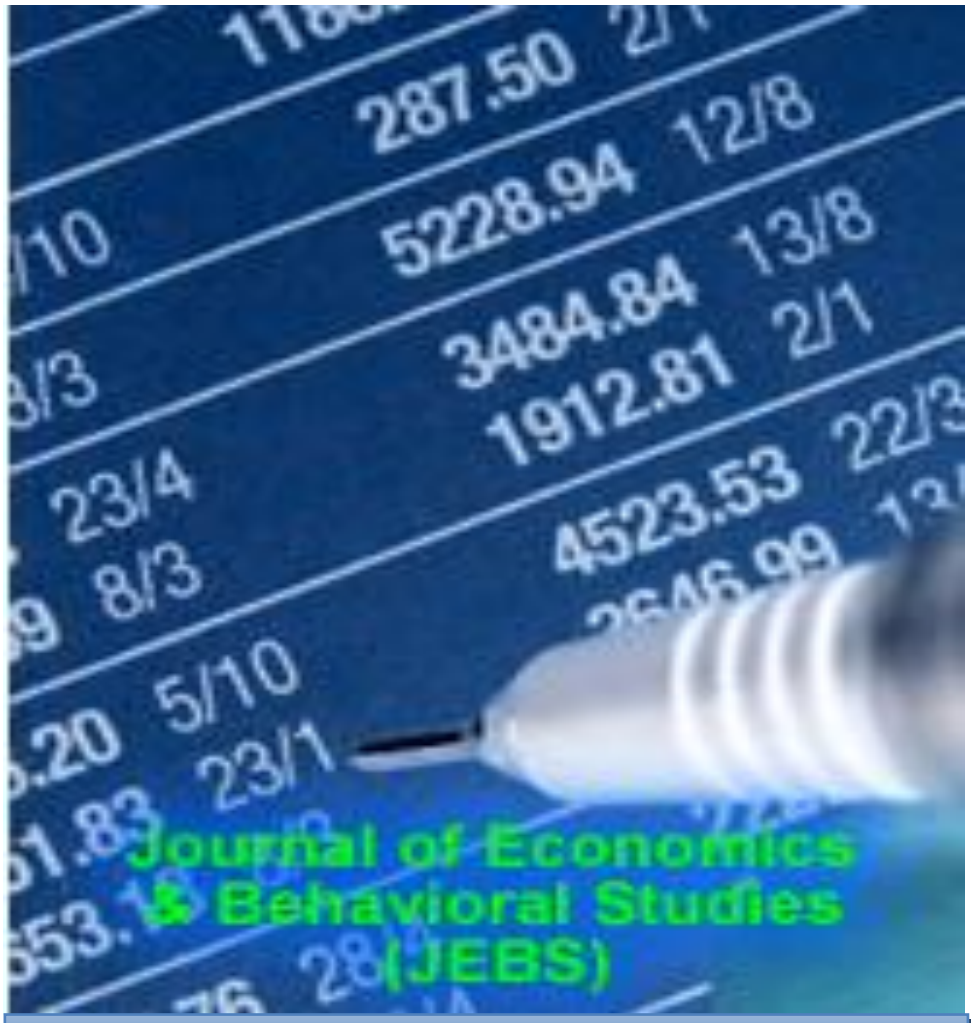

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Editorial

Journal of Economics and Behavioral Studies (JEBS) provides distinct avenue for quality research in the ever-changing fields of economics & behavioral studies and related disciplines. Research work submitted for publication consideration should not merely limited to conceptualization of economics and behavioral developments but comprise interdisciplinary and multi-facet approaches to economics and behavioral theories and practices as well as general transformations in the fields. Scope of the JEBS includes: subjects of managerial economics, financial economics, development economics, finance, economics, financial psychology, strategic management, organizational behavior, human behavior, marketing, human resource management and behavioral finance. Author(s) should declare that work submitted to the journal is original, not under consideration for publication by another journal and that all listed authors approve its submission to JEBS. Author (s) can submit: Research Paper, Conceptual Paper, Case Studies and Book Review. Journal received research submission related to all aspects of major themes and tracks. All submitted papers were first assessed by the editorial team for relevance and originality of the work and blindly peer-reviewed by the external reviewers depending on the subject matter of the paper. After the rigorous peer-review process, the submitted papers were selected based on originality, significance, and clarity of the purpose. The current issue of JEBS comprises papers of scholars from USA, Korea, Zimbabwe, Uganda, Bangladesh, Indonesia and Lebanon. Performance Comparison of Various Bootstrap Methods for Diffusion Processes, Effects of Exchange Rates on Zimbabwe's Exports, Regional Differentials in Early Antenatal Care, Health Facility Delivery and Early Postnatal Care, Have-on-Mask and Maintain-Physical-Distance: Are they the Outcome of Lockdown-Laws in Corona-Virus Crisis, Antecedents of Regional Financial Independence and Lebanese Investors' Decision Making Analysis from Conventional and Behavioral Perspectives were some of the major practices and concepts examined in these studies. The current issue will therefore be a unique offer where scholars will be able to appreciate the latest results in their field of expertise and to acquire additional knowledge in other relevant fields.

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PAPERS

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A Performance Comparison of Various Bootstrap Methods for Diffusion Processes

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Abstract: In this paper, we compare the finite sample performances of various bootstrap methods for diffusion processes. Though diffusion processes are widely used to analyze stocks, bonds, and many other financial derivatives, they are known to heavily suffer from size distortions of hypothesis tests. While there are many bootstrap methods applicable to diffusion models to reduce such size distortions, their finite sample performances are yet to be investigated. We perform a Monte Carlo simulation comparing the finite sample properties, and our results show that the strong Taylor approximation method produces the best performance, followed by the Hermite expansion method.

Keywords: *Bootstrap; diffusion process; strong Taylor approximation; stationarity; Monte Carlo simulation.*

1. Introduction

Markov processes play a central role in financial analyses, granted that prices efficiently reflect information in the market. Diffusion processes are continuous-time Markov processes that have a semi-martingale property, and they have been widely used to model stocks, bonds, and many other financial derivatives (Chan et al., 1992). However, diffusion models are known to heavily suffer from size distortions of hypothesis tests. While there are many bootstrap methods applicable to diffusion models to reduce such size distortions, their finite sample performances are yet to be investigated. Thus, we compare their performance by using Monte Carlo simulations.

It is well known that bootstraps enhance finite sample performance in various statistical analyses, such as parameter value estimations and hypothesis testing. For example, the bootstrap can be used to correct biases in estimation as seen in Tang & Chen (2009). However, bootstrapping the diffusion processes is not straightforward because of the dependence structure residing in the time series data (Kreiss & Lahiri, 2012; Horowitz, 2003; Härdle et al., 2003; Pan & Politis, 2016a; Pan & Politis, 2016b). There are various methods for circumventing this problem. For example, when the parametric dependence structure of the diffusion model is well known and easy to construct, we can generate the bootstrap samples using the parametric bootstraps. Conversely, if the parametric structure of the model is unknown or difficult to construct, we may need to utilize nonparametric approaches. In this study, we consider various parametric and nonparametric bootstrap resampling methods in practice.

Among the parametric approaches, the strong Taylor approximation is straightforward and easy to implement, so it is preferred by many researchers. Having been used for a long time, it is still one of the most widely implemented methods, and many extensions are still proposed, as seen in Gyöngy & Rásonyi (2011) and Mikulevičius & Zhang (2015). A relatively new approach utilizes the Hermite expansion suggested by Aït-Sahalia (1999). Due to its sound theoretical background and good performance in estimation, parameter estimation using the Hermite expansion has gained popularity since its introduction. In this study, we utilize the Hermite expansion method to generate bootstrap samples.

Nonparametric approaches utilize a nonparametrically estimated conditional distribution. The conditional distribution contains essential characteristics of the diffusion process; therefore, it plays an important role in various diffusion analyses, as seen in Chen et al. (2008) and Bhardwaj et al. (2008). Due to its versatility and robustness to misspecification, the nonparametric approach is also preferred by many researchers. As for the bootstrap resampling, Horowitz (2003) suggested using the Markov conditional bootstrap (MCB), in which random samples are generated from the non-parametrically estimated conditional distributions. These parametric and nonparametric approaches have their own strengths and weaknesses, and their finite sample performances in hypothesis testing are yet to be investigated.

This paper compares the accuracy of the coverage probabilities of various bootstrap methods by utilizing Monte Carlo experiments. Overall, we find that the strong Taylor approximation method performs the best, followed by the Hermite expansion method. The nonparametric MCB shows relatively larger size distortions, but it still performs better than the first-order asymptotics. We conjecture that this is because the nonparametric methods involve many user-dependent factors, such as the choice of kernel function and bandwidth. However, as it clearly

outperforms the first-order asymptotics, it is worthwhile to consider the MCB when the nonparametric method is inevitable.

In Section 2, we introduce various bootstrap resampling methods that generate samples either from the parametrically constructed or from nonparametrically constructed transition densities. Section 3 presents the results of a Monte Carlo simulation on the performance of the bootstrap methods. Section 4 presents concluding remarks.

2. Various Bootstrap Methods for Diffusion Models

In this section, we introduce various bootstrap resampling methods that can be applied to diffusion models. For the analysis, we consider a stationary diffusion process X whose stochastic differential equation (SDE) is given as the following:

$$dX_t = \mu(X_t)dt + \sigma(X_t)dW_t,$$

where W is the standard Brownian motion.

Since closed-form expressions of exact transition densities are not generally available, we first consider the strong Taylor approximation. The Euler and Milstein schemes are popular strong Taylor approximation methods. In addition to these, we also consider other more sophisticated methods, such as the Heun method and the order 1.5 strong Taylor scheme. Furthermore, we also consider an approximation utilizing the Hermite expansion of the transition density, as suggested by Aït-Sahalia (1999). Although it is one of the most popular methods used for parameter estimation, it is not very common for random sample generation. Lastly, we consider the MCB, a nonparametric bootstrap method proposed by Horowitz (2003). For the financial analysis using diffusion models, it is worthwhile to consider using nonparametric methods, since parametric diffusion models are often imprecisely specified for simplification.

Exact Transition Density: In general, closed-form expressions of exact transition densities are not available except for very few diffusion processes. For stationary diffusions, only the following two models are known to have closed-form transition densities.

- Vasicek model (Ornstein-Uhlenbeck process), attributed to Vasicek (1977). The SDE of the Vasicek model is given as
$$dX_t = \kappa(\alpha - X_t)dt + \sigma dW_t$$
for $\kappa, \sigma \in \mathrm{R}_+$ and $\alpha \in \mathrm{R}$. The conditional distribution of $X_\Delta|X_0 = x$ is the normal distribution, whose density function is
$$p(y|x) = \varphi(y; m(\Delta, x), v(\Delta, x))$$
here, φ is the density function of the normal distribution, whose conditional mean and variance are, respectively,
$$m(t,x) = E(X_t|X_0 = x) = e^{\kappa t}x + \alpha(1 - e^{-\kappa t}), \text{ and}$$
$$v(t,x) = var(X_t|X_0 = x) = \frac{\sigma^2(1 - e^{-2\kappa t})}{2\kappa}.$$
- The Cox-Ingersoll-Ross model (Feller's square root process), attributed to Cox et al. (1985). The SDE is given as
$$dX_t = \kappa(\alpha - X_t)dt + \sigma\sqrt{X_t}dWt$$
for $\kappa, \alpha, \sigma \in \mathrm{R}_+$ such that $2\kappa\alpha > \sigma^2$. In this case $X_\Delta|X_0 = x$ follows a noncentral χ^2- distribution. The transition density is $p(y|x) = c\ exp(-u - v)\left(\frac{v}{u}\right)^{q/2} I_q(2\sqrt{uv})$ for $x, y \in R_+$ where $c=2\kappa/(\sigma 2\ (1-exp(-\kappa\Delta)))$, $q=2\kappa\alpha/\sigma 2 - 1$, $u=cx\ exp(-\kappa\Delta)$, $v=cy$, and I_q is the modified Bessel function of order q.

Strong Taylor Approximation: The use of a strong Taylor approximation can be considered for bootstrap sampling. Once we obtain the parameter estimates of the diffusion processes, we can generate a stochastic process from the strong Taylor approximation. In order to define the strong Taylor approximation, we first introduce the absolute error criterion $E(|X_T - Y(T)|)$, where Y is an approximation of X. Next, Y^δ, a discrete-time approximated version of X on the time interval $(\tau)_\delta = \{\tau_n: n = 0, 1, \cdots\}$, is considered strongly converging with the order of γ, if there exist C and δ_0 such that $E(|X_T - Y^\delta(T)|) \le C\delta^\gamma$ for any $\delta \in (0, \delta_0)$. This definition can be naturally understood as a generalization of the deterministic version convergence criterion. The higher value of γ implies a sharper order of convergence, for more details, see Platen (1999). For more convergence results of the strong Taylor approximation,

a discrete-time approximation Y^{δ} is strongly consistent if, for some nonnegative function $c(\delta)$ with $\lim_{\delta \downarrow 0} c(\delta) = 0$, we have

$$E(|E(\frac{Y^{\delta}_{\tau_{n+1}} - Y^{\delta}_{\tau_n}}{\Delta_n}|A_{\tau_n}) - \mu(Y^{\delta}_{\tau_n})|^2) \leq c(\delta) \text{and} E(\frac{1}{\Delta_n}|Y^{\delta}_{\tau_{n+1}} - Y^{\delta}_{\tau_n} - E(Y^{\delta}_{\tau_{n+1}} - Y^{\delta}_{\tau_n}|A_{\tau_n}) - \sigma(Y^{\delta}_{\tau_n})\Delta W_n|^2) \leq c(\delta)$$

for all n=0,1, …, where $\{A_t, t \geq 0\}$ is a family of σ-algebras. The above two conditions roughly imply that Y^{δ} converges to X in terms of the mean and variance. Thus, if an approximation is strongly consistent, then the two processes are pathwisely close to each other. Under some regularity conditions such as the Lipschitz condition and the linear growth bound condition, we formulate the following theorem.

Theorem 1 (Kloeden & Platen, 1992). A strongly consistent equidistant time discrete approximation Y^{δ} *of a* one-dimensional autonomous Ito process X with $Y^{\delta}(0) = X_0$ converges strongly to X.

When we derive a discrete-time approximation in the strong convergence criterion, we refer to it as a strong Taylor approximation.

As shown in the following, the convergence order is determined by how many terms we include in the expansion.

Euler–Maruyama Scheme: The Euler–Maruyama scheme, also called the Euler scheme, is the simplest strong Taylor approximation, and in general, it attains the order of strong convergence $\gamma = 0.5$. The Euler scheme is given by

$$Y_{\tau_{n+1}} = Y_{\tau_n} + (Y_{\tau_n})\Delta + \sigma(Y_{\tau_n})\Delta W$$

where Δ is the length of the interval $[\tau_n, \tau_{n+1}]$ and $\Delta W = W_{\tau_{n+1}} - W_{\tau_n}$ is the increment of the standard Brownian motion W, on $[\tau_n, \tau_{n+1}]$.

Improved Euler Scheme (Heun Method): For the Euler scheme, $Y_{\tau_{n+1}} = Y_{\tau_n} + \mu(Y_{\tau_n})\Delta + \sigma(Y_{\tau_n})\Delta W$, we evaluate the right-hand side of the equation at the beginning of each interval $\tau_n < t < \tau_{n+1}$. We can obtain a more accurate approximation when we include more information of the process from elsewhere, for example, when we use the average of the values at both τ_n and τ_{n+1}. In this case, we have

$$Y_{\tau_{n+1}} = Y_{\tau_n} + \frac{1}{2}\{\mu(Y_{\tau_n}) + \mu(Y_{\tau_{n+1}})\}\Delta + \sigma(Y_{\tau_n})\Delta W$$

This method is not feasible because the unknown quantity $Y_{\tau_{n+1}}$ appears on both. To address this issue, we use the Euler scheme to replace the $Y_{\tau_{n+1}}$ term on the right-hand side. Accordingly, we obtain that

$$\overline{Y}_{\tau_{n+1}} = Y_{\tau_n} + \mu(Y_{\tau_n})\Delta,$$

$$Y_{\tau_{n+1}} = Y_{\tau_n} + \frac{1}{2}\{\mu(Y_{\tau_n}) + \mu(\overline{Y}_{\tau_{n+1}})\}\Delta + \sigma(Y_{\tau_n})\Delta W,$$

or

$$Y_{\tau_{n+1}} = Y_{\tau_n} + \frac{1}{2}\{\mu(Y_{\tau_n}) + \mu(Y_{\tau_n} + \mu(Y_{\tau_n})\Delta)\}\Delta + \sigma(Y_{\tau_n})\Delta W.$$

This approximation is called the improved Euler scheme or the Heun method.

