how privacy concerns influence program participation and show the importance of splitting the concerns into components instead of grouping them into a single measure.

Loyalty Program Participation

Many factors may influence the decision to join a loyalty program. Noble and Phillips

(2004) used focus groups and interviews to identify reasons why satisfied customers did not want to participate. They divided the reasons into four groups: upkeep (e.g., maintenance, forgetting to carry, ad barrage), time (e.g., sign-up, accumulation requirements, location), benefit (e.g., disappointing rewards, difficult to receive rewards, hidden costs, lack of benefit information), and personal (e.g., privacy, embarrassment from association with the firm). Addressing these issues might help boost loyalty program enrollments. A UK intercept survey found that consumers had between 0 and 8 loyalty program memberships (Wright & Sparks, 1999). Age, presence of children, income, and gender were linked with card ownership. An Australian survey found that program attribute appeal varied by gender (Vilches-Montero et al., 2018). For example, women were more interested in program innovativeness. Another factor, the number of loyalty cards an individual already possessed, was positively associated with joining a new program (Leenheer et al., 2007; Demoulin & Zidda, 2009). While the characteristics of individuals with many cards could indicate who might be the most likely to join a program, the attributes of individuals with few cards could suggest what issues need to be addressed before they join another program.

Customer Database Research

Although having a variety of customer characteristics in models can improve data analyses, many supermarkets limit what they ask during program sign-up. About 87% of supermarkets asked shoppers for their name, address, and phone number at loyalty program enrollment (Ashman, 2000). Less than 60% asked about age and less than 15% asked about other demographics (e.g., household size, age of children, etc.). A study in Belgium found that gathering more than the basic name and address information would require significant, immediate rewards (De Wulf et al., 2003).

Marketers need to invest in maintaining their data accuracy. For example, about 10% of Americans move each year (United States Census Bureau, 2019). Public information (e.g., new addresses, deaths, marriages, and births) may be added to customer databases so that promotional offers to each household are more relevant. Some supermarkets gather additional data about their customers. In California, supermarket chains must publicize what they collect (Lazarus, 2020). One chain listed transaction history at the stores along with geolocation data, insurance coverage, employment history, education, website usage, and credit history. Some customers may be troubled by all the data that may be collected and choose not to participate in a loyalty program. To improve data coverage, marketers need to consider customer concerns when selecting the measures to collect.

METHODOLOGY

During late 2005 and early 2006, a four-page survey was distributed by first-class mail to 4,900 adults who were randomly selected by a professional mailer from a very large



mailing list. The sample frame was individuals, aged 25 to 60 years old, who lived in Illinois, Indiana, Michigan, and Ohio. To confirm the 2006 survey results, using the same methods, a survey with identical questions was mailed to another sample of 4,900 randomly-selected adults in 2010.

TABLE 2. SURVEY SAMPLE PROFILES

Variables in Model	2006 Survey Sample Proportions	2010 Survey Sample Proportions
Loyalty Program Memberships (None/ 1-3/ 4-6/ 7+)	0.357/ 0.472/ 0.106/ 0.065	0.321/ 0.404/ 0.177/ 0.097
Female	0.547	0.462
Age 35 to 44 Years	0.261	0.357
Age 45 Years or More	0.581	0.419
Single/Separated/Divorced/Widowed	0.322	0.336
Attend Religious Service (at least once per month)	0.464	0.440
Some College (No 4-Year Degree)	0.270	0.296
Four Year College Degree or More	0.566	0.574
Non-white	0.097	0.126
Medium Low Incomes: \$30,000 to \$59,000	0.295	0.260
Medium High Incomes: \$60,000 to \$89,000	0.265	0.256
High Incomes: At Least \$90,000	0.318	0.314
Sample Size	420	277

The survey asked respondents: “How many frequent flyer/frequent buyer/customer loyalty programs does your household participate in?” Subjects were given seven choices from none to more than 15. The top four options were collapsed into a “seven or more” category. Table 2 shows that more than 30% of respondents did not participate in any programs and more than 40 % participated in one to three programs. These four classes, represented by integers between 0–3, will be the dependent variable. Measures associated with more memberships will be identified with ordered probit regressions.

Besides demographics, people were also asked if they attended religious services at least once per month. Religiosity has been associated with many consumer behaviors (Larson & Heimrich, 2015). Larson (2020) linked religiosity to several privacy-protecting behaviors. Because religiosity has not been considered in prior loyalty

program studies, it will be included as an exploratory variable.

To assess privacy concerns, eight items with high factor scores from the Smith et al., (1996) scale were used along with five computer or technology anxiety scale questions (Parasuraman & Igarria, 1990). Many studies have used all of the Smith scale, parts of it, or modified the scale's questions (Malhotra et al., 2004). Other researchers have used items from the Smith scale along with the Parasuraman scale to test for privacy concern effects (Ahn et al., 2015; Larson, 2018, 2019). The survey assessed respondents' privacy concerns by asking them to respond to 13 statements using a 7-point Likert scale (1 was Strongly Disagree, and 7 was Strongly Agree). If privacy concerns are found to be negatively related to participation, this would suggest that people weighed the benefits and costs when considering whether to join loyalty programs.

RESULTS

In 2006, recipients returned 420 usable responses, representing about a 9% response rate (after adjusting for bad addresses). The 2010 recipients returned 277 usable responses, representing about a 6% response rate. Low response rates were expected since the survey primed individuals to think about privacy and there was little incentive to complete the survey (i.e., to control costs, less than 5% of the samples were sent \$1 incentives).

Table 2 shows the demographic profiles of the two samples. Women represented 54.7% of the sample in 2006 and 46.2% in 2010. In both 2006 and 2010, most profile measures were similar to the Midwest population. More than half of the respondents said they had earned at least a four-year college degree, which is higher than the target population. Non-whites were under-represented (10 and 12% of respondents), which is common in surveys that do not use ethnic quotas or oversample minorities.

At the top of Table 3 are the five computer or technology anxiety scale questions (Parasuraman & Igarria, 1990). The rest of this column shows items selected from the Smith scale. The reliability of the thirteen statements about attitudes toward privacy was measured by Cronbach's alpha and was very good, 0.815 in 2006 and 0.814 in 2010 (George & Mallery, 2003). For both the 2006 and 2010 privacy responses, principal component analysis identified three factors using the eigenvalue-greater-than-1 criterion. The results after Varimax rotation are shown in Table 3. Varimax rotation was used to eliminate any multicollinearity between the factors in the regressions. The first factor in both surveys was primarily the five Parasuraman scale questions and was labeled "Technology Anxiety."

There was a slight change in the structure of the second and third factors between the two surveys. Confirmatory factor analysis did not find the deviation to be statistically significant. In the 2006 survey, six questions that dealt with the confidentiality of personal information dominated the second factor ("Confidentiality") and the remaining two questions made up the third factor ("Data Accuracy"). In the 2010



survey, the two questions about the accuracy of data were part of the second factor (“Company Actions”) and three questions about the sharing of personal data made up the third factor (“Data Sharing”). Although these factor differences could complicate the analysis, they will have little effect.

TABLE 3. FACTOR ANALYSIS RESULTS

	2006 Survey			2010 Survey		
	Tech Anxiety	Priv2-2006 Confidentiality	Priv3-2006 Data Accuracy	Tech Anxiety	Priv2-2010 Company Actions	Priv3-2010 Data Sharing
I am sometimes frustrated by increasing automation in my home	<u>0.835</u>	0.027	-0.041	<u>0.867</u>	-0.030	-0.003
I am easily frustrated by computerized bills	<u>0.827</u>	0.073	-0.035	<u>0.799</u>	-0.025	0.076
I am anxious and concerned about the pace of automation in the world	<u>0.687</u>	0.184	0.194	<u>0.764</u>	0.176	0.079
Computers are a real threat to privacy in this country	<u>0.606</u>	0.189	0.203	<u>0.622</u>	0.308	0.222
Sometimes I am afraid that data processing department will lose my data	<u>0.603</u>	0.046	0.407	<u>0.611</u>	0.239	0.171
Companies should never share personal information with other companies unless it has been authorized by the individuals who provided the information	0.007	<u>0.762</u>	0.140	-0.094	<u>0.546</u>	0.278
Companies should never sell the personal information in their computer databases to other companies	0.166	<u>0.718</u>	0.003	0.064	<u>0.604</u>	0.042
Computer databases that contain personal information should be protected from unauthorized access – no matter how much it costs	0.016	<u>0.682</u>	0.288	0.092	<u>0.707</u>	-0.065
People should refuse to give information to a business if they think it is too personal	0.195	<u>0.647</u>	-0.019	0.092	0.012	<u>0.735</u>
When companies ask me for personal information, I sometimes think twice before providing it	0.036	<u>0.555</u>	0.099	0.062	0.152	<u>0.696</u>
It bothers me to give personal information to so many companies	0.431	<u>0.541</u>	0.220	0.416	0.282	<u>0.597</u>
Companies should take more steps to make sure that the personal information in their files is accurate	0.130	0.208	<u>0.871</u>	0.223	<u>0.689</u>	0.160
Companies should have better procedures to correct errors in personal information	0.159	0.140	<u>0.863</u>	0.270	<u>0.625</u>	0.181
Cronbach’s Alpha	0.815			0.814		

Note: Underlined and bold entries identify the largest factor score for each question

TABLE 4. LOYALTY PROGRAM MEMBERSHIPS ORDERED PROBIT REGRESSION RESULTS

Independent Variables in Model	2006 Survey		2010 Survey	
	B	P-value	B	P-value
Intercept 0 1	0.603**	0.043	0.095	0.761
Intercept 1 2	2.056**	0.000	1.326**	0.000
Intercept 2 3	2.678**	0.000	2.121**	0.000
Female Dummy Variable	0.046	0.716	-0.165	0.250
Age 35 to 44 Years	-0.082	0.668	0.187	0.317
Age 45 Years or Higher	-0.230	0.177	0.002	0.993
Single/Separated/Divorced/Widowed	0.302**	0.047	0.036	0.817
Frequent Religious Attendance	0.155	0.204	0.063	0.652
Some College (No 4-Year Degree)	0.270	0.167	0.189	0.430
Four-Year College Degree or More	0.604**	0.001	0.491**	0.041
Non-white	-0.126	0.534	-0.205	0.340
Medium Low Income	0.355	0.119	0.229	0.312
Medium High Income	0.563**	0.021	0.061	0.806
High Income	1.001**	0.000	0.689**	0.006
Technology Anxiety Factor	-0.125*	0.056	-0.222**	0.002
Privacy Factor 2: Confidentiality/Company Actions	-0.031	0.658	-0.107	0.116
Privacy Factor 3: Data Accuracy/Data Sharing	0.037	0.554	-0.108	0.114
AIC		808.99		673.24

Note: * indicates significance of at least 0.90; ** and bold indicates significance of at least 0.95.

Table 4 shows the results for the ordered probit regressions. Unlike some previous studies, gender and age were not significant and education was positively related to participation in both regressions. The results for marital status were not consistent and religiosity and ethnicity were not significant. The high-income class was positive and significant in both regressions. This implies that enticing people with college degrees and high incomes to join loyalty programs may be easier. The second and third privacy factors, Confidentiality/Company Actions and Data Accuracy/Data Sharing, were not significant, which suggests that those joining more programs did not express those concerns. The privacy concern measure that was significant was technology anxiety. Hinz et al., (2007) also found technology anxiety to be significant. In both regressions, those individuals who expressed more anxiety participated in fewer programs (at the 90% confidence level).



DISCUSSION

Some firms have been disappointed with the performance of their loyalty programs. Data that is collected can have high marketing research value and may tip the scale, making programs with limited direct effects net positives. To provide unbiased recommendations for assortment, pricing, promotion, and merchandising decisions, more customers, including those who do not buy large amounts, need to participate in loyalty programs. Marketers may need to change program designs, adjust incentives, and improve product offerings to attract more infrequent customers and small-transaction shoppers. Too many loyalty programs appear to be copies of competing programs (Heath, 1997). Differentiation options include adding some innovative features (to appeal to women) (Vilches-Montero et al., 2018) and offering unique nonmonetary benefits (Koh et al., 2020). Because preferences for hedonistic benefits (e.g., games, sweepstakes), recognition benefits (e.g., personalized check out, birthday cards), convenience benefits (e.g., priority checkouts, home delivery), and informational newsletters vary by customer, careful planning is needed to design the rewards system (Meyer-Waarden et al., 2013). Some rewards should have aspirational or emotional attributes and light buyers should be able to earn them.

The focus group research by Noble and Phillips (2004) highlighted other issues. Many supermarkets offer key tag membership cards or let members attach their membership number to their phone number (so individuals only need to recall their phone number to have a transaction added to their account). Firms should also make receiving rewards easy and publicize all the community and charitable activities that they support so that customers are proud of their memberships. Nunes and Dreze (2006) recommended awarding new members points at enrollment and providing a reason for the endowments. The communication system can influence perceptions of fairness (Shulga & Tanford, 2018). A European study found customer preferences varied for the communication media that highlighted a program's features (Ieva & Ziliani, 2017). Therefore, marketers should have multiple options for regular communications and allow members to choose the medium that they prefer. They also should recognize loyal members when they move out of the market area (Brierley, 2012). These steps should increase program participation and improve the value of the customer purchase database.

This study found that it may be easier to add households with college degrees or higher incomes to programs. This also means that extra efforts may be needed to attract households with less education and with lower incomes. Perhaps direct mail solicitations sent to specific neighborhoods could boost participation among customers with less education or lower incomes.

The lack of significance for the two privacy concern factors tends to support the

privacy paradox and not the tradeoff concept. The negative coefficient on technology anxiety offers new insights on how to recruit members. Keeping the loyalty program sign-up, usage, and redemption processes simple may help reduce this anxiety. Firms should also provide assurances that the data will be protected and will not be misused. This anxiety continues to bother some consumers. The average scores for the technology anxiety questions in this study were 4.4 and 4.3 (on a 1–7 scale). The percentages of subjects with average scores of at least five were 37% and 34%. Two national online panel surveys in 2015 asked the same five questions and had average scores of 4.0 and 3.8 (Larson & Farac, 2019). The percentages with scores of at least five were also lower, 21% and 15%. One option to reduce this anxiety may be to use science fiction movies as a prime to encourage thinking about the future and privacy tradeoffs (Milne et al., 2021). Reducing anxiety about a program's use of technology and alleviating concerns about how membership might create technology frustrations should help increase participation.

Like most studies, this research has some limitations. The data are from a period when memberships were increasing; the results should be confirmed with more recent surveys. The response rates were low and the samples were not ideal reflections of the Midwest target audience. Future research could have larger, national samples, have greater non-white participation, and test for differences between regions. Longer privacy concern scales could also be used to measure consumer attitudes. By following the suggestions in this research, marketers with loyalty programs should be able to raise the quality of their customer databases and make better decisions for their operations.

REFERENCES

- Ahn, H., Kwolek, E. A. & Bowman, N. D. (2015). Two faces of narcissism on SNS: The distinct effects of vulnerable and grandiose narcissism on SNS privacy control. *Computers in Human Behaviour*, 45, 375–381.
- Allaway, A. W., Gooner, R. M., Berkowitz, D. & Davis, L. (2006). Deriving and exploring behavior segments within a retail loyalty card program. *European Journal of Marketing*, 40(11/12), 1317–1339.
- Allaway, A. W., D'Souza, G., Berkowitz, D. & Kim, K. (2014). Dynamic segmentation of loyalty program behaviour. *Journal of Marketing Analytics*, 2(1), 18–32.
- Alshurideh, D. M. (2019). Do electronic loyalty programs still drive customer choice and repeat purchase behaviour? *International Journal of Electronic Customer Relationship Management*, 12,(1), 40–57.
- Ashley, C., Noble, S. M., Donthu, N. & Lemon, K. N. (2011). Why customers won't relate: Obstacles to relationship marketing engagement. *Journal of Business Research*, 64(7), 749–756.



- Ashman, S. M. (2000). Grocery store buying behaviour: Evidence from loyalty program data. *Journal of Food Distribution Research*, 31(1), 1–8.
- Azeem, M. M., Baker, D., Villano, R. A., Mounter, S. & Griffith, G. (2018). Food shoppers' share of wallet: A small city case in a changing competitive environment. *Journal of Retailing and Consumer Services*, 43, 119–130.
- Bandara, R., Fernando, M. & Akter, S. (2020). Explicating the privacy paradox: A qualitative inquiry of online shopping consumers. *Journal of Retailing and Consumer Services*, 52, Article 101947.
- Bellizzi, J. A. & Bristol, T. (2004). An assessment of supermarket loyalty cards in one major US market. *Journal of Consumer Marketing*, 21(2), 144–154.
- Brierley, H. (2012). Why loyalty programs alienate great customers. *Harvard Business Review*, 90(7-8), (Accessed 12 November 2021).
- Camron, V. A. F. (2020). Natural Grocers maintains sales growth as basket size increases. *Supermarket News*, February 7, (Accessed 12 November 2021).
- Chaudhuri, M., Voorhees, C. M. & Beck, J. M. (2019). The effects of loyalty program introduction and design on short-and long-term sales and gross profits. *Journal of the Academy of Marketing Science*, 47(4), 640–658.
- Cigliano, J., Georgiadis, M., Pleasance, D. & Whalley, S. (2000). The price of loyalty. *McKinsey Quarterly*, 4, 68–77.
- Cortinas, M., Elorz, M. & Mugica, J. M. (2008). The use of loyalty-cards databases: Differences in regular price and discount sensitivity in the brand choice decision between card and non-card holders. *Journal of Retailing and Consumer Services*, 15(1), 52–62.
- Demoulin, N. T. M. & Zidda, P. (2008). On the impact of loyalty cards on store loyalty: Does the customers' satisfaction with the reward scheme matter? *Journal of Retailing and Consumer Services*, 15(5), 386–398.
- Demoulin, N. T. M. & Zidda, P. (2009). Drivers of customers' adoption and adoption timing of a new loyalty card in the grocery retail market. *Journal of Retailing*, 85(3), 391–405.
- De Wulf, K., Odekerken-Schroder, G., De Canniere, M. H. & Van Oppen, C. (2003). What drives consumer participation to loyalty programs? A conjoint analytical approach. *Journal of Relationship Marketing*, 2(1-2), 69–83.
- Dowling, G. R. & Uncles, M. (1997). Do customer loyalty programs really work? *Sloan Management Review*, 38(4), 71–82.
- Faramarzi, A. & Bhattacharya, A. (2021). The economic worth of loyalty programs: An

- event study analysis. *Journal of Business Research*, 123, 313–323.
- Feinberg, F. M., Krishna, A. & Zhang, Z. J. (2002). Do we care what others get? A behaviorist approach to targeted promotions. *Journal of Marketing Research*, 39(3), 277–291.
- Filipe, S., Marques, S. H. & Salgueiro, M. D. (2017). Customers' relationship with their grocery store: Direct and moderating effects from store format and loyalty programs. *Journal of Retailing and Consumer Services*, 37, 78–88.
- Fruend, M. (2017). *2017 Colloquy Loyalty Census*. Toronto, CA: LoyaltyOne.
- Gabisch, J. A. & Milne, G. R. (2014). The impact of compensation on information ownership and privacy control. *Journal of Consumer Marketing*, 31(1), 13–26.
- Gallagher, J. (2004). Connecting through cards. *Supermarket News*, 52(45), 43.
- George, D. & Mallery, P. (2003). *SPSS for Windows Step by Step: A Simple Guide and Reference*, 4th edition, Boston: Allyn and Bacon.
- Gerber, N., Gerber, P. & Volkamer, M. (2018). Explaining the privacy paradox: A systematic review of literature investigating privacy attitude and behavior. *Computers and Security*, 77, 226–261.
- Gomez, B. G., Arranz, A. M. G. & Cillan, J. G. (2012). Drivers of customer likelihood to join grocery retail loyalty programs. An analysis of reward programs and loyalty cards. *Journal of Retailing and Consumer Services*, 19(5), 492–500.
- Hallam, C. & Zanella, G. (2017). Online self-disclosure: The privacy paradox explained as a temporally discounted balance between concerns and rewards. *Computers in Human Behavior*, 68, 217–227.
- Heath, R. P. (1997). Loyalty for sale. *Marketing Tools*, 4(6), 40–46.
- Hinz, O., Gerstmeier, E., Tafreschi, O., Enzmann, M. & Schneider, M. (2007). Customer loyalty programs and privacy concerns. Proceedings of the 20th BLED Conference in Bled, Slovenia: *Merging and Emerging Technologies, Processes, and Institutions*, June 4-6, 372–383.
- Huang, C. T. & Chen, P. T. (2010). Do reward programs truly build loyalty for lodging industry? *International Journal of Hospitality Management*, 29(1), 128–135.
- Ieva, M. & Ziliani, C. (2017). Towards digital loyalty programs: Insights from customer medium preference segmentation. *International Journal of Retail and Distribution Management*, 45(2), 195–210.
- Inman, J. J. & Nikolova, H. (2017). Shopper-facing retail technology: A retailer adoption decision framework incorporating shopper attitudes and privacy concerns. *Journal of Retailing*, 93(1), 7–28.
- International Institute for Analytics (2014). *Keeping Customers: Successful Loyalty*



through Analytics, Portland, OR, August, (Accessed 12 November 2021).

Jai, T. & King, N. J. (2016). Privacy versus reward: Do loyalty programs increase consumers' willingness to share personal information with third-party advertisers and data brokers? *Journal of Retailing and Consumer Services*, 28, 296–303.

Jang, D. & Mattila, A. S. (2005). An examination of restaurant loyalty programs: What kinds of rewards do customers prefer? *International Journal of Contemporary Hospitality Management*, 17(4-5), 402–408.

Karolefski, J. (2015). Data make the difference. *Progressive Grocer*, 94(2), 126–129.

Kehr, F., Kowatsch, T., Wentzel, D. & Fleisch, E. (2015). Blissfully ignorant: The effects of general privacy concerns, general institutional trust, and affect in the privacy calculus. *Information Systems Journal*, 25(6), 607–635.

Kim, D., Lee, S. Y., Bu, K. & Lee, S. (2009). Do VIP programs always work well? The moderating role of loyalty. *Psychology and Marketing*, 26(7), 590–609.

Koh, B., Raghunathan, S. & Nault, B. R. (2020). An empirical examination of voluntary profiling: Privacy and quid pro quo. *Decision Support Systems*, 132, Article 113285.

Krafft, M., Arden, C. M. & Verhoef, P. C. (2017). Permission marketing and privacy concerns - Why do customers (not) grant permissions? *Journal of Interactive Marketing*, 39, 39–54.

Lacey, R. (2009). Limited influence of loyalty program membership on relational outcomes. *Journal of Consumer Marketing*, 26(6), 392–402.

Lacey, R. & Sneath, J. Z. (2006). Customer loyalty programs: Are they fair to consumers? *Journal of Consumer Marketing*, 23(7), 458–464.

Lal, R. & Bell, D. E. (2003). The impact of frequent shopper programs in grocery retailing. *Quantitative Marketing and Economics*, 1(2), 179–202.

Larson, R. B. (2018). Examining consumer attitudes toward genetically-modified and organic foods. *British Food Journal*, 120(5), 999–1014.

Larson, R. B. (2019). Supermarket self-checkout usage in the U.S. *Services Marketing Quarterly*, 40(2), 141–156.

Larson, R. B. (2020). Privacy concerns and actions to reduce privacy risks. *International Journal of Information Privacy, Security and Integrity*, 4(4), 314–333.

Larson, R. B. & Farac, J. (2019). Profiling green consumers. *Social Marketing Quarterly*, 25(4), 275–290.

Larson, R. B. & Heimrich, C. R. (2015). Characteristics of several religiosity measures. Proceedings of the 40th Annual Macromarketing Conference, *Marketing as Provisioning*

Technology: Integrating Perspectives on Solutions for Sustainability, Prosperity, and Social Justice, 766–778.

Larson, R. B. & Kinsey, J. (2019). Culture and sampling issues with ‘green’ attitude research. *Social Marketing Quarterly*, 25(2), 91–106.

Lazarus, D. (2020). Is a supermarket discount coupon worth giving away your privacy? *Los Angeles Times*, January 21. ProQuest.

Leenheer, J., Van Heerde, H. J., Bijmolt, T. H. A. & Smidts, A. (2007). Do loyalty programs really enhance behavioral loyalty? An empirical analysis accounting for self-selecting members. *International Journal of Research in Marketing*, 24(1), 31–47.

Leon, P. G., Rao, A., Schaub, F., Marsh, A., Cranor, L. F. & Sadeh, N. (2015). Privacy and behavioral advertising: Towards meeting users’ preferences. Proceedings of the Symposium on Usable Privacy and Security, July 22-24, Ottawa, CA. (Accessed 12 November 2021).

Lin, Z. & Bennett, D. (2014). Examining retail customer experience and the moderation effect of loyalty programmes. *International Journal of Retail and Distribution Management*, 42(10), 929–947.

Liu, Y. (2007). The long-term impact of loyalty programs on consumer purchase behavior and loyalty. *Journal of Marketing*, 71(4), 19–35.

Liu, Y. & Yang, R. (2009). Competing loyalty programs: Impact of market saturation, market share, and category expandability. *Journal of Marketing*, 73(1), 93–108.

Lundberg, J. & Lundberg, S. (2010). Retailer choice and loyalty schemes – Evidence from Sweden. *Letters in Spatial and Resource Sciences*, 3(3), 137–146.

Magi, A. W. (2003). Share of wallet in retailing: The effects of customer satisfaction, loyalty cards and shopper characteristics. *Journal of Retailing*, 79(2), 97–106.

Malhotra, N. K., Kim, S. S. & Agarwal, J. (2004). Internet users’ information privacy concerns (IUIPC): The construct, the scale, and a causal model. *Information Systems Research*, 15(4), 336–355.

Marques, S. H., Cardoso, M. G. & Lindeza, A. C. A. (2017). Do loyalty cards enhance loyalty in the pharmaceutical sector? *Journal of Relationship Marketing*, 16(2), 143–162.

Martin, K. D., Kim, J. J., Palmatier, R. W., Steinhoff, L., Stewart, D. W., Walker, B. A., Wang, Y. & Weaven, S. K. (2020). Data privacy in retail. *Journal of Retailing*, 96(4), 474–489.

McCall, M. & McMahon, D. (2016). Customer loyalty program management: What matters to the customer. *Cornell Hospitality Quarterly*, 57(1), 111–115.

McEwen, W. J. (2005). *Married to the Brand: Why Consumers Bond with Some Brands for Life*. New York: Gallup Press.



- Melnyk, V. & Bijmolt, T. (2015). The effects of introducing and terminating loyalty programs. *European Journal of Marketing*, 49(3-4), 398–419.
- Meyer-Waarden, L. (2008). The influence of loyalty programme membership on customer purchase behaviour. *European Journal of Marketing*, 42(1-2), 87–114.
- Meyer-Waarden, L. & Benavent, C. (2006). The impact of loyalty programmes on repeat purchase behaviour. *Journal of Marketing Management*, 22(1-2), 61–88.
- Meyer-Waarden, L. & Benavent, C. (2009). Grocery retail loyalty program effects: Self-selection or purchase behavior change? *Journal of the Academy of Marketing Science*, 37(3), 345–358.
- Meyer-Waarden, L., Benavent, C. & Casteran, H. (2013). The effects of purchase orientations on perceived loyalty programmes' benefits and loyalty. *International Journal of Retail and Distribution Management*, 41(3), 201–225.
- Milne, G. R., Kaplan, B., Walker, K. L. & Zacharias, L. (2021). Connecting with the future: The role of science fiction movies in helping consumers understand privacy technology trade offs. *Journal of Consumer Affairs*, 55(3), 737–762.
- Moses, L. (2005). Circular logic: Many retailers would like nothing better than to ditch their circular, but today they need them more than ever to stay competitive. *Supermarket News*, 53(1), 24.
- Murthi, B. P. S., Steffes, E. M. & Rasheed, A. A. (2011). What price loyalty? A fresh look at loyalty programs in the credit card industry. *Journal of Financial Services Marketing*, 16(1), 5–13.
- Nannery, M. (1999). Pigging out. *Chain Store Age*, 75(7), 77–79.
- Noble, S. M. & Phillips, J. (2004). Relationship hindrance: Why would consumers not want a relationship with a retailer? *Journal of Retailing*, 80(4), 289–303.
- Nunes, J. C. & Dreze, X. (2006). Your loyalty program is betraying you. *Harvard Business Review*, 84(4), 124–131.
- Olivero, N. & Lunt, P. (2004). Privacy versus willingness to disclose in e-commerce exchanges: The effect of risk awareness on the relative role of trust and control. *Journal of Economic Psychology*, 25(2), 243–262.
- Parasuraman, S. & Igarria, M. (1990). An examination of gender differences in the determinants of computer anxiety and attitudes toward microcomputers among managers. *International Journal of Man-Machine Studies*, 32(3), 327–340.
- Preibusch, S. (2013). Guide to measuring privacy concern: Review of survey and observational instruments. *International Journal of Human-Computer Studies*, 71(12), 1133–1143.

- Rainie, L. & Duggan, M. (2015). *Privacy and Information Sharing*, Washington, DC: Pew Research Center, (Accessed 12 November 2021).
- Rains, T. & Longley, P. (2021). The provenance of loyalty card data for urban and retail analytics. *Journal of Retailing and Consumer Services*, 63, Article 102650.
- Raphel, M. (1990). Take a card ... any card please. *Direct Marketing*, 52(10), 63–68.
- Reinartz, W. & Kumar, V. (2002). The mismanagement of customer loyalty. *Harvard Business Review*, 80(7), 86–94.
- Roeber, B., Rehse, O., Knorrek, R. & Thomsen, B. (2015). Personal data: How context shapes consumers' data sharing with organizations from various sectors. *Electronic Markets*, 25(2), 95–108.
- Rossi, F. (2018). Lower price or higher reward? Measuring the effect of consumers' preferences on reward programs. *Management Science*, 64(9), 4451–4470.
- Sayre, S. & Horne, D. (2000). Trading secrets for savings: How concerned are consumers about club cards as a privacy threat? *North American Advances in Consumer Research*, 27(1), 151–155.
- SDL (2014). *Marketing Data and Consumer Privacy: What your Customers REALLY Think*, February 26. (Accessed 12 November 2021).
- Sharp, B. & Sharp, A. (1997). Loyalty programs and their impact on repeat-purchase loyalty patterns. *International Journal of Research in Marketing*, 14(5), 473–486.
- Shugan, S. M. (2005). Brand loyalty programs: Are they shams? *Marketing Science*, 24(2), 185–193.
- Shulga, L. & Tanford, S. (2018). Measuring perceptions of fairness of loyalty program members. *Journal of Hospitality Marketing and Management*, 27(3), 346–365.
- Sides, R., Marsh, M., Goldberg, R. & Mangold, M. (2019). *Consumer Privacy in Retail: The Next Regulatory and Competitive Frontier*. Deloitte. (Accessed 12 November 2021).
- Skogland, I. & Siguaw, J. A. (2004). Are your satisfied customers loyal? *Cornell Hotel and Restaurant Administration Quarterly*, 45(3), 221–234.
- Smith, A., Sparks, L., Hart, S. & Tzokas, N. (2003). Retail loyalty schemes: Results from a consumer diary study. *Journal of Retailing and Consumer Services*, 10(2), 109–119.
- Smith, H. J., Milberg, S. J. & Burke, S. J. (1996). Information privacy: Measuring individuals' concerns about organizational practices. *MIS Quarterly*, 20(2), 167–196.
- Stewart, K. A. & Segars, A. H. (2002). An empirical examination of the concern for information privacy instrument. *Information Systems Research*, 13(1), 36–49.
- Stoneback, D. (1997). It's in the cards – supermarkets deal savings to their best shoppers. *Morning Call*, June 18, D01. NewsBank.