Milstein Scheme: The Milstein scheme is an order 1.0 strong Taylor approximation method. To obtain the Milstein scheme

$$Y_{\tau_{n+1}} = Y_{\tau_n} + \mu\Delta + \sigma\Delta W + \frac{1}{2}\sigma\sigma'\{(\Delta W)^2 - \Delta\}$$

where, $\mu = \mu(Y_{\tau_n})$, $\sigma = \sigma(Y_{\tau_n})$, and $\sigma' = \sigma'(Y_{\tau_n})$, we add the term $\frac{1}{2}\sigma\sigma'\{(\Delta W)^2 - \Delta\}$ to the Euler scheme from the Ito-Taylor expansion.

Order 1.5 Strong Taylor Scheme: An even more accurate approximation can be obtained by including more stochastic Taylor expansion terms. These additional terms consist of stochastic integrals that carry more information about the process. These additional stochastic integral terms play an important role in improving the accuracy of the approximation since they represent the difference between the stochastic differential equations and the deterministic differential equations. To obtain a strong Taylor scheme of order $\gamma = 1.5$, we add more terms to the Milstein scheme utilizing the Ito lemma. Kloeden & Platen (1992) obtain the order 1.5 strong Taylor scheme as follows:

$$Y_{\tau_{n+1}} = Y_{\tau_n} + \mu\Delta + \sigma\Delta W + \frac{1}{2}\sigma\sigma'\{(\Delta W)^2 - \Delta\} + \mu'\sigma\Delta Z + \frac{1}{2}\{\mu\mu' + \frac{1}{2}\sigma^2\mu''\}\Delta^2 + (\mu\sigma' + \frac{1}{2}\sigma^2\sigma''\}\{\Delta W\Delta - \Delta Z\} + \frac{1}{2}\sigma(\sigma\sigma'' + (\sigma')^2)\{\frac{1}{3}(\Delta W)^2 - \Delta\}\Delta W,$$

where, $\mu = \mu(Y_{\tau_n})$, $\mu' = \mu'(Y_{\tau_n})$, $\mu'' = \mu''(Y_{\tau_n})$, $\sigma = \sigma(Y_{\tau_n})$, $\sigma' = \sigma'(Y_{\tau_n})$, $\sigma'' = \sigma''(Y_{\tau_n})$,
and ΔZ is defined as

$$\Delta Z = \int_{\tau_n}^{\tau_{n+1}} \int_{\tau_n}^{s_2} dW_{s_1} ds_2.$$

Hermite Expansion: The Hermite expansion method was first introduced by Aït-Sahalia (1999). For this method, we apply the Lamperti transformation on the original diffusion process so that the transition density of the transformed model would become more suitable for the Hermite expansion. In the below brief overview of the transformations, let $D_x(\underline{x}, \overline{x})$ be the domain of the process X. For the approximation, we first transform X into Y such that

$$Y_t \equiv f(X_t; \theta) = \int_{x^{\#}}^{X_t} \frac{1}{\sigma(u)} du,$$

where $x^{\#}$ is an arbitrary point in the domain D_X. Note that as $\sigma > 0$, the transformation function f is strictly increasing and invertible. We denote $D_Y = (\underline{y}, \overline{y})$ as the domain of Y where $\underline{y} \equiv \lim_{x \to \underline{x}} f(x)$ and $\overline{y} \equiv \lim_{x \to \overline{x}} f(x)$. Then from Ito's lemma, we obtain $dY_t = \mu_Y(Y_t)dt + dW_t$ where

$$\mu_Y(y) = \frac{\mu(f^{-1}(y))}{\sigma(f^{-1}(y))} - \frac{1}{2}\frac{\partial \sigma}{\partial x}(f^{-1}(y)).$$

Next, we transform Y into Z such that $Z_t = \Delta^{-\frac{1}{2}}(Y_t - y_0)$ where $y_0 = f(x_0)$. For the processes X, Y, and Z, Aït-Sahalia (1999) derived their transition densities as follows:

$$p_z(z|y_0) = \Delta^{1/2} p_Y(\Delta^{1/2} z + y_0 | y_0),$$
$$p_Y(y|y_0) = \Delta^{-1/2} p_z(\Delta^{-1/2}(y - y_0)|y_0),$$
$$p_x(x|x_0) = \frac{p_Y(f(x)|f(x_0))}{\sigma(x)},$$

and

$$p_Y(y|y_0) = \sigma(f^{-1}(y)) p_x(f^{-1}(y)|f^{-1}(y_0)).$$

We approximate the transition density of Z as

$$p_Z^{(J)}(z|y_0) \equiv \phi(z) \sum_{j=0}^{J} \eta_j(\Delta, y_0) H_j(z),$$

where φ is the standard normal density and

$$\eta_j(\Delta, y_0) \equiv \frac{1}{j!} \int_{-\infty}^{\infty} H_j(z) p_Z^{(J)}(z|y_0)\, dz.$$

Here H denotes the classical Hermite polynomials, which are given by

$$H_j(z) := e^{z^2/2} \frac{d^j}{dz^j} e^{-z^2/2}, j \geq 0.$$

Finally, we derive the approximated transition densities of Y and X as

$$p_Y^{(J)}(y|y_0) = \Delta^{-\frac{1}{2}} p_Z^{(J)}(\Delta^{-\frac{1}{2}}(y - y_0|y_0) \text{ and } p_X^{(J)}(x|x_0) = \frac{p_Y^{(J)}(f(x)|f(x_0))}{\sigma(x)}.$$

Then the following convergence theorem holds under the conditions assumed in Aït-Sahalia (1999).

Theorem 2 (Aït-Sahalia, 1999). There exists $\overline{\Delta} > 0$ such that for every $\Delta \in (0, \overline{\Delta})$ and $(x_0, x) \in D_X^2$, $p(x|x_0) \to_{J \to \infty} p_X(x|x_0)$.

For the practical implementation of Theorem 1, we first compute $p^{(J)}(z|y_0)$ for a given J. To obtain the coefficients $\eta_j(\Delta, y_0)$ for $j = 0, 1, \ldots, J$, we have

$$\eta_j(\Delta, y_0) = \frac{1}{j!} E\left[H_j\left(\Delta^{-\frac{1}{2}}(Y_{t+\Delta} - y_0)\right) \middle| Y_t = y_0\right].$$

To calculate this expectation, we use the following lemma, which is obtained from the Taylor approximation.

Lemma 1 (Aït-Sahalia, 1999). Let g be a function such that g and all its derivatives have at most exponential growth. Then, for $\Delta \in (0, \overline{\Delta})$, $y_0 \in \mathbb{R}$, there exists $\delta \in [0, \Delta]$ such that

$$E[g(Y_{t+\Delta}|Y_t = y_0)] = \sum_{j=0}^{J}(A^J \cdot g(y_0))\frac{\Delta^j}{j!} + E[A^{J+1} \cdot g(Y_{t+\delta})|Y_t = y_0]\frac{\Delta^{J+1}}{(J+1)!},$$

where A is the infinitesimal operator of the diffusion Y defined by A: $g \to \mu_Y(\cdot)\partial g(\cdot)/\partial y + 1/2\ \partial^2 g(\cdot)/\partial y^2$ and $A^j \cdot g\ (y_0)$ means A applied j times to the function $y \to g(y)$ and evaluated at $y = y_0$.

In practice, we need to consider how many terms should be included in this Taylor series. Aït-Sahalia (1999) suggested that one should first choose the order J and then expand the expectation such that the approximation of the transition density $p_Z^{(J)}(x|x_0)$ is at most of order $\Delta^{J/2}$.

Markov Conditional Bootstrap: Horowitz (2003) proposed the MCB to conduct bootstrap sampling for Markov processes, and he sought to use a transition density to construct the dependency in time series data. We apply this idea by nonparametrically estimating the diffusion transition density. When it is applied to the diffusion model estimation, we expect in general that the nonparametric approaches will perform less accurately than the parametric approaches, since the nonparametric methods involve additional user-dependent factors. However, there are cases in which asymptotic expansion type approximations may not work well enough, so it is still worthwhile to check the performance of the nonparametric method. The MCB estimates the joint and marginal densities as follows:

$$p(x,y) = \frac{1}{(n-1)h_n^2}\sum_{j=2}^{n} K(\frac{x - X_j}{h_n}, \frac{y - Y_j}{h_n})$$

and

$$p(x) = \frac{1}{(n-1)h_n}\sum_{j=2}^{n} K(\frac{x - X_j}{h_n}),$$

where $K(\cdot)$ is the kernel function and h_n is the bandwidth.

3. Monte Carlo Experiments

This section presents the results of the Monte Carlo simulation, which compares the numerical performance of the introduced bootstrap methods. To examine how well the bootstraps perform, we used the Ornstein-Uhlenbeck (OU) process:

$$dX_t = \kappa(\alpha - X_t)dt + \sigma dW_t.$$

We used this process for our simulation as it is one of the most popularly used diffusion models in practice. Furthermore, its transition density function is known in closed form, and its sampling can be carried out without any cumbersome numerical approximation. We use values of $\kappa = 1.0$, $\alpha = 0.6$, and $\sigma = 0.1$ and sample size $n = 300$. We perform 1000 Monte Carlo replications in an experiment. The critical values are obtained from 300 bootstrap iterations, and the coefficients are estimated with the generalized method of moments (GMM). Though applying the exact maximum likelihood estimation is possible for this OU process, we utilize the GMM estimation because the GMM estimation is widely used in practice, whereas the exact maximum likelihood estimation is available only for a few limited diffusion models. In the simulation, we examine the performance of two-tailed t-tests with a significance level of 0.1.

GMM Moment Conditions and the Test Statistic: For the GMM estimation we discretize our diffusion model as follows:

$$X_{t+\Delta} - X_t = \kappa(\alpha - X_t)\Delta + \varepsilon_{t+\Delta},$$

where $E[\varepsilon_{t+\Delta}] = 0$ and $E[\varepsilon_{t+\Delta}^2] = \sigma^2$ following Brennan & Schwartz (1988), Dietrich-Campbell & Schwartz (1986), and Sanders & Unal (2001). We let $\theta = (\alpha, \beta, \sigma^2)$. Given $\varepsilon_{t+\Delta} = X_{t+\Delta} - X_t - \kappa(\alpha - X_t)\Delta$, the vector $f_t(X,\theta)$ is written as

$$f_t(X,\theta) = \begin{pmatrix} \varepsilon_{t+\Delta} \\ \varepsilon_{t+\Delta}X_t \\ \varepsilon_{t+\Delta}^2 - \sigma^2\Delta \\ (\varepsilon_{t+\Delta}^2 - \sigma^2\Delta)X_t \end{pmatrix}.$$

Denoting with θ_0 the true but unknown value of θ, we have $E[f_t(X, \theta_0)] = 0$. The GMM procedure estimates parameter values by finding the values that satisfy the sample version of the moment conditions, where $E[f_t(X, \theta)]$ is replaced with $g_T(X,\theta) = \frac{1}{T}\sum_{t=1}^{T} f_t(X,\theta)$. Then the parameter estimates are given by the minimizer of the quadratic form

$$J_T(\theta) = g'_T(X,\theta)W_T(\theta)g_T(X,\theta),$$

where $W_T(\theta)$ is a positive-definite symmetric matrix. From the matrix differentiation, finding the minimum of $J_T(\theta)$ is equivalent to solving, $D'(\theta)W_T(\theta)\, g_T(X,\theta) = 0$, where $D(\theta)$ is the Jacobian matrix of $g_T(X, \theta)$ with respect to θ. The choice of the weighing matrix W_T is also important since the performance of the GMM estimator θ_n depends on how we define W_T. Hansen (1982) showed that if we let $W_T(\theta) = S^{-1}(\theta)$ where

$$S(\theta) = E\left[f_t(X,\theta)f'_t(X,\theta)\right],$$

then the resulting GMM estimator achieves the smallest asymptotic variance. Denoting $S_0(\theta)$ as an estimator of $S(\theta)$, the asymptotic variance matrix of the GMM estimator is

$$\sigma = \frac{1}{T}(D'_0(\theta)S_0^{-1}(\theta)D_0(\theta))^{-1},$$

where $D_0(\theta)$ is the Jacobian matrix at the estimated values.

We denote the consistent estimator of σ with σ_n; the (r, r) component of σ_n with $(\sigma_n)_{rr}$; and the r'th components of θ and θ_n with θ_r and θ_{nr}, respectively. Thus, the t-statistic for the null hypothesis $H_0: \theta_r = \theta_0$ is $t_{nr} = n^{1/2}(\theta_{nr} - \theta_{0r})/(\varsigma_n)_{rr}^{1/2}$. To obtain the bootstrap versions of t_{nr}, we define $\hat{f}_t(\cdot,\theta) = f_t(\cdot,\theta) - \hat{E}f_t(\cdot,\theta_n)$ using moment conditions such that $\hat{E}\hat{f}_t(\hat{X},\theta) = 0$ where $\hat{E}$ is the bootstrap expectation and $\hat{X}$ is a bootstrap sample. As in Hall & Horowitz (1996) and Andrews (2004), we apply the recentering technique to the bootstrap version since there is no θ such that $\hat{E}f_t(\hat{X},\theta) = 0$ for an overidentified case. The bootstrap estimator of θ, denoted by $\hat{\theta}_n$, is obtained by replacing f_t with $\hat{f}_t$ and X with $\hat{X}$. The bootstrap version of ς_n, denoted by $\hat{\varsigma}_n$, is obtained by replacing f_t with $\hat{f}_t$, X with $\hat{X}$, and θ_n with $\hat{\theta}_n$ in the expression for ς_n. The bootstrap version of the t-statistic is $\hat{t}_{nr} = n^{1/2}(\hat{\theta}_{nr} - \theta_{nr})/(\hat{\varsigma}_n)_{rr}^{1/2}$ where $\hat{\theta}_{nr}$ denotes the r'th component of $\hat{\theta}_n$.

Numerical Results: Table 1 reports the results of the Monte Carlo simulation, listing the differences in the coverage probabilities of the bootstrap tests for nominal 90% confidence intervals. For the comparison of the bootstrap performances, we only focus on the coverage probability of the drift term parameters κ and α, which are known to suffer from large size distortions. Since the Euler and Milstein schemes coincide with each other in the case of the OU process, the simulation of Milstein schemes is not conducted. When the transition density is estimated by a nonparametric method or by the Hermite expansion, it is impossible to generate bootstrap samples with explicit formulae. Therefore, sampling is executed with the accept–reject method.[1] To evaluate the accuracy of each bootstrap method, the summation of the absolute values of differences between the nominal and empirical coverage probabilities in each bootstrap test is shown at the bottom of the table.

As seen in Table 1, the bootstraps utilizing the Hermite expansions of orders 1 and 2 outperform the first-order asymptotic test. However, they do not outperform the Euler approximation, which is unexpected. We conjecture that the accept–reject method brought about some inefficiency in the process of bootstrap sampling. Moreover, the bootstrap method with the best performance is the one utilizing the order 1.5 strong Taylor approximation. The higher the order of strong Taylor approximation, the more accurately the empirical coverage probability from bootstrap is calculated. The nonparametric MCB shows relatively larger errors, as it inevitably involves more factors to adjust, but it at least performs better than first-order asymptotic test even for this simple OU model case.

Table 1: Difference between the Actual and Nominal Coverage Probabilities (Actual – Nominal)

	Asym.	Exact	Tayl. 1.5	Heun	Euler	Herm. 1	Herm. 2	MCB
K	-0.0818	-0.0313	-0.0263	-0.0313	-0.0364	0.0448	0.0400	0.1000
A	-0.0465	-0.0010	0.0040	0.0040	-0.0010	0.0310	-0.0267	-0.0243
Abs. sum	0.1283	0.0323	0.0303	0.0353	0.0374	0.0758	0.0667	0.1243

4. Conclusion

This paper compares the performance of various bootstrap methods that are applicable to diffusion models. Among the various bootstrap methods, those using the idea of a strong Taylor approximation provide the most precise results. The bootstrap using the Hermite expansion fails to perform well possibly because of sampling errors in

[1] The, accept—reject method works as follows. Given a density function *f*, first we choose a density function g and a constant M such that $f(x) \le Mg(x)$. Then we generates $X \sim g, U \sim U_{[0,1]}$. Next we accept $Y = X$ if $U \le f(X)/Mg(X)$, and reject otherwise. Finally, we return to the first step. If we follow this method, it produces a variable Y distributed according to the density function *f*.

accept—reject method. The nonparametric MCB shows relatively poor performance, but it still outperforms the first-order asymptotic test. Based on our results, we suggest using the strong Taylor approximation for bootstrapping diffusion processes. In addition, we also suggest the Hermite expansion method when the diffusion model is more complicated as we only consider a simple diffusion model here. Though the MCB produces rather an unsatisfactory result, we may also consider it when we are not very certain about the model specification, since it surely outperforms the first-order asymptotics. Furthermore, a future study would be needed to reduce the sampling error in accept—reject method, which would enhance the performance of the bootstraps using the Hermite expansion or the nonparametric transition density estimation.

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The Effects of Exchange Rates on Zimbabwe's Exports

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Abstract: The study reviewed the effect of exchange rates on exports in Zimbabwe using the Ordinary Least Squares (OLS) technique. The objective of the study was to examine the effects of exchange rate on export growth in Zimbabwe using mainly the multicurrency era data. This is because the exchange rate plays a key role in policy formulation and implementation. The study is significant as understanding the role of exchange rate on export guides policymakers in coming up with the right policy mix to stimulate exports. Using secondary data from ZIMSTAT and World Bank, obtained results from a robust regression showed that South Africa's exchange rates (SAEXRT) were weakly significant at 10%, South Africa broad money supply (SAM2) was significant at 5% and imports (DDIMP) were important to Zimbabwe's export growth at 1% level of significance. To increase exports, there is a need for policy shift, shifting from overly focusing on foreign direct investment and increasing gross domestic product (GDP) because empirical results showed that FDI and gross domestic product were not significant in the model. Policies such as trade cooperation between South Africa and Zimbabwe may increase exports given the impact of South Africa's broad money supply on Zimbabwe's exports.

Keywords: *Exchange rates, Exports, ordinary least, Zimbabwe*.

1. Introduction

Export returns play a crucial role in many economies including Zimbabwe. The export-led growth hypothesis emphasized that an increase in exports creates employment, increases profit, triggers productivity and increases the country's foreign reserve buffer and thus performing the role of an engine of growth (Romer, 2012). In the same vein, (Edwards, 1998) stated that the export-led growth rule is confirmed by the argument that the foreign exchange from the export growth makes it possible to import capital goods used to increase the production potential of an economy. However, the export growth may be adversely or positively affected by various factors and the exchange rate is one of the key factors (Blanchard, 2010). Therefore, exchange rates strategies are viewed as vital macroeconomic instruments because they affect the decision-making of business investments in an economy. In addition, Paksay, Genc and Semic (2018) stated that exchange rates fluctuations affect many macroeconomic variables such as employment, inflation, interest rates, money supply and export growth. Thus, the significance of exchange rates to the well-being of an economy cannot be underestimated.

In the past decades, Zimbabwe has been facing an immense decline in economic activity. The recovery of the economy of Zimbabwe started with the launch of the Short Term Emergency Recovery Programme (STERP) in March 2009, which abandoned local currency and opted for multicurrency as hyperinflation had rendered the local currency useless. The multicurrency system brought hyperinflation and currency devaluation to an end, laying a foundation for economic recovery. (Sloman, 2006), proclaims that a country that goes through the exchange rate uncertainty could possibly embrace either currency boards in which the country adopted a multicurrency system with the United States of America dollar (USD) as the major currency. This helps to get rid of exchange rate uncertainties which have negative effects on exports and the general economic activities. According to Tulasombat, Buchapattnaskda and Ratanakomut (2015), the exchange rate fluctuations affect exports as it gives uncertainty to the exports earnings whereby risk-averse exporters will reduce their volume of exports. Despite the increasing number of studies, the definite impact of the exchange rate on exports is an open and debatable question.

Background of the Study: When the Bretton Woods system collapsed, many countries adopted the new regime of flexible exchange rates. The exchange rates fluctuations have increased among these countries because of the free movement of goods between borders (Dooley, Folkerts-Landau and Garber, 2004). The exchange rate plays a crucial role in public debate on trade and trade policy in Zimbabwe. Like many other

developing countries, Zimbabwe's economic success depends on the rest of the world and the government of Zimbabwe (GOZ)'s macroeconomic policies. The 'crush' of the Zimbabwe dollar in 1997, led the country's exports earnings to decline by 49% from US$ 2,6 billion in 1997 to US$ 1,3 billion in 2006 causing the foreign exchange buffer to decrease (GOZ, 2012). Similarly, the real sectors of the economy which are agriculture, mining and manufacturing had a negative growth as they succumbed to economic instability faced by the country. Zimbabwe has previously pursued foreign exchange strategies that hampered the growth of exports. For instance, due to foreign currency shortages, the Tradable Foreign Currency Balance Systems (TFCBs) was implemented in 2005 as a dual exchange rate system. The TFCBs framework was coupled with a rampant broad money supply growth which was constantly increasing from 669.9% in May 2006 to 1 438.3 % in November 2006 (Reserve Bank of Zimbabwe (RBZ), 2005). The increased money supply resulted in high speculative demand and it prompted the monetary authorities to depreciate the currency. The TFCBs framework conditions were compelled exporters to retain 70% of their export earnings in foreign currency accounts (FCA), and relinquish 30% to the Reserve bank of Zimbabwe using the foreign currency auction-rate which was pegged at Z$26000 to 1 US$.

The corporate foreign currency accounts balances were reserved for up to 30 days, after which any remaining foreign currency balances were liquidated into the interbank foreign exchange market. In addition, exporters were supposed to sell their foreign currency in FCA balances, at an auction determined rate on the interbank market through authorized dealers (RBZ, 2005). Due to these foreign exchange controls in Zimbabwe, the black market for foreign currency came into existence and was dominated by the US Dollar. Also, the dual-listed counters on the Zimbabwe stock exchange became channels for foreign currency externalization and parallel market dealings (RBZ, 2005). Hence, the black market value for the US Dollar was Zimbabwean $ 330 per US Dollar in January 2002, but it widened to Z$550000 in July 2006 (ZIMSTAT,2008). Thus, the domestic currency was overvalued between the year 2002 and 2006, which drove the government to create special systems for tobacco and gold exporters, while the parallel market premiums were blowing up. Hence, the overvaluation together with the extremely lax monetary and fiscal policies adversely affected the exporters as the increasing of the parallel market premium led to smuggling at the cost of legal exports. Zimbabwe's top export basket is comprised of a few conventional primary products, whose global prices were vulnerable to numerous market changes. These products include gold, ferroalloys, raw tobacco, raw sugar and diamond.

In order to enlarge the export basket, the government emphasized growing trade in services. This saw the services sector contributing 50% to the GDP but accounted for 10% in terms of foreign currency earnings. The sector included tourism, financial, education, health, energy, transport and communications, construction and related engineering services (Industrial Policy Zimbabwe, 2012). The Reserve Bank of Zimbabwe proposed a twenty-five percent point increase in interest rate, in December 2015 in order to bring to an end the quantitative easing policy (RBZ, 2016). As a result, changes in long-term interest rates had a bearing on exchange rates, asset price developments and capital flows. The appreciation of the US dollar against the currency of Zimbabwe's major trading partner (South Africa) raised an alarm concerning the country's export volumes and its trade balance. Hence, the demand for precious minerals like gold and platinum was eroded and their prices declined by 14.6% and 30.9% respectively, in 2015 (RBZ, 2016). Thus, the export receipts for Zimbabwe were further dampened by the appreciation of the US dollar against the Rand. To stimulate the growth of exports, the government implemented several strategies, for instance in 1995, export processing zones (EPZs) were established to promote foreign direct investments (FDI) which would then transform into an increase in manufactured exports.

The EPZ program came with a number of export incentives to promote export-oriented production and development. Hence, Zimbabwe became Africa's breadbasket because of its exports which were mainly on agricultural products like beef, maize, tobacco and other products. But the implementation of the Land Reform policy in 2000 affected the output of these products which resulted in their decrease since Land distribution is in process. The reduction of agricultural exports was much more noticeable than that of mineral exports. Thus, the agricultural production decreased by 51% between the period of 2000 to 2007 and also GDP fell by at least 40% during the same period (RBZ, Monetary Policy Statement, 2009). However, the discovery of precious metals like diamond, platinum and other minerals improved the exports volumes, whereby the mining sector accounts for 52 % of the export earnings. The decline in the commodity prices worldwide affected the country's revenue and also the deficit in the trade balance remained unjustifiable. In

order to survive these challenges, Zimbabwe has been emphasizing on value addition thus production and exportation of processed goods. The Industrial Development Policy (IDP) Framework (2012) aimed at redirecting the economy towards export orientation and international competitiveness. The policy expected to see Zimbabwe being transformed from being an exporter of primary goods to an exporter of secondary and tertiary goods.

Since 2012, the Ministry of Industry and Commerce together with the Ministry of Small and Medium Enterprises has been working together for better policy coordination for Small and Medium Enterprises (SMEs). The ministries aimed at rationalizing and improving the support services and access to technology for SMEs in order to promote their exports. Also, the export market training program for SMEs was established with the view of developing an export culture within the SMEs. In addition, the policy sought to diversify and expand Zimbabwe's export base by and reaching out to new markets and at the same time promote the consumption of goods produced locally (GOZ, 2012). Also, the government has been improving customs administration and eliminating customs delays as a way of simplifying exporting and importing procedures, for example, the Chirundu one-stop border post. Furthermore, the duty drawback system for imported raw materials needed to manufacture exports goods was put in place as an incentive to support export growth.

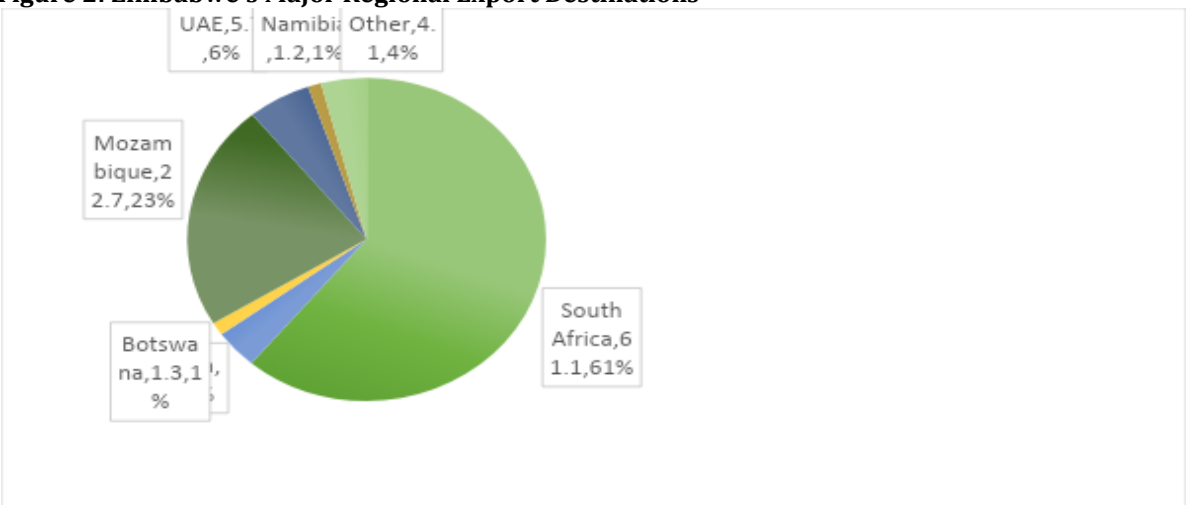
In the same vein, Zimbabwe resuscitated the export credit reinsurance fund in order to restore exporters' confidence and it also joined African Trade Insurance Agency (ATI). ATI is a Common Market for Eastern and Southern Africa (COMESA) institution which provides export credit, political risk and investment insurance. In addition, Zimbabwe's participation at regional and international trade fairs. Publicity campaigns were intensified as witnessed by the deployment of trade promotion officers in strategic and potential markets (GOZ, 2012). Despite all these strategies to develop the export growth, the merchandise exports started declining from US$ 3,882 million in 2012 to US$3,507 million in 2013 and US$2,716 million in 2015 as shown in figure 1 below which shows the country's merchandise export performance for the period 1995 to 2015. This was probably due to de-industrialization and land redistribution and also some factors like the appreciation of the US dollar against other currencies as aforementioned which has led to the reduction in merchandise exports.

Figure 1: Merchandise exports for the period of 1995 to 2015

Source: World Bank, 2016

Most of Zimbabwe's exports are destined to the SADC bloc, with South Africa being the major trading partner followed by Mozambique inter alia (RBZ, Monetary Policy Statement, 2015), as shown in figure 2.

Figure 2: Zimbabwe's Major Regional Export Destinations



Source: Reserve Bank of Zimbabwe, 2019

Though the government implemented policy reforms and undertook measures to revive the export sector, in the past decades, continuous real exchange rate fluctuations together with policy irregularities undermined these efforts. Despite the adoption of the multicurrency regime, export levels continued to decline. The critical question for Zimbabwean policymakers is whether managing exchange rate changes can improve export performance. Though a number of studies have been done on how exchange rates affect exports most studies were carried out in industrialized or developed countries, with only a few studies conducted in Africa. The study was narrowed down to a developing country, Zimbabwe and it focused on the exchange rates of the US Dollar to South African rand, its effects on the export volumes in Zimbabwe. Given South Africa is Zimbabwe's major trading partner, the South African Money supply and exchange rate were used, also considering fixed exchange rates as they create great stability in international trade.

2. Literature Review

This section's focus is on both theoretical and empirical literature reviews on how exchange rates affect exports. Exchange rate-export relationship theories are reviewed first and then followed by a review of studies that examined the relationship between exchange rate and exports.

Theoretical Literature: A number of theoretical models revealed that the effect of exchange rates on exports may be negative or positive depending on the demand for domestic goods and the time taken on trade transactions. Some of the theories are reviewed below.

Elasticity Approach: Lesko and Muchova (2020) stated that the elasticity approach assesses how exports and imports react to changes in the exchange rate. This approach determines the degree to which depreciation would positively affect net exports. If the country experiences currency depreciation locally produced goods become cheaper as compared to imported goods. Thus, exports would increase while imports would decrease. If demand for imports demand is very sensitive to exchange rate change, domestic currency deterioration would cause a disproportional decrease in the country's import bill (Panshak, Civcir and Odzeser, 2019). A nation's foreign exchange reserves depend on its demand for imports and its export supply. An excess supply of foreign currency would cause the net exports to decline and excess demand of foreign currency would result in an improvement of the net exports. The elasticity approach depends on the Marshal-Lerner condition, which states that if the sum of import and export elasticities is greater than the unit, currency devaluation is likely to improve the net exports. If the total price elasticities of demand for exports and imports are less than one, the devaluation of a currency could make imports cheaper relative to exports leading to a decline in the net exports. If the Marshall Lerner condition holds, devaluation may only lead to the improvement of the net export if the sum of import and export elasticities of demand is more than

one. Thus, in this case, it can be noted that the direction of the exchange rate effect on exports is influenced by the elasticities of both imports and export.

Delayed Beneficial Effect or J-Curve Effect: Onakoya and Johnson (2019) posit that when the exchange rates are higher, the country's commodities become expensive to customers outside the country and thus, with high, real exchange rates (ϵ) the nation's export(X) volumes decreases and the imports (IM) bill increases because foreign goods become cheaper. Furthermore, Onakoya and Johnson (2019) indicated that depreciation improves net exports through the delayed beneficial effect or J-curve effect. The delayed beneficial effect theory states that the impact of depreciation is discovered in prices and quantity in the first two months after depreciation. Thus, the import price increases in the domestic country and the export prices decline as quantities of both imports and exports slowly adjust. This takes some time for consumers to realize a price change and also for businesses to move from expensive to less expensive suppliers. Therefore, a depreciation may lead to an initial worsening of the trade balance as imports or exports slowly adjust to change in exchange rate leading to a decrease in net exports ($- NX = X- IM /\epsilon$). Also, Blanchard (2010), states that as time progresses, the impact on the change in the comparative costs of both import and export strengthen. Thus, when real exchange rates deteriorate to an extent that the cost of imports rises in domestic currency terms, the higher import cost would lead to a decrease in the imports demand and the net exports eventually rises. The rise in exports may take six or more months to manifest and is called the delayed beneficial effect or the J-curve effect.