- Taylor, M., Buvat, J., Nambiar, R., Singh, R. R. & Radhakrishnan, A. (2015). *Fixing the Cracks: Reinventing Loyalty Programs for the Digital Age*, Capgemini Consulting, Paris, Fr. (Accessed 12 November 2021).
- Taylor, J. F., Ferguson, J. & Ellen, P. S. (2015). From trait to state: Understanding privacy concerns. *Journal of Consumer Marketing*, 32(2), 99–112.
- Tenser, J. (2006). The big payoff. *Advertising Age*, 77(12), S1, S4.
- United States Census Bureau (2019). CPS Historical Migration/Geographic Mobility Tables, Table A-1. (Accessed 12 November 2021).
- Van Doorn, J., Verhoef, P. C. & Bijmolt, T. H. A. (2007). The importance of non-linear relationships between attitude and behaviour in policy research. *Journal of Consumer Policy*, 30(2), 75–90.
- Vilches-Montero, S., Pandit, A., Bravo-Olavarria, R. & Chao, C. (2018). What loyal women (and men) want: The role of gender and loyalty program characteristics in driving store loyalty. *Journal of Retailing and Consumer Services*, 44, 64–70.
- Vuorinen, A., Erkkola, M., Fogelholm, M., Kinnunen, S., Saarijarvi, H., Uusitalo, L., Nappila, T. & Nevalainen, J. (2020). Characterization and correction of bias due to nonparticipation and the degree of loyalty in large-scale Finnish loyalty card data on grocery purchases: Cohort study. *Journal of Medical Internet Research*, 22(7), Article e18059.
- Wansink, B. (2003). Developing a cost-effective brand loyalty program. *Journal of Advertising Research*, 43(3), 301–309.
- Wendlandt, M. & Schrader, U. (2007). Consumer reactance against loyalty programs. *Journal of Consumer Marketing*, 24(5), 293–304.
- Wright, C. & Sparks, L. (1999). Loyalty saturation in retailing: Exploring the end of retail loyalty cards? *International Journal of Retail and Distribution Management*, 27(10), 429–439.
- Yoo, M., Bai, B. & Singh, A. (2020). The evolution of behavioral loyalty and customer lifetime value over time: Investigation from a casino loyalty program. *Journal of Marketing Analytics*, 8(2), 45–56.
- Young, M. L. (2003). Fire the worst customers: Dorothy Lane Marketing Inc. *CIO Insight*, 1(34), 51.



GOVERNMENT AGRICULTURAL PROJECTS AND RURAL DEVELOPMENT IN SELECTED LOCAL GOVERNMENT AREAS IN RIVERS STATE

Alwell Nteegah, Godwin Uzochukwu Nosiri

Abstract

This paper examined contributions of government agricultural projects to rural development in selected Local Government Areas in Rivers State. Specifically, the contributions of Risonpalm Estate (now SIART NIG. LTD), School-to-Land Programme and Songhai Farm to rural employment, farm output, and rural farmers' income in rural areas in Rivers State were explored. A cross-sectional research design, using survey method was followed and combinations of descriptive and inferential statistics formed the basis for the analysis of the responses generated using a well-structured questionnaire. The findings revealed that government agricultural projects/supports to farmers have helped to create more jobs in the host communities thereby contributing to the development of the host communities and the state at large. Similarly, it was found that government supports to farmers and the employment of people in government-owned farms in Rivers State have improved the productivity of farmers and employees thereby contributing to the development of the host communities and the state at large. The results further indicate that government agricultural projects/supports to farmers have helped to improve the income level of farmers and employees in the host communities where the projects are located thereby contributing to the development of the host communities. Based on these findings, the study concluded that government sponsored agricultural activities/projects have contributed to the development of the rural communities in Rivers State. Thus, the paper recommends among others that government should increase support to farmers and funding to the farms to improve productivity and output of both farmers and employees of the farms.

Key words: Rural Development, Agricultural projects, Income, employment and output.

INTRODUCTION

Economic history revealed that agriculture is key pre-condition for economic growth and development and life-wire of modernization in every nation globally. Every modern nation passed through agrarian period. In Nigeria, before oil was uncovered in 1956, agriculture was life-wire of their economy because it provided foods, jobs and raw-materials for local and oversea based firms.



In their research, Nchuchuwe and Adejuwon (2012) reenacted position of the classists, that agriculture advancement is sub-set for monetary development. The continued increase in production level over sensible time period followed by subsequent enhanced wellbeing of people reflected in increased income and living standard, defines development. But development as relates to group of persons defer from community to community, thus development definition in urban area, where there are notable facilities infrastructure like electricity, water, shelter, etc. cannot be used to define development, in sense of communities in local areas, where electricity, roads, water, health services, etc. are far cry. Development in local sense is about providing key necessities of life to local communities. Nchuchuwe and Adejuwon (2013) summarized local-area advancement as development that benefits local area population's living standard. Daneji (2011) in his work drew nexus between agriculture development and general or common government objectives globally. Governments globally are interested in improving citizen's welfare and general security for their life and property. Life cannot be secured with hunger, deprivation and terribly low living standard. This becomes cornerstone for every government that wants to fulfill obligation to people would first aspire to secure its citizens by pursuing vigorous agriculture program/projects. The aim is to ensure security of citizens, earn oversea income, secure future of their industries and generally improve GDP of the country (Robinson & Kalu, 2013).

To reduce abject poverty, create jobs, improve income and trigger development among local dwellers, international organizations like World Bank along with nations and states have launched agriculture programs/projects at different times and some of these programs include; "United Nations Development Programme (UNDP), International Fund for Agricultural Development (IFAD), Agricultural Development Programme (ADP), Food and Agricultural Organization (FAO), National Economic Empowerment and Development (NEED), the Directorate of Food, Road and Local Infrastructure (DIFRRI), National Accelerated Food Production Programme (NAFPP), Green Revolution (GR), Operation Feed the Nation (OFN)" (IFAD, 2011).

In Rivers State specifically, governments have hurled agriculture programs like Accelerated Oil Palm development Initiative in 2008, Risonpalm Project (now SIART), 1978, Delta-Rubber Company Limited, 1975, the Root and Tuber Expansion Project (RTEP) and the School to Land Project, the Shongai Farm among others. The objectives of these projects include to provide foods for citizens, make available raw-materials for firms, create jobs, earn additional income and develop local areas through providing road, transportation, agriculture funding, technical assistance for local farmers, improved market access and paucity alleviation in local areas and country in general (Dare et al., 2014).

Based on the objectives of government on establishing agricultural projects in Rivers state, the paper seeks to examine how three projects of the government – Risonpalm Project (now SIART) at Obima, the Shongai Farm at Bunu Tai and School to Land farm at Rumuodamaya have affected economic development through the creation of jobs, improvement in income of the people and increase productivity/output of people in the areas where the projects are sited. We shall continue our investigation by reviewing relevant literature, expose the methodology of the paper, providing the results of our analysis, findings and concluding remarks.

LITERATURE REVIEW

Agriculture and Local-area advancement

According to Mane (2009), it is due time to revitalize agriculture to guarantee food security, work and income as bottom-line for local-area advancement. Mane posits that “in order to address local-area advancement challenges, government future agricultural policies must focus on revolution in information and communication and the opportunity of linking farmers, extension workers and scientists with national and international data base; conservation of natural resources as protection of environment and vast untapped potential of our soil and water resources and farming systems”.

However, agriculture programs need to focus on well-being of local area people. Mane thus, suggested that human dimension is main determinant for agriculture programs and not just production. He mentioned that main priorities to reveal in these policies includes; to assess agriculture progress as concerns farmer’s incomes, to narrow down gender aspect of policies focusing on maintainable local livelihood, develop social security scheme and support farming services, attract youths to farm by making them involve in small and medium scale farming. The emphasis was to organize farmers towards participating in developing process via agriculture.

A cross-continents study done by World Bank (2008) in Sub-Sahara Africa, Eastern-Asia and Southern-Asia revealed that agriculture has notably contributed to work-creation and GDP growth, used local sector to develop other sectors of economy and reduce poverty gap. In another study done by Barkely and Wilson (1995) they uncovered that government establishing wine grape, Kiwi and cheese-orchards in Mississippi, Oklahoma, Arizona and Carolina reduced pattern of declining job and income in non-city areas. They maintained that local areas involved in non-conventional farming gain from expanded employment, access to supportive government and business sector. Stable income flows and improves in infrastructure facilities.

Gollin et al., (2002) in their study revealed essence of agriculture in early developmental stage. Analyzed information from 62 upcoming nations for time period 1960-1990, they uncovered that growth in agriculture was quantitatively



crucial in comprehending growth in GDP. Both cross-section along with panel data revealed that nation witness increased agriculture productivity was able to release labor from agriculture to other monetary sectors. On average, contribution of agriculture growth, non-agriculture growth and sector shifts was 54, 17 and 29% respectively.

As evidence from case studies and reviewed literature, Derek et al., (2005) presented five propositions concerning agriculture contribution to local-area advancement and paucity reduction:

- (i) Agriculture played crucial and often leading role in initial development stage. Beyond its direct contribution to growth, number of features specific to this sector enhances its contribution to pro-poor growth, including concentration of poor in this sector, the large size of its growth linkages to other sectors and positive externalities from assured food security and reduces food prices.
- (ii) The contribution of agriculture to growth naturally declines with structural transformation from an agriculture economy to urban-based non-agriculture economy, although even in economies that are well into mid-income condition, agriculture continues to “pull beyond its weight” as measured by contribution to GDP because of its unique “externalities”.
- (iii) Even as agriculture role in growth reduce with structure transformation, local-area advancement continues to become critical in reducing paucity and inequality.
- (iv) The “agro-pessimists” raise crucial questions about future agriculture role. These questions highlight how agriculture contribution to pro-poor growth varies massively not just at different development stage for any set nation but across and within nations because of initial conditions. More than ever, designing government policy for enhancing agriculture contribution and local-area advancement to pro-poor increment must be conditioned by local contexts.
- (v) The role of local area non-farming economy increases as growth source initially led by connections to agriculture growth, but knotted to city industrial advancement especially in places with better infrastructure and population.

From foregoing, it is proved that local agriculture can be changed to modern sector by adopting science-based technology and making massive contribution to development. Secondly, nations have clearly identified massive growth connection and multiplier impact of agriculture growth to non-agriculture sectors. It is empirically known that

massive share of manufacturing in initial development stage is agriculture related (Gemell et al., 2000). This multiplying impact is not significant.

The Diffusion Model

This is theory of local-area advancement formed in 1985 by Rogers as mentioned in Kenny (2019) and expresses change process via innovation into any community and tried to explain presence of substantial production disparity among farmers in similar monetary and geographical area and these disparity occur because of mix-up in adoption of farmers to novel seed varieties and mechanical demands. Since that section of agriculture and local-area advancement depends on reducing existing production disparity using technological invention, the model designer focused on analyzing different communication technique. They maintained that “this model has considerable appeal in many less developed nations. It impact an extension bias to agricultural development and leads to the streamlining and encouragement of extension services in developing countries. Many policy makers in their search for the most effective method of diffusing innovations resort to a number of devices such as experimental stations and demonstration farms aimed at spreading new techniques through demonstration effects”.

The key thrust of these models is how novel inventions and discoveries could spread in social system. Rogers (1983) stated that “diffusion model of innovation is characterized by people by passage of individuals and institutions through three stages. First, people play with it to find out its capabilities and limitations. Second stage has to do with their application of the new technology to assist them in their daily activities and responsibilities. Third stage, they begin to use the innovation to help address new opportunities or problems which have not been solved or addressed before the new innovation was introduced”. Invention diffusion could take time and time between developing innovation and common adoption is “Innovation Diffusion Gap”. In this case, emphasis is position on farmers and local-leaders whose production methods serve as example to farmers in other area. In same manner, adoption model supports national and global efforts to move novel technology from advanced to upcoming nations

Olayide (1975) stated that “the criticism concerning this model is that in the recent years the model has not been particularly successful in spreading new technology on the basis of the strategies prescribed by the diffusion model”. Reason being that experiment stations and demonstration have little demonstration impact on farm areas where they are sited and second, using farm leader’s created disappointing outcome as concern number of farmers changed to using novel techniques and novel tech. Third, this model functioned successfully in situation in which farming people are learned and are agents of change with good understanding of what is being explain to them. However, some limitations that arise from this model come on fact that it attempt to seek stability at expense of real situation and did not consider



possible impact of politics and institution arrangements which have massive effect on cause of economic advancement in upcoming nations.

Based on History, agriculture income is stable indicator for people welfare for mainly local households because it has transitory features through earning process and consumption, households could receive massive revenue from sales from farm but smaller revenue during entire year thereby increases paucity level (Beson et al., 2004). Invariable expenses on agriculture relatively impact output and revenue from firms Akpokoje and Nwosu (1993) in their work stated that “government allocation to agriculture is relatively low and that actual expenditure falls short of budgeting expenditure and the rate of under spending is usually higher for agriculture than for other economic sectors”. Loto (2011) stated that massive amount of funds allotted to agriculture do not directly get to farmers.

The agro-system performance output is measured based on their contribution to GDP not till civil war from 1967 to 1970, agriculture dominate Nigeria monetary sector contributing 53% to GDP as at 1965. In 1984 proportion share was halved according to Iganiga and Unamhilin (2011) which aligned with works from Aheam et al., (1998), Weir (1999), Gopinath & Roe (1997), Yee et al., (2000) which stated that several factors like poor funding facilities, enhanced inputs, novel agriculture technology, infrastructure and other constraints to agriculture sector growth which explains reason for massive existence of low-leveled farmers in Nigeria. Loto (2011) stated that poverty alleviation schemes in upcoming nations link effectiveness to state agriculture policies and revenue of local farmers.

Cross-country study of Africa nation by Okezie et al., (2013) uncovered that monthly revenue generate over 18 nations that adopt modernize agriculture practices was 40% compare to those practicing conventional farm technique. Therefore, improve revenue was encouraged to further adopt government initiated modern agriculture technique for farming. Ezeh and Nwachukwu, (2007) examined “the Impact of Selected Local-area advancement Programmes on Poverty Alleviation in Ikwuano Local Government Area, Abia State, Nigeria” and they revealed that involved farmers performed better in revenue and output compared to others. Thus there exist connections between results and revenue that high outputs trigger high income for farmer. In manner, high revenue shows high profit that are supposed to be put back into their farming by purchasing more inputs for next farming season. Overtime, low-level farming changes to commercial farming and work creation to sustain production is noticed. Similarly, better production leads to low-price farm product in absence of monopoly attitude which explains importance of agro-based sector.

Not minding some important role that agro-sector plays in developing nation, successive governments in Nigeria at all level haven’t been able to suitably address

these major hindrances to agro-sector production in attempt to elevate agro-sector production. For example, a one-timed Agriculture minister Chief Audu-Ogbe said that “nevertheless, the agricultural potentials are yet to be fully exploited since Nigerians are still very vulnerable to hunger and poverty” (Ruma, 2008). Poor people that live in local and city area usually comprise of largest proportion of population and are main producers of food and essential product, yet formal finance institutions have no enough funding services due to stringent conditions required to funds available for farmers.

Akintunda (2013) worked of effectiveness of state yearly budget allotment on agriculture and monetary program instrument’s role in agriculture growth GDP on covering time 1980 to 2012. The outcome of this analysis revealed that Agro-business funding scheme in formal year GDP and CPI contribute positively to agriculture GDP growth, other variables like IR, ER and state expenses on agriculture negatively contribute to agriculture GDP growth. The study thus suggested that government need to elevate her expenses to agro-business sector, monitor funding allotted and provide needed infrastructure facilities like road, electric, health and water for people.

Lawal (2011) inspected “the impact of informal agricultural financing on agricultural production in the local economy of Kwara State, Nigeria” using information obtained primarily from structured-questionnaires on some selected farmers that are involving in 3 informal funding schemes namely: “(i) periodic savings; (ii) money lending; and (iii) rotating savings” in 9 LGA spread across 3 senatorial areas in Kwara State, Using “multi-stage random sampling method” they selected 1,350 farmers and 1,249 questionnaires shared were returned and processed with OLS and their outcome indicated that firms positively impacted on agriculture production by rotating savings” which is notable at 10% SL. Based on this outcome, they suggested that rotating loans need to become crucial to agriculture funding among farmers in local-areas with improvement on other funding sources aimed at increasing membership drive for informal funding firms. Okurut (2007) confirmed that informal funding firms played major part in mobilizing and allotting fund for developing nations.

Rivers State government, apart from state agricultural programme initiated as approaches to positively impact on local-area advancement such as Risonpalm Company, Delta Rubber Company, etc. the state cued into several international local-area advancement policy programmes such as “Root and Tuber Expansion Programme, National Programme for Food Security”, etc to guarantee the well-being of local people. Study conducted by Prince (1989) on “Crop Farming Scheme in Rivers State school-to-land”, revealed that good crop and livestock production increased by 26% compared to the previous year. Result also showed that number of young school leavers engaged in agriculture increased by 13% the same year.

Research works that examined relationship between agriculture scheme and local-area advancement are many in the past. For instance, Ikala (2010) studied “the



assessment of women's participation in national special program for food security (NPFS)". The work showed that over 86% of women within reproductive period involved in program. The work also showed that massive involvement of women in maize/cassava production revealed that these crops are staple food for families and revenue generation. Also fund availed for participants assisted them in increasing production due to increased planted farm size and revenue. Interestingly, the research dwell more on old agriculture programmes. It is important the recently established modern farms be investigated; hence the inclusion of the Songhai Agricultural Project at Bunu Tai LGA. It is Supposed that the Songhai Project with modern technological and management approach will add to the narrative and relationship between agricultural project and poverty reduction in Rivers State.

Studies by Lawal (2011), Akintunda (2013) and Okurut (2007) all dwelled on the role or impact of intervention by either the informal sector or government on agricultural production in other sub climes in Nigeria. These studies were less concern about how interventions in the agricultural sector by the government have trickle down to improving output, income level and employment on the farms. Given the increasing poverty level in Nigeria and the dominance of agriculture in the rural areas of the country, it is pertinent to study how government intervention in a sector that is perceived to be the highest employer of labour in developing country has contributed to economic development in the country using Rivers state as a case study.

METHODOLOGY

Though Rivers state sponsored agricultural projects are concentrated in eight local government areas, the government sponsored agricultural projects investigated are those that are active. This is because records and expert advice from the Ministry of Agriculture in Rivers state shows that most of the government sponsored projects in the state are moribund. According to the Rivers State Ministry of Agriculture, those that are functional as at 2021 are: the School-to-Land (STLP) farm at Rumuodamaya in Obio/Akpor LGA, Risonpalm (now SIART NIG LTD) Estate at Ubima in Ikwerre LGA and Songhai Farm in Bunu Tai in Tai LGA in Rivers State. The activities of these farms cover: Palm oil production, crop production, fishery and poultry. The School-to-land farm at Rumuodamaya is also involved in extension services which is crucial for productivity and output.

Rivers state is situated in the Southern part of Nigeria. Rivers state has 23 Local Government Areas. The government agricultural projects are however hosted and concentrated in eight LGAs -Khana, Obio-Akpor, Emohua, Etche, Gokana, Oyigbo, Ikwerre and Tai. The local governments hosted School-to-Land Programme (STLP), Risonpalm (now SIART NIG. LTD) and Songhai projects. "The State is bounded on the south by Atlantic Ocean, to the north by Imo and Abia States, to the east by Akwa-

Ibom State and to the west by Bayelsa and Delta States. The inland part of Rivers State consists of tropical rainforest; towards the coast the typical Niger Delta environment features many mangrove swamps”.

Rivers State has landmass of over 11,000 km² and is located on latitudes 40° 32' and 50° 53' North and longitudes 70° 25' and 80° 25' East of equator. The State has yearly mean rainfall of 2,200mm for upland area comprising land areas surrounded with water. Temperature range is between 23-31°C and vegetation included water swamp, mangrove and rain forest. Main seasons are dry and rainy seasons. The seasonal conditions of this State present healthy environment for fish-farming because water supply to ponds is no problem.

Given that only active and functional agricultural projects in Rivers State are selected for this study, the research employs the purposive and random sampling procedures in the sourcing for relevant information required for this study. The purposive sampling procedure covers the active and functional agricultural projects and the category of respondents to be interviewed while the random sampling procedure covers the respondents to be interviewed. The category of respondents that were interviewed are: the employees of the Rivers state sponsored agriculture projects, the farmers in the host communities where those farms are sited and the staff of the Ministry for Agriculture and Local-area advancement. The choice of these categories of respondents is to help broaden the scope of our investigation in order to achieve a better result. The qualification of a farmer or employee of the farms based on a simple random sampling of 'Yes or No' those who picked 'Yes' were given questionnaire while those who picked 'No' were not given questionnaire. Only staff of Ministry for agriculture directly involved in supervising and managing these farms were interviewed.

The Taro Yamane (1967) formula for determining sample was applied to determine the actual sample size to be studied. It is given thus (1):

$$n = \frac{N}{(1 + N(e)^2)} \quad (1)$$

Where n = Sample size

N = Interest Population

e = Error Margin

The application of this formula is could be traced to earlier studies by Anokye (2020) Bartlett et al., (2001) and Taherdoost (2017). To determine the sample size for our study, we substitute the population of farmers in Rivers state, a total of 2,817,520 into the above formula given the error margin or probability of 0.05, we have

$$\text{Sample size (n)} = \frac{2817520}{1 + 2817520(0.05)^2}$$



$$\frac{2817520}{1+7043.8} = \frac{2817520}{7044.8} = 399.94 \text{ or } 400$$

The sample size of for this study is approximates 400 respondents. To achieve objectives of this paper questions relating to the operations of the agricultural projects under consideration and key local-area advancement employment and the general wellbeing of the employees of the farms and those farmers residing around the projects area were asked and distributed to the 400 respondents in the following proportion; (a) Employees of Rivers state sponsored agricultural projects, 165 questionnaire (b) farmers doing their business in the host communities of the government owned agricultural project, 165, and (c) Staff of the Ministry of Agriculture and Rural Development 70 respondents. In nutshell, 55 questionnaires were administered to employees in each of the three active and functional government owned agricultural project in the state and 55 to local farmers in each of the host communities where the projects are located. In like manner, 15 questionnaires each (45) were given to staff on site in the different farms while 25 questionnaires were given to the staff of the Ministry in Port Harcourt office. The reason for this distribution was to reach out to the major stakeholders in the project under investigation.

The instrument for data collection is the questionnaire. This questionnaire was used to elicit basic information on how government sponsored agricultural projects have contributed to the development of the local communities in Rivers State. The questions have three sections, section A provides questions for employees of the Rivers state sponsored agricultural farms. Section B covers questions for the farmers in the host communities of government sponsored agricultural projects while Section C provided questions for staff of Agriculture and local-area advancement ministry and other supervising agencies. The questions cover issues on employment, output of farmers, income of farmers, infrastructure, etc. In each of the variables, items are provided in the questionnaire that covers or suggest availability of the variable. The respondents are supposed to respond to the questionnaire by ticking the choice they deem necessary.

Data collected was analyzed with descriptive and inferential statistics. In analyzing the data sourced for this study, simple percentages, tables, charts, the line graphs and the chi-square statistical method were used to analyse the data sourced. The chi-square as an inferential statistic is appropriate in this research because it will provide the relationship between government sponsored agricultural projects and local-area advancement in Rivers State. Hence the perception of the respondents on key local-area advancement parameters like: income level, productivity/output, employment, health care, infrastructure among others in the different agricultural activities

identified and their host communities' farmers were analyzed. These helped the researcher assess how government sponsored agricultural activities have contributed to local-area advancement in Rivers State.

Tables, charts, descriptive statistics and graph were used to analyse opinion sought from the respondents on how the agricultural projects have contributed to the development of the local communities where they are located while the chi square were used to test the hypotheses generated for the study. The Chi Square formula is given as follows (2):

$$\text{Chi square } X^2 = \frac{(fo - fe)^2}{fe} \quad (2)$$

Where: fo = observed frequency; fe = expected frequency.

The chi-square was used to test the hypotheses generated for the study.

RESULTS

TABLE 1. NUMBER OF QUESTIONNAIRE DISTRIBUTED TO THE RESPONDENTS

Respondent	Risonpalm (SIART) Estate Ubima	School-to-Land Rumuodamaya	Songhai Farm Bunu Tai	Total	% Distributed
Employees of the Farms	55	55	55	165	41.25%
Farmers of Host communities	55	55	55	165	41.25%
Staff of Ministry of Agriculture	23	24	23	70	17.5%
Total	133	134	133	400	100%

Source: Field work.

Table 1 shows distribution of questionnaire distributed amongst the people interviewed in the course of this study. 165 staff of the agricultural projects in Rivers state situated at Rumuodamaya, Ubima and Bunu Tai representing 41.25% of the respondents were selected and administered questionnaire, 165 farmers representing 41.25% of the respondents in the above mentioned communities were also selected and interviewed while 70 staff of Agriculture and Local-area advancement ministry representing 17.5% of the respondents were also selected and administered questionnaire.

Table 2 indicates that out of the 400 questionnaire administered, 360 were retrieved. This represents 90% of the questionnaire administered. For the staff of the three farms located at Risonpalm (now SIART NIG LTD) Estate at Ubima, School-to-land at Rumuodamaya and Songhai farm at Bunu Tai 150 questionnaire were retrieved. 150 questionnaires were also retrieved from the farmers residing in Ubima, Rumuodamaya and Bunu Tai while 60 questionnaires were retrieved from staff of Agriculture and Local-area advancement ministry at the Port Harcourt office and the zonal offices.

TABLE 2. NUMBER OF QUESTIONNAIRE RETRIEVED

Respondent	Risonpalm (SIART) Estate Ubima	School-to-Land Rumuoda maya	Songhai Farm Bunu Tai	Total Adminis-tered	Total Retrieved	% Retrieved
Employees of the Farms	50	50	50	165	150	91%
Farmers of Host communities	50	50	50	165	150	91%
Staff of Ministry of Agriculture	19	22	19	70	60	90%
Total	119	122	119	400	360	90%

Source: Field work.

As reported in Figure 1, government seems to be more involved in supporting crop farming than fishing and poultry farming. It is crucial to note that crop farming and fish farming are the major occupation of farmers in Rivers state. However, the location of the communities considered for this study and government policy on agriculture may have informed our results.

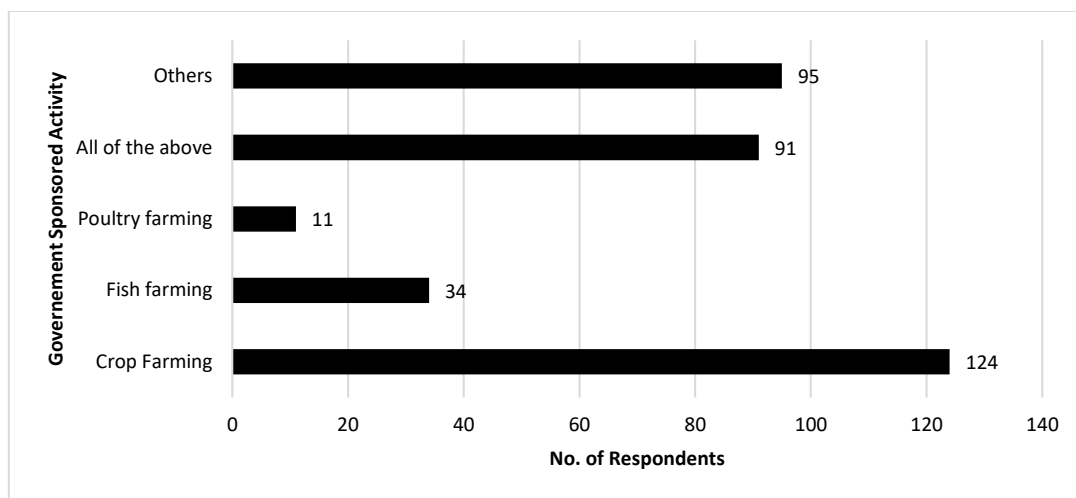


FIGURE 1. GOVERNMENT SPONSORED AGRICULTURAL ACTIVITIES IN RIVERS STATE

Information in Figure 2 shows that 58% of the farmers/ farms in the communities visited have between 2-10 workers working for them. 18% of the farmers have between 11-20 workers while 24% of the farms has over 20 workers. This implies that most of the farms in these communities are small scale farms with minimum capacity for production.

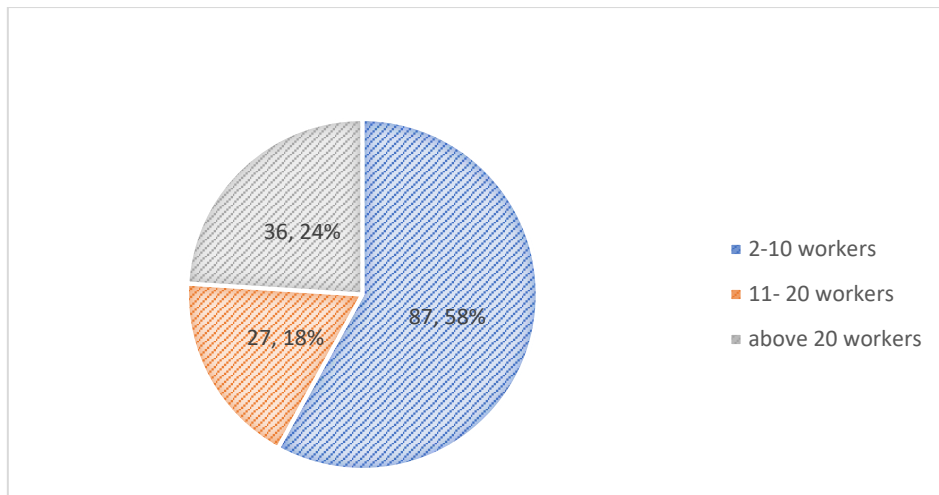


FIGURE 2. NUMBER OF WORKERS EMPLOYED BY FARMER IN HOST COMMUNITIES OF AGRICULTURAL PROJECTS

Figure 3 revealed that 97% of the respondents agreed that they get support from government either directly or indirectly. Only 3% of the respondent claimed they do not get support for government. This implies that most farmers are beneficiaries of government support in Rivers state.

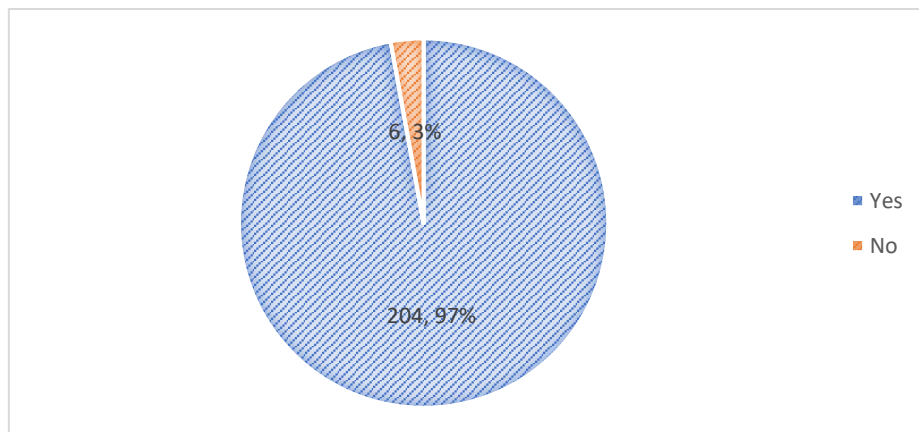


FIGURE 3. RESPONSES ON GOVERNMENT SUPPORT TO FARMERS BY THE RESPONDENTS

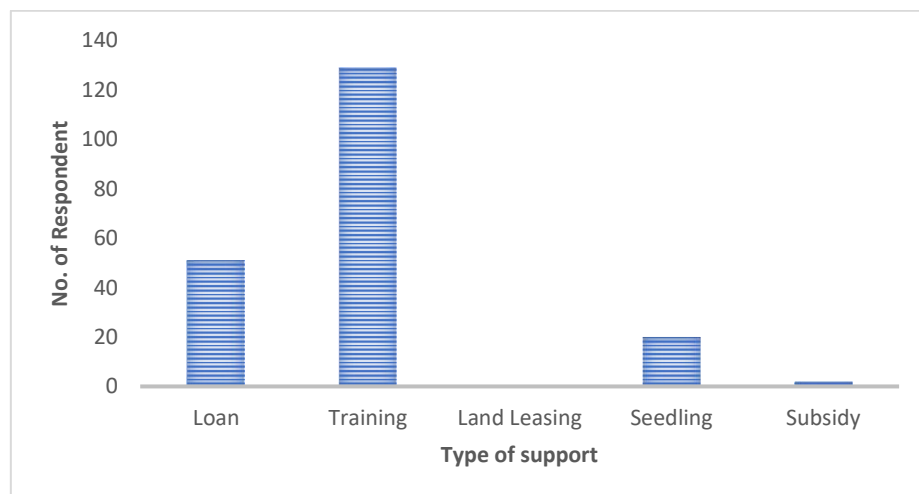


FIGURE 4. TYPES OF GOVERNMENT SUPPORT TO FARMERS IN THE COMMUNITIES

Figure 4 shows that most respondents claimed that they received government support on farming activities through training. To them, this training is done on the farm and through workshop and seminar. About 50 of the respondents claimed the support to them from government is through granting of loan/credit while others said they got support from government through the provision of farm inputs like seedling and subsidy. Support from government to local farmers is geared towards increasing productivity and output.