Marshall Lerner Condition: Also the Marshall Lerner condition shows that real depreciation affects the net exports (NX) through three different channels (Dornbusch, Fischer and Startz, 2011). Firstly, real depreciation makes domestic goods become cheap in foreign countries which leads to an increase in international demand for locally produced goods thereby increasing exports. Secondly, real depreciation makes imports more expensive in the domestic country. Thus, the consumers and firms shift their demand towards domestic goods resulting in a decrease in imports. Lastly, if the relative price of foreign goods increased as compared to locally produced goods, the nation's import bill will rise. Due to depreciation, the same quantity of imports costs more to buy in terms of domestic goods (Romer, 2012). A real depreciation may result in a trade balance improvement if the sum of proportionate change in the real exchange rate (EE), change in exports (XX) and change in imports ($IMIM$) would be greater than zero as shown in the equation below: $NXX = EE + XX - IMIM = EE + NXX > 0$. Therefore when the real depreciation causes the net export to increase, then Marshall Lerner Conditions are present.

Empirical Literature: A number of empirical studies produced inconclusive results. Some studies revealed an inverse relationship between exports and exchange rates while other studies reported that exchange rates affect exports positively. In examining the empirical literature, Nyeadi, Atiga and Atogenzoya (2014) used the OLS estimator which the current study adopted. The study investigated how exchange rates affected Ghana's export growth. By employing the OLS technique, it was found that exchange rates had no impact on the export of goods and services. However, gross domestic product, gross national product, total investment and import growth had a significant impact on exports performance. Sekati, Tshoku and Metsileng (2020), studied the impact of real exchange rate volatility on exports in South Africa and found contrasting results. Using GARCH models, Sekati, Tshoku and Metsileng (2020)'s findings supported the assertions that the exchange rates had a significant and negative impact on South Africa's exports to the United States of America.

Using a different methodology but obtaining the same results as Sekati, Tshoku and Metsileng (2020) established a negative relationship between exchange rates and export performance. Applying Cointegration Analysis, Genc and Attar (2014) explored the effect of exchange rates on imports and exports in the 22 emerging countries. The study found that in the long run exchange rates and export were co-integrated. Tulasombat, et al. (2015), scrutinized the relationship between exchange rates and agricultural exports in Thailand using the linear regression method and found an inverse relationship between real exchange rates and exports. From the reviewed literature above, it is apparent that the relationship between exchange rates and exports exist but the nexus is still ambiguous and varies across countries and periods under review. Thus the study sought to establish the relationship between Zimbabwe exports and the exchange rate.

3. Methodology

The section presents the methodology used in assessing the impact of exchange rates on exports in Zimbabwe using data from ZIMSTATs and the World Bank. Model specification and statistical diagnostic tests and model results are discussed in this section.

Model Specification: The underlying theory on effects of exchange rates on exports and empirical studies carried by Sandu and Ghiba (2011), Nyeadi, et al. (2014), and Genc and Attar (2014) provides the foundation for the ordinary least squares model that was used in the study. The export growth or volume function as expressed below: EXPg =f(SAEXRT, GDP,FDI,IMP,SAM2)
The model is then specified as:
EXPg = α+1GDP+2IMP+3SAEXRT+4 FDI+5 SAM2+t
Where EXpg is the dependent variable and is defined as the growth of exports
Explanatory variables are as follows:
GDP – gross domestic product
IMP– import growth
EXRT- exchange rates
FDI - foreign direct investment
SAM2 - broad money supply
t– Error term capturing all other variables

Variable Justification

Exports: These are goods and services transactions between residents of a country and the rest of the world including changing of ownership from residents to non-residents of general merchandise. The export growth is the dependent variable.

Gross Domestic Product: It is the monetary value of all finished goods and services produced within the country's borders at a given time period (Mankiw, 2019). Since exports bring revenue into the country which enhances the importation of capital goods that in turn increase in GDP is expected to influence exports positively.

Broad Money Supply (M2): Broad money supply is the total currency held by the public, transaction deposits at banking institutions plus savings deposits. A decrease in money supply will lead to an appreciation of exchange rates, a decrease in output and hence a reduction of exports. An increase in the money supply of export receiving countries is expected to have a positive effect on exports as this improves international demand for exports (Blanchard, 2010). Thus local money supply is expected to negatively influence the exports while the international money supply is expected to positively influence exports.

Foreign Direct Investment: It is the establishment of business entities or securing of business assets in another country, such as proprietorship made by a company or individual in one country to another country. Foreign direct investment is an important tool for technology transfer which in turn increases the exporting capability in the host country (Blanchard, 2010). Hence foreign direct investment is expected to influence exports positively.

Imports: These are the total goods and services brought into the country from abroad. The rise in imports may increase exports if the imports are of capital goods or raw materials which in turn increase production. Hence, a positive coefficient is expected for this variable.

Exchange Rates: This refers to the rate at which one national currency exchanges for another, and the rate is expressed as the amount of one currency that is necessary to purchase one unit of another currency, (Blanchard, 2010). The exchange rates are expected to negatively affect the export growth on the basis that the appreciation of the major currency (USD) against the currency (Rand) of the country's dominant trading partner South Africa, reduces the volume of goods and services exported.

Model Estimation Procedures: The study employed the Ordinary Least Squares (OLS) method because of its ability to produce the minimum sum of squared deviations between the explained and the explanatory variables and also its ability to produce estimates that are Best Linear Unbiased Estimates (BLUE), (Gujarati and Porter, 2008). GARCH could have been used to validate the OLS results, but the sample size was too small for GARCH to bring out meaningful results, and thus OLS was the best model to apply for the study.

Diagnostic Tests

Unit Root Test: This study adopted the Augmented Dickey-Fuller (ADF) to test for the existence of unit root**.** The utilization of non-stationary time series data in a Classical Linear Regression Model gives biased or misleading results that are inconsistent and have a low Durbin Watson (DW) statistic, (Gujarati and Porter, 2008). To avoid the violation of the basic Classical Linear Regression Model (CLRM) assumptions and from getting spurious results data was tested for unit root. The unit root results are shown in Table 2,

Table 1: Unit Root Test Results

Variable	ADF Probability Value	Integration Order	Conclusion
EXP	1.000	0	Non stationary
GDP	1.000	0	Non stationary
IMP	1.000	0	Non stationary
SAEXRT	0.8643	0	Non stationary
FDI	0.4981	0	Non stationary
SAM2	0.0000	0	stationary

Table 1 above shows that the variables are not stationary, with the exception of SAM2 only being stationary. Hence the data was differenced and tested at different levels as shown in table 2 below:

Table 2: Unit Root Results after Differencing

Variable	ADF Probability Value before differencing	ADF probability After first differencing	ADF after Second differencing	Integration order	conclusion
DEXP	1	0.0249		1	stationary
DDGDP	1	1	0.0285	2	stationary
DDIMP	1	0.2413	0.0612	2	stationary
DSAEXRT	0.8643	0.0357		1	stationary
DFDI	0.4981	0		1	stationary
SAM2	0			0	stationary

D behind the variables means first difference and DD means second difference.

The Augmented Dickey-Fuller Test (ADF) which tests the existence of a unit root was used to test for stationarity of variables after differencing. Table 2 above shows that SAM2 is integrated of order zero. The variables EXP, SAEXRT GDP, IMP and FDI are not stationary and they had a unit root. After being differenced EXP, SAEXRT and FDI became stationary at the integration of order one while GDP and IMP became stationary at integration at order two.

Normality Test: Normality is one of the Classical Linear Regression Model (CLRM) assumptions and testing for normality is very important in regression analysis. The study employed the Jacque-Bera test for normality test. The presence of heteroscedasticity normally gives us the confidence intervals and significant test which are unreliable and also overestimated standard errors. Normality test results are shown in Table 3 below;

Table 3: Normality Test Results

Variable	Pr (Skewness)	Adj (X2)	Prob>X2
DEXP	0.0000	14.92	0.006
DDGDP	0.0005	11.39	0.0034
DDIMP	0.0000	15.81	0.0004
DSAEXRT	0.010	9.06	0.0108
DFDI	0.136	8.46	0.0146
SAM2	0.0000	20.67	0.0000

The null hypothesis is that the data is normally distributed and the skewness is zero. From the above table, the skewness for DEXP, DDGDP, DDIMP and SAM2 is zero and thus is normally distributed. The variables that satisfy the normality assumption may lead to unreliable results.

4. Presentation and Analysis of Results

After the data was subjected to do data diagnostic tests, it was then further processed to highlight the effects of the exchange rate on Zimbabwe's exports.

Robust Regression Estimation: Robust regression is a technique of weighted and unweighted least squares regression that can be employed on the parametric and non-parametric data for the elimination of outliers. The outliers in a data set have a tendency of pulling the least-squares fit too far from their direction by receiving extra weight than they deserve leading to spurious results from regression coefficients. The robust regression dampens the effects of the outliers for better fitting the rest of the data. Hence the results were considered reliable for reporting and interpretation. The regression results are presented in Table 4.

Table 4: Regression Results

DEXP	COEF	STD ERROR	t	P>t	(95% conf	Interval)
Dependent Variable: EXP						
DDGDP	-0.0843477	0.0653815	-1.29	0.219	-0.225957	0.0569004
DDIMP	0.2509522	0.0713115	3.52	0.004	0.968931	0.4050113
DSAEXRT	-2.12e+08	1.08e+08	-1.97	0.070	-4.45e+08	2.04e+07
DFDI	0.8328289	0.9078919	0.92	0.376	-1.128552	2.79421
SAM2	-8.11e+07	3.59e+07	-2.26	0.042	-1.59e+08	-3601307
_CONS	7.85e+08	3.53e+08	2.22	0.045	2.22e+07	1.55e+09
Number of observations = 19			*R-Squared = 0.6494*			
Prob> F = 0.03			*Adjusted R = 0.5146*			
			Root MSE = 3.7e+08			

The variables SAERXT was negative and significant at a 10% level of significance, SAM2 was negative and significant at 5% and domestic imports were found to be positive and significant at a 1% level of significance. Thus, exchange rate uncertainty adversely affects exports as the marginal producers' will shift to non-traded goods or limit their output due to their risk-averse leading to a decline in exports, as argued by (Sandu and Ghiba, 2011). Positive significant domestic imports were found to be consistent with our expectations and literature reviewed Nyeadi, et al. (2014) and Genc and Attar (2014). Both the R2 and Adjusted R2 were greater than 0.5 with values of 0.6494 and 0.5146 respectively. This shows that R2 is reliable and the model is of good fit as about 64% of variations in export growth are explained by combined variations in the explanatory variables. Moreover, the F- statistic probability value is 0.0355 which is less than 0.05 implying that the whole model is significant at a 5% level. The coefficient of South Africa's broad money supply (SAM2) was found to be negative and statistically significant at 5%. The negative and significant SAM2 shows that as the South African money supply decreases, it leads to a reduction in spending by the South Africans and a decrease in Zimbabwe's export volumes. These findings support the view that a reduction in international money supply reduces demand for exports (Dornbusch, Fischer and Startz, 2011).

5. Conclusion and Recommendations

The regression results show that South Africa's exchange rates (SAEXRT) were weakly significant at 10%, South Africa broad money supply (SAM2) was significant at 5% and imports (DDIMP) is very important to the export growth, as it had a 1% level of significance. Given the conclusion, the study recommended a number of policy measures. To increase exports, there is a need to focus on domestic imports given their impact on export. Where imports are of a capital nature, there is a need to increase capital imports to increase the production of exports. There is also a need to shift policies from foreign direct investment because empirical results have shown that they don't have any significant impact on export growth. Given the effect of South Africa's broad money supply on Zimbabwe's exports, policymakers may consider cooperation through a quota system to alleviate the negative effect of the reduction in South Africa's broad money supply on Zimbabwe's exports.

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Regional Differentials in Early Antenatal Care, Health Facility Delivery and Early Postnatal Care among Women in Uganda

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Abstract: This study aimed at examining regional differentials in maternal healthcare services in Uganda. Using a sample of 1,521 women of reproductive ages (15-49) from Eastern and Western sub-regions of Uganda, and non-linear Oaxaca' Blinder Multivariate Decomposition method, we assessed differentials in utilization of early antenatal care, health facility delivery and early postnatal care services among the women, henceforth, establishing main predictors of regional inequalities that will enable policymakers to make better evenly interventions and focused decisions. The study reveals that differentials in the utilization of maternal healthcare services are not only hindered by social and economic barriers, but also widespread disparities in the utilization of existing services. Significant differentials were attributed to both variation in women's characteristics and effects of coefficients. Findings showed that the gap in early antenatal care would reduce on average by 31.6% and 34.7% of differences in availability of community health workers and media exposure respectively, were to disappear. Furthermore, the gap would increase on average by 68.8% and 12.6% in absence of the variation in effects of maternal education, and wealth respectively. The gap in health facility delivery would reduce on average by 24.6% and 37.2% of differences in community health worker availability and media exposure were to disappear respectively and increase on average by 54.9% in the absence of variations in effects of maternal education. The gap in EPNC would reduce on average by 18.5% and 17.17% of differences in maternal education and community health worker availability were to disappear respectively and increase on average by 52.8% and 8.4% in the absence of the variation in effects of maternal education and wealth respectively. Progress towards equitable maternal health care should focus more on strategies that guarantee even distribution of community health workers, broad dissemination of maternal healthcare information and girl child education completion in Uganda.

Keywords: *Regional decomposition, Oaxaca' Blinder, Early ANC, health facility delivery, EPNC.*

1. Introduction

Maternal health is one of the ultimate rights of every woman to be enjoyed, without distinction of demographic, social or economic conditions (WHO, 2017). According to United Nations Children's Fund (UNICEF), a newborn or expectant mother dies somewhere in less than half a minute from circumstances that may perhaps be avoided and averted (UNICEF, 2019). Every day, approximately 810 women die globally from pregnancy-related complications, and inequalities to quality maternal health services still exist (WHO, 2019). Equal and early care make it possible for health workers to evenly offer maternal care among women, and discover avoidable and or preventable complications on time (Bbaale & Guloba, 2011; Rice, 2019; Rutaremwa, Wandera, Jhamba, Akiror, & Kiconco, 2015; UNICEF, 2019). Different studies in developing countries have attributed uneven and delayed utilization in Maternal Health Care Service (MHCS) utilization to a combination of reasons such as distance to a hospital or clinic, cost of receiving services, different income levels, maternal age, maternal education, availability of community workers.

Parity and exposure to maternal health information (Emelumadu et al., 2014; Golooba-Mutebi, 2011 Ricketts & Goldsmith, 2005 Wudineh, Nigusie, Gesese, Tesu, & Beyene, 2018). Safe Motherhood programs (SMP) and the Uganda National Population Policy sought to address reasons for uneven and delayed maternal health care accessibility by promoting informed choice, equitable and improved quality of Maternal and Infant health care. Equity in the health sector has long been considered an essential objective of the health system (Houweling, Ronsmans, Campbell, & Kunst, 2007; WHO, 2015b). However, low use of maternal health services coupled with enormous spatial disparities requires a significant shift to increase better service coverage and better policy formulation (Adeyanju, Tubeuf, & Ensor, 2017; Fang et al., 2010; Pallikadavath, Foss, & Stones, 2004b). Even distribution of MHCS and early care is essential in preventing and lowering

mortality and or mortality keeping the mother and her newborn healthy (Kerber et al., 2007; UBOS, 2017). Even though Uganda over the years registered progress in maternal health wellness programs, regional disparities were evident in the early utilization of maternal care services (UBOS, 2017).

Besides, the country's maternal mortality rate is still among the highest globally at 440 deaths per 100,000 live births (Rice, 2019; UNICEF, 2019) compared to the average target of 70 deaths per 100,000 live births (Norton, 2016). Uganda's strive after the United Nations (UN) proposed Sustainable Development Goal 3.1 on lowering maternal mortality and Goal 10 regarding reduced inequalities can be accomplished by better interventions aiming at even distribution and early MHCS access (WHO, 2015a, 2015b). Therefore, the importance of this study is to establish regional differentials in the utilization of early antenatal care, health facility delivery and early postnatal care in Uganda. This research contributes towards an improved understanding of balanced interventions regarding equity, early maternal healthcare utilization, and quality of care that will assist policymakers to focus their interventions and create better decisions.

2. Literature Review

Fairness in the health sector is considered a vital goal of every health system (Houweling et al., 2007; WHO, 2015b). According to Pallikadavath et al. (2004b), low use of maternal health services coupled with enormous regional disparities with socio-economic and cultural changes require a substantial change in priorities to increase better service coverage and better policy formulation. A study by Magadi, Zulu, and Brockerhoff (2003) revealed that maternal health inequalities are still high in most areas across nations of sub-Saharan Africa. In most developing countries, inequalities were evident due to differentials in distance to the health facility, age, clinic availability, maternal education (Say & Raine, 2007) and availability of government health workers (Pal, 2015). In Malawi, inequalities were mainly because of different geographical locations, education and wealth (Yaya, Bishwajit, & Shah, 2016). In Nigeria, access to health facility delivery had greater levels of inequalities and was determined mainly by the less educated, poor and rural dwellers (Adeyanju et al., 2017). This was further confirmed in China (Liu, Gao, & Yan, 2014) and Bangladesh, (Khan, Islam, & Rahman, 2018). In India, pregnant women from impoverished backgrounds with many children were the least likely to obtain prenatal check-ups and services in the major northern zones (Pallikadavath, Foss, & Stones, 2004a).

A study carried out in Namibia showed that women with a high level of education residing in urban places, originating from regions with high human development indicators had a higher utilization factor of maternal health care services (Zere, Oluwole, Kirigia, Mwikisa, & Mbeeli, 2011). In the presence of inequities, it is hard to reduce maternal mortality ratios and identify better maternal interventions for different groups (Liu et al., 2014). Among North African countries, maternal utilization services are unevenly enjoyed by distinct socioeconomic strata especially unacceptable differentials between the rich and poor (Boutayeb & Helmert, 2011), large urban-rural disparities in Vietnam (Tran et al., 2011), differences between privileged and underprivileged cities in USA (Alexander, Kogan, & Nabukera, 2002). In Brazil, reduction in income inequalities among the wealthy and poor populations, improved maternal education, cash waivers, improvements in hygiene led to improved equality in maternal health utilization between different regions (Victora et al., 2011). In Uganda, despite the fact that women who live in Western regions had higher odds of utilizing maternal health care services (Rutaremwa et al., 2015), according to UBOS (2017), they had a low utilization factor in all maternal health services as compared to women from Eastern sub-region. Furthermore, household welfare, high maternal education levels and community knowledge about health, gradually reduce inequalities in health (Ssewanyana & Kasirye, 2012).

Arthur (2012), reveals that considerable variations existed in the usage of prenatal care in different regions of Ghana due to insufficient health workers and facilities in some of the regions. Likewise, Rai, Singh, and Singh (2012) found that though most women deliver from institutions, the exposed with a good education utilized the services earlier compared to their counterparts. In China, regional health inequality was associated with different wealth quintiles and the availability of resources (Fang et al., 2010). In Nigeria, migrants, women with low education levels and incomes predicted inequalities and at the same time represented the common perception to judge MHCS gaps (Ononokpono & Odimegwu, 2014). Furthermore, differentials in maternal outcomes were common in women from lower socioeconomic classes, certain ethnic groups, and living in

suburbs (de Graaf, Steegers, & Bonsel, 2013). Findings by Singh, Rai, Alagarajan, and Singh (2012) indicated that main variations in the use of maternal healthcare were associated with educational attainment, financial status and area of residence. The use of maternal health care and treatment services is not only associated with socio-economic and cultural issues but also with geographical places (Navaneetham & Dharmalingam, 2002). Additionally, Lavado and Lagrada (2008) revealed that, in the Visayas, inequality in maternal and child health services utilization was more across regions. Houweling et al. (2007), findings on poor-rich differentials in maternity utilization in 45 developing countries revealed that, place of delivery nursing care favors the wealthy in most states.

3. Methodology

The Uganda Demographic and Health Survey (UDHS) conducted during the period 2015/16 were used in this study. This UDHS implemented by the Uganda Bureau of Statistics (UBOS) provides information on key demographic and population characteristics for giving up-to-date maternal health indicators. Consent and authorization to make use of the data were acquired from ICF Macro International U.S.A, DHS Program. Based on our previous study (Atuhaire, Atuhaire, Wamala, & Nansubuga, 2020), 939 women from Eastern and 582 women from Western sub-regions were sampled. The selection was based on the two sub-regions having almost similar economic indicators but with different maternal healthcare utilization factors (UBOS, 2017). Using available information, we created three outcome variables defined as; early antenatal care (EANC) (women who utilized first antenatal care within the three months of pregnancy), health facility delivery (HFD) (women who had institutional deliveries) and early postnatal care (women who received the first PNC within 2 days after giving birth). The predictor variables included maternal age, education, wealth, marital status if the pregnancy was wanted or not, media exposure, complications during pregnancy, available health workers in the community if the distance to a health facility was problematic or not, and costs of service (Atuhaire et al., 2020).

Data Analysis: Data were processed and analyzed using STATA 13.0 (Stata, 2013). Descriptive summary statistics showing differentials in women's characteristics and a bar graph of the differences in the outcome variables were carried out. Thereafter, percentage differences in EANC, HFD and EPNC were distributed according to the demographic, social and economic characteristics obtained. Lastly, the Blinder-Oaxaca decomposition technique using a logistic model to partition differences between Eastern (A) and Western (B) sub-regions into components attributable to variation in women's characteristics and variation in the effect of coefficients fitted. The decomposition was based on equations (1), (2) and (3) as shown below:

$$\overline{Y}_A - \overline{Y}_B = \overline{F(X_A\beta_A)} - \overline{F(X_B\beta_B)} \qquad (1)$$

The mean difference between women in different regions was further decomposed as below:

$$\overline{Y}_A - \overline{Y}_B = \left\{\overline{F(X_A\beta_A)} - \overline{F(X_B\beta_A)}\right\} + \left\{\overline{F(X_B\beta_A)} - \overline{F(X_B\beta_B)}\right\} \qquad (2)$$

The above equation can be summarized as;

$$\overline{Y}_A - \overline{Y}_B = E - C \qquad (3)$$

Where $\overline{Y}_A - \overline{Y}_B$ implies inequalities/differences in mean level outcomes between Eastern and Western sub-regions. The component E denotes the part of the differential accountable to differences in characteristics. The component C denotes the part of the differential attributable to variations in coefficients and $X\beta$ denotes the coefficients of characteristics of women. F Follows a logistic function mapping $X(X\beta)$ to Y. Associations between the variables and differences attributed to compositional variations and predictor variations were established at 5% level of significance.

4. Results and Discussion

This section presents the descriptive characteristics of Eastern and Western women, the differences in EANC, HFD and EPNC between the women, decomposition of change in EANC, HFD and EPNC and discussion of results. Table 1 reveals that the main disparities in percent distribution of women by their characteristics were identified in maternal highest education level, distance to the health facility, wealth, availability of community health worker and media exposure. The findings reveal that more than 16% of women in the Western region have incomplete primary education compared to women from the Eastern region, and more than 14% of women in the Eastern region have some secondary education, this implies that more women in

the Eastern sub-region have complete primary education as compared to women from Western sub-region. Furthermore, regarding the highest maternal level, in both regions, the majority of women had below primary level 47.1% for Eastern and 63.8% for Western in comparison to other categories.

In relation to wealth, a difference in distribution was observed among poor and rich women; the majority of women in the Western are poorer than those of the Eastern (14.7%) sub-region and the proportion of rich women in Eastern is higher than those in Western sub-region (11.4%). This finding agrees with Houweling et al. (2007) who revealed that EANC, HFD and EPNC utilization is much higher among rich households compared to poor households in developing countries. Additionally, results show that distance to reach the health facility is a bigger problem in the Western compared to the Eastern sub-region (8.5%) and community health workers are more readily available in the Eastern (76.5%) than in the Western sub region (56.9%). There was a relatively large difference in the percentage distribution of women who were exposed to any form of media between Eastern and Western sub-regions (14.9%). In addition, six out of every ten women in Eastern are exposed to media as compared to four out of ten women in the Western sub-region.

Table 1: Distribution by Characteristics of Women

Characteristics	Eastern (n=939)	Western (n=582)	Difference (%)
Age			
15-19	28.13	31.75	-3.62
20-34	61.78	58.24	3.54
35-49	10.09	10.01	0.89
Maternal Education Level			
Below primary	47.1	63.8	-16.7
Completed primary seven	14.6	13.3	1.3
Some secondary	32.0	18.0	14
Completed secondary six	6.3	4.9	1.4
Marital Status			
Unmarried	70.6	69.8	0.8
Married	29.4	30.2	-0.8
Wealth			
Poor	33.2	47.5	-14.3
Middle	25.9	23.0	2.90
Rich	40.9	29.5	11.4
Distance to Health Facility			
Not big problem	60.3	51.8	8.5
Big problem	39.7	48.2	-8.5
Cost of Service			
Not big problem	56.0	52.8	3.2
Big problem	44.0	47.2	-3.2
Availability of a Health Worker in Community			
Not readily available	23.5	43.1	-19.6
Readily available	76.5	56.9	19.6
Exposure to media			
Not exposed to media	37.7	52.6	-14.9
Exposed to media	62.3	47.4	14.9
Pregnancy Wanted			
No	26.2	27.1	-0.9
Yes	73.8	72.9	0.9
Complications			
No	97.4	96.5	0.9
Yes	2.60	3.50	-0.9

Table 2 presents the weighted differences between Eastern and Western women by their characteristics, who are summarized as follows: EANC was higher for women who completed senior six (advance level) (Eastern 36.8% and western 32%) with a percentage difference of 4.8%, the unmarried (21.8% and 17.8% (=4%)) and among the rich (26% and 22.2% (=3.8%)). However, the main difference was observed among women with some primary education levels (21.5% and 15.9% (=5.6%)). The percentage difference in HFD between Eastern and Western was high in a community with readily available health workers (80.4% and 58.7% (=21.7%)). However, there was a slight difference in HFD between Eastern and Western women who completed senior six (78.2% and 75.8% (=2.4%)), and those with the cost of service problems (72.8% and 70.3% (=2.5%)). Percentage differences in EPNC between Eastern and Western women were higher among those who completed senior six (53.8% and 38% (=15.8%)) and among women without distance to the health facility problems (41.3% and 3.3% (=11.0%)). EPNC was higher among the rich quintile for Eastern and Western women (60.2% and 54.7%) respectively.

Table 2: Differences in EANC, HFD and EPNC between Women in Eastern and Western sub Regions Distributed by Background Characteristics

Characteristics	Early ANC		Health Facility delivery		EPNC	
	Eastern	Western	Eastern	Western	Eastern	Western
Age						
15-19	29.9	27.2	54.0		39.9	34.2
20-34	23.2	21.5	58.8		43.1	36.5
35-49	27.8	26.8	63.0		41.8	37.8
Maternal Education						
Below primary	21.5	15.9	74.8	58.1	36.5	30.1
Completed primary 7	21.9	21.9	76.7	60.9	39.7	36.9
Some secondary	33.8	31.8	78.0	69.8	40.2	36.8
Completed secondary six	36.8	32.0	78.2	75.8	53.8	38.0
Marital Status						
Unmarried	21.8	17.3	76.8	56.3	39.8	36.3
Married	24.0	21.4	78.0	58.4	43.0	38.9
Wealth						
Poor	20.2	20.8	77.2	57.8	38.2	37.9
Middle	27.7	25.4	80.7	58.4	43.7	38.4
Rich	22.2	26.0	79.2	60.2	60.2	54.7
Distance to Facility						
Not big problem	29.7	27.4	79.7	60.4	40.7	37.4
Big problem	21.3	23.5	75.3	57.0	41.3	30.3
Costs of Service						
Not big problem	23.8	22.3	72.8	70.3	43.8	39.1
Big problem	21.2	21.5	69.2	56.5	36.2	36.5
Availability of a Health Worker in Community						
Not readily available	22.8	21.2	79.8	50.2	28.8	29.2
Readily available	30.4	28.5	80.4	68.5	42.4	39.4
Exposure to Media						
Not exposed to media	21.7	21.2	77.7	56.9	30.5	30.0
Exposed to media	27.9	25.6	79.3	58.0	42.6	35.2

Characteristics	Early ANC		Health Facility delivery		EPNC	
	Eastern	Western	Eastern	Western	Eastern	Western
Pregnancy Wanted						
No	17.4	18.5	77.8	57.3	40.3	35.3
Yes	22.0	21.1	78.2	58.5	43.7	39.0
Complications						
No	23.5	22.9	77.1	57.2	20.2	19.5
Yes	29.3	27.9	82.4	68.5	45.4	40.2
TOTAL	**28.1**	**25.1**	**77**	**57**	**43.3**	**38.9**

Note: level of significance *p<0.05,

Results in Figure 1 reveal that disparities exist in the utilization of early ANC, HFD and EPNC between Eastern and Western women. The results show the biggest difference to be in health facility delivery (20%). Western sub-region has a low utilization factor in all maternal health care services as compared to Eastern.

Decomposition of Differences in EANC, HFD and EPNC Services: A multivariate decomposition logistic regression model was used to decompose differences in EANC, HFD and EPNC between women in Eastern and Western sub-regions. The differentials are attributed to variation in their characteristics/ endowments (E) and variation in the effects of the predictors/coefficients (C) as indicated in Tables 3, 4, 5 and 6. Results in Table 3 reveal that differences in early ANC, health facility delivery and EPNC between the selected sub regions were significantly attributed to both variations in the characteristics and variations in effects of predictors (p<0.05). Overall, about 57.39%, 63.88% and 59.06% of the gap in EANC, HFD and EPNC respectively, is attributed to differences in characteristics of women. In contrast, 42.61%, 36.12% and 40.94% of the gap are attributed to differences in the effects of coefficients.

Figure 1: Multiple Bar Chart Showing Percentage Distribution of Women by EANC, HFD and EPNC

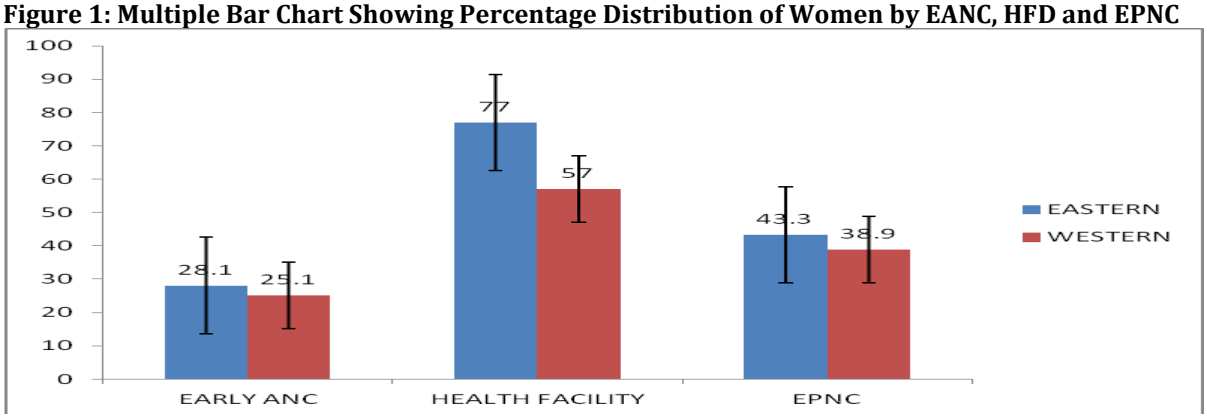

Table 3: Summary of Decomposition of Early ANC, Health Facility Delivery and EPNC Services

	Early ANC			Health Facility Delivery			EPNC		
Components	**Coef**	**p-value**	**%**	**Coef**	**p-value**	**%**	**Coef.**	**p-value**	**%**
E	0.194	0.000	57.39	0.260	0.001	63.88	0.225	0.000	59.06
C	0.145	0.000	42.61	0.147	0.000	36.12	0.156	0.003	40.94
R	0.339	0.000	100	0.407	0.001	100	0.381	0.003	100

Note: Overall decomposition results of early ANC, health facility delivery and EPNC; n=1521: variations to differences in endowments (E) and effects of coefficients(C); R is the total variation.

Decomposition of Early ANC Due to Differences in Characteristics and Effects of Coefficients

Variations Due to Differences in Characteristics of Women: Overall, variation in the characteristics of women contributed about 57.39% to the overall gap in early ANC between the two sub regions. Specifically, at 5 % level of significance, the differences were significantly attributed to maternal education (-6.5%), marital status (0.2%), availability of a health worker in the community (34.72%), media exposure (31.6%) and desire for pregnancy (0.75%). In Turkey, strong demographic differentials existed between different nationals regardless of their socio-economic statuses (Koc, Hancioglu, & Cavlin, 2008). The positive percentages indicate the proportion in which the total gap would decrease if the disparities in women's characteristics in the different sub regions were to disappear. In contrast, the negative percentage reveals the proportion to which the gap in early ANC would increase if the differences in the characteristics of women were to disappear. The overall gap in early ANC between Eastern and Western sub regions would reduce mainly if differences in availability of community health workers and media exposure were to disappear and increase without differences in maternal education.