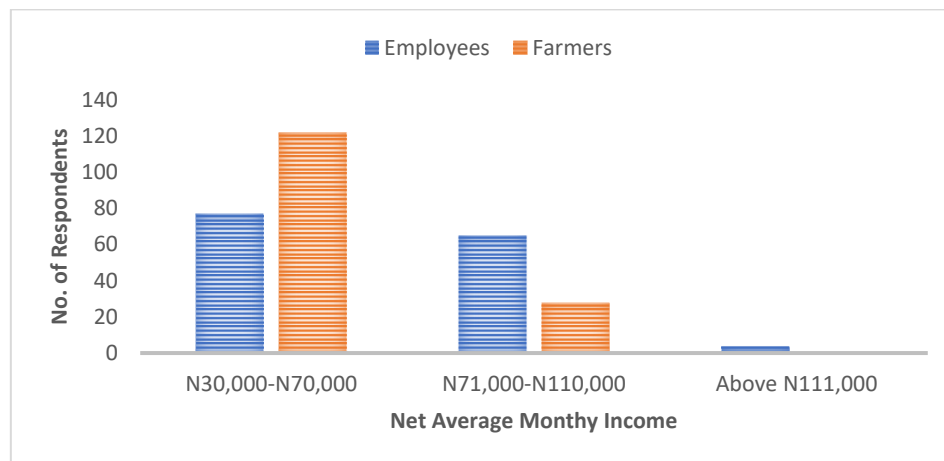


FIGURE 5. RESPONSES OF THE RESPONDENTS ON NET AVERAGE MONTHLY INCOME BY FARMERS

Figure 5 reports net average income received by farmers and employees of the farms in the three Rivers state agricultural projects in Bunu, Rumuodamaya and Ubima. It reveals that greater number of the respondents in this category earn between N30,000–N70,000 as net average income. Few earn the range of N71,000–N110,000 as net income while very few earn net income above N111,000. Net income is the income after tax for employees and income after expenses for farmers privately employed. The implication of this is that the respondents actually received income above the minimum wage of N30,000.

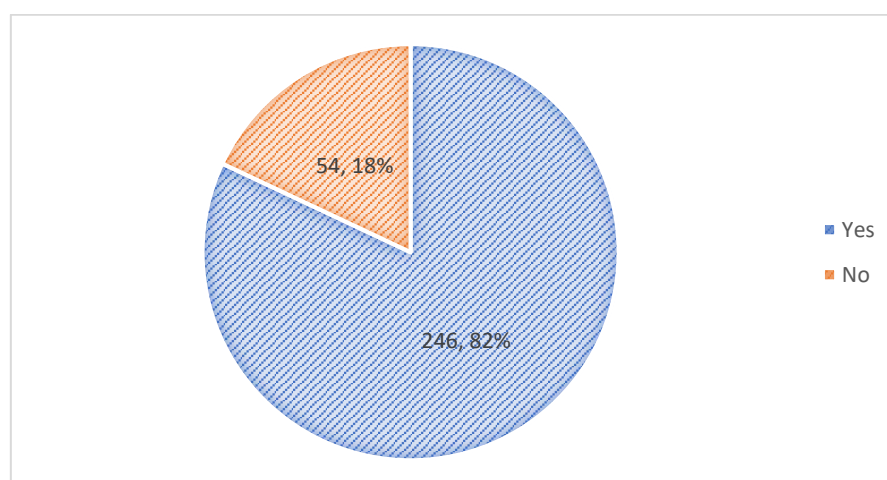


FIGURE 6. RESPONSES ON IF FARMERS AND EMPLOYEES CAN AFFORD MEDICARE VIA FARMING ACTIVITIES

Information in Figure 6 indicates that 82% of the respondents (farmers and employees of state owned agricultural farm) agreed that they could afford and provide basic medical for themselves and their household through farming activities while only 18% of the respondent claimed they could not afford basic medical care for themselves and the immediate family. The high percentage of the respondents acknowledging the ability of providing for themselves medical care through farming activities shows that farming is rewarding economically.

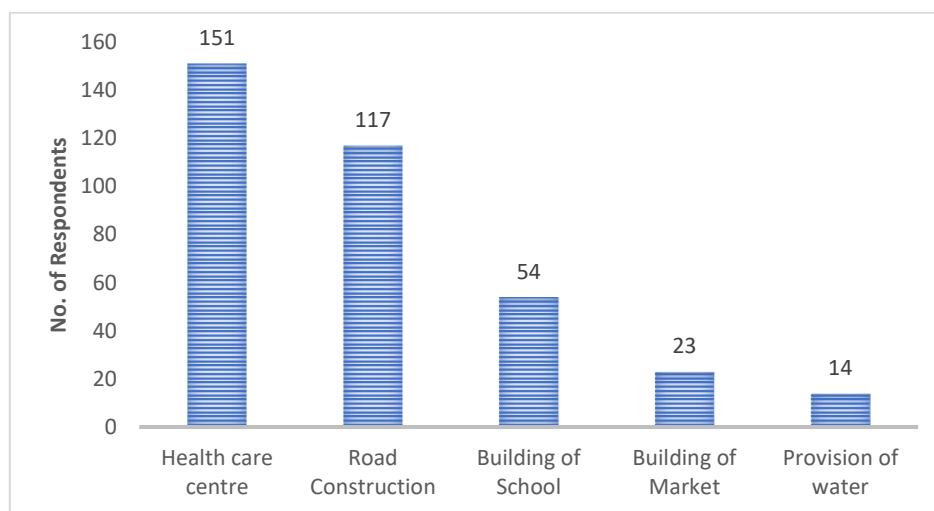


FIGURE 7. RESPONSES ON OTHER PROJECTS IN HOST COMMUNITIES AFTER THE SITING OF AGRICULTURAL PROJECTS BY GOVERNMENT IN HOST COMMUNITIES

Figure 7 shows that outside the farms established by government in the three communities of Bunu, Rumuodamaya and Ubima, the government has also built health care centres to provide basic health care to the people in the communities. These communities also have good internal road network linking the communities to neighboring ones. The communities have functional primary schools, markets and boreholes sunk close to the farms where the residents do get water supply for domestic use. Though portable water supply appears to be low among facilities provided by the government via the farms, its presence means much for health care delivery in these communities. Health care facilities and road construction appear to dominate government assisted projects in the communities under investigation.

Figure 8 reveals that 71% of the respondents (farmers, employees of the farms and staff of the Ministry of Agriculture) agreed that the siting of agricultural projects in the communities in Rivers state by the government has enhanced the development of the host communities and the state at large. However, 29% of the respondents claimed that they could not see nor experienced increase in welfare and living conditions from the presence of the projects in their communities.

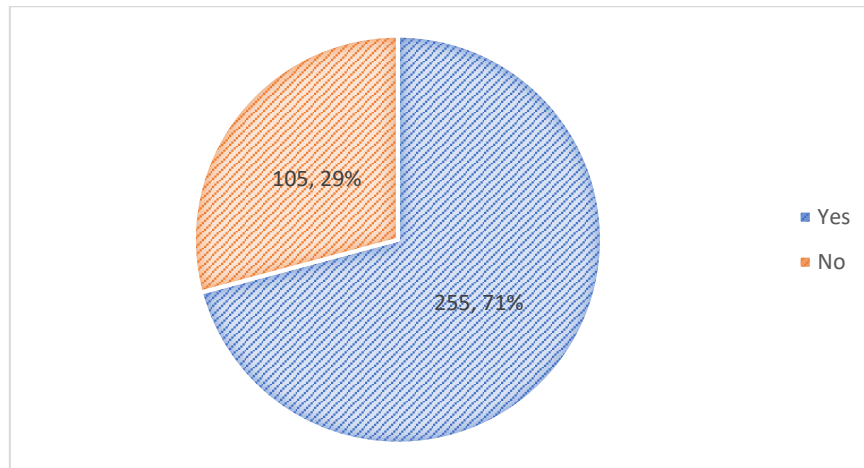


FIGURE 8. RESPONSE ON IF SITING OF AGRICULTURAL PROJECT HAS ENHANCED THE DEVELOPMENT OF THE HOST COMMUNITIES

Hypotheses Testing

In order to verify the hypotheses formulated in the course of this study, four hypotheses were tested. The contingency tables, results and interpretation of results are presented in Tables 3, 4 and 5.

TABLE 3(a). CONTINGENCY TABLE ON RESPONSES ON WHETHER RIVERS STATE GOVERNMENT AGRICULTURAL PROJECTS HAVE HELPED IN JOB CREATION

Respondent	Strongly Agreed	Agreed	Disagreed	Strongly Disagreed	Total
Employees of the Farms	7	95	41	7	150
Farmers of Host communities	5	103	39	3	150
Staff of Ministry of Agriculture	3	56	1	0	60
Total	15	254	81	10	360
Percentage	4.2%	70.5%	22.5%	2.8%	100%

Source: Field work.

The reactions of the respondents on whether government support through agricultural sponsored project had enhanced job creation in the communities/state are reported in Table 3(a). It shows that 4.2% of the respondent strongly agreed that the supports from government had improved employment in the host communities and state, 70.5% of the respondents agreed that the projects had improved jobs, 22.5% disagreed that the projects have created jobs in the communities/state while 2.8% of the respondent strongly disagreed to the claim of job creation. These responses were further subjected to test to find out if notable connection exists between government projects/supports and job creation.

TABLE 3(b). RESPONSES ON RIVERS STATE GOVERNMENT AGRICULTURAL SUPPORT ON JOB CREATION
* CATEGORY OF RESPONDENT CROSS TABULATION

			Category of Respondent			Total
			Employees of the Farms	Farmers of Host communities	Staff of Ministry of Agriculture	
Responses on Rivers State Government Agricultural Support on Job creation	Strongly Disagreed	Count	7	3	0	10
		Expect Count	4.2	4.2	1.7	10.0
	Disagreed	Count	41	39	1	81
		Expect Count	33.8	33.8	13.5	81.0
	Agreed	Count	95	103	56	254
		Expect Count	105.8	105.8	42.3	254.0
	Strongly Agreed	Count	7	5	3	15
		Expect Count	6.3	6.3	2.5	15.0
	Total	Count	150	150	60	360
		Supposed Count	150.0	150.0	60.0	360.0

TABLE 3(c). CHI-SQUARE TESTS

	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi-Square	23.905 ^a	6	.001
Likelihood Ratio	32.997	6	.000
Linear-by-Linear Association	13.470	1	.000
N of Valid Cases	360		

a. 4 cells (33.3%) have Supposed count less than 5. The minimum Supposed count is 1.67.

Symmetric Measures			
		Value	Approximate Significance
Nominal by Nominal	Phi	.258	.001
	Cramer's V	.182	.001
N of Valid Cases		360	

The chi square result reported in Table 3(c) reveals that null hypothesis that states that, “there is no significant relationship between government agricultural projects/ supports to farmers and job creation in the state” is rejected as reported in the chi square statistic of 23.905 and its probability value of 0.001. This implies that government agricultural projects/ supports to farmers have helped to create more jobs in the host communities thereby contributing to the development of the host communities and the state at large. This is in consonance with earlier study by Mondal (2008) who finds that agricultural support program/activities created jobs in Bangladesh.



TABLE 4(a). THE EXTENT TO WHICH GOVERNMENT AGRICULTURAL PROJECTS IMPLEMENTED IN RIVERS STATE IMPACT PRODUCTIVITY/OUTPUT OF FARMERS

Respondent	Excellent	Very Good	Good	Fair	Poor	Total
Employees of the Farms	7	108	30	5	0	150
Farmers of Host communities	20	57	66	7	0	150
Staff of Ministry of Agriculture	7	36	15	2	0	60
Total	34	201	111	14	0	360
Percentage	9.5%	55.8%	30.8%	3.9%	0%	100%

Source: Field work.

The reactions of the respondents on whether government support through agricultural sponsored project improve their productivity and output are reported in Table 4(a). It shows that 9.5% of the respondents claimed that the supports from government had excellently improved productivity and output, 55.8% of the respondents felt that it was very good, 30.8% claimed that it is good, 3.9% felt it is fair while none claimed it is poor.

TABLE 4(b). RESPONSES ON THE INFLUENCE OF GOVERNMENT SUPPORT TO FARMERS ON OUTPUT AND PRODUCTIVITY * CATEGORY OF RESPONDENT CROSS TABULATION

			Category of Respondent			Total
			Employees of the Farms	Farmers of Host communities	Staff of Ministry of Agriculture	
Responses on the influence of Government Support on employee and farmers Output and Productivity	Fair	Count	5	7	2	14
		Supposed				
		Count	5.8	5.8	2.3	14.0
	Good	Count	30	66	15	111
		Supposed				
		Count	46.3	46.3	18.5	111.0
	Very Good	Count	108	57	36	201
		Supposed				
		Count	83.8	83.8	33.5	201.0
	Excellent	Count	7	20	7	34
		Supposed				
		Count	14.2	14.2	5.7	34.0
Total		Count	150	150	60	360
		Supposed				
		Count	150.0	150.0	60.0	360.0

TABLE 4 (c). CHI-SQUARE TESTS

	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi-Square	37.299 ^a	6	.000
Likelihood Ratio	38.196	6	.000
Linear-by-Linear Association	.310	1	.578
N of Valid Cases	360		

a. 1 cells (8.3%) have Supposed count less than 5. The minimum Supposed count is 2.33.

Symmetric Measures			
		Value	Approximate Significance
Nominal by Nominal	Phi	.322	.000
	Cramer's V	.228	.000
N of Valid Cases		360	

These responses were further subjected to test to know if significant connection exists between government support and the productivity/output of farmers/employees that, “there is no significant relationship between government support to farmers and productivity/output of farmers” is rejected as indicated in the chi square statistic of 37.299 and its probability value of 0.000. This implies that government supports to farmers and employment of people in government owned farms in Rivers State have improved the productivity of farmers and employees thereby contributing to the development of the host communities and the state at large. This is in consonance with earlier studies by Eze and Nwachukwu (2007) and Bidemi (2013). They found that participating farmers in government sponsored projects had improved productivity and output of the farmers. The chi square result reported in Table 4(c) reveals that the null hypothesis that states

TABLE 5(a). CONTINGENCY TABLE ON RESPONSES BY THE RESPONDENTS ON GOVERNMENT AGRICULTURAL PROJECTS/SUPPORT ON IMPROVEMENT IN EMPLOYEE AND FARMERS' INCOME LEVEL

Respondent	Strongly Agreed	Agreed	Disagreed	Strongly Disagreed	Total
Employees of the Farms	38	76	34	2	150
Farmers of Host communities	9	98	33	10	150
Staff of Ministry of Agriculture	8	50	2	0	60
Total	55	224	69	12	360
Percentage	15.3%	62.2%	19.2%	3.3%	100%

Source: Field work.

The reactions of the respondents on whether government agricultural projects/supports have improved the income of farmers and employees of the projects in the communities/state are reported in Table 5(a). It reveals that 15.3% of the respondent strongly agreed that the projects/supports from government have improved their income level, 62.2% of the respondents agreed that the projects/supports have improve their income level, 19.2% disagreed that the



projects/supports have improved their income level while 3.3% of the respondents strongly disagreed to the claim of improved income. These responses were further subjected to test to find out if notable connection exist between government projects/supports and improvement in revenue of farmers and employees.

TABLE 5(b). RESPONSES ON GOVERNMENT SPONSORED AGRICULTURAL PROJECT ON IMPROVEMENT IN EMPLOYEE AND FARMERS' INCOME LEVEL * CATEGORY OF RESPONDENT CROSSTABULATION

			Category of Respondent			Total
			Employees of the Farms	Farmers of Host communities	Staff of Ministry of Agriculture	
Responses on Government Sponsored Agricultural Project on Improvement in employee and farmers' Income level	Strongly Disagreed	Count	2	10	0	12
		Supposed Count	5.0	5.0	2.0	12.0
	Disagreed	Count	34	33	2	69
		Supposed Count	28.8	28.8	11.5	69.0
	Agreed	Count	76	98	50	224
		Supposed Count	93.3	93.3	37.3	224.0
	Strongly Agreed	Count	38	9	8	55
		Supposed Count	22.9	22.9	9.2	55.0
	Total	Count	150	150	60	360
		Supposed Count	150.0	150.0	60.0	360.0

TABLE 5(c). CHI-SQUARE TESTS

	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi-Square	44.512 ^a	6	.000
Likelihood Ratio	50.688	6	.000
Linear-by-Linear Association	.140	1	.709
N of Valid Cases	360		
Symmetric Measures			
		Value	Approximate Significance
Nominal by Nominal	Phi	.352	.000
	Cramer's V	.249	.000
N of Valid Cases		360	

The chi square result reported in Table 5(c) reveals that the null hypothesis that states that, "there is no significant relationship between government agricultural projects/supports to farmers and improvement in the income level of farmers and employees of the projects" is rejected as indicated in the chi square statistic of 44.512 and its probability value of 0.000. This implies that government agricultural projects/supports to farmers have helped to improve the income level of farmers and

employees in the host communities where the projects are located thereby contributing to the development of the host communities and the state at large. This result is in agreement with early works by Eze and Nwachukwu (2007) who found that participating farmers in government sponsored agricultural projects help improve income level of the farmers and workers.

DISCUSSION OF FINDINGS

The results of our analysis show that government sponsored agricultural projects have significant effect on employment creation in the host communities and in the state. From Table 3(a), we find out that 97.2 % of the respondents agree that government sponsored agricultural projects contributed to improvement in job creation in the host communities. This is in agreement with earlier studies by (Mondal, 2008), who found that agricultural support programmes helped in job creation in Bangladesh. A trip to the communities of Bunu Tai, Rumuodamaya and Ubima also provided evidence on the extent to which the existing agricultural projects in the three communities have helped in job creation both in the government owned farms and among the farmers doing businesses in the communities. Most of the employees in the farms confessed that prior to the siting of the farms, they had no job. Also the farmers doing business in the communities informed us that they have employed more workers due to increased farm activities and cultivation of more portions of land since the establishment of the farms in their communities.

The results also reveal that government sponsored agriculture projects have significant effect on both productivity of workers employed in the farms located in the communities and the farms studied. Table 4(a) shows that 96.1 % of the respondents agree that government sponsored agriculture projects brought improvement on the output of farmers in the host communities. This implies that agricultural projects sited in the local communities in Rivers State have improved the output of both the farms and that of farmers doing businesses around the areas where the farms are located. This result is in consonance with earlier studies by Eze and Nwachukwu (2007), who found that participating farmers in government sponsored agricultural projects have improved productivity and output in a study carried out in Imo state and Bidemi (2013) who found that agricultural financing through government has direct and positive relationship with output of farmers. The farmers and employees all agreed that the projects sited in their communities brought new ideas and techniques of farming which were hitherto not available to them. A visit to the host communities and our interaction showed that School-to-Land trained 250 each in fish farming and crop farming in 2019. In 2018, Songhai encouraged poultry farmers with day old chicks and improved feed. On almost annual basis, Risonpalm (SIART NIG LTD) distributed thousands of palm seedlings to farmers. The new technique and ideas acquired through training by extension workers and specialists in the different personnel posted to their communities helped boost their productivity and output.



The result further reveals that government sponsored agricultural projects in Rivers state assisted in improving income level of farmers through improved output and employees who had no jobs prior to the sitting of the projects. Table 5(a) indicates that 96.7 % of the respondents agree that income improved as a result of the sitting of the government sponsored agricultural projects in their communities. This is in consonance with earlier works of Ezech and Nwachukwu (2007) and Ammani (2012), who found positive relationship between government assisted agricultural projects and income level of farmers. The increase in income earned from farming activities according to the farmers is a direct consequence of training, credit and provision of farming inputs by government agencies. This is because our analysis indicates that 97% have received government support in various forms. These direct inventions provided the farmers in the host communities and employees of the agriculture projects with requisite skills and ideas for improved production which increases outputs, sales and income. An interaction with the farmers in the community hosting the Songhai farm revealed to us that farmers in the community prior to the establishment of the farm estate grew mostly cassava and yam. However, the presence of Songhai farm made the farmers to cultivate other crops like vegetable, Okra and Cucumber. Most of the farmers also started fish farming and poultry from ideas they received from training and activities in the farm. These to them have improved their income earning from farming activities.

CONCLUDING REMARKS

Results and findings from the study provided serious evidence that activities within and outside the agricultural sponsored/owned farms in Rivers state especially those consulted in these study at Bunu Tai, Rumuodamaya and Ubima have increased the productivity and outputs of farmers and employees of the farms, improve their income level hence alleviated poverty, created additional jobs for the people in the host communities and enhanced economic development in the host communities. From these findings, the study concludes that government sponsored agriculture activities/projects have contributed to development of local communities in Rivers state. Based on this conclusion, the paper recommends: need for government to increase support to farmers and funding to the farms, increase training for farmers and employees of the farms, improve facilities on the farms and improve the conditions of services of the workers on the farms in order to raise their productivity and make the farm projects development friendly in the communities and state at large.

REFERENCES

Ahearn, M., J. Yee, E. Ball & R. Nehring. (1998). Agricultural Productivity in the United States. USDA, ERS, Agricultural Information Bulletin no. 740.

- Ammani, A.A. (2012). An Investigation into the Relationship Between Agricultural Production and Formal Credit Supply in Nigeria. *International Journal of Agriculture and Forestry*, 2(1), 46-52.
- Akintunde, W.A., Adesope A.A., & Okruwa, V.O. (2013). An Analysis of Federal Government Expenditure and Monetary Policy on Agricultural Output in Nigeria. *International Journal of Economics, Finance and Management Sciences*, 1(6), 310-317.
- Anokye, M.A. (2020). Sample size determination in survey research. *Journal of Scientific Research and Reports*, 26(5), 90-97.
- Bartlett, J.E., Kotrlik, J.W., Higgins, C.C. (2001). Organizational research: Determining appropriate sample size in survey research. *Information Technology, Learning, and Performance Journal*, 19(1), 43-50.
- Barkley, D.L., & Wilson, P.N. (1995). The Role of Non-traditional Agriculture in Rural Development. *Journal of Agriculture, USA*, 9(2).
- Benson, T.J.C., & Rhinehart, I. (2004). An Investigation of the Spatial Determinants of the Local Prevalence of Poverty in Rural Malawi. *Journal of Food Policy*, 30(5), 32-50.
- Bidemi, A.T. (2013). The Impact of Development Finance on Agricultural Growth in Nigeria (A Case Study of Bank Agriculture). Being a Research Project Submitted to the Department of Banking and Finance, Faculty of Management Sciences, University of Abuja.
- Dare, O.O., Sunday, O.W.T., Olumuyiwa, A.O., & Onyekwere, O.C.U. (2014). Impacts of Agricultural Development Programme (ADP) on Rural Dwellers in Nigeria: A Study of Isan-Ekiti. *International Research Journal of Finance and Economics*, 128, 42-55.
- Deneji, M.I. (2011). Agricultural Development Intervention Programmes in Nigeria (1960 to Date): A Review. *Savannah Journal of Agriculture*, 6(1), 101-107.
- Ezeh, C.I., & Nwachukwu, I.N. (2007). Impact of Selected Rural Development Programmes on Poverty Alleviation in Ikwuano Local Government Area, Abia State, Nigeria. *African Journal of Food Agriculture Nutrition and Development*, 7(5).
- Gemmell, N.C.L., & Matthew, M. (2000). Agricultural Growth and Inter-sectoral Linkages in Developing Country. *Journal of Agricultural Economics*, 5(3), 353-370.
- Gollin, D.S.P., & Rogerson, R. (2002). The Role of Agriculture in Development. *American Economic Review*, 92, 160-164.
- Gopinath, M. & M.S.T. Roe. (1997). United States Agricultural Growth and Productivity: An Economywide Perspective, USDA/Economic Research Service.
- Iganiga, B.O., & Unemhilin, D.O. (2011). The Impact of Federal Government Agricultural Expenditure on Agricultural Output in Nigeria. *Journal of Economics*, 2(2), 81-88.



Ikala, P.A. (2010). Impact of Public Agriculture Expenditure on Agricultural Output and Economic Growth: (1978-2007). An Unpublished Thesis of the Caritas University, Amorji-Nike; Emene Enugu.

International Food and Agricultural Development. (2001). The Challenges of Ending Rural Poverty. Rural Poverty Report 2001: International Fund for Agricultural Development, Oxford: Oxford University Press.

Kenny, S.V. (2019). The Role of Agricultural Sector Performance on Economic Growth in Nigeria. Munich Personal RePEc Archive.

Lawal, W.A., & Abudlahi, I.B. (2011). Impact of Informal Agricultural Financing on Agricultural Production in the Rural Economy of Kwara State, Nigeria. *International Journal of Business and Social Science*, 12(19).

Loto, M.A. (2011). The Impact of Economic Downturn on the Performance of Agricultural Export in the Nigerian Economy (A Quarterly Empirical Analysis). *Journal of Emerging Trends in Economics and Management Sciences*, 2(6), 504-510.

Mane, R.S. (2009). The Importance of Agriculture in Sustainable Economic Growth in India. Centre for Study in Science Policy. Jawaharlal, Nehru University, India.

Mondal, M.A.S. (2008). Agriculture and Food Security: The Challenges of Unemployment. *Journal of Agriculture and Economics*, 4(7).

Nchuchuwe, F.F., & Adejuwon, K.D. (2012). The Challenges of Agriculture and Rural Development in Africa: The Case of Nigeria. *International Journal of Academic Research in Progressive Education and Development*, 1(3), 45-61.

Nwosu, A.C., & Akpokodje, G. (1993). Planning for the Rural Poor: Trends and options in the Development Plans of Nigeria. Review of Government and Society.

Okezie, A.I., Nwosu, C., & Njoku, A. C. (2013). An Assessment of Nigeria Expenditure on the Agricultural Sector: Its Relationship with Agricultural Output (1980 – 2011). *Journal of Economics and International Finance*, 5(5), 177-186.

Okurut, N., & Thuto, B. (2007). Informal Financial Markets in Botswana: A Case Study of Gaborone City. Study Prepared for Botswana Institute for Development Policy Analysis (BIDPA), 26(2), 255-270.

River State Government – RSG. (1987). The Community Development Committee in Rural Development: A CDC Guide. Ministry of Local Government, Port Harcourt.

Rivers State Agricultural Development Programme (ADP) Report. (2009).

Robinson, M.O., & Kalu, I.E. (2013). Impact of Government School-to-land Agricultural Project on Rural Development in Rivers State, Nigeria. *Journal of Economics and Sustainable Development*, 4(12): 39-44.

Ruma, S.A. (2008). Nigeria Ranks 20th on Global Hunger Index- Minister for Agriculture. The online Punch Newspaper.

Taherdoost, H. (2017). Determining sample size; how to calculate survey sample size. *International Journal of Economics and Management Systems*, 2, 237-239.

Weir, S (1999). The effects of education on farmer productivity in rural Ethiopia. *CSAE Working Paper Series 1999-07*, Centre for the Study of African Economies, University of Oxford.

Yamane, T. (1967). *Statistics: An introductory Analysis*, 2nd Edition, New York: Harper and Row.

Yee, J., Huffman, W.E., Ahearn, M., & Newton, D. (2002). Sources of Agricultural Productivity Growth at the State Level, 1960-1993. In V.E. Ball and G.W. Norton (eds.) *Agricultural Productivity: Measurement and Sources of Growth* (Norwell, MA: Kluwer) 185-209.



APPLYING GEOGRAPHIC MODELS TO EXAMINE THE IMPACT OF GROSS DOMESTIC PRODUCT AS A PROXY FOR ECONOMIC WELL-BEING

Aaron J. Pacheco¹, Kristian Braekkan², PhD, Shelly Albaum³, JD

¹Minnesota State University-Mankato, USA

²Kristian Braekkan, Region Nine Development Commission, USA

³Shelly Albaum, USA

Abstract

This paper considers whether gross domestic product (GDP) adequately measures economic well-being, or whether other measures of economic well-being should be used instead of or in addition to GDP. Increasing GDP/capita has long been the goal for local communities, regions, and states. Usually, GDP is treated either explicitly or implicitly as a measure of economic prosperity. But economic prosperity might not correspond to economic well-being if the prosperity is unevenly distributed or if the benefits are experienced outside the local area. This paper introduces a two-pronged approach to evaluating the relationship between regional economic development and regional economic well-being. First, we identify geographical patterns of economic development and consider measures of economic well-being for the same geographical areas. Second, we consider spatial analyses that cluster index values in relation to cultural and geographic features at national, region, and state levels. Regression residuals and local R^2 patterns confirm the complexity at which economic well-being factors vary over space. The paper concludes that policy making based on economic well-being must incorporate a comprehensive definition of economic well-being that attends to local and regional interactions; economic well-being cannot be adequately defined by any single variable, such as GDP. Recommendations for future studies are included.

Keywords: Economic well-being, GDP, Geospatial, Econometrics.

INTRODUCTION

The traditional view of economic development measures economic growth and job creation (Flammang, 1979; Botev et al., 2019). The underlying logic is static in time and space and typically ignores within- and between-market differences as well as other determinants of economic and community well-being, like quality of life

measures, publicly shared services, and other community assets (Harangozo et al., 2018).

The Problem

Contemporary research on economic development emphasizes job creation within a locality (Rather, 2020; Jakobsen, 2017). However, resources in one geographic market can, and arguably will, provide opportunities for entrepreneurs, job seekers, and families in other markets and do not necessarily have to be recreated as these assets are dynamic and can be enjoyed regionally. Important examples of resources that can impact job creation within or across regions include resources from institutions and organizations with the ability to respond with technical assistance and capital to entrepreneurs and small business owners, the ability to assist displaced workers and employers with job placement and job fulfillment, or assistance with post-incident coordination and information dissemination during times of crises. Similarly, community resources are often enjoyed by non-residents and are a source of competitive advantage, not because of their proximity to local market demands, but as an attraction to neighboring communities - within or outside the immediate region (Chen et al., 2021).

The presence of resource fluidity, such as knowledge sharing, industrial cluster formations across communities, labor force mobility, and extensive and integrated supply chains of production, highlight the apparent shortcomings of assuming a 1:1 ratio of economic growth to job creation (Yang, 2019). The error, for decision making purposes, becomes clear for economic development professionals when assessing the dynamic nature of labor supply, consumer demand, and natural cross-regional trade that takes place in most, if not all, economic development districts in the United States.

Visualization Models

Mapping regional industrial capacity not only facilitates quicker and more agile development but also helps economic developers to visualize regional patterns and multilevel differences and similarities. Being able to visualize *what* is produced and *where* reveals opportunities to respond to unanticipated needs through public/private strategic arrangements (McGlashan, 2019). The recent COVID-19 crisis demonstrated how public and private entities might struggle to identify potential producers of medical equipment, transportation channels, and other logistics solutions. Visualization models and mapping of dynamic assets in spatial- and relationship-based formats can support faster, better decision-making.

The within and between differences of regional economic development may be local or industry-specific, or a part of a larger regional pattern, which can be discovered by examining similarities and differences among the different levels of analyses such as Census regions, counties, organizational markets, MSAs, etc. (Markham & McKee, 1991). This multi-level approach would clearly be valuable to smaller, private



economic actors that need to monitor needs and opportunities that are regional by nature (Das & Bing-Sheng, 1999). For example, many entrepreneurs cannot easily align organizational strategies with industry changes. It is simply too costly for these organizations to access frequently changing data and make sense of variables that act differently within and between markets.

However, these visualization models could help the public sector, too. In particular, public entities operating at a regional or state-level could achieve improved process congruence if each lower-level entity were better equipped to adjust production systems in a timely and efficient manner, by relying on macro-information that was collected through models that encompass regional and state-level data.

The full value of this approach, however, cannot be captured in metrics that emphasize optimizing economic efficiency in support of increased gross domestic product (GDP), because raising GDP may not be the ultimate goal for local communities, regions, and even states. Therefore, this project introduces a two-pronged approach to supporting regional economic development in a dynamic, highly integrated, and complex economy: 1) the conceptualization of economic development as an activity sensitive to the location of resources in proximity to one another, and (2) supporting decision-making by identifying geographical patterns within and between economic activity that may affect economic well-being.