Variations Due to Differences in Effects of Coefficients: Variations in the effects of coefficients on early ANC between Eastern and Western subregions contribute about 42.61% to the overall change, with the difference in intercepts accounting for this most. Specifically, the differences were significantly attributed to variation in the effects of maternal education (-68.8%), wealth (12.6%) and availability of health workers in the community (2.4%) ($p<0.05$. Especially, the overall gap would increase on average by 68.8%, 12.6% and 2.4% in the absence of the variation in the effects of maternal education, wealth, and community health worker respectively.

Table 4: Decomposition of Early ANC Due to Differences in Characteristics and Effects of Coefficients

Variables	Differences in Characteristics(E)			Differences in Effects of Coefficients(C)		
	Coefficient	p-value	Percent	Coefficient	p-value	Percent
Age						
15-19	1.000			1.000		
20-34	-0.182	0.104	-0.26	-0.759	0.939	-0.22
35-49	1.335	0.614	-0.29	-3.096	0.700	-0.91
Highest Maternal Education						
Below primary	1.000			1.000		
Completed primary 7	-8.394	**0.002**	-2.48	-120.341	**0.014**	-23.40
Some secondary	-6.323	**0.000**	-2.29	-23.781	**0.005**	-26.70
Completed secondary 6	0.089	**0.017**	-1.73	-12.012	**0.036**	-18.70
Marital Status						
Unmarried	1.000			.000		
Married	1.568	**0.000**	0.2	-49.461	0.302	-14.6
Wealth						
Poor	1.000			1.000		
Middle	-4.819	0.822	-1.4	-33.948	**0.008**	-10.02
Rich	-5.886	0.821	-1.33	-7.017	**0.017**	-2.58
Distance to Health Facility						
Not big problem	1.000			1.000		
Big problem	-0.552	0.166	-0.16	0.365	0.689	0.077
Cost of Service						
Not big problem	1.000			1.000		
Big problem	-2.098	0.232	-0.07	-0.041	0.527	-1.92
Availability of a Health						

Variables	Differences in Characteristics(E)			Differences in Effects of Coefficients(C)		
	Coefficient	p-value	Percent	Coefficient	p-value	Percent
Worker in Community						
Not readily available						
Readily available	1.000			1.000		
	116.50	**0.000**	34.72	-8.119	**0.009**	-2.40
Exposure to media						
Not exposed media	1.000			1.000		
Exposed to media	1.369	**0.002**	31.6	12.439	0.319	3.67
Pregnancy Wanted						
No	1.000			1.000		
Yes	2.529	**0.00**1	0.75	8.153	0.328	-2.41
Complications						
No	1.000			1.000		
Yes	-0.184	0.335	-0.05	9.818	0.401	1.91
Constant				494.080	0.053	145.223
Total	0.194	**0.000**	57.39	0.145	**0.000**	42.61

Decomposition of Health Facility Delivery Due to Differences in Characteristics and Effects of Coefficients

Variations Due to Differences in Characteristics of Women: Generally, variation in the characteristics of women contributed about 63.88% to the total gap in health facility delivery between Eastern and Western sub regions. Specifically, the differences were significantly attributed to the highest maternal education (-8.89%), community health worker availability (24.62%), media exposure (34.7%), and complicated pregnancy (-0.01%) ($p<0.05$). The overall gap in health facility delivery between women in Eastern and Western regions would reduce on average by 24.62% and 37.2% of differences in availability of a health worker in the community and media exposure were to disappear respectively and would increase mainly on average by 8.89% at the disappearance of the differences in highest maternal education.

Variations Due to Differences in Effects of Predictors: Variations in the effects of predictors on HFD among women in Eastern and Western subregions contribute about 36.12% to the overall change. The difference in intercepts accounted for most of the changes. Specifically, the differences were significantly attributed to variation in the effects of maternal education (-54.9%) and wealth (8.69%) ($p<0.05$). In particular, the overall gap in health facility delivery would increase on average by 54.9% in the absence of the variation in the effects of maternal education and reduce on average by 8.69% in the absence of the variation in the effects of wealth.

Table 5: Decomposition of Health Facility Delivery Due to Differences in Characteristics and Effects of Predictors

Variables	Differences in Characteristics (E)			Differences in Effects of Coefficients(C)		
	Coefficient	p-value	Percent	Coefficient	p-value	Percent
Age						
15-19	1.000			1.000		
20-34	-0.452	0.35	0.00	0.370	0.067	-0.78
35-49	0.631	0.091	2.00	0.096	0.730	-1.3
Highest Maternal Education						
Below primary	1.000			1.000		
Completed primary 7	5.430	**0.031**	-3.50	-74.481	**0.042**	-17.80
Some secondary	-1.327	**0.001**	-0.50	-24.532	**0.000**	-22.40

Variables	Differences in Characteristics (E)			Differences in Effects of Coefficients(C)		
	Coefficient	p-value	Percent	Coefficient	p-value	Percent
Completed secondary 6	2.084	**0.024**	-4.89	-11.009	**0.001**	-14.70
Marital Status						
Unmarried	1.000			1.000		
Married	2.102	0.150	0.04	-6.782	0.302	-11.3
Wealth						
Poor	1.000			1.000		
Middle	-3.512	0.172	5.2	10.236	**0.021**	6.029
Rich	-5.1844	0.351	-1.7	8.100	**0.005**	2.670
Distance to Health Facility						
Not big problem	1.000			1.000		
Big problem	-0.290	0.091	-0.10	-1.345	0.126	-0.032
Cost of Service						
Not big problem	1.000			1.000		
Big problem	0.088	0.511	1.57	-0.111	0.530	-2.64
Availability of a Health Worker in Community						
Not readily available						
Readily available	1.000			1.000		
	98.90	**0.003**	24.62	1.091	0.315	-3.41
Exposure to Media						
Not exposed media	1.000			1.000		
Exposed to media	1.809	**0.000**	37.2	6.903	0.501	2.62
Pregnancy Wanted						
No	1.000			1.000		
Yes	1.751	0.073	0.89	-0.148	0.710	-3.02
Complications						
No	1.000			1.000		
Yes	2.153	**0.000**	-0.01	12.023	0.081	2.04
Constant				310.12	0.053	107.043
Total	0.260	**0.001**	63.88	0.147	**0.000**	36.12

Decomposition of EPNC Due to Differences in Characteristics and Effects of Coefficients

Variations Due to Differences in Characteristics of Women: Variations in the women's characteristics contributed about 59.06% to the overall gap in EPNC between Eastern and Western sub regions. Specifically, the differences were significantly attributed to maternal education (18.52%), marital status (0.34%) and availability of a health worker in the community (17.17%) ($p<0.05$). The overall gap in EPNC between the two sub regions would reduce mainly on average by 18.52% and 17.17% of differences in maternal education and availability of community health workers were to disappear.

Variations Due to Differences in Effects of Predictors: Variations in the coefficients or effects of predictors on EPNC between women in Eastern and Western subregions contribute about 40.94% to the total change, mostly with the difference in the intercepts. Precisely, the differences were significantly attributed to variation in the effects of maternal education (-52.8%), wealth (-8.4%) and availability of health workers in the community (-4.7%) ($p<0.05$). In particular, the overall gap in EPNC would increase on average by 52.8%, 8.4% and 4.7% in the absence of the variation in the effects of maternal education, wealth, and health worker availability in the community respectively.

Table 6: Decomposition of EPNC Due to Differences in Characteristics and Effects of Coefficients

Variables	Differences in Characteristics (E)			Differences in Effects of Coefficients (C)		
	Coefficient	p-value	Percent	Coefficient	p-value	Percent
Age						
15-19	1.000			1.000		
20-34	-0.440	0.231	1.60	-0.191	0.149	-0.62
35-49	-1.323	0.181	-2.04	-1.62	0.07	-1.11
Highest Maternal Education						
Below primary	1.000			1.000		
Completed primary 7	12.24	**0.045**	13.5	-34.23	**0.004**	-20.10
Some secondary	10.32	**0.010**	3.00	-2.791	**0.025**	-23.00
Completed secondary 6	1.089	**0.007**	2.02	0.012	**0.011**	-9.70
Marital Status						
Unmarried	1.000			.000		
Married	1.568	**0.006**	0.34	-32.404	0.140	-2.43
Wealth						
Poor	1.000			1.000		
Middle	-3.839	0.236	-3.03	-10.921	**0.019**	-6.43
Rich	-2.832	0.070	-2.79	-3.324	**0.007**	-1.97
Distance to Health Facility						
Not big problem	1.000			1.000		
Big problem	0.342	0.136	-0.15	-0.315	0.919	0.47
Cost of Service						
Not big problem	1.000			1.000		
Big problem	1.018	0.114	-0.37	-0.249	0.316	-1.39
Availability of a Health Worker in Community						
Not readily Available						
Readily available	1.000			1.000		
	98.20	**0.03**	17.17	-2.321	**0.025**	-4.70
Exposure to Media						
Not exposed media	1.000			1.000		
Exposed to media	2.219	0.283	31.68	8.210	0.523	4.07
Pregnancy Wanted						
No	1.000			1.000		
Yes	-0.029	0.120	- 3.56	3.230	0.068	-5.01
Complicated Pregnancy						
No						
Yes	1.000			1.000		
	-0.097	0.92	-1.13	7.085	0.330	-2.02
Constant						
				345.01	0.621	17.91
Total	0.225	**0.000**	59.06	0.156	**0.003**	40.94

Discussion of Results

Our findings show a relatively large regional gap in the use of maternal healthcare services (MHCS) between Eastern and Western sub-regions in Uganda. The main factors that contributed to the gap were the highest maternal education and community health worker availability followed by media exposure and wealth. A

similar study found significant inequalities in the early use of maternal health services in Malawi due to different geographical locations, education and wealth (Yaya et al., 2016). In Nigeria, pregnant women from impoverished backgrounds with a low level of education were less likely to receive early maternal services (Adeyanju et al., 2017), confirmed in China (Liu et al., 2014), Bangladesh, (Khan et al., 2018) and India (Pallikadavath et al., 2004a). The higher contribution of maternal education in the overall regional gap in all indicators could be understood through the association of education with increasing migrations. Due to the fact that many people move from different regions to the Western sub-region looking for work evidenced by the highest percentage of recent female internal migrants (UBOS, 2017) and high annual regional population growth. Among this population of women, this results in less awareness and underuse of services. The significant contribution of community health worker availability may be attributed to a higher concentration of health workers leading to ease of use (Malarcher et al., 2011).

As well as more support organizations in the Eastern than Western sub-region. Western sub-region is considered a geographically disadvantaged sub-region in Uganda because of acculturation of mixed tribes (the Bafuliki Bakiga, Banyankole) and constant migrations from Congo, which limits women's awareness of health services (Isarabhakdi, 2004; Shaokang, Zhenwei, & Blas, 2002; Van der Stuyft, De Muynck, Schillemans, & Timmerman, 1989). Notably, findings indicate that wealth lowers the average gap in utilization of early antenatal care, health facility delivery and EPNC between the two sub regions. This may be explained by the fact that better economic stand is associated with relatively better education status and affordable cost of service, both of which are favorable for better use of healthcare services (Kiwanuka et al., 2008; Ssewanyana & Kasirye, 2012; Zere et al., 2010). In sum, there exists delayed use of maternal health services with enormous regional disparities due to socioeconomic differences in Uganda. Hence, there is a need for fairness and equity in education, wealth, increasing information service coverage, and even distribution of essential maternal health community services across the country.

Limitation of the Study: This study used secondary data which was collected through a retrospective investigation that is often susceptible to memory lapse and recall biases. For example, information obtained concerning wealth and distance to a health facility reflected the situation at the time of the inquiry and not the time the mother delivered, and hence they may have shifted from one group of classification into another which might have affected the results. Furthermore, the time for first antenatal care attainment might not be recalled exactly, which may impact the precision of the findings. Reports of only alive women at the time of the survey were obtained, moreover, in Uganda where the maternal mortality ratio is very high, essential information on mothers who succumbed during childbirth could have contributed to the study.

5. Conclusion and Recommendations

There exist regional inequalities in the utilization of early antenatal care, health facility delivery and EPNC among women in Uganda. The critical variations are mainly due to differences in maternal education level, availability of health workers in the community, exposure to media and wealth. To address the significant disparities, this study proposes two main strategies: Ensuring strong and even allocation of community health workers without distinction of demographic, social and economic conditions across all regions, and Government of Uganda and other stakeholders emphasizing girl child education completion, equal broad dissemination of maternal health and continuum of care information across the country and passing the pending bill on insurance to reduce costs of accessing maternal health services.

In Essence: Equity is paramount in improving early maternal health care utilization in Uganda**.**

Declarations: Ethics Approval and Consent to Participate**.** The Uganda Demographic and Health Survey (UDHS) conducted during the period 2015/16 were used in this study. This UDHS series is a nationally cross-sectional survey implemented by the Uganda Bureau of Statistics (UBOS) that provides information on key demographic and population characteristics for giving up-to-date maternal health indicators. Consent and authorization to make use of the data were acquired from ICF Macro International U.S.A, DHS Program based on our previous study (Atuhaire, Atuhaire, Wamala, & Nansubuga, 2020). Participants expressed their consent before the start of the interview as stated by the data originator.

Availability of Data and Materials: The datasets retrieved and used during this study are not publicly available due to a requirement of approval from ICF Macro International U.S.A. The authors obtained authorization to use "Survey" data from the Demographic and Health Surveys (DHS) Program accessed on: http://www.dhsprogram.com/data/dataset_admin/login_main.cfm. The approval letter is, therefore, attached for confirmation.

Competing Interests: The authors declare that they have no competing interests.

Author's Contributions: RA conceived the study, retrieved data, analyzed the data, prepared this Manuscript, reviewed literature, and interpreted the findings. RW conceptualized the study, developed the Methodology, and substantively reviewed the Manuscript. LKA and EN contributed to identifying and classification of variables, preparing the manuscript, and improving the scientific content of the study. The authors read, reviewed, edited, and authorized the final manuscript.

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Have-on-Mask and Maintain-Physical-Distance: Are they the Outcome of Lockdown-Laws in Corona-Virus Crisis Country-Wise?

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Abstract: The COVID-19 pandemic is an infectious disease that was initially detected in December 2019 in Wuhan City, China. Since then, it has been spreading country-wise on mild to severe scales, where Bangladesh, like most countries, was not prepared to meet the challenges. Addressing the crisis, Bangladesh, like many countries, starting with the philosophy of the traditional approach. In the 1st-wave of COVID-19, the government implemented lockdown laws and enforced to *have-on-mask* and *maintain-physical-distance*. However, no government effort was seen ensuring modern-approach for convincing people, making people for their way understanding consequences & preventive-measures thus people can take own decision facing perceived-risk. In the proposed approach, under Consumer Choice Theory, an individual's utility received from using *face-mask* and *maintaining distance* is equal to expected utility. Here outcome depends on an individual's efforts and the quality of the product individual uses. Any changes to these may risk getting infected, which may defeat the individual in fights with COVID-19. Rather than investing efforts only within main cities, the government could have reached out to rural areas by having local administration engaged. It could have weakened today's trends of catastrophes. The proposed approach could have been appealing to people for their actions in choices. It could ensure peoples' roles in society on moral-responsibility grounds. However, today's nation is witnessing the 2nd-wave and strict lockdown with provisions of arrest, penalties for violators. Since the number of death and infected people daily remained almost unchanged and since the mostly populated rural-area situation is not fully known, it is difficult to assess the effectiveness of government policies where the empirical study is warranted overcoming limitation. But people are now familiar with consequences and preventive measures in choices. This progression was not free-of-cost but with high-price-tag "so many lives", which could have been curtailed if modern strategies were in place.

Keyword(s): *COVID-19 & consequences, wearing mask & often sanitation, traditional approach, modern approach, perceived risks, sense of responsibility, Consumer Choice Theory.*

1. Introduction

The Corona virus Disease 2019 (COVID-19) is caused by a novel corona virus, which causes the severe acute respiratory problem. It was first detected in December 2019 in the city of Wuhan in Hubei province, China (Fauci, Lane & Redfield, 2020). After the WHO declaration on public health emergency concerns in connection to COVID-19, over 40 countries have immediately declared *extra* health measures in multi-faucets. Several countries, that have denied entry to travelers or have put on hold the flights to and from China or other affected countries, are now reporting cases of COVID-19 (WHO, 2020). A cross-cutting economic activity, unlike any other, travel and tourism are confronted by the COVID-19 challenges. This is because of the essential people-to-people nature of the sector. In general, the spreading virus of epidemics is linked to public transportation for traveling, shopping mall, markets and tourism, etc. With these possibilities in human-daily-life activities, since the beginning of the crisis, the pandemic has been spreading country-wise with some cases slower and some cases at faster rates.