LITERATURE REVIEW/THEORY

Economic Growth

Economic growth is defined as an increase in the production of economic goods and services, from one period to another. It can be measured in nominal or real terms (i.e., adjusted for inflation). Traditionally, aggregate economic growth is represented by gross national product (GNP) or gross domestic product (GDP), although alternative metrics can be used (Fagerberg et al., 2010). Economic growth is modeled as a function of physical capital, human capital, labor force, and technology. The model assumes that increasing the quantity or quality of the working age population, combined with improved technology and methods of production, will lead to increased economic output.

Economic growth is measured by increases in aggregate production in an economy. It is assumed that aggregate gains in production correlate with increased average marginal productivity, which in turn leads to an increase in incomes, higher consumption, and ultimately a higher material quality of life or standard of living. The post-war era in the 1950s and 1960s were examples of rapid increases in aggregate production in the United States with corresponding income growth, although followed by stagnant and more uncertain growth cycles over the subsequent five

decades. Similarly, the neoliberal expansion in China following market liberalizations by the central government led to even higher growth rates in the late 1980s, 1990s, and early 2000s as the economy embraced modern supply chains, heavy capital investments in production systems, and global trade (McNally, 2011).

China's experience demonstrates some of the challenges associated with rapid economic expansion and unequal geographic developments, but the contemporary American economy also exhibits wealth inequalities and geographic distributions that are also quite staggering. Economists have focused extensively on income and wealth inequalities following the 2008 financial crisis. However, these examinations are often done in the aggregate, and few economists have paid significant attention to the underlying regional challenges from a geographic standpoint. Urbanization and the gradual transition from rural and primary and secondary industries to service-based economies have complicated the study of regional development and have also made it even more important to understand how policies aimed at augmenting economic development for the sake of growth alone can be detrimental for communities and larger regions (Harvey, 2018).

Drivers of Regional Economic Growth

The contribution of innovation to regional growth has been widely identified and documented through studies on innovation, competitiveness, and economic growth (Ewers, 2019). Advanced economic activities tend to possess a high market value, resulting in a competitive advantage at least during the first stage of the diffusion process. As a result, these advanced economic activities provide new, and at times unique, opportunities for the development of firms, and the expansion of market shares, profitability, and employment growth (Wang & Tan, 2021). Regions characterized by a high level of technological innovation typically show a greater acceleration of economic growth than regions with slower innovation patterns. These high innovation regions also attract investments at a higher rate.

Technology diffusion is a complex process, involving changes in the behavior of economic agents. Many studies emphasize the great importance of the technology diffusion process for market development. Therefore, societal expected return on new technology without the diffusion process remains insignificant and limited to product-specific production within the individual firm. Nonetheless, there are few examples in rural communities of programs that are specifically designed to foster technology diffusion (Ghezzi et al., 2013).

Regional economic competitiveness is directly and strongly dependent on the spatial diffusion of innovation processes. Innovations occur somewhere in space and time, and until the new technology is fully diffused, innovations, creations and/or adaptations are marked by regional spatial variations. For example, potential solutions to industry-specific challenges often remain hidden on college campuses



and in laboratories not frequented by those who would benefit most from the academic progress being made.

The most powerful paradigm for technological progress remains Schumpeter's model of evolutionary process, and the interpretations and extensions of the model. According to this model, ideas, innovations, and technologies compete for resources in an environment characterized by economic scarcity. Ultimately, the technology most suited to the times and the conditions is expected to triumph, though the process may be long, time-consuming, and somewhat inefficient. The Schumpeterian evolutionary models imply that as technology ages, more and more firms gain the opportunity to learn and use it as they observe other firms and adapt.

However, most firms do not possess skills, capital, or capacity to innovate at the scale necessary unless they operate in a field where innovation is a core competency (e.g., information technology, software development, design innovation, etc.). Unlike with Silicon Valley-style innovation, most manufacturers and service providers in rural areas of the U.S. cannot host their own R&D operations and instead need the expertise acquired from a dedicated research entity and/or thorough inter-sector collaboration (Harfst et al., 2017). Public sector officials and industry leaders often emphasize the important role of information and knowledge in the process of technological change and the diffusion of innovation as critically important for regions to advance economically. Obviously, advanced means of communication can support disseminating knowledge over space, yet, in regional economies, the dissemination does not occur automatically – the element of space may have to be overcome as a necessary component in the process of regional development and economic growth.

The precise nature of the process by which innovation procedures diffuse through an economy, from region to region, and from one economy to another - and through which one firm learns from another - is very important, because it is a crucial determinant of competitive advantages for our regions and local communities.

The business milieu of a community or region, upon which sustainable development depends (Bergvall-Kåreborn et al., 2009), may be characterized by five general attributes: (1) basic location factors (e.g., labor, land, infrastructure, capital), (2) quality of life, (3) existing organizational structures, (4) business and finance regulations, and (5) support around environmental initiatives (Löfsten & Lindelöf, 2003).

Some of these elements are fixed and cannot be altered, improved, or replaced. However, each of the five categories include elements that may be flexible or susceptible to improvement. The innovative milieu should therefore be perceived as an opportunity to enhance the innovative capability of firms and local economies to provide real-world experiences for entrepreneurs and possibly students enrolled in

higher education. From an industry standpoint, it would be a cost-reducing agent or factor that diminishes uncertainty and increases production efficiencies.

Challenges/Opportunities with Regional Economic Development

Focusing on economic growth alone is not sufficient to enhance quality of life and standards of living across and within regions because regional economic competitiveness also depends greatly on the quality of supporting institutions (Nelson, 2008). There is a strong correlation between the quality of regional institutions and its overall competitiveness. Unlike the ability to tax, plan, legislate and enforce laws, the regional economic success of a city depends upon stakeholders' willingness to support effective and strong institutions.

Moreover, a narrow focus on economic growth may appear myopic or short-sighted if the growth proves unsustainable, and external economic factors rapidly undo the benefits of that growth. Many small and mid-sized cities and towns across the U.S. are struggling because their economies were built largely on a single economic sector that has changed significantly in recent years. For example, if jobs might have been heavily concentrated in industries like agriculture, food processing, or related manufacturing, but technology and market forces have significantly automated or otherwise transformed these sectors, then the regions may no longer require a large workforce - or at least not the same type of workforce. And the new jobs may require different skills (Drozдов, 2015). And not only technology shifts, but other kinds of changing circumstances, such as those caused by resource depletion, globalization, or shifts in consumer preferences, can shake the economic foundations of communities, leaving people without jobs and cities without a healthy tax base.

Alternatives to traditional economic development efforts are beginning to emerge in the United States. Rather than simply seeking to attract major employers to replace lost jobs, some cities have tried a different method to anticipate and overcome some of these challenges with "smart growth" economic development, which is a strategy that builds upon existing assets, takes incremental actions to strengthen communities, and builds long-term value to attract a range of investments (Edwards & Haines, 2007).

The three core components of such smart growth strategies are (1) supporting businesses, (2) supporting workers, and (3) supporting quality of life.

Supporting Businesses

Attracting new businesses and supporting and expanding existing businesses contribute to economic development in several key ways, including (1) helping businesses create jobs, (2) encouraging entrepreneurship, (3) enhancing fiscal sustainability by expanding and diversifying the tax base, and (4) improving quality of life with new services and amenities (Perley et al., 2017).



The strategy of supporting businesses for smart growth focuses on understanding the current composition and location of businesses, jobs, and potential emerging entrepreneurs in the community (Artmann et al., 2019). This information can help reveal how well businesses serve local residents and contribute to quality of life, and which industries have the most potential to drive sustainable economic growth in the future.

Targeting key economic sectors for growth allows regional actors to direct their economic development efforts in a strategic manner, which helps communities use their limited resources wisely (Bibri, 2019). This part of the smart growth economic development strategy considers not only the businesses and industries with the greatest growth potential, but also where these businesses are located and how their location helps the community meet its economic, environmental, and other goals.

Supporting Workers

Workforce development is important to ensuring that residents can successfully compete for employment opportunities and that all residents have the opportunity to benefit from economic prosperity. The availability of a workforce with a wide range of skills and education levels can help local businesses grow and attract new businesses.

Quality of Life

By offering residents opportunities to learn skills for a wide range of jobs, workforce development efforts might also reduce the need for residents to commute long distances to find appropriate employment, thereby improving quality of life and reducing pollution from vehicles. This smart growth economic development component focuses on how well the skills and education of the local workforce align with the needs of existing and growing industries and provides insight into what the community could do to help workers better match businesses' needs (Aliakbari et al., 2019).

Economic Growth vs. Economic Well-Being

As Harvey (2007) suggests, economic development is not the same as growth. Development greatly depends on social relations, communal structures, and relations to nature, and does not necessarily align with the needs of invested capital. Similarly, the strengths of local and regional institutions, matter a great deal when it comes to a region's development and the region's ability to adapt to economic changes.

Impacts and responses to global influences also matter. Whereas some regions are more closely tied to global trade through industry clusters focused on exports, other

regions produce more for local consumption. Different regions will therefore develop in different ways due to their history, culture, location, and political-economic conditions. Outside developments can be supportive or complementary to local production, while others might be deleterious or even antagonistic (Harvey, 2007).

Economic development should be viewed as more multifaceted than simply stimulating growth and job creation. Ultimately, the objective of economic development should be the economic well-being of the affected communities. Economic well-being means that people have their most basic survival needs met as well as additional resources necessary to prosper (Dynan & Sheiner, 2018). Economic well-being is already recognized as an important construct by the federal government in the United States and is increasingly viewed as critical for a society's health and prosperity, and a way to ensure that economic decision-making also accounts for environmental sustainability (Chrysopoulou, 2020).

Whereas growth viewed in isolation often benefits investors from outside the region – especially in regions where local entrepreneurship plays a minor role in the industrial portfolio – per capita personal income in the region is a better measure of successful development. Specifically, growth in wages and salaries is a crucial indicator of economic well-being, because a high personal income from any source could be due to passive income, such as transfer payments, rents, capital gain, interest, and dividends.

Income equality is also frequently used as an indicator of sound economic development and is typically associated with lower social and economic problems (Wilkinson & Pickett, 2020; Stiglitz, 2017). Similarly, poverty and unemployment rates are other considerations not captured by the traditional measures of growth and job creation. Dependence on income sources other than those tied to work also reflect a region's ability to support economic well-being. Finally, net migration patterns reflect the attractiveness of regions.

METHODOLOGY

Our spatial analysis and visualization involved the following stages: Data acquisition (hypothesis generation), exploratory regressions, ordinary least squares (OLS), geographically weighted regressions (GWR), and data visualization and initial analysis. At each stage we refined variable selection from the input categories of Innovation 2.0 including Human Capital & Knowledge Creation, Business Dynamics, Business Profile, and Social Capital (Slaper et al., 2016). Exploratory regressions provided different lenses through which to view the data. OLS and GWR tools in GIS allowed us to generate geospatial and visualization products to this paper. All geospatial-statistical analyses used the geographic information system (GIS) software ArcGIS Pro 2.8.2 by Esri Inc.



The geographic data central to the analysis was acquired as prepackaged spreadsheets delivered by StatsAmerica.org, Innovation Index 2.0 (Slaper et al., 2016). The single file included populated fields for a selection of variables used by the EDA to produce the rankings, medians, and index values per county for the full United States. Because the geospatial components of the analysis relied on topology, the data only covers the 3,080 counties of the contiguous United States. Distribution patterns of variables within groupings, called neighborhoods, the relationships between neighborhoods, and correlations between adjacent features are limited to adjacent counties. Each county and its neighbors were analyzed as neighborhoods with weight given to connectivity and variation over distance.

Upon completion of the national-level analysis, which considered geographical relationships without regard to whether adjacent counties were in different states, we looked for patterns within a state. The visualization of clustered features is more useful when restricted to the state or sub-regional level because regional experts and officials can examine the results relative to their area of focus and specialization. For this paper, the state of Minnesota was selected because of the authors' familiarity and expertise.

Regression Analysis

GDP per worker is often used by policy makers and market analysts to convey trends in economic well-being. Although GDP does not closely correspond to the economic well-being index used in this paper, which comprises numerous measures (Slaper et al., 2016), GDP per worker along with other known influential variables were initially assessed using exploratory regressions. Each variable was tested for its viability and significance using an OLS regression model and spatial autocorrelation (Jang et al., 2021). As expected, several different variables could potentially explain the observed patterns. A review of each individual coefficient of determination (R^2) and corrected Akaike information criterion (AICc) ranked GDP per worker as a first choice, with variables related to education attainment ranking a close second. Thus, GDP per worker was not the sole categorical influencer of economic well-being, which warranted further analysis.

County-level spatial data incorporating the two variables were then processed through global OLS linear regression and GWR. The two models were run in parallel as seen in Figure 1. While traditional OLS offers a sufficient means of regression with a regression coefficient fixed over the entire sample area, GWR considers sample variation over space (Ali et al., 2007). We found that the OLS and GWR regression models generated significant differences in the spatial econometric analysis.

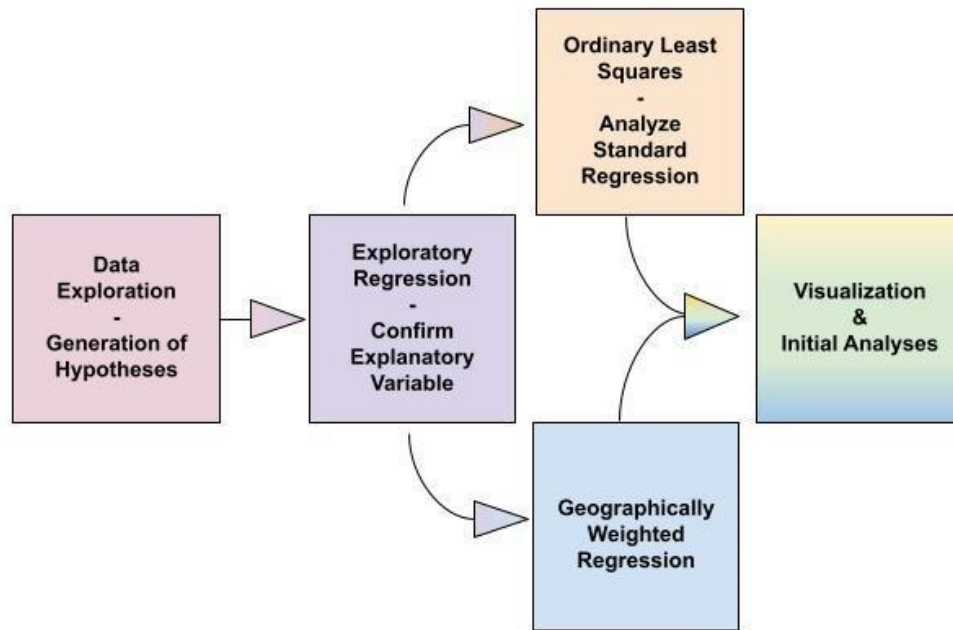


FIG 1. FLOW CHART OF PAPER ANALYSES

RESULTS

OLS and GWR Results

The OLS map depicted in Figure 2 reveals significant non-random clustering of county results. The significance measure for the spatial autocorrelation is shown in Figure 3. The significant clustering at the national level could result from a variety of factors and other explanatory variables that appear to cross multiple states and regions. When compared per county to the Economic Well-Being index (Figure 4) and the GDP per worker index (Figure 5), the OLS regression produced clustering closely related to the original index values of the dependent variable.

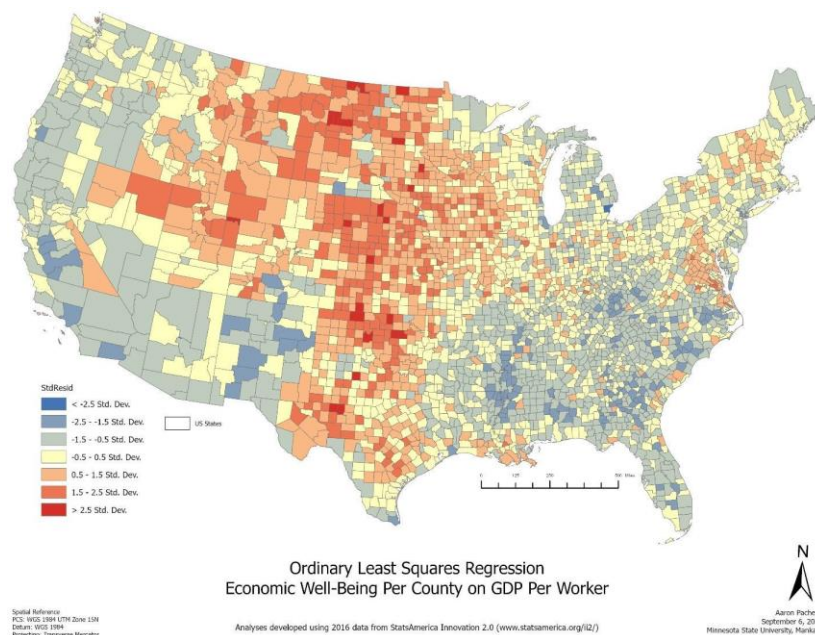
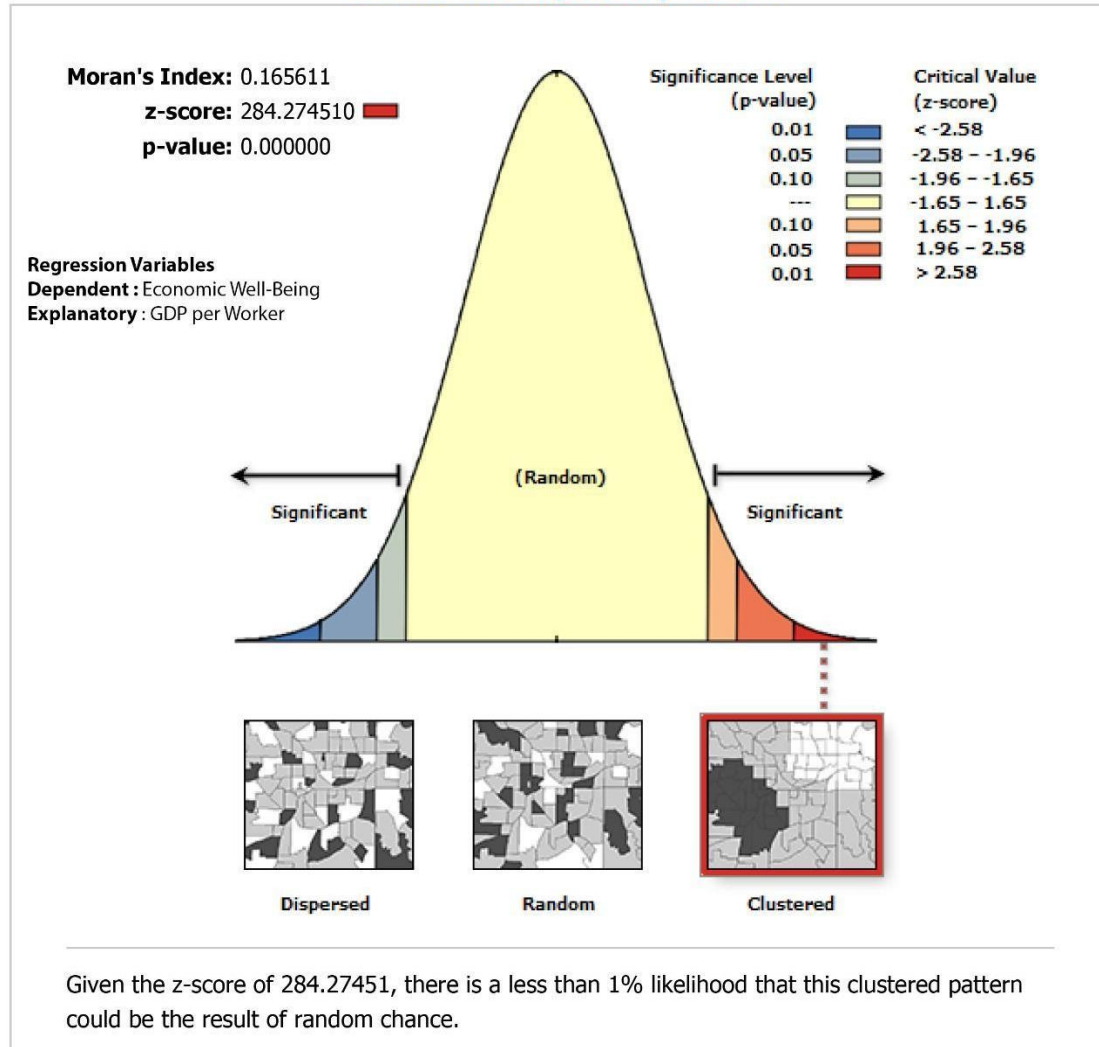


FIG 2. OLS REGRESSION FOR CONTIGUOUS UNITED STATES

Spatial Autocorrelation Report

Ordinary Least Squares Regression
Economic Well-Being on GDP per Worker



Global Moran's I Summary

Moran's Index:	0.165611
Expected Index:	-0.000325
Variance:	0.000000
z-score:	284.274510
p-value:	0.000000

FIG 3. SPATIAL AUTOCORRELATION OF OLS REGRESSION

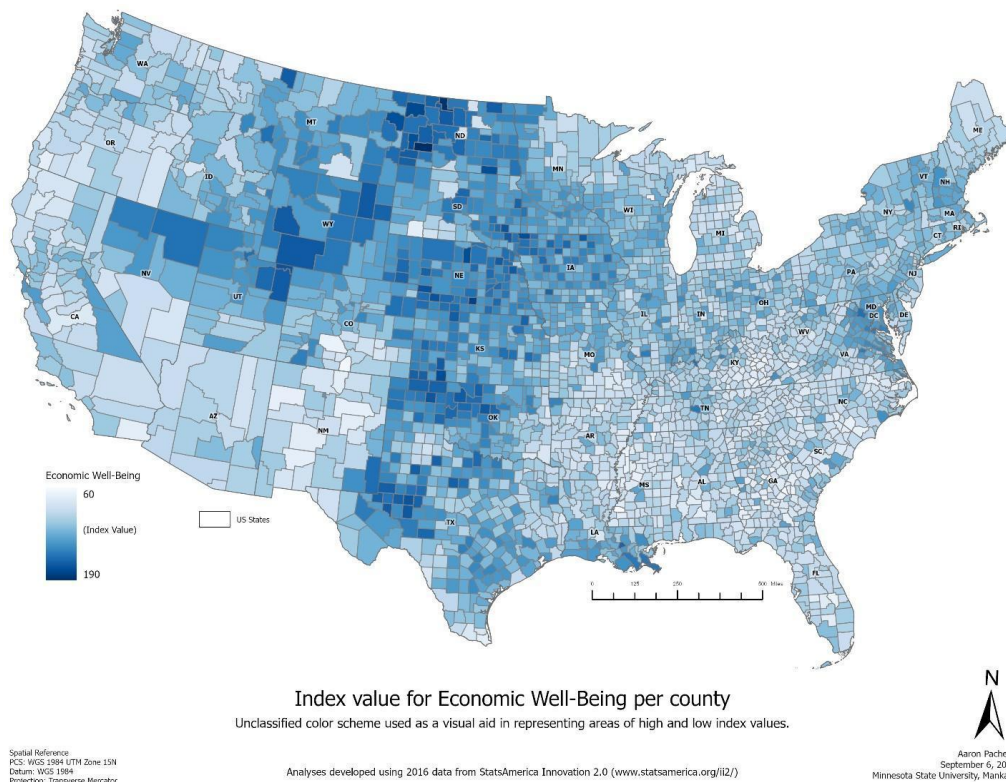


FIG 4. ECONOMIC WELL-BEING PER COUNTY

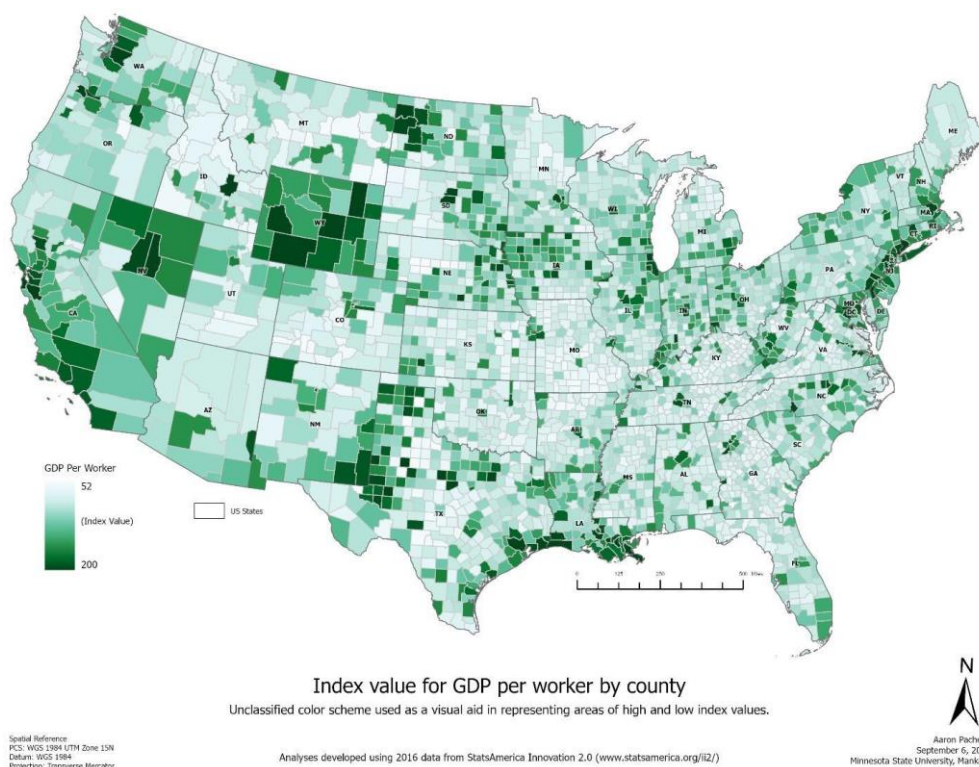
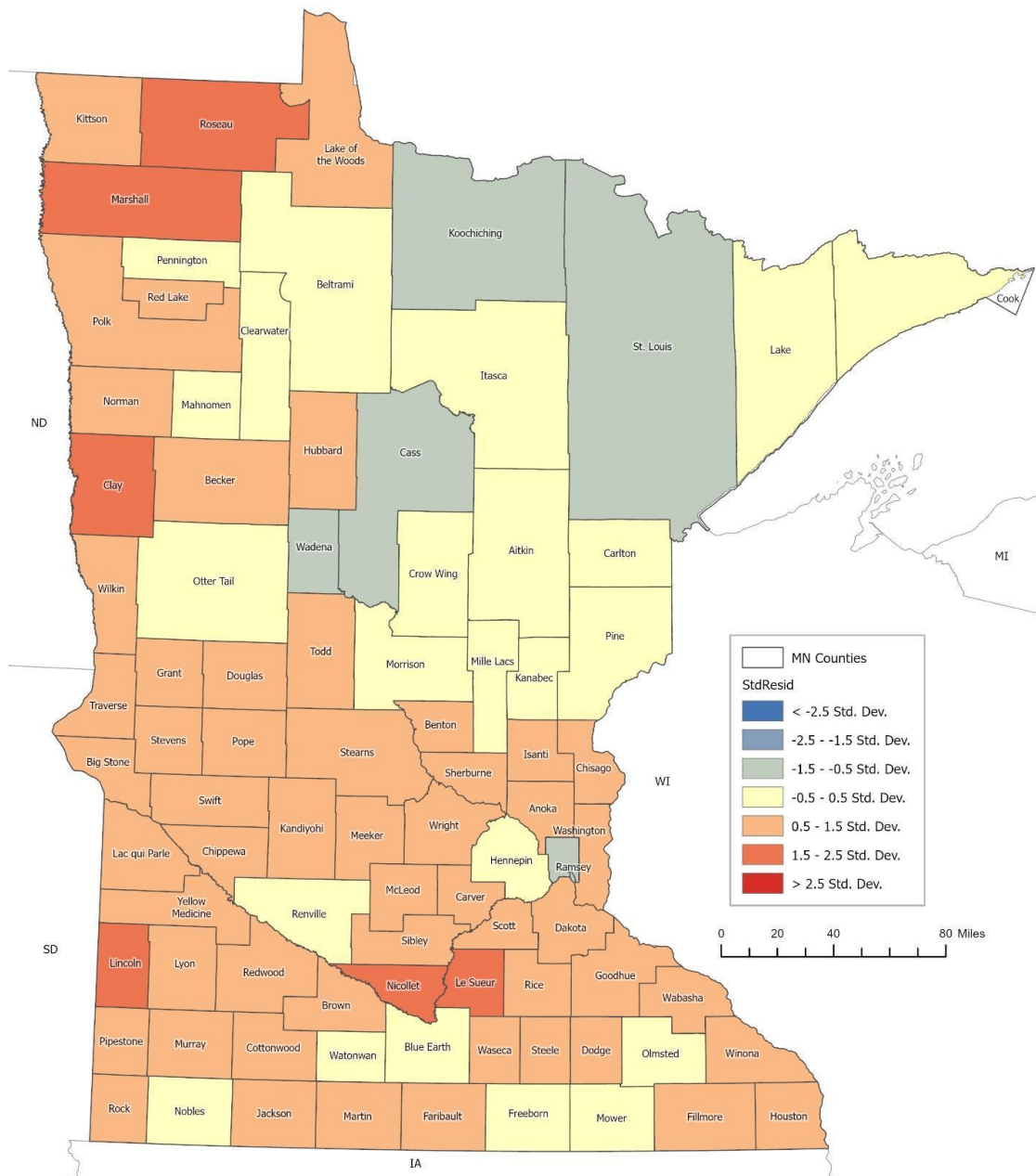


FIG 5. GDP PER WORKER PER COUNTY

The clustering of effects is not surprising. Production requires geographic concentration of money, means of production, and local labor force availability.



Proximity to each of these increases the competitiveness of regional industry, which is reflected by the clusters. The effect is magnified when the production clusters are also close to consumer markets and/or the production of other export goods. Figure 2 shows widespread clustering at the national level. At the state level (Figure 6), clusters define economic regions that can guide state policy making.



Ordinary Least Squares Regression
Economic Well-Being Per County on GDP Per Worker
(Performed for contiguous U.S. and cropped to state-level post-regression)

Spatial Reference
PCS: WGS 1984 UTM Zone 15N
Datum: WGS 1984
Projection: Transverse Mercator

Analyses developed using 2016 data from StatsAmerica Innovation 2.0 (www.statsamerica.org/ii2/)

N
Aaron Pacheco
September 6, 2021
Minnesota State University, Mankato

FIG 6. OLS RESULTS LIMITED TO MINNESOTA

A key element in GWR over OLS is the introduction of weight matrices for neighborhoods of grouped features (Ali et al., 2007). The resulting map and distribution of residuals in Figure 7 could be mistaken for a random pattern, but because both clustering and dispersion can be statistically significant, the resulting spatial autocorrelation (Figure 8) reveals a geographical pattern with less than one percent chance of randomness.

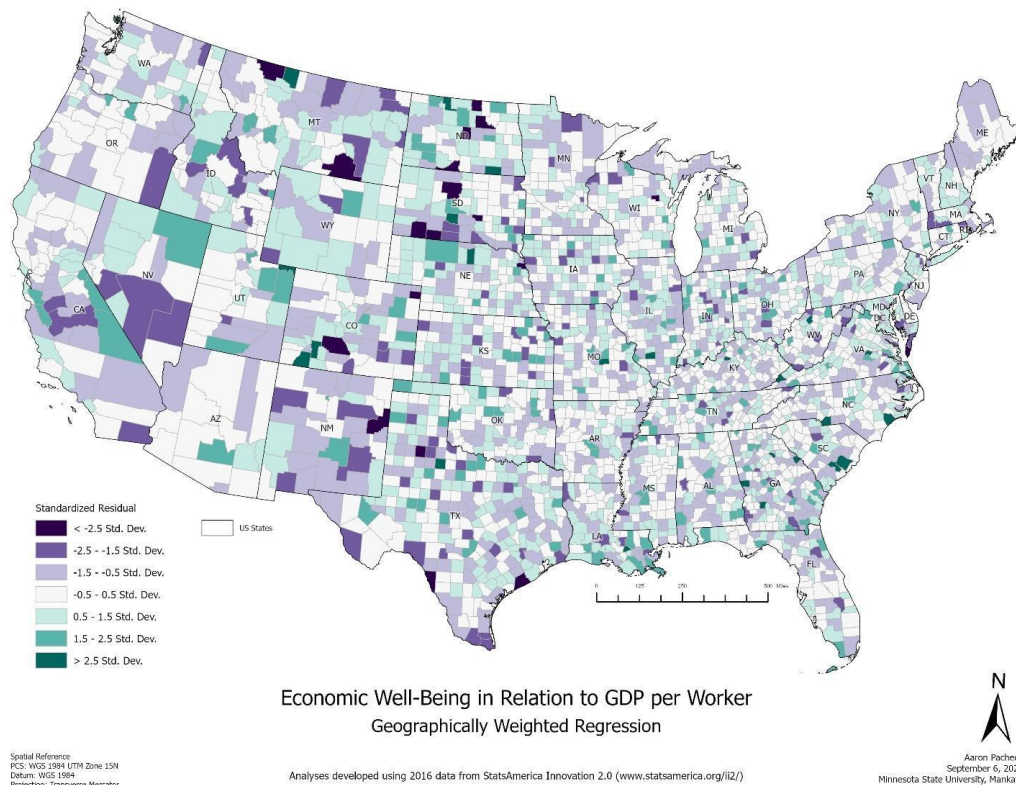
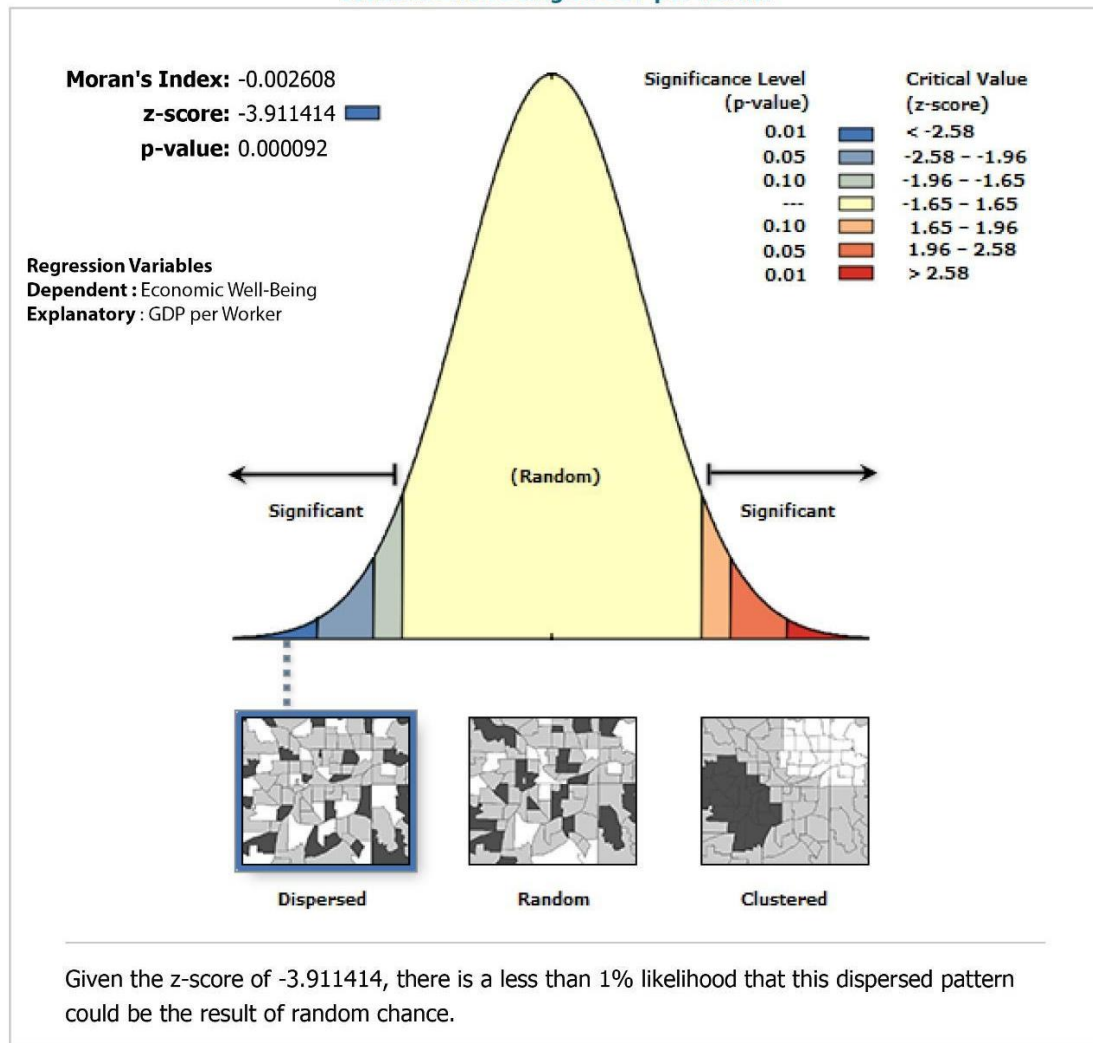


FIG 7. GWR RESULTS FOR CONTIGUOUS UNITED STATES

Dispersed patterns on a small map scale (e.g., lower 48 states) are less effective at displaying significant clustering information. When examining the same data on a larger map scale (e.g., state-level) seen in Figure 9, the significance of the information becomes clearer. The residuals of the Minnesota counties demonstrate geographic relationships between features such as the Minneapolis-Twin Falls center versus the surrounding suburbs or between agricultural and mining regions to the north and south.

Spatial Autocorrelation Report

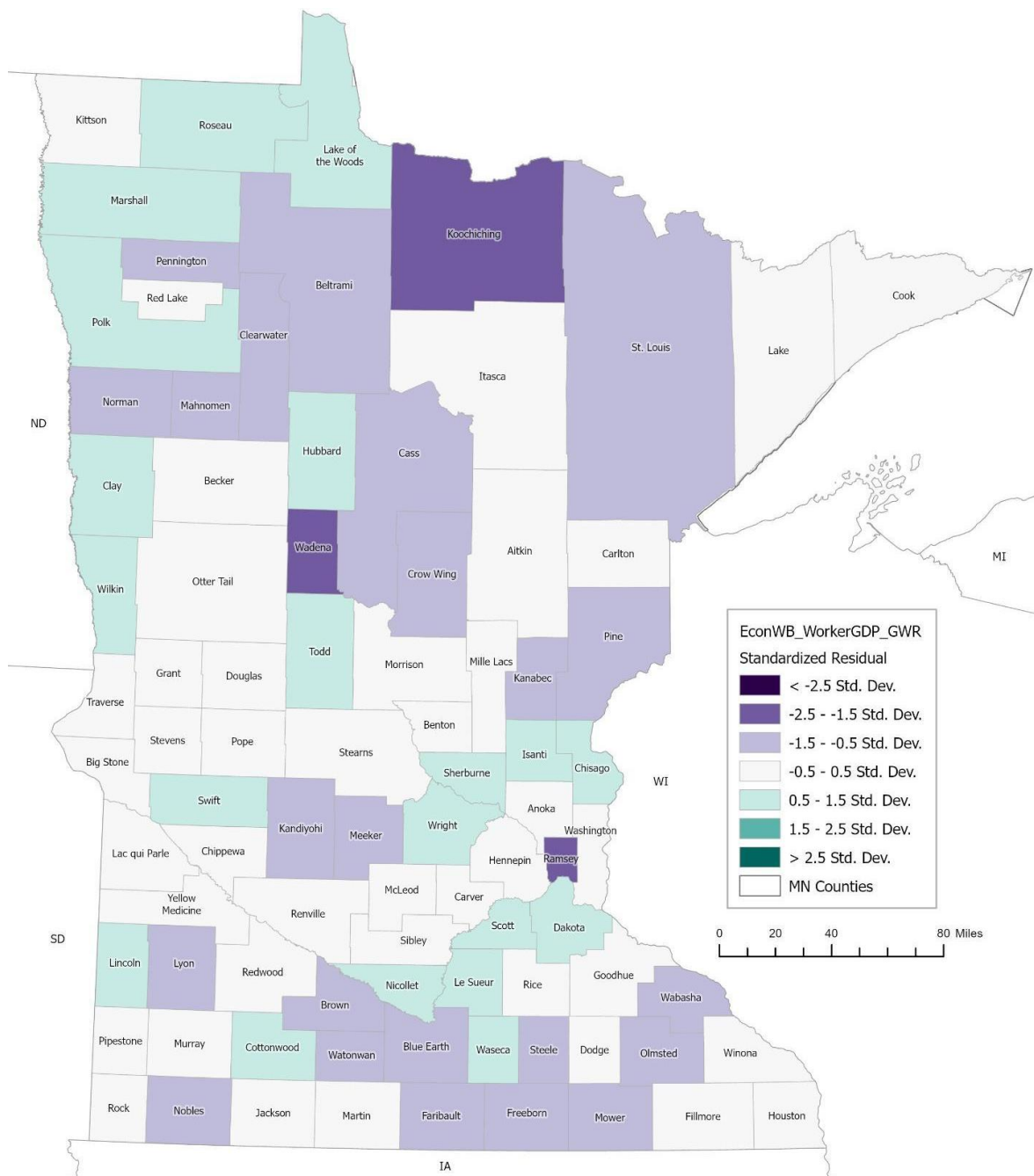
Geographically Weighted Regression
Economic Well-Being on GDP per Worker



Global Moran's I Summary

Moran's Index:	-0.002608
Expected Index:	-0.000325
Variance:	0.000000
z-score:	-3.911414
p-value:	0.000092

FIG 8. SPATIAL AUTOCORRELATION OF GWR



Economic Well-Being in Relation to GDP per Worker
Geographically Weighted Regression

Spatial Reference
PCS: WGS 1984 UTM Zone 15N
Datum: WGS 1984
Projection: Transverse Mercator

Analyses developed using 2016 data from StatsAmerica Innovation 2.0 (www.statsamerica.org/ii2/)

Aaron Pacheco
September 6, 2021
Minnesota State University, Mankato

FIG 9. GWR RESULTS LIMITED TO MINNESOTA

The health care and social services sectors are the leading employers in Minnesota and both sectors are expected to continue growing. Among traded clusters, medical device manufacturing and marketing are the two strongest clusters in the state. Construction is also trending upwards and exhibits high earning potentials for the foreseeable future. The Minnesota population is getting older and more diverse. Rural counties are experiencing high net outmigration, or, in some cases, only maintaining



population through an influx of non-white workers filling essential labor positions. Minnesota is experiencing increasing wealth inequalities, not only between individuals, but also geographically. As a state, Minnesota is doing well, but the great majority of counties are well below the national average when it comes to economic output and personal earnings. Human capital and knowledge creation, historically a Minnesota competitive advantage, appear to be at risk as innovation and technology diffusion now lag national and global trends (The innovation index, 2021). Access to capital for entrepreneurial ventures is also in decline, especially in rural areas.

The R^2 produced in the GWR visualization process helps assess how well GDP per worker describes economic well-being. Patterns emerge at national (Figure 10) and state levels (Figure 11), with darker areas representing the stronger correlation between GDP per worker and economic well-being, the lighter areas, showing a weaker correlation. These economic patterns would reasonably be expected to develop geographically, due to clustering of industrial activity, and geographic similarities within and between regions with shared history, culture, location, and political-economic conditions. It is reasonable to assume that relationships between economic growth and economic well-being form patterns throughout an economy and is not *accidental* or random. Because GDP variation is likely the result, not the cause, of the observed clustering, other measures should be explored to identify potential drivers of economic well-being.

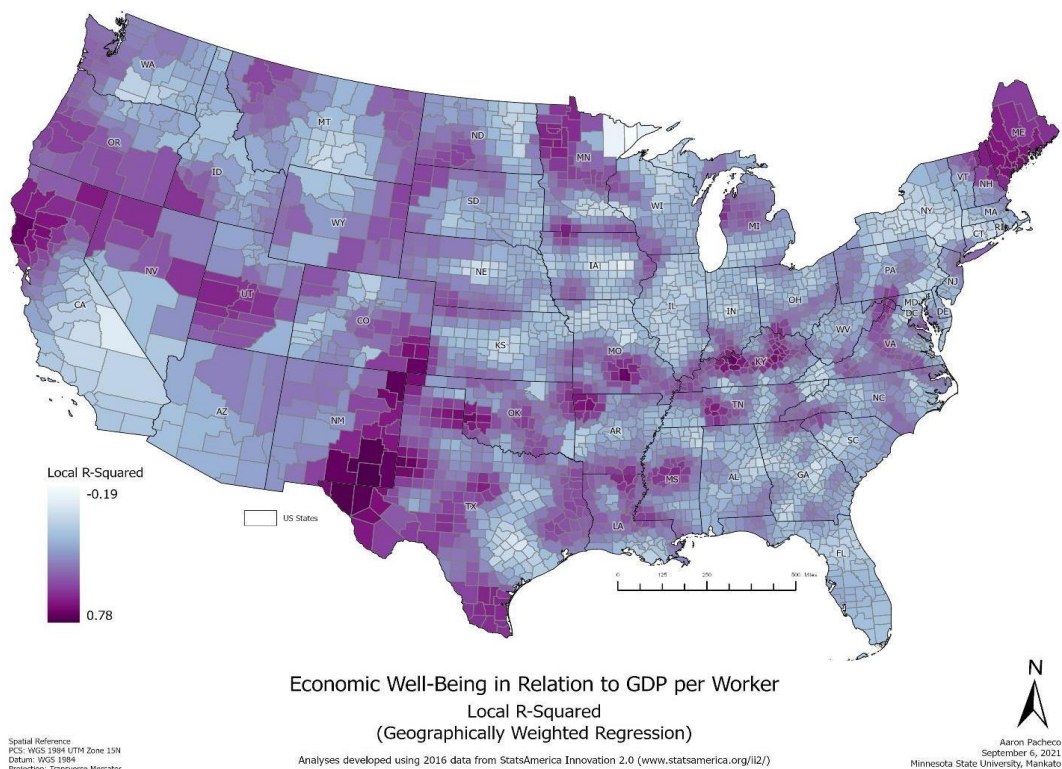
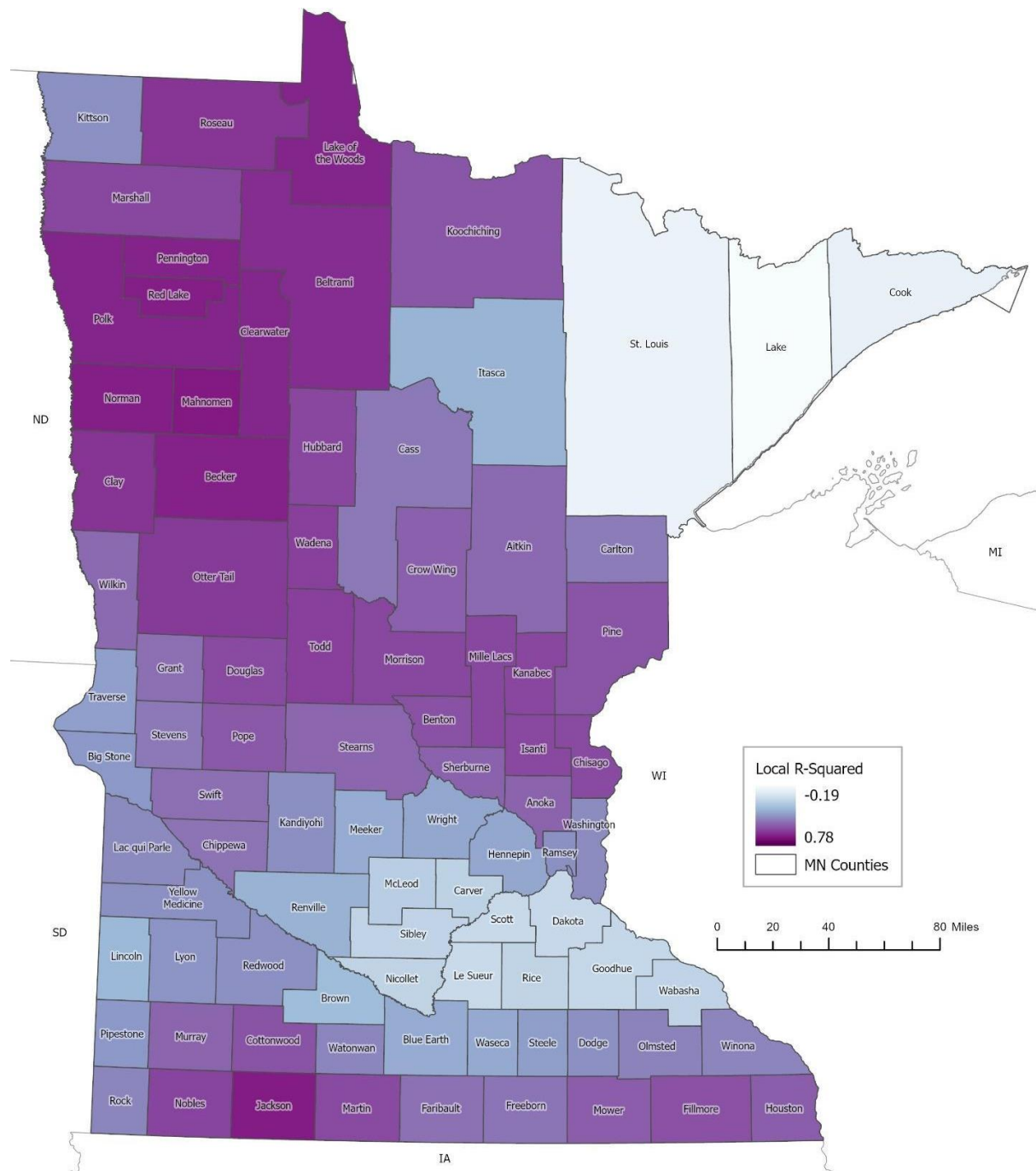


FIG 10. LOCAL R-SQUARED RESULTS LIMITED TO CONTIGUOUS UNITED STATES



Economic Well-Being in Relation to GDP per Worker
Local R-Squared
(Geographically Weighted Regression)

Spatial Reference
PCS: WGS 1984 UTM Zone 15N
Datum: WGS 1984
Projection: Transverse Mercator

Analyses developed using 2016 data from StatsAmerica Innovation 2.0 (www.statsamerica.org/ii2/)

Aaron Pacheco
September 6, 2021
Minnesota State University, Mankato

FIG 11. LOCAL R-SQUARED RESULTS LIMITED TO MINNESOTA

DISCUSSION

To support economic development, market analyses often consider the systematic changes in economic geography and sectoral composition over time. Economies often become more competitive by shifting activities both to higher value-add activities *within* existing industries and also to higher value-add industries (Christian, 2019).



However, increasing specialization in ways that are not complementary – i.e., that lack opportunities for mutually beneficial interactions – can undermine overall prosperity growth or economic well-being if aggregate economic growth, or GDP per worker, is the core outcome of interest.

Cluster Identification

Results from this study suggest that identifying clusters, defined as regional concentrations of economic activities in related industries connected through local linkages and spillovers, can be an important tool for guiding economic development efforts. Cluster identification reveals the interplay between location, value chains, and regional specialization patterns. Clusters can be identified in several dimensions:

First, the clusters are groups of related industries and the economies of scope that the relationships make possible. As the findings reveal, clusters are not simply a concentration of economic activity in a narrow industry, driven by economies of scale. They are crucially defined by the notion of related variety, where dynamism emerges from the combination of capabilities and activities that are complementary, not identical, or merely diverse, throughout regions (Lu et al., 2018).

Second, clusters are shaped by geographical proximity. On one hand, they reflect the specific nature and density of local connections, for example, in a deep local skill pool, in knowledge spillovers, and in deep collaborations among local partners. On the other hand, they take into account non-local relationships that stretch longer distances, such as global value chains and knowledge networks (Bathelt & Glückler, 2018). Cluster frameworks suggest that local and global connections play complementary but different roles. Local clusters can be the sources of unique competitive advantages, providing access to a specific set of local circumstances and partners. Global linkages add capabilities that are missing locally – no location provides everything - but can be copied by economic entities from other locations.

Third, clusters appear to be driven by the interplay of collaboration and competition among related activities within a given location. Clusters provide some benefits merely from the co-location of related activities – for example knowledge spillovers and deeper and more specialized input markets. However, the dynamic power of co-location is significantly enhanced if the co-located entities start to engage with each other directly (Yström & Aspenberg, 2017). This can happen through collaboration, for example in joint research or training efforts. However, it can also happen in the intense local competition among rival

firms, forcing them to adopt more differentiated strategies as well as enhancing productivity and innovation.

Fourth, the dynamics that can emerge in regional clusters are driven by the critical mass that geographically linked actors achieve in a set of related industries. If the related activities are few and the entities locally present are small, the number of actual linkages may be small as well. As the number of participants grows, the possible interactions increase geometrically. This drives a regionally dependent growth path, where clusters start showing significantly higher performance and growth once they move beyond a certain size (Götz & Jankowska, 2017). Clusters emerge naturally as the benefits of co-location affect the growth of firms differently across locations and enhance specific locations' attractiveness for firms that are moving. The process of cluster emergence is shaped both by the decisions firms make about their investments and ways of competing and by the decisions governments and other institutions make about relevant qualities of the cluster-specific business environment (Isaksen, 2016).

Fifth, clusters may experience economic growth without corresponding improvements in economic well-being. Indeed, the economic benefits intrinsic to clusters themselves, such as interdependence of geographically co-located complementary resources, offer new ways to increase economic growth even while overall economic well-being within the cluster is diminished when considering other measures. This may occur when high resource dependence, specialization within related sectors, and high degrees of traded (i.e., exported) clusters increase productivity even as the workforce is shrinking (e.g., due to out-migration), transfer payments increase (e.g., age-related benefits), and labor participation declines (Biermann & Harsch, 2017). Accordingly, regionally important clusters should be monitored not only for economic growth but also for economic well-being to detect threats to economic resilience that could lead to measured growth unaccompanied by the benefits of growth, or short-term growth followed by long-term decline.

Economic Well-Being and Growth

These results indicate that economic well-being is a key determinant of economic growth and not the other way around. In other words, ensuring economic stability, job opportunities, and prosperity is a critical component for areas and regions seeking growth, while growth in itself does not generate well-being. It is quite plausible that a regional economy produces enough wealth to sustain high levels of well-being, but if there are no mechanisms in place to facilitate local ownership of capital and revenues, earnings from growth may not be reinvested locally.

It is also possible that economic growth, contrary to neo-classical dogmas, leads to inefficiencies as regional workers perform more work than is required to produce their own consumption, i.e., a situation where the wage is below the average product of



labor. If so, one fails to fulfill the notions of *competitive markets* which would require a wage that is less than the value of the marginal product of labor. In labor intensive sectors of a regional economy, it is therefore quite plausible that there is a distribution problem, which is typically overlooked by neo-classical theories of economic development.

LIMITATIONS, FUTURE RESEARCH, AND PRACTICAL IMPLICATIONS

Regional economic well-being would be better measured by considering multiple states, and not only Minnesota. This would have allowed for an analysis of differences and similarities between states and within-state regions, while also examining between state specific differences. Economic well-being itself would be better measured by considering additional indicators such as quality of life, disposable income, etc. Although it might have been premature to develop additional measures before it was clear if these economic clustering relationships existed, or what within-state differences looked like, additional articulation of well-being measures and the comparison of clustering effects in multiple states is now warranted.

Additionally, the study was limited to single-year observations. Future studies should assess findings utilizing longitudinal data to assess the impact of long-term trends, economic disruptions, etc. Future research should also pay attention to how economic modeling assesses growth and how job creation is viewed as a tool to stimulate growth, particularly in rural segments of the economy. We know little about why a sole focus on economic growth is more detrimental in some regions than in others.

Future research is also needed to fully understand the benefits and risks of using economic growth to measure the success of economic development strategies designed to achieve resilient communities and improve quality of life for residents. Finally, future research should also examine the predictive differences among variables at different levels of analyses. Traditional economic development models have assumed that the same variables will impact models in consistent manners in very different geographic markets. If economic development efforts were to be translated to sources of competitive advantage, as suggested by the literature, taking multilevel implications into consideration should greatly benefit our understanding of these advantages.

ACKNOWLEDGMENT

This article was supported financially by the Region 9 Development Commission of Minnesota. We are particularly grateful for the assistance and advising provided by Dr. Tom Clement and Dr. Rama Mohapatra and would like to express our great appreciation for Antonia Bacigalupa for her ongoing support of our work and for being our most dedicated reader. This paper is dedicated to family, whose support has been invaluable in getting us to this point.

REFERENCES

- Ali, K., Partridge, M. D., & Olfert, M. R. (2007). Can geographically weighted regressions improve regional analysis and policy making? *International Regional Science Review*, 30(3), 300-329.
- Aliakbari, E., Shaterian, M., & Sheikhzadeh, F. (2019). Evaluation of Social Capacity in Accepting Smart Urban Growth Principles (Case Study: Kashan). *Geographical Urban Planning Research (GUPR)*, 7(2), 239-264.
- Artmann, M., Kohler, M., Meinel, G., Gan, J., & Ioja, I. C. (2019). How smart growth and green infrastructure can mutually support each other – A conceptual framework for compact and green cities. *Ecological Indicators*, 96, 10-22.
- Bathelt, H., & Glückler, J. (2018). Relational research design in economic geography. *The new Oxford handbook of economic geography*, 179-195.
- Bergvall-Kåreborn, B., Eriksson, C. I., Ståhlbröst, A., & Svensson, J. (2009). A milieu for innovation: defining living labs. In *ISPIM Innovation Symposium: 06/12/2009-09/12/2009*.
- Bibri, S. E. (2018). Backcasting in futures studies: a synthesized scholarly and planning approach to strategic smart sustainable city development. *European Journal of Futures Research*, 6(1), 1-27.
- Biermann, R., & Harsch, M. (2017). Resource dependence theory. In *Palgrave handbook of inter-organizational relations in world politics* (pp. 135-155). Palgrave Macmillan, London.
- Botev, J., Égert, B., & Jawadi, F. (2019). The nonlinear relationship between economic growth and financial development: Evidence from developing, emerging and advanced economies. *International Economics*, 160, 3-13.
- Chen, X., Xuan, C., & Qiu, R. (2021). Understanding spatial spillover effects of airports on economic development: New evidence from China's hub airports. *Transportation Research Part A: Policy and Practice*, 143, 48-60.
- Christian, K. (2019). A Competitiveness-Based View. *The Oxford Handbook of Structural Transformation*, 151.
- Chrysopoulou, A. (2020). The Vision of a Well-Being Economy. *Stanford Social Innovation Review*. https://ssir.org/articles/entry/the_vision_of_a_well_being_economy. Accessed the 3rd of September 2021.
- Das, T. K. & Bing-Sheng, T. (1999). Cognitive biases and strategic decision processes: An integrative perspective. *Journal of Management Studies*, 36(6).
- Drozdov, G. D., Malafeyev, O. A., & Nemnyugin, S. A. (2015). Multicomponent dynamics of competitive single-sector economy development. In *2015 International Conference "Stability and Control Processes" in Memory of VI Zubov (SCP)* (pp. 457-459). IEEE.



- Dynan, K., & Sheiner, L. (2018). GDP as a measure of economic well-being. *Work. pap*, 43.
- Eckardt, R., Yammarino, F. J., Dionne, S. D., & Spain, S. M. (2021). Multilevel methods and statistics: The next frontier. *Organizational Research Methods*, 24(2), 187-218.
- Edwards, M. M., & Haines, A. (2007). Evaluating smart growth: Implications for small communities. *Journal of planning education and research*, 27(1), 49-64.
- Ewers, H. J. (2019). 6.2 Regional Economic Development and Innovation-Oriented Measures: Summary and Perspectives. In *Innovation and Regional Development* (pp. 337-344). De Gruyter.
- Fagerberg, J., Srholec, M., & Verspage, B. (2010). *Innovation and Economic Development*. Handbook of the Economics of Innovation, 2, 833-872.
- Flammang, R. A. (1979). Economic Growth and Economic Development: Counterparts or Competitors? *Economic Development and Cultural Change*, 28(1).
- Ghezzi, A., Rangone, A., & Balocco, R. (2013). Technology diffusion theory revisited: a regulation, environment, strategy, technology model for technology activation analysis of mobile ICT. *Technology Analysis & Strategic Management*, 25(10), 1223-1249.
- Götz, M., & Jankowska, B. (2017). Clusters and Industry 4.0—do they fit together?. *European Planning Studies*, 25(9), 1633-1653.
- Harangozo, G., Csutora, M., & Kocsis, T. (2018). How big is big enough? Toward a sustainable future by examining alternatives to the conventional economic growth paradigm. *Sustainable Development*, 26(2), 172-181.
- Harfst, J., Pichler, P., & Fischer, W. (2017). Regional ambassadors-an innovative element for the development of rural areas?. *European Countryside*, 9(2), 359.
- Harvey, D. (2018). *The limits to capital*. Verso books.
- Harvey, D. (2007). *A brief history of neoliberalism*. Oxford University Press, USA.
- Innovation 2.0. StatsAmerica. (n.d.). <https://www.statsamerica.org/ii2>. Accessed on the 24th of June 24 2021.
- The innovation index. Region Nine. (2021, April 13). <https://www.rndc.org/the-innovation-index/>. Accessed on the 24th of September 2021.
- Isaksen, A. (2016). Cluster emergence: combining pre-existing conditions and triggering factors. *Entrepreneurship & Regional Development*, 28(9-10), 704-723.
- Jakobsen, O. (2017). *Transformative Ecological Economics: Process Philosophy, Ideology and Utopia*. Routledge.
- Jang, W., Yuan, F., & Lopez, J. J. (2021). Investigating sustainable commuting patterns by socio-economic factors. *Sustainability*, 13(4), 2180.

- Löfsten, H., & Lindelöf, P. (2003). Determinants for an entrepreneurial milieu: Science Parks and business policy in growing firms. *Technovation*, 23(1), 51-64.
- Lu, R., Reve, T., Huang, J., Jian, Z., & Chen, M. (2018). A literature review of cluster theory: are relations among clusters important?. *Journal of Economic Surveys*, 32(4), 1201-1220.
- Markham, S.E. & McKee, G.H. (1991). Declining organizational size and increasing unemployment rates: Predicting employee absenteeism from within- and between-plant perspectives. *Academy of Management Journal*, 34, 952-965.
- McGlashan, J., de la Haye, K., Wang, P., & Allender, S. (2019). Collaboration in complex systems: Multilevel network analysis for community-based obesity prevention interventions. *Scientific reports*, 9(1), 1-10.
- McNally, D. (2011). *Global slump: The economics and politics of crisis and resistance*. Pm Press.
- Nelson, R. R. (2008). Economic development from the perspective of evolutionary economic theory. *Oxford development studies*, 36(1), 9-21.
- Perley, R., Goetter, A., & Brown, N. (2017). Applying Smart Growth Principles in Boulder, Colorado, and Canberra, Australia. *UMAP Journal*, 38(2).
- Rather, S. E. (2020). *Wealth Creation. A New Framework for Rural Economic and Community Development*. Routledge; 1st edition. O. Jakobsen (2017). *Transformative Ecological Economics*. Routledge; 1st edition.
- Slaper, T., van der Does, T., Egan, P., Ortuzar, G., & Strange, R. (2016, August). Driving-Regional-Innovation. Bloomington; Indiana Business Research Center, Kelley School of Business, Indiana University.
- Stiglitz, J. (2017). Inequality, stagnation, and market power. *The Roosevelt Institute*.
- Wang, R., & Tan, J. (2021). Exploring the coupling and forecasting of financial development, technological innovation, and economic growth. *Technological Forecasting and Social Change*, 163, 120466.
- Wilkinson, R., & Pickett, K. (2020). *The inner level: How more equal societies reduce stress, restore sanity and improve everyone's well-being*. Penguin Books.
- Yang, F. (2019). The impact of financial development on economic growth in middle-income countries. *Journal of International Financial Markets, Institutions and Money*, 59, 74-89.
- Yström, A., & Aspenberg, H. (2017). Open for innovation? Practices supporting collaboration in Swedish regional clusters. *International journal of innovation management*, 21(05), 1740008.