Addressing the issue globally, some governments country-wise have implemented traditional approaches such as policies or laws particularly lockdown, shutdown crowded spot(s) and forced to wear a mask and encourage for often sanitation. Bangladesh is no exception. Despite having Government's advice and lockdown-laws in place on maintaining physical distancing, regular hand-washing, wearing face mask and self-isolating if they have symptoms, a large population nationwide have ignored the advice and violated laws. The severity of this violation is comparatively low in city areas than that in the rural area where 65% of people reside (BBS, 2021). The government could have utilized approaches for convincing people, making them for understanding and then appeal to peoples' actions on a moral-obligation basis rather than using the traditional command & control approach. Also, studies show that solving grand problems requires a sense of responsibility, coordinated efforts for pragmatic collaborations with stakeholders.

Where understanding stakeholders'' emotions, attitudes and preferences can be helpful (Doh, 2003; George et al., 2016; Muff, 2013) for an effective outcome. But it was missing in some country's efforts facing the corona crisis where Bangladesh is no exception. Since no country was prepared with knowledge for addressing the crisis, governments country-wise started their efforts on their traditional approaches even though today's human mentalities have been changed. And now accordingly, it asks for convincing, understanding & appealing approaches over command & control approach. Some countries have succeeded to manage their boundaries where they have done so based on their peoples' preferences – approaches of convincing, understanding, etc. However, in some other countries, despite traditional preventive measures in place, the consequences of COVID-19 have been spreading globally. In this process, some countries are going through the second stage of consequences. Bangladesh is now in its 2nd wave. Rather than emphasizing human-appealing approaches of the modern world in designing preventive measures, the Bangladesh government has been sticking with its traditional approach, somewhat now stricter than it was in the 1st– wave. In reality, the situation was getting worse in the 1st wave, once the secrecy on practices of the Sabrina-ism (Rahman, 2021b), under the banner of the Directorate General of Health Services (DGHS) became known to the public (Rahman and Alif, 2020).

In public eyes, the DGHS was becoming a money-making machine in the early days of the crisis where the Ministry of Health (MoH) was the watchdog and Sabrina gong was seen as frontrunners of the money-sucking machine (Rahman, 2021b). Elaborating further on the reasons for the failure during the 1st-wave, it would not be overstated that some were doubtful about the extent to which the public would be willing and able to behave in the required ways. The other reasons might be certain individuals or groups of individuals, by their natures, oppose any legal & moral standards in practice and react differently to the emerging phenomenon. For example, protecting others around the individual, the individual may feel it like "being mercy of those around". Because of lacking national protocol country-wise such as Bangladesh, when and where to wear a face mask, it is not quite unusual to be shamed for wearing one and angry when others don't. With these *dilemmas* in multi-phases, at the beginning of the crisis, the government of Bangladesh has made changes its positions many times on its strictness implementing policies underpinning command & control theme. Accordingly, the government has confiscated the criminal activities - *Forging Covid-19 Certificates*, and has taken measures for its ending immediately. It has set up an example in the healthcare service arena in Bangladesh where the number of death was very low on a daily basis (Wasim and Adhikary, 2020).

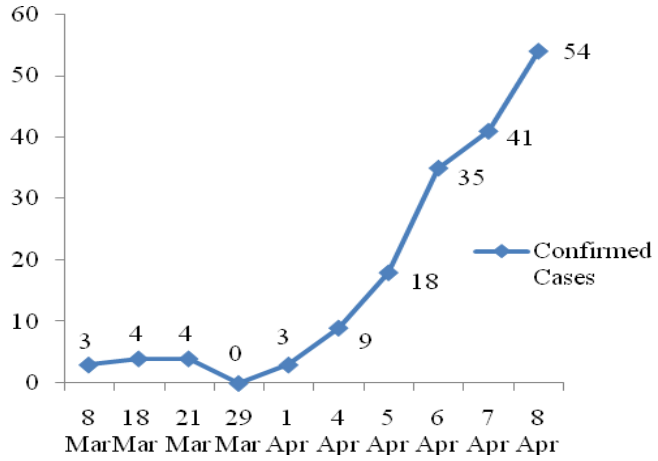
In reality, the nation is now in its 2nd wave on the severity of the consequences of COVID-19 where the nation's highest number of death was 258 in one day and a total of 14,925 people tested positive for the virus on that day (Star Digital Report, July 27 of 2021). Accordingly, the government has called on the Law-enforcement Agency (Police), Bangladesh Army, Border Guard of Bangladesh (BGB) and Rapid Action Battalion (RAB) for strict implementation of government laws on lockdown and to ensure wearing masks, maintaining physical-distance, etc. Since people are more familiar today with the severity of the crisis and people have learned the strictness of government roles & policies and since the nation is in its 2nd wave on COVID-19 severity, people are now more attentive to its actions than that during the 1st–wave. This progression raises the question: whether have-on-mask and maintain-physical-distance etc. are the outcomes of lockdown laws – *traditional-approach*? This study takes on the challenges of answering the questions posed using the Theory of Consumer Choices & Behaviors. It continues with three specific objectives. They are:

- To identify factors that have undermined the effectiveness of government lockdown laws.
- To identify factors that have influenced wearing masks & maintaining a physical distance.
- To examine how individuals feel in economics perspective wearing mask etc.

Why Bangladesh: The COVID-19 pandemic crisis is a global issue where Bangladesh is no out of the crisis. Like in many countries in the globe, Bangladesh has taken traditional-approach in multi-phases aiming to control Coronavirus transmission among people across the country. From the very early days, the government initiated its effort to control the transmission. On March 08, 2020, three patients were first identified to be COVID-19 infected where the number of death was *zero* (IEDCR, 2020) in Bangladesh. Figure-2 shows that the Corona victim's death took place first on March 18 of 2020. On that day total of 3 people were identified as infected, shown in Figure 1. Initially, Bangladesh Government began its efforts with evacuations, travel restrictions, social distancing measures, shutting down schools, colleges,

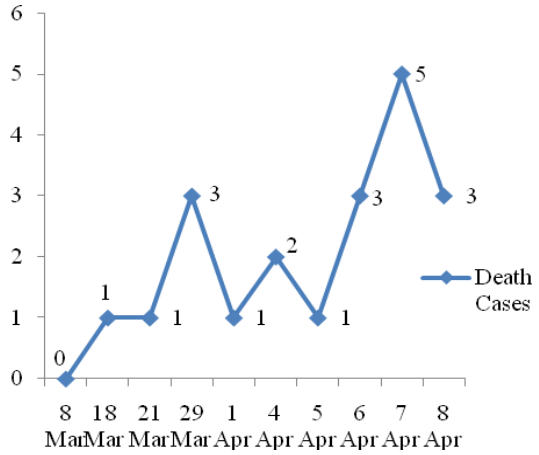
universities, etc. and finally imposing traditional approaches such as lockdown laws in Dhaka city and slowly beyond. Besides this, government-initiated testing and treatment of COVID-19 patients in govt. and in some private hospitals and clinics across the country. Since then the number of infected individuals was gradually increasing with the exception of March 29 of 2020 when no newly infected individual was identified but there were 3 deaths of corona patients in Figures 1 & 2. Since then the trends of the infected were increasing rapidly and trends of deaths were fluctuating slowly, which captured the pattern of wave 1 of COVID-19 consequences in Bangladesh.

Fig 1: Confirmed Cases of Corona, Year 2020, 1st Wave



Data Source: IEDCR

Fig 2: Death in COVID-19, Year 2020, 1st Wave



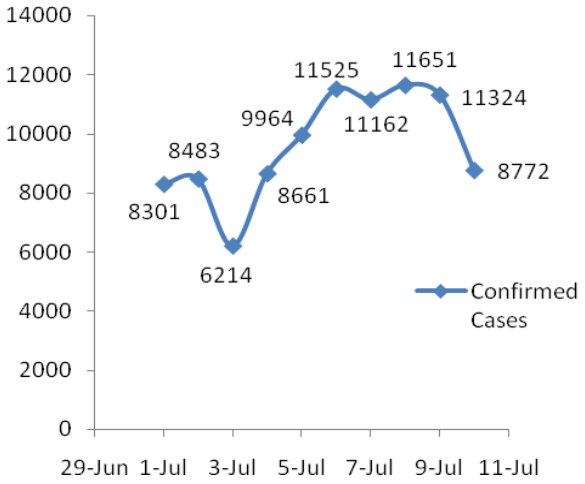
Data Source: IEDCR

However, Government's this journey began with the wrong signal to the public where the Directorate General of Health Services (DGHS) under the Ministry of Health was responsible for approving service providers conducting COVID-19 tests. JKG Healthcare was one of the approved service providers that were engaged in producing fake Covid-19 test reports and issued forged "Covid-19 Certificate". In reality, it got further ugly. The JKG was secretly led by physician Sabrina who was officially employed as Government Surgeon under the DGHS, MoH. With this reality, the general peoples' question "whether a higher number of people infected" was a creation of Sabrina-ism? This question is still active and it deserves to be investigated empirically. This Sabrina-ism of the DGHS under the umbrella of the MoH has polluted the *entire* healthcare service sector. In this process, many like Sabrina became the money-suckers at the frontline, DGHS was becoming a money-making machine and MoH was watching the Sabrina-ism where COVID-19 was a blessing for the parties involved with the costs of the public. Only the Sabrina group has been prosecuted but no change has yet been made to the leadership of the entity(s). Thus it is reasonable to claim "they are blessed" at least for now. This *dilemma* points to the nation's leadership one way or other. As a result, it has somewhat undermined the publics' sentiments on government law relates to lockdown, physical distancing, wearing masks, etc. in this pandemic crisis. In other words, people were coming back in normal lives and since the number of death per day was very low but growing, the government certainly pulled off the lockdown policies, media promotion for corona-test, etc.

All these *dilemmas* including the government's traditional approaches and then premature withdrawal lockdown in the 1st wave of COVID-19 undermined it's much of the populations' psychological positive attitudes towards the seriousness of the Coronavirus in Bangladesh. This Sabrina-ism *dilemma* would not take place, if the government had started its journey with modern-approach relates to convincing people, making them understanding, etc. for inspiring people for moral-responsibility-ground behaviors rather sticking with command & control traditional-approach. Rather than engaging in criminal activities, the Sabrina gong would have engaged with moral-responsibility-ground behaviors and extended official duties to their fullest where the government's modern approach would have inspired them. Also, during the 1st wave, district-level healthcare services were not fully equipped & ready for addressing the issues, which has undermined the effectiveness of the government's efforts. In the initial stage, the number of infected

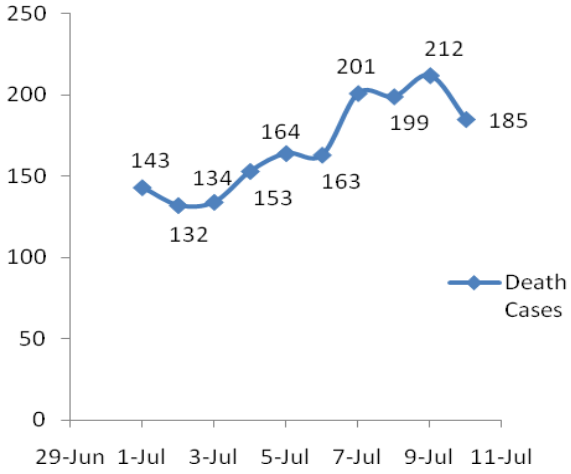
individuals was increasing slowly but the number of death was *zero* until March 17 of 2020, Figures 1 & 2. It has undermined much population's preferences to have on-mask and maintain physical distance. But because of economic necessities or unwillingness of the people to follow health rules such as lockdown laws, social distancing and have-on-mask, etc., the virus transmission has been increasing on an alarming scale in Bangladesh as reported (The Daily Star, June 28 of 2021). The current severity reflects that Bangladesh is now going through the 2nd wave of Coronavirus transmission where the initial number of death was 5 to 10 in a day. Then it was becoming higher 30 to 40 in a day. Figure 1 & Figure 2 show that the number of death reaches 212 in one day as of July 9th and a total of 11,324 people tested positive for the virus on that day (The Daily Star, July 09 of 2021). Matter of fact, the death rate has been climbing fast.

Fig 3: Confirmed Cases in COVID-19 – 2nd Wave



Data Source: Local Newspaper

Fig 4: Death Trend in COVID-19 – 2nd Wave



Data Source: Local Newspaper

The country continues to reel from the 2nd-wave of the pandemic as the trends of Covid-19 infected cases and deaths are rising on a daily basis. Figures 3 & 4 clearly show that June 29 of 2021 spiked the number of death and reached a total of 143 and since then the number has been growing with minor fluctuations on a daily basis. Similarly, the number of infected has been growing significantly. Facing this severity, the government imposed a shutdown nationwide for 7 days starting from July 1st of 2021 where Police, the Army, BGB and RAB are called on to monitor strictly. Under this strict policy, just recently the government imposed a shutdown nationwide for 15 days, which lasted until August 10th of 2021. For any violations, people are faced with penalties including fines, get arrested, etc. Nowadays, these *scenarios* are frequently broadcasting on TV, radio, newspapers, etc. and what not. Besides this, media outlets now broadcast the specific death tolls district-wise on a daily basis. People now have more knowledge than before on the consequences of COVID-19 and the consequences of violation of lockdown law, mask-wearing violations. It is now forcing people to think deeply about their actions & choices facing the perceived risk during the crisis.

Bangladesh is a southeast Asian middle-income country. Its economy has been flourishing rapidly and steadily for a while now. In the last decade, immense development was noticed in every sphere of life including women empowerment. Accordingly, the literacy rate of Bangladesh was 74.70 in the year 2020, which was 73.91% in 2018 (BBS, 2020). Thus, in this modern Bangladesh, people here prefer more freedom and expect approaches like convincing, making understandable and appealing for making them do something in case of common goals. Also, people here, like any other people in the world country-wise, drive their life with hard work and mostly behave based on business-mentality – *no mother feeds baby unless baby cries* (Rahman, 2018). Thus, it is palatable believing that any effort whether it is from the government or private sector for a common goal, can be more effective with approaches other than the traditional command & control approach. However, the incidence of the COVID-19 pandemic has influenced every sector of Bangladesh badly. Hence, the pandemic has become the worst threat to the life of the people of this country

and its economy & development. Hence this is the right time for Bangladesh to think of alternative initiatives to end this pandemic in Bangladesh otherwise it will have to pay a heavy price "so many precious lives".

2. Elaboration of Concepts

a. COVID 19 and its Consequences: The COVID-19 is a respiratory disease, which presents a range of illnesses from asymptomatic or mild through to severe disease and death. Since contact, droplets, etc. are the means of transmission, public health measures, such as hand hygiene and good respiratory etiquette (coughing into your elbow or a tissue and immediately disposing of the tissue), are vital to prevent infection. According to a report by the WHO (2020b), the speed of transmission for the COVID-19 virus is estimated to be 5-6 days. The reproductive number (the number of secondary infections from one infected individual) is said to be between 2 and 2.5. Children are less infected than adults, and clinical attack rates in the 0-19 age group are low (WHO, 2020b).

b. The Sabrina-ism under the DGHS: Physician Sabrina Arif Chowdhury, who was employed as Government Surgeon in the National Heart Institute and Hospital under the DGHS, MoH, was directly involved in forging Covid-19 Certificates since the beginning of the COVID-19 crisis. Although she was working with the Government of Bangladesh, earlier she gave several interviews to the media as the Chairman of JKG Health Care (Liton, 2020). She was also employed as Chairman of JKG Health Care, the DGHS and the MoH like to call it "a secrete employment" (Liton, 2020). In law enforcement custody, Sabrina revealed that she had played important roles in obtaining permission from the DGHS for Covid-19 sample collection, but her partner misused the opportunity and issued fake Certificates without conducting tests (The Business Standard, July 17 of 2020). Apart from issuing fake Covid-19 Certificates, JKG has also made a good amount of money by providing telemedicine services, for which they were not permitted. In this *episode*, Sabrina was working as a money-sucker in the frontline and DGHS was becoming a money-making machine where the MoH was the watchdog under administrative setup. However, the leadership of the MoH, a political appointee, appointed by the current leadership of the nation was witnessing the *entire* Sabrina-ism in the healthcare-service arena.