DOES FINANCIAL INCLUSION ALLEVIATE POVERTY IN NIGERIA? A TIME SERIES ANALYSIS

Akeeb Olushola Oladele, Alwell Nteegah, Okechuku Onuchuku, Monday Olulu Robinson

Abstract

The quest to reduce poverty by the government and its agencies through the provision of financial services for the poor and rural dwellers in Nigeria makes it imperative to investigate how the access, availability and cost of financial services provided by Deposit money banks (DMBs) have reduced poverty in Nigeria. In order to achieve this purpose of the study, data on poverty rate as dependent variable, deposit penetration, credit penetration, bank branch penetration, ratio of domestic investment to GDP and interest rate as independent variables were sourced from secondary source and analysed using the Autoregressive and Distributed lag (ARDL) methodology. The result shows that: deposit penetration and bank branch penetration had negative and significant impact on poverty level both in the short and long run hence retarded poverty while credit penetration has mix effect on poverty in the short run but positive and significant impact on poverty in the long run. Ratio of domestic investment to GDP also exerted negative impact on poverty in the long run while interest rate has insignificant and negative impact on poverty in the short run but positive and insignificant effect on poverty in the long run. The result also shows that the variables in the poverty equation adjust speedily to short run dynamics in poverty level. Given these results, the study concludes that, financial inclusion (access, availability and cost of financial services) significant implications on poverty level both in short and long run in Nigeria over the period of this study. Based on this conclusion, the study recommends: increase in deposit mobilisation through savings, domestic investment and banks' branches to create jobs and reduce poverty in Nigeria.

Key words: Poverty rate, Deposit penetration, Credit penetration, Branch penetration, Domestic investment, Interest rate.

INTRODUCTION

Poverty refers to inability of people or person to meet their fundamental and necessity needs like food, clothes and shelter. According to UNDP poverty means "denial of choices and opportunities, a violation of human dignity" and it means the poor inability to be involved in society effectively apart from not having "food, clothes and shelter". The multi-dimensional nature of poverty factor was presented by UNDP which assessed 105 nations that cover nearly three quarter of global population in 2020. The work moved beyond revenue and identified how people are ignored within

three main dimensions like health-care, education and living-standard. The work revealed that multi-dimension poverty nature is noticed in every less developed nation globally but it is mostly severe serious in sub-Sahara Africa and south Asian nations where 83% of multi dimension poor people live. The nations with most persons living in multi-dimension poverty are “India, Nigeria, Ethiopia, Pakistan and Bangladesh”. In sub-Sahara Africa, over 550 million persons are living in multi-dimension poverty while in Nigeria over 40% of people are living in severe poverty. The 2020 UNDP records confirmed Nigeria as poverty headquarters globally with over 40% of people living in extreme poverty and it is supposed that nearly 150 million persons would drop into severe poverty by end of 2021.

Due to crucial role financial services and inclusion play in gathering and allocating funds between lacking and excess monetary units, Policy-makers, regulators and banking sector have not reneged in instituting programs that would improve realisation of financial inclusion agenda and poverty alleviation in Nigeria. The key player behind this strategy is that nations that are seeking or pursuing rigorous monetary inclusion intend to accomplish high macro-economic performance especially poverty alleviation than ones with lower financial inclusion rate (Uruakpa et al., 2019).

Consequent upon these actions, Nigeria government, CBN and DMB have over these years, initiated and implemented countless of programs geared toward improving monetary inclusion in the nation thus stimulate investment, economic growth and reduce poverty of the nation. Some of programs initiated by government and monetary sectors in Nigeria over these years include: local banking aimed at facilitating bank habits among large agro-based rural people; community formation and micro-finance banks, “e-banking products, electronic payment system and cashless policy – ATMs, POS and mobile banking; Non-interest banking involving Islamic banking; the National Economic Reconstruction Fund (NERFUND) and Family Economic Advancement Programme (FEAP)” among others (NFS, 2018).

In spite of existence of these schemes, CBN report of 2016 shows that only 58% of Nigeria which represent 96.4million adults are restricted from access to monetary services. In 2018, CBN initiated strategy targeted at reducing number of adult in Nigeria that are monetarily not included to 20% in 2020 from base figure of over 45% in 2010. The extent to which these strategies and policies have affected local investment and poverty are key concerns of this paper. We shall continue our investigation by reviewing works carried out by past scholars on the topic, followed by outlining the methodology employed to address the questions raised, results, findings and concluding remarks.



LITERATURE REVIEW

Some scholars championed by Romer in 1990 examined connections between financial advancement and long-term growth and poverty reduction. The concern of these scholars was if financial conditions could show maintainable increment in per-capita GDP and their main contention was that “finance generates an external effect on aggregate investment efficiency, which offsets the decrease in the marginal product of capital. Some studies consider the role of stock markets exclusively”. In several studies this model structure is AK typed (Romer, 1986) which means that “there are constant returns to a sufficiently broad concept of capital”. Bencavenga and Smith (1991) presented model in which savings were directed to productive operations through ensuring that investors adjust or control their assets composition to physical growth improving investments. People are confronted with uncertainty concerning their future money needs and thus they keep two forms of assets, namely liquid assets these are unproductive but safe, or non-liquid assets these are highly productivity and unsafe. The presence of financial intermediaries moves assets composition to riskier one and thereby increases growth and reduce poverty. Monetary firms allow people to reduce danger connected to their liquidity needs. Not minding the uncertainty people face concerning future money needs, banks are confronted with predictable need for money from depositors due to law of massive numbers. Thus, banks are helped to allocate invested funds efficiently. Also, social unnecessary funds are reduced because people are never compelled to liquidate their assets in presence of financial intermediaries. In same manner Bencevenga et al., (1995) revealed that monetary firms reduce liquidity danger which savers confront by making monetary assets buyable or by help depositors withdraw money before maturity which minimizes disincentive to invest in long-term assets. The lower transaction expenses in monetary markets are critical to analysis. King and Levine (1993) presented Schumpeterian model for technology-based progress likened to Romer (1990) and Grossman and Helpman (1991) and stated that “Financial intermediaries provided by banks and security markets help investors to take up innovative activities which affects economic growth through productive investment”. Monetary systems impact of business activities in different manner: They assess businesses, pool resources; diversify value and risk, supposed gain from inventive operations. Better financial systems increase probability for successful invention.

Distortions such as rate of deposit ceilings or massive reserve needs reduce invention rate. Another set of work is focused on issues such as state interventions in money market or market-failure. These scholars put these “old” concerns into “new framework of endogenous growth”. Roubin and Sala-Martin (1992) for example re-investigated financial repression context for AK model especially for endogenous

increment with fixed capital return. In this model state might design policies for financial repression to create simple inflationary income. Financial repression triggered people to move massive nominal money and that is base for inflation. Due to massive income levy based on levy evasion, states opt to repress monetary sector and increase inflation. Growth will be hindered due to negative impact of financial repression on capital effectiveness and savings.

Mattesini (1996) presented different technique for financial advancement. He designed simple overlapped model in which money market is known for asymmetric or non-unified information. Similar to Roubini Martin production based on Romer (1986) fixed scale technology return and one factor of growth is cost monitoring level for monetary firms, one parameter represents efficiency of intermediation system which is approximated through spread between lend and borrow funding rates to conduct analysis. High cost for monitoring is assumes to minimize monetary growth rate which means that growth and spreading are supposed to be connected negatively. The critical plank in this these argument is that increase in access to financial services through intermediation by the banking sector help to stimulate investment, create jobs and reduce poverty among the people. However, the low access to financial services in most developing economies especially, Nigeria has worsened poverty among the populace resulting to about 50% of its populace living below the poverty as at the year 2020.

Supporting the crucial role of financial inclusion in development process, Demirguc-Kunt et al., (2017) in their work provided proof on how ease to cheap financial services motivate people to make daily monetary transactions efficiently and safely and increase their investment and monetary risk handling options by using formal financial system. They argued that “development is very common for people living in the poorest 40% of households”. They also maintained that not all financial products are operative in accomplishing economic development goals like poverty and inequality annihilation.

Uddin et al., (2012) used ARDL approach to examine connections between bank financial services and poverty eradication in Bangladesh from year 1976 to 2010 and their findings show that long run improve bank sector activities was linked with poverty alleviation. However, two-way cause-based (bi-directional) connection exist between improve bank sector activities and poverty reduction was found in short run. Based on their findings, they suggested that government and monetary sector operators must improve financial sector in order to eradicate poverty and improve performance of Bangladesh economy. These findings were also reinforced by another study in 2014 by same authors using same method of ARDL for Bangladesh. This time, they used growth variables in addition to data sourced between 1970 and 2011. Their findings this time indicated that policy and politics in Bangladesh have powers to



reduce or eradicate poverty by availing funds to SMEs thereby, stimulating jobs and eradicating poverty.

Boukhatem (2016) studied how financial inclusion reduced poverty using panel analysis for data obtained 67 low and mid revenue nations over time period 1988-2012. This author did not use growth variable like other works and findings revealed improvement in access to monetary services impact positively on poverty reduction. This result ignites call on policy-makers to consider program for increasing fund supply or bank-credit which contribute to enhancing people welfare and increase monetary transactions that triggers increased opportunities for fund gathering, revenue allotment and triggers family demand.

Park and Mercado (2018) examined “the effect of financial inclusion on poverty and income inequality across different countries’ income groups for 151 countries”. They employed PCA and cross-section technique. The outcomes from their work show that increased monetary-inclusion appreciably co-varies with high economic development and low poverty rates for high and mid-high-income nations. The outcome also reveals that financial inclusion does not co-vary with high monetary growth and low poverty rate for mid-low and low-revenue. The work also reports that financial inclusion insignificantly impacts on revenue inequality in all income group.

In related work on “the effect of the proportion of adult population with access to formal financial services and poverty and inequality for 162 countries” Honohan (2011) built composite monetary access detector using cross-section series that combined family survey data-sets and secondary data. The study uncovered that access to financial service significantly and negatively connected to poverty alone without inclusion of control factor like Per Capita income, private credit to GDP ratio, price-level, institution effectiveness, population and sub-Sahara Africa dummy. Also this study availed prove that access to monetary services significantly reduced revenue inequality as one variable and when private-credit to GDP ratio and price-level were involved. However, accessing monetary service was not found to reduce poverty and inequality when Per Capita Income and sub-Sahara Africa imitation were included.

Jabir et al., (2017) examined “the impact of access to financial services on poverty alleviation among the low-income household level for 35 countries in sub-Saharan Africa”. With cross section data for 2011 to 2006 and outcome of their investigated revealed that accessing monetary services seriously negatively affect poverty hence reduce sub-Sahara Africa. To the authors, this was achieved by availing large welfare gains to poor in these nations.

García-Herrer and Turégano (2015) worked on “the effect of spread of the financial sector and access to financial services on income inequality reduction using regression analysis”, the authors uncovered that access to monetary services significantly and negatively connected to revenue inequality. This implies that accessing monetary services reduced revenue inequality. This outcome was realised when regression was tested for critical economic development and financial program variables. The study also reported that size and spread for financial sector and services did not promote income equality like accessing financial services.

In related study on how requirements and conditions for monetary services affect poverty and inequality in Latin-America and Caribbean nations, Dable-Norris et al., (2015) uncovered that minimising monetary involvement and controlling expenses and liberalising collateral demand and promote investment, economic development and reduce inequality in Latin-America and Caribbean nations via trade-offs were possible.

Omar and Inabar (2020) examined “the effect of monetary-inclusion on poverty and inequality in less developed countries” by using unbalanced yearly panel data from 116 LDCs spanned from 2004 to 2016. The authors measure financial-inclusion with broad set of monetary sector outreach factors like Per capita income, internet users’ ratio, age-dependency ratio, price-increase and revenue inequality. Their reason for this choice of variables is that they have serious implications on financial inclusion level in developing nations. The outcome of their study revealed that financial inclusion seriously negates poverty rates and income inequality in less developed countries. Hence concluded that financial inclusion reduced poverty and inequality for developing nations and suggests reaching-out to unbanked people especially in local areas as viable means for eradicating poverty and inequality.

Churchill et.al (2020), also examine the effect of financial inclusion – measured in terms of “access to banks, access to credit, and access to insurance” on poverty among family members using data from the 2016 Financial Inclusion Insights (FII) scheme for Nigeria. They found that financial inclusion reduces poverty. Empirical analyses from the study shows that a standard deviation rise in financial inclusion is associated with a 0.277-0.672 standard deviation drop in poverty, depending on how poverty is measured. Based on the finding, the study concluded that closeness to bank, access to savings and fixed deposit account are very important in alleviating poverty than credit and insurance services.

In a similar study in Nigeria, Eze and Alugbuo (2021) studied how access to financial services provided by the banks and insurance companies alleviate poverty using a logit model using the World Bank Global Findex survey data collected in Nigeria in 2017. In order to achieve the objectives of the study, the “poor” was used as the regressand while the regressors were; “age of respondents, educational level of respondents, gender, employment status, wage payment, government transfers,



pension, savings, self-employment income and wage earnings of respondents". The study found that access to financial services by family members reduced poverty in Nigeria. The study also found that self-development and entrepreneurial skills were important in reducing poverty in Nigeria. Based on the results, the study recommended siting of bank branches in rural areas, development of financial products that will address the needs of the diverse religious groups in the country and enlightenment of the public especially the unbanked group as possible ways of making financial services unfriendly with poverty in Nigeria.

Ogbeide and Igbinigie(2019) also studied how financial services provided by financial institutions alleviated poverty in Nigeria over the period 2002-2015 using time series data and the ordinary least squares multivariate regression technique. Their findings show that financial services provided by the monetary institutions had serious effect on personal income level (per capita income) hence alleviates poverty and raises the living standard of the people. The result further revealed that banks branch penetration has positive implication on personal income level hence also reduces poverty and raised living standard. Savers with Deposit money banks (DMBs) per 1000 adults had a negative impact on poverty reduction from the result of the study while borrowers from DMBs per 1,000 adults were found to raise personal income level hence reduced poverty but the variable was not significant statistically. The study also discovered that availability of ATM machines facilitated access to financial services, raises income level and reduces poverty insignificantly. Based on these results and findings, the study recommended strengthening of policies that encourages access to financial services in order to reduce poverty in Nigeria.

The review of relevant literature indicates that much had been done on the contribution of financial inclusion on poverty in the world and Nigeria in particular. However, most of the studies consulted in Nigeria do not really consider and capture issues of financial penetration, access and cost which are germane in financial inclusion. This paper seeks to fill this gaps by employing the autoregressive and distributed lag (ARDL) approach.

METHODOLOGY

The Endogenous growth model led by Romer (1986) also recognised the critical role of financial services in the growth process and poverty alleviation via human capital development. Grossman and Helpman (1991) specially argued that financial services provided by deposit money banks and security markets help investors to take up innovative activities which affects economic growth through productive investment. The NeoStructuralists however argued that financial sector plays a vital role in

determining whether financial services provided by the sector could spur economic growth or not.

Empirically, Boukhatem (2016) studied how financial inclusion helped in reducing poverty using panel analysis for 67 low and middle income countries. Makina and Walle (2019) used dynamic Panel and panel VAR to examine financial inclusion and economic growth in African countries. Kinn et al., (2018) used dynamic panel and panel VAR to examine how financial services provided by banks affect economic growth in Organisation of Islamic Countries (OICs). On the country specific study, Uddin et al., (2012) used the Autoregressive and Distributed Lag (ARDL) approach to investigate how financial inclusion alleviate poverty in Bangladesh between 1976-2010 and 1970-2011. Ogbeide and Igbinigie (2019) also studied how financial services provided by financial institutions alleviated poverty in Nigeria over the period 2002 and 2015 using time series data and the ordinary least squares multivariate regression technique. While appreciating the various works done by other scholars, this shall follow the paths adopted by Uddin et al., (2012) and Ogbeide and Igbinigie (2019) in its investigation and analysis. However, the choice of the independent variables is a major points of departure from other studies.

Based on these theoretical and analytical underpinnings, the seeks to achieve its objectives by specifying the following functional relationship between financial inclusion, domestic investment and poverty level as follow:

$$POVR_t = f(NAPA_t, DCE_t, DDE_t, GCF_t, INTR_t) \quad (1)$$

For ease of estimation, the above functional relationships between poverty rate and financial inclusion could be expressed in mathematical form thus;

$$POVR_t = \beta_0 + \beta_1 NAPA_t + \beta_2 DCE_t + \beta_3 DDE_t + \beta_4 GCF_t + \beta_5 INTR_t + e_t \quad (2)$$

Where:

β_0 = intercept or autonomous component of poverty rate; β_1 - β_5 = parameter estimates
POVR_t = Poverty rate; NAPA_t = Number of bank account per 1000 adults/bank branch penetration; DCE_t = ratio of Domestic credit to GDP/ credit penetration; DDE_t = ratio of Domestic deposit to GDP/deposit penetration; GCF_t = ratio of Gross capital formation to GDP/investment penetration and INTR_t= interest rate.

The nature of information to be investigated in this study is predominantly quantitative; hence mostly secondary data were used in our analysis. These are information already published in text books, economics journals, Central Bank statistical bulletin etc. In nutshell, the study sourced it data from: Central Bank of Nigeria statistical bulletin, National Bureau of Statistics, and The World Bank data base.



For us to ascertain the long run capacity and short run dynamic interactions among the time series variables under study – Unemployment rate, poverty rate and inflation rate and deposit penetration, credit penetration, bank branch penetration, ratio of domestic investment to GDP and interest rate on loanable funds, we adopted also the Autoregressive distributed lag (ARDL) bound test approach to co-integration as formulated by Pesaran and Shin (1999) and Perasan et al., (2001) due to its superiority over the Engle and Granger (1987) and Johansen's (1995) models. The ARDL cointegration technique as a general 12 vector autoregressive (VAR) model of order p , in Z_t ,

Where: Z_{it} = column vector composed of the six variables: Y_{it} = selected macroeconomic variables (unemployment rate, poverty rate and inflation rate).

$Z_{it} = (POVR_t DDE_t DCE_t NBPA_t GCF_t INTR_t)'$ was also used. The null hypothesis of no cointegration is tested against the alternative hypothesis of cointegration. ARDL is therefore represented as follows:

$$D(POVR_t) = \beta_{01} + \lambda_{1i}(POVR_{t-1}) + \lambda_{2i}(DDE_{t-1}) + \lambda_{3i}(DCE_{t-1}) + \lambda_{4i}(NBPA_{t-1}) + \lambda_{5i}(GCF_{t-1}) + \lambda_{6i}(INTR_{t-1}) \\ \sum_{t=1}^p \beta_{1i}D(Y_{t-1}) + \sum_{t=1}^q \beta_{2i}D(DDE_{t-1}) + \sum_{t=1}^q \beta_{3i}D(DCE_{t-1}) + \sum_{t=1}^q \beta_{4i}D(NBPA_{t-1}) + \sum_{t=1}^q \beta_{5i}D(GCF_{t-1}) + \\ \sum_{t=1}^q \beta_{6i}D(INTR_{t-1}) + \varepsilon_{1i} \quad (3)$$

$$D(DDE_{it}) = \beta_{02} + \lambda_{2i}(POVR_{t-1}) + \lambda_{3i}(DDE_{t-1}) + \lambda_{4i}(DCE_{t-1}) + \lambda_{5i}(NBPA_{t-1}) + \lambda_{6i}(GCF_{t-1}) + \lambda_{7i}(INTR_{t-1}) \\ \sum_{t=1}^p \beta_{2i}D(DDE_{t-1}) + \sum_{t=1}^q \beta_{3i}D(POVR_{t-1}) + \sum_{t=1}^q \beta_{4i}D(DCE_{t-1}) + \sum_{t=1}^q \beta_{5i}D(NBPA_{t-1}) + \sum_{t=1}^q \beta_{6i}D(GCF_{t-1}) \\ + \sum_{t=1}^q \beta_{7i}D(INTR_{t-1}) + \varepsilon_{2i} \quad (4)$$

$$D(DCE_t) = \beta_{03} + \lambda_{3i}(POVR_{t-1}) + \lambda_{4i}(DDE_{t-1}) + \lambda_{5i}(DCE_{t-1}) + \lambda_{6i}(NBPA_{t-1}) + \lambda_{7i}(GCF_{t-1}) + \lambda_{8i}(INTR_{t-1}) \\ \sum_{t=1}^p \beta_{3i}D(DCE_{t-1}) + \sum_{t=1}^q \beta_{4i}D(DDE_{t-1}) + \sum_{t=1}^q \beta_{5i}D(POVR_{t-1}) + \sum_{t=1}^q \beta_{6i}D(NBPA_{t-1}) + \sum_{t=1}^q \beta_{7i}D(GCF_{t-1}) \\ + \sum_{t=1}^q \beta_{8i}D(INTR_{t-1}) + \varepsilon_{3i} \quad (5)$$

$$D(NBPA_t) = \beta_{04} + \lambda_{4i}(POVR_{t-1}) + \lambda_{5i}(DDE_{t-1}) + \lambda_{6i}(DCE_{t-1}) + \lambda_{7i}(NBPA_{t-1}) + \lambda_{8i}(GCF_{t-1}) + \lambda_{9i}(INTR_{t-1}) \\ \sum_{t=1}^p \beta_{4i}D(NBPA_{t-1}) + \sum_{t=1}^q \beta_{5i}D(DDE_{t-1}) + \sum_{t=1}^q \beta_{6i}D(DCE_{t-1}) + \sum_{t=1}^q \beta_{7i}D(POVR_{t-1}) + \sum_{t=1}^q \beta_{8i}D(GCF_{t-1}) \\ + \sum_{t=1}^q \beta_{9i}D(INTR_{t-1}) + \varepsilon_{4i} \quad (6)$$

$$D(GCF_t) = \beta_{05} + \lambda_{5i}(POVR_{t-1}) + \lambda_{6i}(DDE_{t-1}) + \lambda_{7i}(DCE_{t-1}) + \lambda_{8i}(NBPA_{t-1}) + \lambda_{9i}(GCF_{t-1}) + \lambda_{10i}(INTR_{t-1}) \\ \sum_{t=1}^p \beta_{5i} D(GCF_{t-1}) + \sum_{t=1}^q \beta_{6i} D(DDE_{t-1}) + \sum_{t=1}^q \beta_{7i} D(DCE_{t-1}) + \sum_{t=1}^q \beta_{8i} D(NBPA_{t-1}) + \sum_{t=1}^q \beta_{9i} D(POVR_{t-1}) \\ + \sum_{t=1}^q \beta_{10i} D(INTR_{t-1}) + \varepsilon_{5i} \quad (7)$$

$$D(INTR_t) = \beta_{06} + \lambda_{6i}(POVR_{t-1}) + \lambda_{7i}(DDE_{t-1}) + \lambda_{8i}(DCE_{t-1}) + \lambda_{9i}(NBPA_{t-1}) + \lambda_{10i}(GCF_{t-1}) + \lambda_{11i}(Y_{t-1}) \\ \sum_{t=1}^p \beta_{6i} D(INTR_{t-1}) + \sum_{t=1}^q \beta_{7i} D(DDE_{t-1}) + \sum_{t=1}^q \beta_{8i} D(DCE_{t-1}) + \sum_{t=1}^q \beta_{9i} D(NBPA_{t-1}) + \sum_{t=1}^q \beta_{10i} D(GCF_{t-1}) \\ + \sum_{t=1}^q \beta_{11i} D(POVR_{t-1}) + \varepsilon_{5i} \quad (8)$$

The ARDL bounds test is based principally on the combined F-statistic which its asymptotic distribution is non-standard under the null hypothesis of no cointegration. The basic step in the ARDL bounds approach is to estimate the six equations (1, 2, 3, 4, 5 & 6) by ordinary least squares (OLS).

Consequent upon earlier works by Pesaran and Shin (1999) and Perasan et al., (2001), the short run dynamic parameters is arrived at by the estimation of an error correction model linked with the long-run estimates. The model where the null hypothesis of no cointegration is rejected is derived with an error-correction term. Hence the vector error correction model is therefore stated thus:

$$D(POVR_t) = \beta_0 + \sum_{i=1}^p \lambda_{1i} D(POVR_{t-1}) + \sum_{i=1}^q \lambda_{2i} D(DDE_{t-1}) + \sum_{i=1}^q \lambda_{3i} D(DCE_{t-1}) + \sum_{i=1}^q \lambda_{4i} D(NBPA_{t-1}) + \\ \sum_{i=1}^q \lambda_{5i} D(GCF_{t-1}) + \sum_{i=1}^q \lambda_i D(INTR_{t-1}) + \lambda ECT_{t-1} + \varepsilon_i \quad (9)$$

$$D(DDE_t) = \beta_0 + \sum_{i=1}^p \lambda_{1i} D(DDE_{t-1}) + \sum_{i=1}^q \lambda_{2i} D(POVR_{t-1}) + \sum_{i=1}^q \lambda_{3i} D(DCE_{t-1}) + \sum_{i=1}^q \lambda_{4i} D(NBPA_{t-1}) + \\ \sum_{i=1}^q \lambda_{5i} D(GCF_{t-1}) + \sum_{i=1}^q \lambda_i D(INTR_{t-1}) + \lambda ECT_{t-1} + \varepsilon_i \quad (10)$$

$$D(DCE_t) = \beta_0 + \sum_{i=1}^p \lambda_{1i} D(DCE_{t-1}) + \sum_{i=1}^q \lambda_{2i} D(POVR_{t-1}) + \sum_{i=1}^q \lambda_{3i} D(DDE_{t-1}) + \sum_{i=1}^q \lambda_{4i} D(NBPA_{t-1}) + \\ \sum_{i=1}^q \lambda_{5i} D(GCF_{t-1}) + \sum_{i=1}^q \lambda_i D(INTR_{t-1}) + \lambda ECT_{t-1} + \varepsilon_i \quad (11)$$

$$D(NBPA_t) = \beta_0 + \sum_{i=1}^p \lambda_{1i} D(NBPA_{t-1}) + \sum_{i=1}^q \lambda_{2i} D(POVR_{t-1}) + \sum_{i=1}^q \lambda_{3i} D(DDE_{t-1}) + \sum_{i=1}^q \lambda_{4i} D(DCE_{t-1}) + \\ \sum_{i=1}^q \lambda_{5i} D(GCF_{t-1}) + \sum_{i=1}^q \lambda_i D(INTR_{t-1}) + \lambda ECT_{t-1} + \varepsilon_i \quad (12)$$



$$D(GCF_t) = \beta_0 + \sum_{i=1}^p \lambda_{1i} D(GCF_{t-1}) + \sum_{i=1}^q \lambda_{2i} D(POVR_{t-1}) + \sum_{i=1}^q \lambda_{3i} D(DDE_{t-1}) + \sum_{i=1}^q \lambda_{4i} D(DCE_{t-1}) + \sum_{i=1}^q \lambda_{5i} D(NBPA_{t-1}) + \sum_{i=1}^q \lambda_{6i} D(INTR_{t-1}) + \lambda ECT_{t-1} + \varepsilon_t \quad (13)$$

$$D(INTR_t) = \beta_0 + \sum_{i=1}^p \lambda_{1i} D(INTR_{t-1}) + \sum_{i=1}^q \lambda_{2i} D(POVR_{t-1}) + \sum_{i=1}^q \lambda_{3i} D(DDE_{t-1}) + \sum_{i=1}^q \lambda_{4i} D(DCE_{t-1}) + \sum_{i=1}^q \lambda_{5i} D(NBPA_{t-1}) + \sum_{i=1}^q \lambda_{6i} D(GCF_{t-1}) + \lambda ECT_{t-1} + \varepsilon_t \quad (14)$$

Where: $\lambda_{1i}, \lambda_{2i}, \lambda_{3i}, \lambda_{4i}, \lambda_{5i},$ & λ_{6i} , are the short-run dynamic coefficients of the model's convergence to equilibrium and β is the speed of adjustment

RESULTS

TABLE 1. DESCRIPTIVE STATISTICS

Statistic	POVR (%)	INTR(%)	DDE/GDP	DCE/GDP	NBPA/100000	GCF/GDP
Mean	57.18205	22.10718	3331.829	9.210077	3.146410	36.36513
Median	58.11000	21.55000	385.1900	8.169000	1.890000	34.11000
Maximum	88.00000	36.09000	17040.72	19.62600	6.560000	89.38000
Minimum	32.00000	10.00000	6.560000	4.958000	1.230000	14.90000
Std. Dev.	14.58604	6.183622	5030.569	3.556115	1.875377	19.06441
Skewness	0.181041	-0.064411	1.370275	1.194680	0.576982	1.057202
Kurtosis	1.908294	2.694020	3.515372	3.999963	1.741735	3.822555
Jarque-Bera	2.149753	0.179105	12.63636	10.90208	4.736654	8.364368
Probability	0.341340	0.914340	0.001803	0.004292	0.093637	0.015265
Sum	2230.100	862.1800	129941.3	359.1930	122.7100	1418.240
SumSq. Dev.	8084.600	1453.013	9.62E+08	480.5462	133.6475	13811.16
Observations	39	39	39	39	39	39

Source: (computed result EViews12).

The descriptive result reported in Table 1 indicates that there is a serious disparities and instabilities in both poverty and financial inclusion variables in Nigeria over the period under consideration. These are evidenced in the standard deviation, minimum and maximum values of poverty rate, interest rate on credit, ratio of domestic deposit to economic growth, ratio of domestic credit by deposit money banks to GDP, number of deposit money banks branches per 100,000 adults and gross capital formation percentage of GDP. The implication of this result is that the Nigerian economy had witnessed very high level of instability both in poverty level and access to financial services.

TABLE 2. UNIT ROOT TEST RESULT USING PHILIP PERRON (PP) METHOD

Variable	PP Statistic	1%	5%	10%	Decision
POVR	-5.924	-3.621	-2.943	-2.610	Stationary@ 1 st difference
INTR	-8.507	-3.621	-2.943	-2.610	Stationary@1 st difference
DDE	5.220	-3.616	-2.941	-2.609	Stationary@ level
DCE	-7.319	-3.621	-2.943	-2.610	Stationary@ 1 st difference
NBPA	-5.590	-3.621	-2.943	-2.610	Stationary@ 1 st difference
GCF	-3.568	-3.616	-2.941	-2.609	Stationary@ level

Source: (computed result EViews 12).

The unit roots test results reported in Table 2 indicate mix order of stationarity among the variables under investigation. For instance, deposit penetration, and ratio of domestic investment to GDP were stationary at level $\{i(0)\}$ while poverty rate, interest rate, credit penetration and bank branch penetration were stationary at first difference $\{i(1)\}$. This mix order of stationarity informed the choice of ARDL technique for our analysis. To check for long run relationship among the variable, the ARDL bound test was carried out. The result is presented in Table 3.

TABLE 3. BOUND TEST RESULT FOR POVERTY RATE MODEL

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	4.229415	10%	2.08	3
K	5	5%	2.39	3.38
		2.5%	2.7	3.73
		1%	3.06	4.15
Actual Sample Size	35		Finite Sample: n=35	
		10%	2.331	3.417
		5%	2.804	4.013
		1%	3.9	5.419

Source: (computed result EViews 12).

The autoregressive and distributed lag (ARDL) bound test for long run dynamics reported in Table 3 shows that long run equilibrium exists between the dependent (poverty rate) and independent variables (financial inclusion) given the F-statistic of 4.229415 and the critical values at 1%, 5% and 10% respectively. Given this result, we reject the null hypothesis that; no levels relationship exists among the variables in the poverty model. The confirmation of long run relationship is a pre-condition for estimating the long run coefficients and error correction model (ECM) for the poverty equation.

TABLE 4(a). ARDL LONG RUN RESULT FOR POVERTY MODEL - SELECTED MODEL: ARDL (1, 4, 3, 1, 0, 3)

Variable	Coefficient	t-Statistic	Prob.
C	19.21064	0.803718	0.4327
POVR(-1)*	-0.485958	-3.540876	0.0025
DDE(-1)	-0.001961	-2.969408	0.0086
DCE(-1)	5.147149	4.117055	0.0007
NBPA(-1)	-5.081147	-2.357818	0.0306
GCF**	-0.430253	-1.460923	0.1623
INTR(-1)	0.068800	0.251596	0.8044
D(DDE)	-0.005370	-2.820786	0.0118
D(DDE(-1))	0.003752	1.705589	0.1063
D(DDE(-2))	-4.31E-05	-0.018782	0.9852
D(DDE(-3))	-0.005709	-2.711797	0.0148
D(DCE)	3.170758	4.597742	0.0003
D(DCE(-1))	-2.224065	-3.039746	0.0074
D(DCE(-2))	-2.369790	-2.879776	0.0104
D(NBPA)	-9.833566	-5.412355	0.0000
D(INTR)	-0.165112	-0.716741	0.4833
D(INTR(-1))	-0.220295	-0.852710	0.4057
D(INTR(-2))	-0.442707	-1.872702	0.0784

Source: (computed result EViews 12).

TABLE 4(b). LONG RUN COEFFICIENT WITH RESTRICTED CONSTANT AND NO TREND FOR POVERTY RATE MODEL

Variable	Coefficient	t-Statistic	Prob.
DDE	-0.004036	-4.112563	0.0007
DCE	10.59175	3.624264	0.0021
NBPA	-10.45593	-3.069529	0.0069
GCF	-0.885370	-1.975081	0.0647
INTR	0.141576	0.245180	0.8093
C	39.53147	0.945023	0.3579

Source: (computed result EViews 12).

The long run result of the poverty rate model reported in Table 4a and Table 4b, show that ratio of domestic deposit to GDP (deposit penetration) is negatively and significantly related to poverty level. This implies that increase in the deposit penetration retarded poverty and vice versa. This result conforms to theoretical apriori expectation and economic theory. This result is also in agreement with earlier studies by Honohan, (2007 & 2008), Garcial-Herrer & Turegano (2015), Jabir et al., (2017), and Omar & Inaba (2020). These studies reported a negative relationship between access to financial services and poverty rate which implies that access to financial services reduce incidence of poverty.

Ratio of domestic credit to the private sector by DMBs to GDP (credit penetration) has positive relationship with poverty rate. However, it is also significant at 5% level. This implies that domestic credit by DMBs (credit penetration) significantly stimulated poverty in Nigeria thus deviated from the apriori theoretical expectation and economic theory. The result deviated from earlier studies by Honohan, (2007 & 2008), Garcial-Herrer & Turegano (2015), Jabir et al., (2017), and Omar & Inaba (2020).

Ratio of domestic investment to GDP is in consonance with theoretical expectation and theory with a negative coefficient. It is also significant at 5% level. This implies that increase in domestic investment significantly retarded poverty in Nigeria over the period of this study.

Deposit money banks' branches penetration bears a negative coefficient and is significant at 5% level. This indicates that increase in the spreads of banks' branches reduce poverty thus significantly improve the living condition of the people in Nigeria over the period under investigation. This result is in tandem with the theoretical expectation. This result agrees with study by Park and Mercado (2018) who found that financial inclusion defined in term of spread of size on financial services did not reduced poverty in less developed countries.

Interest rate conforms to theoretical expectation with a positive coefficient though it is not significant at 5% level. This implies that increase in cost of funds spurred poverty and vice versa. An increase in cost of credit will reduce access and affordability of basic necessity of living hence fuel poverty. In nutshell, all the indicators of financial inclusion except domestic credit comply with theoretical apriori expectation and are significant at 5% level. This implies that financial inclusion significantly reduced poverty in Nigeria over the period of this study.

TABLE 5. ARDL ERROR CORRECTION (ECM) RESULT FOR POVERTY RATE MODEL WITH
SELECTED MODEL: ARDL (1, 4, 3, 1, 0, 3)

Variable	Coefficient	t-Statistic	Prob.
D(DDE)	-0.005370	-5.412779	0.0000
D(DDE(-1))	0.003752	3.785572	0.0015
D(DDE(-2))	-4.31E-05	-0.036822	0.9711
D(DDE(-3))	-0.005709	-4.744903	0.0002
D(DCE)	3.170758	6.758271	0.0000
D(DCE(-1))	-2.224065	-4.114806	0.0007
D(DCE(-2))	-2.369790	-3.860632	0.0013
D(NBPA)	-9.833566	-7.335728	0.0000
D(INTR)	-0.165112	-0.977775	0.3419
D(INTR(-1))	-0.220295	-1.352902	0.1938
D(INTR(-2))	-0.442707	-2.808672	0.0121
CointEq(-1)*	-0.485958	-6.328906	0.0000
R ² = 0.84; R ² - adjusted = 0.76; Durbin -Watson Stat = 2.28; AIC = 5.76; SC = 6.30			

Source: (computed result EViews 12).



The ARDL error correction model (ECM) result reported in Table 5 indicates that ratio of domestic deposit to GDP (deposit penetration) has negative coefficient with poverty rate at level, lags 2 & 3 but has positive coefficient at lag 2. It is also significant at 5% at these lags. This implies that deposit penetration has significantly implication on poverty level in Nigeria over the period of the study. The conformity of domestic deposit penetration to theoretical expectation and its significance shows that domestic deposit penetration retarded poverty over the period of this study. Increase in domestic deposit increase money supply and level of liquidity hence reduce interest rate on loanable funds for investment which help to stimulate production, create job and reduce poverty. This result agrees with earlier studies carried out by Honohan, (2007 & 2008), Garcial-Herrer & Turegano (2015), Jabir et al., (2017), and Omar & Inaba (2020). These studies reported a negative relationship between access to financial service and poverty rate which implies that access to financial services reduce incidence of poverty.

Ratio of domestic private sector credit to GDP has positive relationship with poverty at level but has negative relationship with poverty at lags 1 & 2. It is also significant at these lags levels. This implies that domestic private credit to GDP has significant effect on poverty rate in Nigeria over the period. Increase in domestic private sector credit promotes investments hence help stimulate economic activities, create additional jobs and reduce poverty. This result deviated from the works of Honohan, (2007 & 2008), Garcial-Herrer & Turegano (2015), Jabir et al., (2017), & Omar and Inaba (2020), at level but complies with these earlier studies at lags 1 & 2. The studies reported a negative relationship between access to financial service and poverty rate which implies that access to financial services reduce incidence of poverty.

Number of DMBs branches per 100,000 adults (branch penetration) has negative and significant relationship with poverty rate. This result is in consonance with theoretical apriori expectation. This implies that number of DMBs branches per 100,000 adults has significant negative implication on poverty hence reduced poverty during the period of this study. The rise in deposit money bank branches after the banking sector in 2004 and the availability of DMBs branches/services in most rural communities may have accounted for this result. The formal banking institution and services in the rural communities have made access to financial services easy and cheaper. This encourages entrepreneurship, investment, job creation and help reduce poverty. It complies with earlier studies by Honohan, (2007 & 2008), Garcial-Herrer & Turegano (2015), Jabir et al., (2017), and Omar & Inaba (2020). These studies reported a negative relationship between access to financial service and poverty rate which implies that access to financial services reduce incidence of poverty. It however, deviated from the

study by Park and Mercado (2018) which found that spread and size of financial services do not reduce poverty in less developed countries.

Interest rate with negative relationship with poverty at level and all the lags levels. This is in tandem with theoretical expectation and economic theory. Though insignificant at 5% level, the result suggests that interest rate on loanable fund has less implication on poverty rate in Nigeria. Interest rate on loanable fund over the period of this stood at an average of 22.1%. This high and unhealthy for investment, production, job creation and poverty reduction in Nigeria.

The negative coefficient of the speed of adjustment of the error correction model indicates that the variables in the poverty equation adjust speedily to changes in short run dynamics/equilibrium.

The coefficient of determination indicates that 84% of the systematic variation in poverty rate is influenced by financial inclusion and domestic investment in Nigeria over the period under study.

TABLE 6. MODEL DIAGNOSTIC TEST FOR POVERTY RATE

Diagnostic test	F-statistic	Probability
Jarque-Bera test for normality	8.845	0.012
Breusch-Godfrey serial correlation LM test	1.000	0.390
Breusch -Pagan Godfrey Heteroskedasticity test	0.966	0.528
Ramsey RESET test for specification error	0.275	0.607

Source: (computed result EViews 12).

The results of the diagnostics test on the residual as reported in Table 6 reveal that the error term is not normally distributed around the mean as the null hypothesis is rejected (Engle, 1982; Jarque & Bera, 1980). The result however shows no evidence of autocorrelation given the serial correlation LM test value of 1.00 and a probability value of 0.39 hence the acceptance of null hypothesis (Ljung & Box, 1978). Furthermore, the test for heteroscedasticity revealed that it is absent in the model as we accept the null hypothesis of the presence of homoscedasticity. The Ramsey RESET test indicated that no variable is missing in the model as the null hypothesis is also accepted given the probability value of 0.607. The adherence of the model to the basic assumptions of ordinary least squares estimation affirms that the model is good for prediction and forecast hence the best linear estimator (the BLUE)



Stability Test Result for Poverty rate model

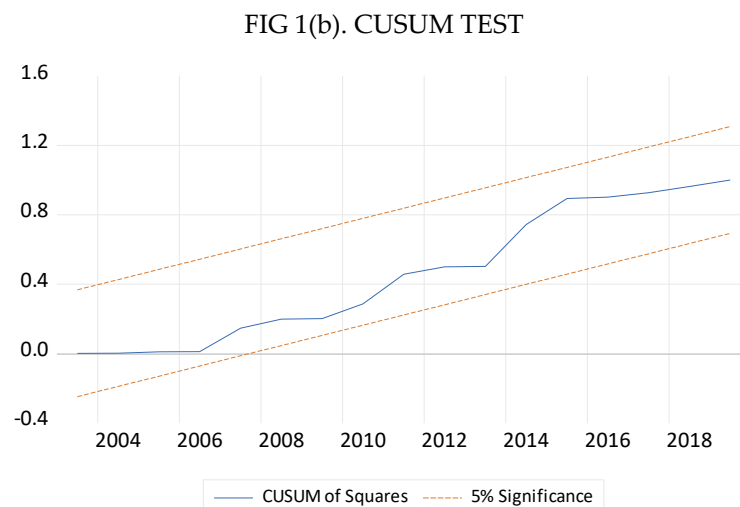
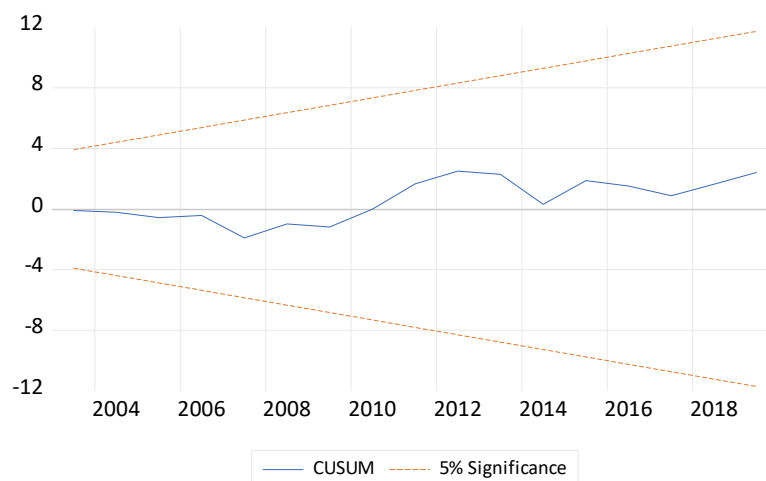
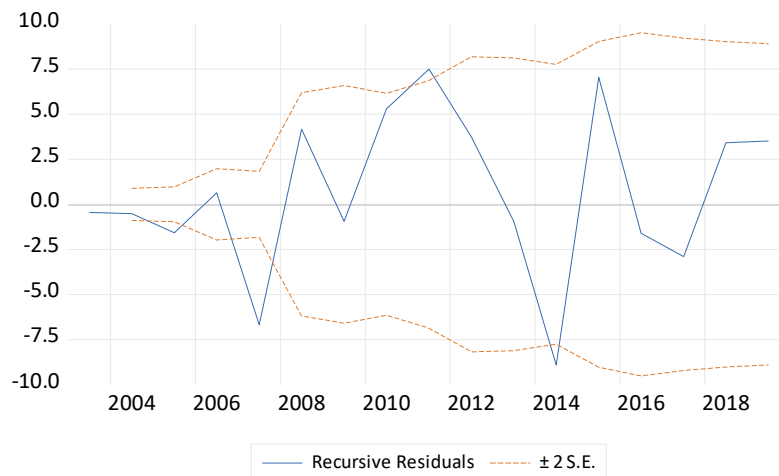


FIG 1(c). CUSUM OF SQUARES TEST

Source: (computed result EViews 12).

Given the instability that sometimes characterized secondary data, testing for the stability of the variables the important, in carrying the stability test, it is crucial to combine short time dynamics to test stability of long time parameters of poverty rate model. This study adopted Bahmani-Oskoei and Shin (2002) technique and apply CUSUM to residuals of ARDL error correction mechanism. For stability in short time dynamics and long-time parameters of poverty rate equation, it is a crucial condition that recursive residuals, CUSUM and CUSUM of squares are within 5% CV representing two straight-lines whose equation are align with Brown et al., (1975). As shown in Figure 1(a, b & c) neither recursive nor CUSUM, and CUSUM square graph crossed 5% CV lines, therefore, we could maintain that estimated features for short time dynamics and long-time of poverty rate equation were stable. That is, stable poverty rate equation exists over this study

CONCLUDING REMARKS

This study examined the impact of financial inclusion on poverty level in Nigeria using the ARDL method. Given the results and findings as outlined above, the study concludes that, financial inclusion (access, availability and cost of financial services) has negative and significant implications on poverty level both in short and long run in Nigeria over the period of this study. Based on this conclusion, the study recommends: increase in deposit mobilisation through savings, domestic investment and banks' branches to create jobs and reduce poverty in Nigeria.

REFERENCES

- Bahmani-Oskoei, M., & Shin, S. (2002). Stability of the Demand for Money in Korea. *International Economic Journal*, Taylor & Francis Journals, 16(2), 85-95.
- Bencivenga, V.R., & Smith, B.D. (1991). Financial Intermediation and Endogenous Growth. *Review of Economic Studies*; 58(2), 195-209.
- Bencivenga, V.R., Smith, B.D. & Starr, R.M. (1995). Transaction Costs, Technological Choice, and Endogenous Growth. *Journal of Economic Theory*, 67(1), 53-77.
- Boukhatem, J. (2016). Assessing the direct effect of financial development on poverty reduction in a panel of low- and middle-income countries. *Research in International Business and Finance*, 214-229.
- Brown, R.L., Durbin, J., & J. M. (1975). Techniques for Testing the Constancy of Regression Relationships over Time. *Journal of the Royal Statistical Society*, 37(2), 149-192.
- Churchill, S.A., & Smith, R. (2020). Financial inclusion and poverty: Micro level evidence from Nigeria.
- Dabla-Norris, E., Deng, Y., Ivanova, A., Karpowicz, I., Unsal, F., VanLeemput, E., & Wong, J. (2015). Financial inclusion: zooming in on Latin America. IMF Working Paper 15/206, Washington, DC.



- Demirgüç-Kunt, A., Klapper, L., & Singer, D. (2017). Financial Inclusion and Inclusive Growth: A Review of Recent Empirical Evidence. Policy Research Working Paper 8040. World Bank Group, Development Research Group.
- Engle, R.F. (1982) Autoregressive Conditional Heteroscedasticity with Estimates of the Variance of United Kingdom Inflation. *Econometrica*, 50, 987-1007.
- Engle, R., & Granger, C. (1987) Cointegration and Error Correction: Representation, Estimation and Testing. *Econometrica*, 55, 251-276.
- Eze, E., & Alugbuo, J.C. (2021). Financial inclusion and poverty reduction in Nigeria: A survey-based analysis. *GSC Advanced Research and Reviews*, 7(3), 75-84.
- García-Herrer, A., & Turégano, D.M. (2015). Financial inclusion, rather than size, is the key to tackling income inequality. BBVA Research Working Paper 15/05, Madrid, Spain.
- Grossman, G., & Helpman, E. (1991). Quality Ladders in the Theory of Economic Growth. *Review of Economic Studies*, 58(1), 43-61.
- Honohan, P. (2007). Cross-country variation in household access to financial services. World Bank Paper Conference on “Access to Finance”, Washington, DC.
- Honohan, P. (2008). Cross-country variation in household access to financial services. *Journal of Bank Finance*, 32(11), 2493-2500.
- Jabir, M.I., Mensah, L., & Gyeke-Dako, A. (2017). Financial inclusion and poverty reduction in sub-Saharan Africa. *African Financial Journal*, 1(9), 1-22.
- Jarque, C.M., & Bera, A.K. (1980). Efficient tests for normality, homoscedasticity and serial independence of regression residuals. *Economics Letters*, 6(3), 255-259.
- Johansen, S. (1995) *Likelihood-Based Inference in Cointegrated Vector Autoregressive Models*, Oxford University Press, Oxford.
- King, R.G., & Levine, R. (1993). Finance, Entrepreneurship, and Growth: Theory and Evidence. *Journal of Monetary Economics*, 32(3), 513-542.
- Kim, D-W., Jung-Suk, Y., & Hassan, M.K. (2018). Financial inclusion and economic growth in OIC countries. *Research in International Business and Finance*, 43(C), 1-14.
- Ljung, G.M., & Box, G.E.P. (1978). On a measure of lack of fit in time series models. *Biometrika*, 65(2), 297-303.
- Mattesini, F. (1996). Interest Rate Spreads and Endogenous Growth. *Economic Notes*, 25(1), 111-129.

Makina, D., & Walle, Y.M. (2019). Financial inclusion and economic growth: Evidence from a panel of selected African Countries Extending Financial Inclusion in Africa. In: Extending Financial Inclusion in Africa (pp.193-210).

National Financial Strategy in Nigeria. (2018). Revised.

Ogbeide, S.O., & Igbinigie, O.O. (2019). Financial inclusion and poverty alleviation in Nigeria. *Accounting and Taxation Review*, 3(1), 42-54.

Omar, M.A., & Inaba, K. (2020). Does financial inclusion reduce poverty and income inequality in developing countries? A panel data analysis. *Journal of Economic structure. Journal of the Pan-Pacific Association of Input-Output Studies*, 9(37) 1-25.

Park, C., & Mercado, R.V. (2018). Financial inclusion: new measurement and cross-country impact assessment. ADB Economics Working Paper Series 539/2018, Manila, Philippines.

Pesaran, M. & Shin, Y. (1999). An Autoregressive Distributed Lag Modeling Approach to Cointegration Analysis, In: S. Strom, (ed) *Econometrics and Economic Theory in the 20th Century: The Ragnar Frisch centennial Symposium*, Cambridge University Press, Cambridge.

Pesaran, M.H., Shin, Y., & Smith, R.J. (2001). Bounds testing approaches to the analysis of level relationship. *Journal of Applied Economics*, 16, 289-326.

Phillips, P.C.B., & Perron, P. (1988). Testing for a Unit root in Time Series Regression. *Biometrika*, 75, 335-346.

Romer, P.M. (1990). Endogenous Technological Change. *Journal of Political Economy*, 98(5), Part 2.

Romer, P.M. (1986). Increasing Returns and Long-Run Growth. *Journal of Political Economy*, 94, 1002-1037.

Roubini, N., & Sala-i-Martin, V. (1992). Financial Repression and Economic Growth. *Journal of Development Economics*, 39(1), 5-30.

United Nations Development Programme. (2020). The 2020 Human Development Report (HDR).

Uruakpa, N.I., Kalu, U.E., & Ufomadu, O.A. (2019). Impact of Financial inclusion on Economic growth of Nigeria. *Double Blind Peer Reviewed International Research Journal*, 12(2), 46-58.

Uddin, G.S., Kyophilavong, P., Sydee, N. (2012). The Casual Nexus of Banking Sector Development and Poverty Reduction in Bangladesh. *International Journal of Economics and Financial Issues*, 2(3), 304-311.



THE EFFECT OF LIQUIDITY RISK MANAGEMENT ON FINANCIAL PERFORMANCE OF COMMERCIAL BANKS IN PAKISTAN

Wajid Alim¹, Amjad Ali^{1,2}, Mahwish Rauf Metla¹

¹Lahore School of Accounting & Finance, University of Lahore, Lahore, Pakistan

²European School of Administration & Management, ESAM, France

Abstract

The study tests the effect of liquidity risk management on financial performance of commercial banks in Pakistan. Pakistani financial market is heavily dependent on its banking sector to achieve its financial goals and stability. Therefore, banking sector's performance has a significant effect on the overall economy of the country. To achieve its need for stability, the central bank of Pakistan ensures that banks maintain an optimum liquidity position to reap most benefits and increased returns. In this study, effect of liquidity risk management on financial performance is studied using panel data for Ordinary Least Square analysis. Financial data of all commercial banks operating in Pakistan during the period of study was taken from year 2006 to 2019 using data archives of State Bank of Pakistan website. It is concluded that higher liquidity increases banks' performance in commercial banks of Pakistan. The results are in line with a number of studies and available literature. This study can become a good reference for future policy decisions regarding minimum liquidity requirements of banks in this region. This study can be further enhanced using a longer period of study and include more variables specific to banking sector in Pakistan, like bank size, age of bank etc. Further studies may include other non-commercial banks to further strengthen the study and increase its reliability.

Keywords: Liquidity Risk, Performance, Banking Sector, ROA, ROE, Pakistan.

INTRODUCTION

The main goal for any profit-making business, including the banking sector, is to maximize its returns through its business operations. Banks operate and strategize in order to achieve this goal of profit maximization and increased returns. They find lucrative investment opportunities that can enhance their income and thus increase their performance. Simultaneously, they also work on risk minimization strategies in order to reduce the chances of failure in any of their endeavors that may impede their performance. Therefore, although, banks look for favorable investments to increase their profit ratios, they also take equal measures to ensure risk minimization in all its operations.

Risk management has always been a priority item in a bank's itinerary. Banking companies undertake various kinds of financial risks in order to provide financial solutions to their clientele. Hence, they play a pivotal role as agents to provide knowledge of any market, funding capacity and efficiency in their financial operations. Due to this important role, banks usually occupy a prime position in such transactions (Santomero, 1997). Thus, despite some crises from time to time, banking industry has always been a vital agent in human welfare and economic development.

Banks are a facilitator to provide funds liquidity solutions to its clients. In order to achieve this goal, banks, sometimes use their own equity to absorb risks and to facilitate transactions (Santomero, 1997). Therefore, banks act as agents to facilitate financial activities among different industries of a country. Thus, performance of the banking sector of a country plays a vital role in order to gauge financial performance of a country itself (Munir et al., 2012).

The main operation of a bank is to smooth the flow of cash between its lenders and depositors. As per the classical point-of-view, banking sector deals in the flow of cash to and from people in the form of custodian or lenders. Therefore, liquidity is the first thing that banks take into account at the time of their establishment (Hakimi & Zaghdoudi, 2017). Liquidity risk can be described as a state when a bank is not able to meet all the depository needs of its customers partially or completely for a period of time (Jenkinson, 2008). Such a state of affairs for a bank is a red alarm as it may signal the market quite negatively which would in turn affect the share price, and eventually its profitability. There can be many reasons for liquidity risk in a banking company. Liquidity risk can be caused if short-term liabilities are funded from long-term assets, which may result in a refinance of that short-term liability. Banks have advanced risk management systems in place which enables the banks to pay off their liabilities when they become due, thus reducing the chances of cash blockage and eventually liquidity crunch (Kumar & Yadav, 2013).

Another reason for liquidity risk can be an increase in interest rates. Bank is basically a channel for lending to businesses. The banking sector liquidity risk increases if there is a monetary contraction and banks have to reduce their lending. As a result of reduced lending, investments in the economy also reduce, thus decreasing the overall economic activity (Igan et al., 2013). A bank with a better liquidity position might face less liquidity risk and be able to lend even under minor contraction in the monetary policy. So, a bank with better liquidity position has a better shock absorption power of monetary policies as compared to a bank with lower liquidity ratio (Kashyap & Stein, 2000). Therefore, banks need to be able to find an optimum level of liquidity to be able to manage its affairs smoothly while being able to keep its sovereignty.

A major responsibility of banks, being the source of liquidity for its clients, is to be able to manage liquidity themselves. The banking channel being a central place for flow of cash flow in an economy has to manage both liquidity creation and liquidity



risk. Banks create liquidity by dislodging liquidity blockages for businesses by providing financing. Meanwhile, it also takes care of its own liquidity risk created due to issuance of a lot of loans (Vossenand & Ness, 2010).

In order to avoid any liquidity crisis, central banks and regulatory authorities take strict action to maintain a certain level of liquidity. The banks are liable to maintain a level of liquidity as per requirements of central banks. As a regulatory authority over all banks operating in Pakistan, State Bank of Pakistan has required all banks to maintain a weekly average of minimum 5% Cash Reserve Requirement (CRR) of its total demand liabilities as per its DMMD Circular No. 4 of 2018 issued by the Domestic Market & Monetary Management department of State Bank of Pakistan. Furthermore, the daily average for CRR cannot go below 4% (State Bank of Pakistan, 2018).

Policymakers all over the world are suggesting that the banking sector must maintain more liquid assets as compared to the past to hedge against any liquidity crisis. It has led to an international discussion on what can be the standard measures that should be taken and what should be standards to avoid liquidity risk (Basel Committee on Banking Supervision, 2014). It is important to note that liquid assets, such as cash in hand and cash reserves with the central bank, are usually less profitable and yield lower returns thus increasing the opportunity costs for banks when they maintain these at a greater level. Therefore, banks try to maintain only the minimum amount of liquid assets that are enough for their smooth operations and which do not impede their performance. Therefore, it comes up to central banks to create a framework and regulations to ensure a certain level of liquidity position of banks to avoid dangerous levels of liquidity risk (Mwangi, 2014).

Liquidity position and bank's performance can be measured by various financial ratios such as Return on Assets (ROA), Return on Equity (ROE), Current Ratio, Quick Ratio, and Net Interest Margin (NIM), etc. (Murthy & Sree, 2003). There have been a lot of studies on the effect of credit risk on bank's performance. However, in the past few years, liquidity risk is also studied as a vital factor that affects a bank's performance. There have been some studies on the relationship of liquidity position on performance (Claeys & Vennet, 2008; Trujillo-Ponce, 2013). The results have been quite varied. Some researchers have found a significant relationship between the two variables. They are of the view that a decrease in liquidity risk positively affects a bank's performance (Bourke, 1989; Graham & Bordeleau, 2010; Lartey et al., 2013). However, some have found the opposite to be true (Konadu, 2009). Furthermore, there are some studies that do not find any significant relationship between the two variables (Lamberg & Valming, 2009; Li, 2007). The difference in results in all these studies is because the effect varies from region to region and in different time periods. Moreover, different variables may have been used to study the effect of liquidity risk

on a bank's performance. Performance is studied through different variables by different researchers. Alzorqan (2014) has used Return on Assets and Return on Investment to study banks' performance in Jordan. On the other hand, Rahman and Saeed (2015) have used Return on Assets and Return on Equity to study banks' performance in Malaysia. Hakimi (2017) has taken Net Income Margin as a measure of banks' performance in Tunisia. Similarly, different units of measures are applied by different researchers to evaluate liquidity position of banks. Loan to deposit ratio, liquid assets to total assets ratio, assets quality, and many more are used to evaluate liquidity position (Chowdhury & Zaman, 2018; Hakimi & Zaghdoudi, 2017; Ferrouhi, 2014). Mwangi (2014) has claimed that the effect of liquidity on performance may also depend on business model of the bank and the difficulties faced by the market where these banks operate. This can also be a gap to be filled by further studies on this topic. Business models and macro environment considerations may make this model more authentic. This study takes into account all the commercial banks operating in Pakistan during the period of this study. Their business techniques are also taken into account. Ratio of non-performing loans and their approach to liquidity position, depicted by ratio of liquid assets to total assets and total deposits respectively, are taken into account to capture the essence of business model of the bank.

The current study is based on the effect of liquidity risk on banks' performance in Pakistan. Banking is the only developed form of financial market in Pakistan and its performance affects the country as a whole. The present work is important to bank regulators to make better decisions regarding portfolio management and risk diversification, taking into account, the cultural and financial constraints of this specific country.

This study contributes to the literature by analyzing the effect of liquidity risk on the performance of banks all over Pakistan. The present study would enable the regulators to forecast the effect of their liquidity position on the profitability of banking industry in Pakistan. This will be helpful in analyzing the optimum percentage of liquidity that needs to be maintained by banks of Pakistan without foregoing any opportunity cost on liquidity assets held in reserve. Similar studies have also been conducted in Kenya, Bangladesh, Iran and Jordan to enable regulators to make better decisions with respect to their specific regions, (Mwangi, 2017; Chowdhury & Zaman, 2018; Tabari et al., 2013; Alzorqan, 2014). The results have shown that an increase in liquidity has a negative effect on banks in Kenya and Bangladesh, (Mwangi, 2017; Chowdhury & Zaman, 2018). However, the results for liquidity management are positive for Jordan and Iran (Alzorqan, 2014; Tabari et al., 2013). As the results for different regions show a lot of variation, a separate is required for Pakistan to know the effect of liquidity on performance in banks in this region. This study contributes to literature by emphasizing the pros and cons of maintaining liquidity by banks in Pakistan after considering the environmental factors and industry norms of banking in Pakistan.



An increase in liquidity decreases liquidity risks and gives provides banks a cushion for shock absorption in times of crisis. On the other, banks incur opportunity cost as they lose business on the funds held to achieve a certain level of liquidity. Therefore, banks need to find the balance between whether an increase in liquidity gives them more profit through avoidance of risk, or it is a source of business losses, (Mwangi, 2017). The study helps banks in Pakistan to be able to study the effect of an increase in liquidity by considering the variables specific to the Pakistani market and its banking industry.

Although there is an extensive study on the impact of liquidity position and liquidity risk on performance of banking sector in many countries, the results have been mixed for different regions, (Chowduhry & Zaman, 2018). Different regions produce different and entirely varied results. So, it can be inferred that region may affect the variables to a much greater extent. The results have shown that an increase in liquidity has a negative effect on banks in Kenya and Bangladesh, (Mwangi, 2017; Chowduhry & Zaman, 2018). However, the results for an increase in liquidity are positive for Jordan and Iran (Alzorqan, 2014; Tabari et al., 2013). Therefore, the results of studies conducted in other countries may not be a good basis for similar results in Pakistan. In fact, the regulatory and institutional environments may be very different and other characteristics specified to this country can be a big reason not to adopt research in other countries as a pretext of similar results in Pakistan. Therefore, a similarly comprehensive study to analyze the effect of liquidity risk on Pakistan banks' performance needs to be conducted. Although Arif and Anees (2012) did analyze the effect of liquidity risk on banks' performance in Pakistan, their sample size included only lesser number of banks and different criteria to measure performance of banks. The current study takes into account all the commercial banks operating in Pakistan during the full currency of the study period.

The study takes into account the specific factors related to banking sector in Pakistan. Pakistan faces a dire issue of no liquid backup assets against its loaning and this study sheds light on the direness of financial situation of this country so that measures could be taken to resolve the liquidity crisis this country is facing. This study would be helpful for regulators to devise strategies considering the acute scarcity of resources in Pakistan. This research can be a landmark to study similar variables in other parts of the world, especially where banking reforms are still in their developmental stage, like Pakistan. The study can be further developed by including more macro-variables to further increase the reliability of the study.

LITERATURE REVIEW

Economy of any country is greatly dependent on the health of its financial sector. Emerging economies, like that of Pakistan, do not have a very well-developed stock

market or money market. Therefore, the banking sector bears all the responsibility of running a stable financial sector. Therefore, performance of banks has a huge impact on the performance of economy as a whole in emerging markets, like Pakistan. Banks need to look for good investment opportunities to boost their performance. Simultaneously, they need to safeguard their existing portfolio against any setbacks or liquidity or financial crisis.

There has been a lot of focus in the past few years on the risk management of banking industry. Risk management can be defined as the procedure that a bank adopts to manage the uncertainty in its financial exposure. Risk management is executed through a number of steps that include identification of risk, assessment, monitoring and control (Bikker & Metzmakers, 2005; Buttimer, 2001). According to researchers, an identified risk is less dangerous than an unidentified risk. Risk can have many dimensions and is often linked with other aspects of daily operations. So instead of dreading its existence risk should be managed (Jorion, 2009).

Banks focus on their more risk-prone areas and build strategies to counter the risk in those areas. Risk managers are continuously trained to develop their skills to identify and mitigate risk. Therefore, banks have specialized risk management frameworks to analyze and reduce the level of risk (De Juan, 1991).

The focus and control measures for any type of risk depends upon its complexity (Ramos, 2000). Although risks cannot be avoidable, banks take an intelligent risk and manage quite well (Kithinji, 2010). Financial institutions, like banking companies are prone to an assortment of risks which include credit risk, interest rate risk, foreign exchange risk, market risk, political risk and liquidity risk (Cooperman et al., 2000; Yusuf, 2003). The current study focuses on liquidity risk of the banks and its pros and cons faced by the banks in Pakistan. Banks need to focus on bringing maximum utilization of their assets while maintaining a safe position for any unforeseen financial shock. Thus, liquidity position is a very critical value to be determined by the banks while keeping in mind both sides of the picture, the profit maximization and loss minimization sides.

As banks are a business of money, liquidity risk is faced by the banks due to availability of liquid assets and cash to run their operations. Money, in the form of liquid assets and pure purchasing power, is necessary to finance expenditures and as a cushion for any future uncertainty. However, when it comes to banking sector, high liquid assets in the form of cash mean low returns and increased opportunity costs for holding money. So, if not otherwise mandated by the regulatory authority, banks may not keep a lot of liquid cash. However, another reason to hold cash is that it ensures stability of the financial system (Chowdhury & Zaman, 2018).

There are a number of factors that determine the financial performance of a bank. Some of them are macro factors that are same for the whole industry. However, their effect on bank to bank varies due to how established a bank is. The macro factor



includes country-wide factors of progress like GDP, inflation, rates of interest, or political conditions of a country. If the GDP is growing, the profitability is positively affected. Similarly, periods of boom in business cycles and political stability also affect the banks in a positive manner (Athanasoglou et al., 2006). Other factors include the micro factors that vary from bank to bank. This may include capital adequacy, assets quality, management efficiency, and liquidity management. A high capital adequacy ratio means that the bank has enough resources to fund its investments. Thus, the bank has much cushion to bear losses and unforeseen market shocks. This may give it a safety net for investments that may be risky but more profitable (Ayele, 2012; Ongore & Kusa, 2013). Furthermore, the quality of assets has a direct effect on bank's performance. A high ratio of non-performing loans is the biggest risk a bank can face (Dang, 2011). A good management performance ensures low operating costs and thus an increase in overall performance (Ongore & Kusa, 2013).

Liquidity management is a very important factor that determines the performance of a bank. Adequate liquidity, i.e., the ability of a bank to fulfill the obligations of its depositors, is positively proportional to the bank's profitability (Dang, 2011). So, banks need to maintain appropriate levels of liquidity in order to be profitable. Liquidity can be measured through a number of ratios, among which total deposit to total assets and total advances to total assets are the most common ratios (Ongore & Kusa, 2013).

There have been a number of studies on the effect of liquidity risk on the performance of banks throughout the world. The results of all these researches have been quite varied. Many researches such as those executed in the banking sectors of Iran, Europe, Tunisia, South Africa, Malaysia and other regions show promising performance with an increase in liquidity position (Cuong Ly, 2015; Tabari et al., 2013; Hakimi, Zaghdoudi, 2017; Mamatazakis & Bermapi, 2014; Marozva, 2015). Even some researchers have found no relationship between the two variables (Konadu, 2009). However, some studies in regions like Jordan have found mixed results for these variables (Alzorqan, 2014; Olagunju et al., 2012). Olagunju et al., (2012) believed that both too much and too little liquidity can be fatal for any bank. However, a number of studies found that a stable liquidity position decreases the performance of banks in Canada, America, Nigeria, Jordan, Nepal, Turkey and Switzerland (Agbada & Osuji, 2013; Alper & Anbar, 2011; Bourke, 1989; Ferrouhi, 2014; Ibe, 2013; Graham & Bordeleau, 2010; Musiega et al., 2017; Neupane & Subedi, 2013; Nimer et al., 2013). The results of a study of these variables have produced quite varied results in different regions, so it can be concluded that regional diversity and specific macro factors of an economy may affect the variables greatly. Therefore, a need arises to study the effect of liquidity on banks' performance specific to this region, i.e., Pakistan. It will enable the regulator to formulate policies and manage risk based on the specific characters of

this region keeping in mind the macro environment of Pakistan.

There are a number of theories that determine some insight as to the ratio of liquidity that must be maintained by the banks. The most common are the Shiftability theory and Liquid Management theory.

Shiftability Theory says that bank's liquidity position can be maintained if it holds assets that can be readily converted into cash or sold for cash. It can further be detailed that in order to ensure liquidity of a bank, the bank should always have assets that can be offered or discounted to cash. Therefore, marketable securities held by the bank are a good source to increase liquidity position.

The liquidity management theory maintains that bank may not need to maintain high liquid assets on its balance sheet at all times as it can always purchase funds from the market when required. This theory is not very well received by many researchers as they claim that during the period of low profits and low business, banks may not be able to find the required liquidity as creditworthiness may be low and market confidence may have shaken. However, for established banks the liability side of the balance sheet, i.e., deposits and other creditors, may be a source of liquidity (Nwankwo, 1991).

Theoretical Models

Different models have been used to study the effect of liquidity risk on banks' performance. In many cases, net interest margin is used to calculate banks' performance by many researchers. Hakimi (2017) has determined a model to test a similar hypothesis that has taken into account the external factors affecting the study. The model is as follows:

$$NIM_{i,t} = \beta_0 + \beta_1 LIQR_{i,t} + \beta_2 CRDR_{i,t} + \beta_3 CAP_{i,t} + \beta_4 SIZE_{i,t} + \beta_5 HHI_{i,t} + \beta_6 GDP_{i,t} + \beta_7 INF_{i,t} + \epsilon_{i,t} \quad (1)$$

where NIM is the bank's performance, LIQR measures the liquidity risk, CRDR measures the credit risk, CAP is the capital adequacy ratio, SIZE measures the bank's size, HHI measures Hirshmen Herfindahl index, GDP is the variable for Gross Domestic Product and INF is the variable for inflation.

Another model used by Ibe (2013), which was also used later in other studies (Mwangi, 2012) to measure banks' performance with respect to liquidity is as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \epsilon \quad (2)$$

where Y represents a return on assets, X1 represents liquid assets to total assets ratio, X2 represents liquid assets to total deposit ratio, X3 represents balance due to other banks to total assets ratio and X4 represents asset quality. Although Net interest margin has also been extensively used by many researchers like Adusei (2015) but a more effective and commonly used measure is to measure return on assets and return on equity to analyze performance with respect to liquidity. This is also used in several



academic works (Doyran, 2013). Bank's performance indicates how efficiently the bank's management of their resources to increase income, (Chwodhry & Zaman, 2018). A higher value of liquid assets to total assets, or total deposits, indicates better liquidity in banks. Asset quality indicates how well the bank is able to manage its funds in terms of good quality loans.

Model & Variable Construct

We design our models based on the second model of Ibe (2013) and Mwangi (2012) as we do not require the effect of macro-variables as only one region is in consideration. Our models are as follows:

$$ROA = \beta_0 + \beta_1 LIQA1 + \beta_2 LIQD2 + \beta_3 BTA3 + \beta_4 LA4 + \beta_5 AQ5 + \varepsilon \quad (3)$$

$$ROE = \beta_0 + \beta_1 LIQA1 + \beta_2 LIQD2 + \beta_3 BTA3 + \beta_4 LA4 + \beta_5 AQ5 + \varepsilon \quad (4)$$

where ROA represents return on assets, i.e., ratio of after-tax profit to total assets, ROE represents return on equity, i.e., the ratio of after-tax profit to total equity, LIQA1 represents liquid assets to total assets ratio, LIQD2 represents liquid assets to total deposit ratio, BTA3 represents balance due to other banks to total assets ratio, LA4 represent Liquid assets that are calculated as a sum of cash in hand, SBP balances, T-bills and bonds minus balances due to other banks. AQ5 represents asset quality that is the ratio of non-performing loans to gross loans and advances. AQ5 is the liquid liabilities side of the liquidity position and is also determined through a ratio of demand deposits to total assets in some studies. Performance is measured through ROA and ROE and liquidity is measured through LIQA, LIQD and BTA. AQ and LA act as control variables. Multiple regressions are conducted through the Ordinary Least Squares (OLS) method to calculate the effect.

The variables detail is as follows:

Variables	Variable Construct	Methodology & Logic	Similar Studies
Bank performance [ROA]	ROA = Profit after Tax/Total Assets	Measured by the ratio of after-tax profit to total Assets	Cebenoyan & Strahan, 2004
Bank performance [ROE]	ROE = Profit after Tax/Total Equity	Measured by the ratio of after-tax profit to total Equity	Farooq et al., 2015
Liquidity risk [LIQD]	LIQD= Liquid Assets / Total Deposit	Measured by the ratio of liquid assets to total deposit.	Mwangi, 2014
Liquidity risk [LIQA]	LIQA= Liquid Assets / Total Assets	Measured by the liquid assets to total assets.	Chowdhury & Zaman, 2018 Cebenoyan & Strahan, 2004
Liquidity risk [BTA]	BTA= Balance due to other banks / Total Assets	Measured by the ratio of balance due to other banks to total assets	Farooq et al., 2015
Liquid Assets [LA]	LA= Cash in hand + SBP balances + T-bills and bonds - Balances due to other banks	Measure of liquidity	Farooq et al., 2015
Assets Quality [AQ]	AQ= NPL / Total Advances	Measured by the ratio of non-performing loans to total gross advances	Kithinji, 2010

Return on asset and Return on equity are the most popular measures to evaluate the performance of a bank or any other business. Other measures include the ratio of interest margin to total assets.

Liquidity risk and credit risk are important factors to be analyzed when considering the overall risk. Liquidity risk is calculated as a ratio of liquid assets to total assets. An increase in this ratio depicts an increase in liquidity position and vice versa. Increased liquidity position means that a bank is in a much better position to grant loans. If the liquidity position is low, then the bank faces liquidity risk, i.e., if depositors wish to withdraw funds, bank may not have enough liquid cash to cater to their needs. Liquidity position as a ratio of liquid assets to total assets has been used in many previous studies (Fiordelisi & Mare, 2014; Hakimi & Zaghdoudi, 2017; Rose & Hudgins, 2008; Trujillo-Ponce, 2013).

The quality of its advances portfolio has a great impact on its overall profitability. According to Dang (2011), the highest risk that a bank faces is the losses occurring from bad debts.

Data Sample

The study is based on financial information consolidated data of listed banks in Pakistan in the Pakistan Stock Exchange and State Bank of Pakistan database for a period of 14 years from 2006 to 2019. In order to keep the study more in line with its purpose and to scale out unnecessary factors, the sample data includes only



commercial banks and does not include development banks, saving banks, mortgage banks, and co-operative banks, etc. The study includes only those banks that have been operational during the complete period under study. Panel data for 25 banks for a period of 14 years is used to study the concept. Ordinary Least Square method (OLS) is used to analyze data.

GMM can also be a good method to analyze this data as it could have resolved any issued of heterogeneity in the data. In the banking industry, the performance of last year greatly affects the performance of the current year. Therefore, in order to reduce the effect of heterogeneity, the GMM model can be used that is better able to interpret results in such cases. However, in the current study our constraint over the number of observations makes it impossible to use GMM. OLS is used owing to the fact that sample size is not very large and panel data is used whereas heterogeneity is not as big a concern as it is for time series studies. Further studies on this may be conducted using GMM if they can achieve the right sample size.

RESULTS AND DISCUSSION

The relationship of liquidity with bank's performance has garnered varied results through different regions and time periods. Therefore, an extensive study to determine their impact on the Pakistani market is required to formulate better policies for this region.

The analysis is conducted in the following manner:

First, descriptive statistics is analyzed to get an overview banking statistic pertaining to this study.

Secondly, correlation analysis shows the relationship between these variables.

Thirdly, regression is run in order to study the effect of liquidity on bank's performance.

Lastly, liquidity position is analyzed and a liquidity risk analysis is conducted.

Descriptive Statistics

Descriptive Statistics of the banks over the years show the following results:

TABLE 1. DESCRIPTIVE STATISTICS

	ROA	ROE	LIQD	LIQA	BTA	AQ
Mean	0.032	0.127	0.119	0.574	0.114	0.343
Median	0.008	0.185	0.110	0.665	0.090	0.210
Maximum	0.350	1.000	0.750	1.000	0.530	1.000
Minimum	-0.710	-14.743	0.040	0.100	0.010	0.000
Std. Dev.	0.148	1.014	0.059	0.281	0.084	0.284

Table 1 shows an overview of the performance position and liquidity positions of the

banks in Pakistan. Pakistani banks have an average return on assets of 3.20%, with a variation of 14.80%. They have an average return on equity of 12.70%, with a variation of 101.40%. This shows that return on assets is a more stable ratio when forecasting the performance of banks in Pakistan.

Correlation Analysis

The correlation analysis shows the direction of the relationship among variables (Table 2).

TABLE 2. CORRELATION ANALYSIS OF VARIABLES

	ROA	ROE	LIQD	LIQA	BTA	AQ
ROA	1.000					
ROE	0.326**	1.000				
LIQD	0.0250	0.025	1.000			
LIQA	0.0432	0.0243	-0.433**	1.000		
BTA	-0.084	-0.079	-0.266**	0.103*	1.000	
AQ	0.126**	0.015	-0.049	0.040	-0.061	1.000

The * and ** show the significance level of 10% and 5%, respectively, for the given values.

There is a strong positive relationship between both variables for performance. If ROA increases, ROE also tends to increase. Similarly, liquidity ratios also show similar positive and significant trends. If the liquid assets increase, it increases both liquid assets to deposit ratio as well as liquid assets to total assets ratio. These ratios have a positive relationship with the performance ratios as well. If liquidity increases, the performance also tends to increase.

Both liquidity ratios have a significant direct relationship with the third liquidity risk ratio, balance due other banks to total assets. However, it has a negative, albeit insignificant, relation with performance ratios. Asset Quality has a significant positive relationship with Return on Equity but has an insignificant positive relationship with Return on Assets.

Regression Analysis

Regression analysis of ROA with liquidity ratios through OLS shows the following results (Table 3).

The results show that a positive relationship of banks' performance in Pakistan with an increase in liquidity. The results show a positive relationship between ROA and LIQD, i.e., liquid asset to deposit ratio. Similarly, it shows a similar positive relationship between ROA and LIQA, i.e., liquid asset to total asset ratio. The results are significant at 5% confidence interval for LIQA. Relationship of ROA with BTA shows a negative result. BTA ratio shows a decrease in liquidity. Therefore, an inverse relationship between ROA and BTA further endorse our results that increase in liquidity positively affects ROA. Overall, the model describes our research up to 17.10%. Addition of more variables and increase in data sample can enhance its goodness of fit. F-stat show a good fit and significant model. Results are significant in

case of ROA and show a positive relationship between liquidity and ROA for commercial banks in Pakistan.

TABLE 3. ANALYSIS OF LIQUIDITY RATIOS WITH PERFORMANCE MEASURES

	Return on Assets	Return on Equity
C	-0.094* (0.041)	-0.007 (0.033)
LIQD	0.163 (0.159)	0.363 (0.276)
LIQA	0.077* (0.036)	0.236 (0.289)
BTA	-0.043 (0.110)	-0.931 (0.886)
AQ	0.065* (0.033)	0.025 (0.265)
R2	0.171	0.013
F-stat	8.755	0.549
Prob. (F-stat)	0.000	0.738
DW Statistics	0.760	1.900

The * that the results are significant at 5% level of confidence. Values in parenthesis show the standard error of the coefficients.

Results show similar tendencies in relation to ROE as well. However, the results are not significant. LIQA and LIQD have a positive relation with ROE and BTA is negative. DW for ROE shows a satisfactory position of autocorrelation. Therefore, considering these results it is evident that liquidity has a positive effect of performance of commercial banks in Pakistan. Thus, our hypothesis that an increase in liquidity positive affects performance of commercial banks in Pakistan is accepted.

Liquidity Risk Analysis

To get an overview of the performance of the banking sector with respect to its performance, we have analyzed our data through the following tables as well.

EVOLUTION OF LIQUIDITY DURING THE YEARS

Table 4 shows the evolution of liquidity during the years for banking sector in Pakistan.

TABLE 4. EVOLUTION OF LIQUIDITY DURING THE YEARS

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Liquid Assets / Total Assets	0.52	0.40	0.51	0.60	0.57	0.65	0.56	0.59	0.65	0.64	0.09	0.10
Liquid Assets / Total Deposit	0.14	0.13	0.13	0.12	0.12	0.12	0.09	0.13	0.11	0.10	0.12	0.14

Table 4 describes the annual average liquidity risk position of Pakistani banks during the period of ten years. The liquidity risk ratio of liquid assets to total assets has

decreased from the year 2008 to 2009 and has then started to rise till 2013. After 2013 it has been somewhat steady till 2017.

The liquidity risk ratio of liquid assets to total deposits shows a steady decline in liquidity from 2008 to 2014, with an increase again in 2015 and 2016.

BANK-WISE AVERAGE LIQUIDITY POSITION

In Table 5, we analyze the bank-wise breakup of average liquidity risk (liquid assets to total assets) faced by banks during the years.

TABLE 5. BANK-WISE AVERAGE LIQUIDITY POSITION

FWB	NBP	SND	BOK	BOP	ABL	ASK	ABK	BAH	BAF	BISL	DIB	FBL
0.58	0.34	0.47	0.50	0.50	0.66	0.75	0.29	0.74	0.43	0.61	0.43	0.74
HBL	HMB	JS	KASB	MCB	UBL	SMB	SILK	SNRI	SCBL	SMIT	MZN	
0.20	0.71	0.62	0.60	0.56	0.44	0.55	0.53	0.70	0.79	0.73	0.57	

Table 5 shows the bank-wise average liquidity during the year for each of the 25 banks in our sample separately. The data helps us to know which banks were more prone to liquidity risks as compared to the rest. The data shows that Habib Bank Limited (HBL) has the least amount of liquidity, followed by Al-Baraka Bank (ALBK) and National Bank of Pakistan (NBP). Moreover, Standard Chartered Bank Limited (SCBL) has the highest liquidity as depicted by the comparable data available, followed by Bank Al-Habib (BAH) and Faysal Bank Limited (FBL). The average liquidity risk position stands at 0.56 for all banks during this period. From these statistics we can analyze that government holding may have a hand in affecting the liquidity position of a bank. National Bank of Pakistan is state-owned. Habib Bank Limited had been state owned previously which was later privatized. Similarly, UBL with a liquidity position of 0.44 was also converted from a government-owned to a private bank. Furthermore, these banks are big banks with huge asset sizes that may have an impact as their overall shock absorption power is greater due to their size and government backing. These banks, although now privatized, still have a great hold of government for their projects. Therefore, in order to cater to these projects, these banks sometimes have lax credit policies as compared to other banks. Therefore, liquidity risk increases and the ratio of liquid assets as compared to total assets decrease much more for these banks. Faysal Bank Ltd and Bank Al-Habib being smaller size private banks may have lesser shock absorption power due to their smaller total assets value and thus they value their liquidity position more in order to stay in the market.

EVOLUTION OF PERFORMANCE OF BANKS DURING THE YEARS

In Table 6, we analyze the evolution of performance via Return on Equity of Pakistani banks.



TABLE 6. EVOLUTION OF PERFORMANCE OF BANKS DURING THE YEARS

2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
-0.04	-0.68	-0.04	0.10	0.05	0.10	0.14	0.14	0.12	0.09	0.11	0.11

Performance of banks shows a dip in performance from 2008 to 2010. It has shown a steady growth till 2015 and again a dip in performance from 2016 to 2019. Comparing this with Table 2 showing the evolution of liquidity, we can see that performance started to decline at the same time when liquidity position started to increase for the banks. So our hypotheses that an increase in liquidity risk decrease performance may not hold true.

BANK-WISE AVERAGE PERFORMANCE

In Table 7, we analyze the bank-wise average performance of banks during our study period.

TABLE 7. BANK-WISE AVERAGE PERFORMANCE

FWB	NBP	SND	BOK	BOP	ABL	ASK	ABK	BAH	BAF	BISL	DIB	FBL
-0.02	0.16	0.06	0.08	0.03	0.24	0.09	-0.04	0.24	0.14	0.03	0.04	0.11
HBL	HMB	JS	KASB	MCB	MZN	SMB	SILK	SNRI	SCBL	SMT	UBL	
0.18	0.16	0.06	-0.21	0.17	0.19	0.00	-1.56	0.08	0.12	-0.44	0.21	

Allied Bank Limited (ABL) and Bank Al-Habib (BAH) have the highest average performance during the years, followed by United Bank Limited (UBL). Silk Bank (SILK) has the least performance during the years followed by Summit Bank (SMT) and KASB Bank (KASB). Looking at this data we can see that the banks with higher total assets have better performance and smaller banks are not able to perform very well. Comparing it with our liquidity position data, we can see that Bank Al-Habib also is one of the top three banks with the most liquid assets as compared to total assets. Allied bank also has a liquidity position quite above average.

Considering these results, it is evident that liquidity has a positive effect of performance of commercial banks in Pakistan. Increase in liquidity incurs opportunity costs to the bank as liquid assets have low interest rates. On the other hand, less liquidity can result in bank's inability to pay their depositors when they wish to withdraw funds. Therefore, a minimum ratio needs to be set for liquid assets to bring an optimum level of risk and return. In line with this observation, the central bank in Pakistan, called the State Bank of Pakistan (SBP), has issued a Statutory Reserve Ratio (SRR) and Statutory Liquidity Ratio (SLR) to be maintained by all banks to avoid default and as a regulatory concern to modulate liquid assets. Current study can help regulators to be better informed of the effect of liquidity position on performance of banks. This will be useful to set an appropriate Cash Liquidity Reserve ratio for the banks to be able to reap maximum benefits.

CONCLUSION AND RECOMMENDATIONS

The results of this study show a positive effect of maintaining liquidity on the performance of the banks in Pakistan. An increase in liquidity ratio has a positive effect of performance of banks in Pakistan. The results are significant for Return on assets but not for Return on Equity. However, both show a positive relation of liquidity position with banks' performance. The results are similar to a number of studies in different regions of the world. Studies conducted in banking sectors of Iran, Europe, Tunisia, South Africa, Malaysia and other regions show promising performance with an increase in liquidity position (Cuong Ly, 2015; Tabari et al., 2013; Hakimi & Zaghdoudi, 2017; Mamatazakis & Bermapi, 2014; Marozva, 2015).

Studies by Ongore and Kusa (2013), Olagunju et al., (2011) and Nimer et al., (2013) and have also shown a similar trend. Their study also shows a positive relationship between liquidity position and banks' performance. However, the works of Cuong Ly (2015), Tabari et al., (2013), and Marozva (2015) show a negative relationship between the two variables. An increase in liquidity incurs opportunity costs to the bank as liquid assets have low-interest rates. On the other hand, less liquidity can result in bank's inability to pay their depositors when they wish to withdraw funds.

The relationship of liquidity with bank's performance has garnered varied results through different regions and time periods. Therefore, an extensive study to determine their impact on the Pakistani market is required to formulate better policies for this region.

This study has important implications for formulating a better regulatory framework. Already banks in Pakistan are required by Pakistan's Central bank, i.e., State Bank of Pakistan (SBP), to maintain a minimum Statutory Reserve Ratio (SRR) and Statutory Liquidity Ratio (SLR), i.e., a minimum liquidity ratio to avoid liquidity risk. This will enable SBP to be able to ascertain the implications faced by the Pakistani banks if too high or too low liquidity position is maintained by them.

REFERENCES

- Adusei, M. (2015). The impact of bank size and funding risk on bank stability. *Cogent Economics & Finance*, 3(1), 1111489.
- Agbada, A.O., & Osuji, C.C. (2013). The efficacy of liquidity management and banking performance in Nigeria. *International review of management and business research*, 2(1), 223-233.
- Al Nimer, M., Warrad, L., & Al Omari, R. (2015). The impact of liquidity on Jordanian banks profitability through return on assets. *European Journal of Business and Management*, 7(7), 229-232.
- Alzorqan, S. (2014). Bank liquidity risk and performance: an empirical study of the banking system in Jordan. *Research Journal of Finance and Accounting*, 5(12), 155, 64.



- Anbar, A., & Alper, D. (2011). Bank specific and macroeconomic determinants of commercial bank profitability: Empirical evidence from Turkey. *Business and economics research journal*, 2(2), 139-152.
- Asked, F. (2014). Basel committee on banking supervision.
- Athanasoglou, P., Delis, M., & Staikouras, C. (2006). Determinants of bank profitability in the South Eastern European region.
- Ayele, H.N. (2012). Determinants of bank profitability: An empirical study on Ethiopian private commercial banks. *Unpublished MBA Project, Addis Ababa University*.
- Bikker, J.A., & Metzmakers, P.A. (2005). Bank provisioning behaviour and procyclicality. *Journal of international financial markets, institutions and money*, 15(2), 141-157.
- Bordeleau, É., & Graham, C. (2010). *The impact of liquidity on bank profitability* (No. 2010-38). Bank of Canada.
- Bourke, P. (1989). Concentration and other determinants of bank profitability in Europe, North America and Australia. *Journal of Banking & Finance*, 13(1), 65-79.
- Buttimer, A. (Ed.). (2001). *Sustainable landscapes and lifeways: scale and appropriateness*, Stylus Publishing, LLC.
- Chowdhury, M., & Zaman, S. (2018). Effect of Liquidity Risk on Performance of Islamic banks in Bangladesh. *IOSR Journal of Economics and Finance*.
- Claeys, S., & Vander Vennet, R. (2008). Determinants of bank interest margins in Central and Eastern Europe: A comparison with the West. *Economic Systems*, 32(2), 197-216.
- Dang, U. (2011). The CAMEL rating system in banking supervision. A case study.
- De Juan, A. (1991). *From good bankers to bad bankers: Ineffective supervision and management deterioration as major elements in banking crises*. World Bank.
- Doyran, M. A. (2013). Net interest margins and firm performance in developing countries. *Management Research Review*.
- Ferrouhi, E.M. (2014). Bank liquidity and financial performance: Evidence from Moroccan banking industry. *Verslas: teorija ir praktika*, 15(4), 351-361.
- Fiordelisi, F., & Mare, D.S. (2014). Competition and financial stability in European cooperative banks. *Journal of International Money and Finance*, 45, 1-16.
- Gardner, M.J., Mills, D.L., & Cooperman, E.S. (2004). *Managing financial institutions*. South-Western Pub.

Hakimi, A., & Zaghdoudi, K. (2017). Liquidity risk and bank performance: An empirical test for Tunisian banks. *Business and Economic Research*, 7(1), 46-57.

Ibe, S. O. (2013). The impact of liquidity management on the profitability of banks in Nigeria. *Journal of Finance and Bank Management*, 1(1), 37-48.

Igan, D., Kabundi, A., Nadal De Simone, F., & Tamirisa, N. (2013). Monetary policy and balance sheets. *International Monetary Fund Working Paper* 13/158.

Jenkinson, N. (2008). Strengthening regimes for controlling liquidity risk: some lessons from the recent turmoil. *Bank of England Quarterly Bulletin*, Quarterly, 2.

Jorion, P. (2009). Risk management lessons from the credit crisis. *European Financial Management*, 15(5), 923-933.

Kashyap, A.K., & Stein, J.C. (2000). What do a million observations on banks say about the transmission of monetary policy? *American Economic Review*, 90(3), 407-428.

Konadu, J.S. (2009). Liquidity and Profitability: Empirical evidence from banks in Ghana. *Kwame Nkrumah University of Science and Technology*.

Kithinji, A.M. (2010). Credit risk management and profitability of commercial banks in Kenya.

Kumar, M., & Yadav, G.C. (2013). Liquidity risk management in bank: a conceptual framework. *AIMA journal of management & research*, 7(2), 2-12.

Lamberg, S., & Vålming, S. (2009). Impact of Liquidity Management on Profitability: A study of the adaption of liquidity strategies in a financial crisis.

Lartey, V.C., Antwi, S., & Boadi, E.K. (2013). The relationship between liquidity and profitability of listed banks in Ghana. *International journal of business and social science*, 4(3).

Li, T.M. (2007). *The will to improve: Governmentality, development, and the practice of politics*. duke university Press.

Ly, K.C. (2015). Liquidity risk, regulation and bank performance: Evidence from European banks. *Global Economy and Finance Journal*, 8(1), 11-33.

Marozva, G. (2015). Liquidity and bank performance. *International Business & Economics Research Journal*, 14(3), 453-562.

Munir, S., Ramzan, M., Rao, Q. I., Ahmad, M., & Raza, A. (2012). Financial Performance Assessment of Banks: A Case of Pakistani Public Sector Banks. *International Journal of Business and Social Science*, 3(14).

Murthy, Y., & Sree, R. (2003). A study on financial ratios of major commercial banks. *Research Studies, College of Banking & Financial Studies, Sultanate of Oman*, 3(2), 490-505.



- Musiega, M., Olweny, T., Mukanzi, C., & Mutua, M. Influence of Credit Risk on Performance of Commercial Banks in Kenya.
- Mwangi, F.M. (2014). *The effect of liquidity risk management on financial performance of commercial banks in Kenya* (Doctoral dissertation, University of Nairobi).
- Mwangi, G.N. (2012). *The effect of credit risk management on the financial performance of commercial banks in Kenya* (Doctoral dissertation).
- Neupane, B., & Subedi, S. (2013). Determinants of Banks Liquidity and their Impact on Financial performance in Nepalese Commercial Banks. *Pokhara University*.
- Nwankwo, G.O. (1991). *Money and capital markets in Nigeria today*. University of Lagos press.
- Olagunju, A., David, A.O., & Samuel, O.O. (2012). Liquidity management and commercial banks' profitability in Nigeria. *Research Journal of Finance and Accounting*, 2(7-8), 24-38.
- Ongore, V.O., & Kusa, G.B. (2013). Determinants of financial performance of commercial banks in Kenya. *International journal of economics and financial issues*, 3(1), 237.
- Payle, D. (1997). Bank risk management. In *Conference on Risk management and regulation in Banking, Jerusalem*.
- Rahman, A.A., & Saeed, M.H. (2015). An empirical analysis of liquidity risk and performance in Malaysia banks." *Australian Journal of Basic and Applied Sciences* 9(28), 80-84.
- Ramos S.J. (2000). Financial Risk Management, *Inter-American Development Bank*.
- Rose, P.S., & Hudgins, S.C. (2008). Bank management & Financial Service, Mc Graw-Hill/Irwin. *America Newyork*.
- Santomero, A.M. (1997). Commercial bank risk management: an analysis of the process. *Journal of Financial Services Research*, 12(2-3), 83-115.
- Tabari, N., Ahmadi, M. & Emami, M. (2013). The Effect of Liquidity Risk on the Performance of South African commercial Banks. *International Research Journal of Applied and Basic Sciences*, 4(6), 1624-1631.
- Thaçi, L. (2015). Liquidity Risk and Liquidity Management Role. *China-USA Business Review*, 454.
- Trujillo-Ponce, A. (2013). What determines the profitability of banks? Evidence from Spain. *Accounting & Finance*, 53(2), 561-586.

Umar, F., Muhammad, Q., Asad, A., & Mazhar, A. (2015). Impact of liquidity risk management on firms' performance in the conventional banking of Pakistan. *IORES Journal of business management invention*, 2(7), 772-783.

Van Greuning, H., & Brajovic-Bratanovic, S. (1999). *Analyzing banking risk: a framework for assessing corporate governance and financial risk management*. The World Bank.

Yusuf, S. (2003). *Innovative East Asia: the future of growth*. The World Bank.

APPENDIX I

LIST OF BANKS WITH ABBREVIATIONS USED

FWB	First Women Bank Ltd
NBP	National Bank of Pakistan
SND	Sindh Bank Ltd
BOK	Bank of Khyber
BOP	Bank of Punjab
ABL	Allied Bank Ltd
ASK	Askari Bank Ltd
ABK	Albaraka Bank Ltd
BAH	Bank Al Habib Ltd
BAF	Bank Alfalah Ltd
BISL	Bank Islami Ltd
DIB	Dubai Islami Bank Ltd
FBL	Faysal Bank Ltd
HBL	Habib Bank Ltd
HMB	Habib Metropolitan Bank Ltd
JS	JS Bank Ltd
KASB	Kasb Bank Ltd
MCB	MCB Bank Ltd
MZN	Meezan Bank Ltd
SMBA	Samba Bank Ltd
SILK	Silk Bank Ltd
SNRI	Soneri Bank Ltd
SCBL	Standard Chartered Bank Ltd
SMIT	Summit Bank Ltd
UBL	United Bank Ltd