E*xcept for* the Sabrina group, the leadership(s) of the relevant government entity(s) is appeared to be blessed for now. In the recent Parliamentary Budget Meetings, loud voices on the issue were raised before the political leadership(s) of the nation, but no response was produced. But the question is still active among the general people of this country. Despite the fact that the COVID-19 has caused more or less crisis worldwide, the COVID-19 was a blessing for the parties involved in the said *episode* in Bangladesh. This *episode* was called *Sabrina-ism* (Rahman, 2021b) named by physician Sabrina Arif Chowdhury who was directly involved in the forgery. This Sabrina-ism would not happen today if the government would have taken approaches based on peoples' preferences under the modern approach over the traditional approach. This is because, with the government's appealing approaches, the Sabrina gong could have followed their moral responsibilities and official obligations on duties. Thus, it can be educational and useful to authority(s) country-wise such as Bangladesh, if the leadership of a county requires initiating an investigation on probable misuses during Corona-crisis or beyond, for detecting departmental-wise public sector fraud.

c. Have-on-Mask and Maintain-Physical-Distance: Analysis of over 75,000 confirmed cases in China found no evidence of airborne transmission of COVID-19. Instead, the overwhelming evidence suggests that it is transmitted primarily through respiratory droplets and through contact. Coughing & sneezes both are common COVID-19 symptoms. Thus, there has been an unprecedented global surge in the sales of medical face-masks. It has led to shortages of health workers in some parts of the world. With this limitation, many countries such as Bangladesh are making mask-wearing and maintain physical distance mandatory for anyone in public places. In some cases, these countries have imposed strict laws and made an arrest or monetary penalty. Other countries are now actively discouraging people from wearing them. As most agreed now that the COVID-19 virus is spread *via* much larger respiratory droplets between 5-10 micrometers in size (WHO, 2020b). These are too large to remain in the air for long and so instead it falls onto nearby surfaces. Anyone close enough can be infected if the droplets land on or around their mouth, nose and eyes or by touching a surface on which droplets have landed and then touching their faces. Thus wearing a mask and

maintaining physical distance, one way or other, can be essential in aim to protect self from danger. Wearing a mask can also be helpful to others nearby where the individual has a moral responsibility in both ways. And for effective outcomes, it requires a sharpening sense of moral responsibility, coordinated efforts and pragmatic collaborations for getting it done. These are the ways the modern approaches have been progressing since the beginning of the 21st Century *era* (Rahman, 2021a).

3. Methodology

In an aim to establish the basis of my theme - approaches other than the traditional approach, this study uses the Theory of Consumer Choice & Behaviors (Rahman, 2019). It puts forward effective policy guidance for leadership country-wise such as Bangladesh as well as for an individual in deciding on its actions in aim to protect from COVID-19 and beyond. It is well recognized in human society country-wise that people prefer approaches that ensure freedom, convincing and profitable choices over any imposing approaches in case of a common goal. In today's society, human mentalities have been changed and now ask for convincing, understanding & appealing approaches than command & control – a traditional approach (Rahman, 2021a). Thus in this study, the following assumptions are made for individual's choices wearing a mask and maintaining a physical distance.

- **a)** It is assumed that no relevant other factors, other than the severity of COVID-19 consequences, are changing.
- **b)** Here a rational individual's preferences "have-on-mask" and "maintain-physical-distance" depend on the individual's understanding of the severity of the risk factor (consequences) and guidance on preventive measures.
- **c)** These preferences are stable, total efforts (because of life & death issue) and transitive for maximizing the utility of risk-protective choices such as have-on-mask and maintain-physical-distance, etc.

***Have-on-Mask* and *Maintain-Physical-Distance* under Consumer Choice Theory:** It is now well recognized that the perceived-risk factor plays an influential role in an individual's decision (Rahman, 2018). It is no different using a mask etc. when a normal individual is around in public places during any pandemic crisis such as the COVID-19. It is palatable assuming that on a rationality perspective, an individual is risk-averse, *i.e.*, the individual prefers certainty over uncertainty when it comes to saving himself from the danger out there. Figure 5 illustrates the risk preferences of a risk-averse for a rational and conscious individual who is concerned with himself. In a world-of-crisis such as COVID 19, an individual's actual benefit or utility that the individual receives using face-masks and maintaining physical distance, etc. will never fall on TU (X) but rather on the chord (the bold line) as shown in Figure 5. Point X_g, in Figure 5 represents outcomes of services (X) from the mask, physical-distance, etc. in which the individual may use a certain level of X. Here service-quality (SQ) = ƒ (using products as directed, quality of the product and surely use them in public places). Quality of the product (QP) = *ƒ* (products).

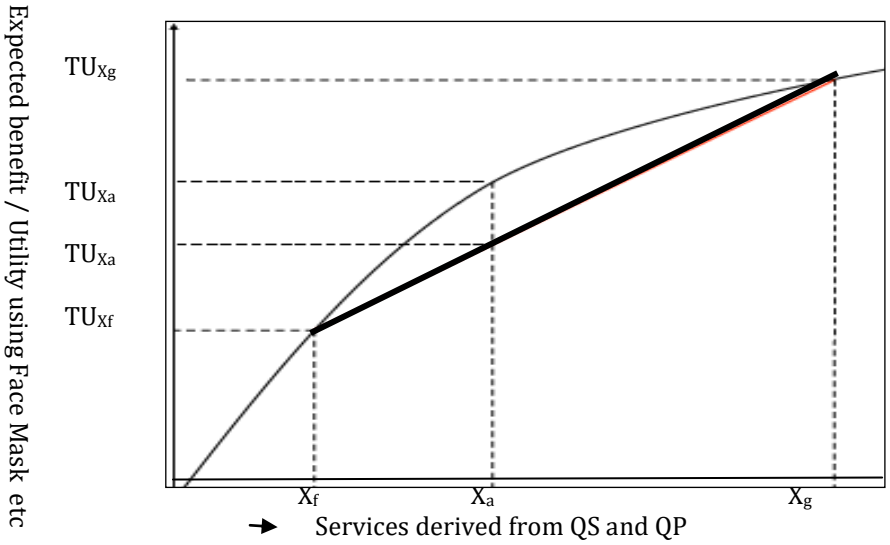
Here the outcome of the services depends on SQ and QP, which means getting not infected = *ƒ* (SQ and QP) where SQ and QP ensure their highest levels. Thus it costs higher for defeating the COVID-19. Any changes in SQ and QP may risk of getting infected with COVID-19. Thus it may cost lower, which may defeat the individual in fights with the COVID-19 crisis. In this setup, X_g represents services derived from SQ and QP, which produces the highest outcome "not infected". Here X_f represents services derived from SQ and QP where $X_g > X_f$. In the case of X_f, an individual enjoys a lower cost for QS and QP, which produces the outcome of "getting infected". As long as there exists a level of consequences of COVID 19, an individual may give a try to use X_g units of service X, the utility that this individual expects to receive will lie somewhere on the chord (the bold line). The chord represents the expected utility (EU) of using service X, which lies in the concavity of the curve. This is because it is the average probability that the individual will use services X or not where X represents the combination of the SQ and QP. As a result, an individual will never receive TU (X_a) but rather EU (X_a).

No Mask, No Service: Individual's Response on Moral-Responsibility Ground: Like in many countries, the Government of Bangladesh in the month of October 2020 introduced the policy that no one would be allowed to enter offices without a mask. And accordingly, all offices were asked to install notice boards saying 'no mask, no service' in order to control the spread of COVID-19 in Bangladesh (Star Digital Report, 2020).

However, in reality, many places *particularly* haat-bazaar and religious places including prayer-places, etc, were, not monitored. It has been seen to be violated in multi-faucets. Rather than putting monitoring efforts into action, sometimes these places particularly prayer-places have been seen to be promoting "Almighty has given the pandemic for a test of humankind and accordingly He will resolve it". Despite these multi-phases behaviors of the people in Bangladesh, it is recognized that the government's policy "no mask, no service" is for inspiring the people here sharpening peoples' moral responsibilities in aim to address the pandemic crisis for survival.

This is because society is a system that organizes interactions between individuals and different groups with, *at least* a view for its survival through legal and moral standards in particular (Parsons, 1951). A particular standard-*moral responsibility* is a collection of rules allowing a system to organize itself optimally according to its goal. On the other hand, a legal standard is inscribed in law and a moral standard is not. On legal issues, punishment can be imposed based on Court decisions whereas, on morality issues, the leadership of a society can impose sanctions on individual misbehaves. Thus in this case "no service" can be seen as a sanction or punishment on an individual who does not follow social rules such as wearing a mask. Since the overall aim here is the *survival of the society*, like in many countries, the leadership of Bangladesh has introduced many policies such as "no mask no service" for addressing the phenomenon of COVID-19. Its absolute implementations could have brought better outcomes in meeting these ongoing challenges in Bangladesh where the nation is now going thru further strict lockdown law, which is scheduled for the next two weeks from July 23rd, 2021.

Fig 5: Corona Risk Aversion Scenario Using Face-Mask, Physical-Distance, etc.



In this setup, individuals under the modern approach can receive more EU than individuals under the traditional approach. This is because, under the modern approach, individuals will have more information on consequences & preventive measures and the resources available to them from multi-sources where the government will play significant roles. On the other hand, individuals under the traditional approach will have information on COVID consequences and preventive-measure mostly on their efforts, which sometimes become difficult unless individuals are well facilitated in lifestyles. It can be a significant issue for the people who reside in rural areas of Bangladesh. Under the traditional approach, individuals may have information on consequences & preventive measures by struggling with lockdown laws. Thus EU received by an individual under modern-approach will be greater than the EU received by an individual under traditional-approach i.e. $EU_{\text{traditional-approach}} < EU_{\text{modern-approach}}$. An empirical study can approach questioning these findings.

Approaches Other than Lockdown-Laws – *Traditional Approach*: Policy Guidance: Since people in the globe country-wise as such Bangladesh have witnessed severe consequences even though they had opportunities leaning & taking preventive measures in actions during the 1st wave, policy-recommendations

are designed based on experience from Bangladesh. Since the COVID-19 is an infectious virus (WHO, 2020), rather than individual's behavior, peoples' behaviors together could play significantly, if it was in effect in response to the pandemic in Bangladesh. In absence of vaccines, behavior by each individual of the public here was more crucial than that of the government's efforts alone meeting the crisis. Accordingly, this section advances analyzing and recommending probable approaches besides lockdown law, which can be instrumentally addressing any phenomenon like the COVID-19 or similar to it in Bangladesh and beyond. In general, the role of the group process (Drury, Carter, Ntontis and Guven, 2020) can be elaborated in this study in four categories addressing today's crisis of COVID-19. In each case, underpinning my accumulated research on behaviors in emergencies or disasters, I show that explanations to the public in terms of social identity processes can make better sense of the patterns of evidence than alternative explanations. The elaborations are as follows.

Recognition of the Threat as a Whole: Evidence suggests that most governments country-wise have acknowledged the corona-virus threat promptly (WHO, 2020). However, the authorities of some countries such as Bangladesh have done little to engage the people of Bangladesh, a three-tire country – *rural, urban and cities*, where 65% of people live in rural areas. Rather than traditional approaches, the local authority could promote the message on the danger of the COVID-19 using multi-media communication tools, if the local authority had, received an order from the central authority or leadership. Here probable communication tools are equipped with a microphone, short-video creation underpinning the theme of COVID-19 consequences and preventive measures, etc. Furthermore, the administration could have formed focus-group(s), as they do political party-wise during the national election, block-wise thru local administration. So that these arrangements ensure that people block-wise in Bangladesh are familiar with COVID-19 consequences and have recognized the importance of preventive measures.

Guiding Public on Required Behaviors Facing the Crisis: In today's world, people are mostly driven by their own benefits in multi-faucets such as financial, feeling-good, self-recognition, self-pride, etc. (Rahman, 2021). In this decision-making process, an individual can be a risk-averse or risk-taker. Thus using technology facilitation, the proposed guidance should be in such a way so that groups or parties involved can be benefitted (Rahman, 2019) in aim to facing the crisis. Risk-benefit analyses can be useful in delivering messages for convincing individuals to take preventive measures for avoiding perceived risk. Most humans make decisions fairly subconsciously. So, by actually thinking about the risks and benefits of an individual's probable actions during this crisis, the individual can make better decisions on his or her choices.

Emphasizing Factors that Increase People's Fondness Facing the Crisis: In human society globally country-wise, it would not be overstated that using coercive measures such as threats, force, shouting, etc. can have backfire effects rather than enhancing effective public engagement on common issues such as the current crisis. However, when authorities manage the procedure and explain the importance to follow lockdown laws, have-on-mask, etc. and then authorities provide regular updates about authorities' actions, it increases perceptions of the legitimacy of the procedure among casualties.

Organizing for Actions of Community Mutual-Aid-Groups: Studies suggest that public involvement, in the form of active support for others-affected, is a necessary part of emergency response (Drury, Novelli and Scott, 2013) for effectively addressing any crisis. It is no different in today's COVID-19 crisis. Since corona-virus is an infectious disease (WHO, 2020), probably for that reason, the Bangladesh government has not yet officially inspired people for extending helps other than monetary to those who need it most. However, with government inspiration and facilitation of required equipment such as oxygen-cylinder, mask, etc. public would come forward, if the government had promoted so. Surely, every member of the public does not or may not provide support but many lives could have been saved by the 'average' citizen, whether 'bystander' or fellow survivor. Thus having the government's initiations for ensuring organized actions of the community could have ensured more people to make choices on supportive health behaviors, which could have ensured a lower number of people infected. It could have saved more lives than that are saved by professionals. Since the number of death and people-infected on a daily basis are not published area-wise such as Upazila, District or Division levels, even though it has been monitored as claimed, accordingly the government publishes only total numbers of death & people-infected in Bangladesh.

Future Research

It is palatable that human society country-wise is a combination of people of risk-averse and risk-takers. Thus this study imposes enough structure to allow meaningful welfare analysis where fewer assumptions at the cost of limiting the welfare analysis can be added. On empirical study, if research grants are available, multi-faucets studies can be conducted on understanding peoples' behaviors when it comes to common goals meeting any challenges such as the COVID-19 crisis. Here multi-phases data collection using an opinion survey of healthcare service providers and general peoples' can be conducted. Factor analysis and hypothesis development & testing can be carried out so that the expected findings can be educational meeting common goals such as any epidemic crisis in the future. It can also be instrumental in designing a school-level social science course *curriculum* to enhance readers' full understandings of their moral responsibilities to the society they live in.

4. Conclusion and Recommendations

The COVID-19 pandemic is an infectious disease that can cause a severe acute respiratory problem. It was initially detected in December 2019 in the city of Wuhan in Hubei Province, China. Since then, it has been spreading globally country-wise on a scale of mild to severe where most countries like Bangladesh were not prepared to meet the challenges. Addressing the crisis, like many other countries, the Bangladesh government started with the philosophy of traditional approach in the 1st wave of COVID-19 and implemented policies particularly lockdown laws including legal forces wearing a mask and to maintain physical distance. However, no government effort was seen in practice that could ensure approaches for convincing people, making people for their way understanding the consequences & preventive-measures, thus, people could decide on choices avoiding perceived risks. Here traditional approach was chosen over the modern approach addressing the crisis. In the proposed approach, under Consumer Choice Theory, an individual's actual utility that the individual receives using face-mask and maintaining physical distance is not equal to total utility but to the expected utility. This outcome depends on the individual's efforts and the quality of the product individual uses in choices. Thus, experience from Bangladesh suggests that any changes in an individual's own efforts can risk getting infected and defeated the individual in fights with COVID-19, which was mostly the outcome of the traditional approach over the modern approach.

Furthermore, the traditional approach has made the COVID-19 to be a blessing to many with the costs of the public in Bangladesh. Rather than putting efforts only within main cities, underpinning relevant leadership's foresees, by engaging local administration, the government could have reached out to residents in rural areas, which could have undermined today's trends of infected people and death. The proposed efforts could have been appealing to people for their actions in choices such as wearing-mask, maintain physical distance and ensuring peoples' roles in society on the moral-responsibility ground. It could enhance peoples' sense of responsibility, coordinated efforts and pragmatic collaborations with stakeholders today and in the future. However, today the nation is witnessing the 2nd-wave and strict lockdown laws with provisions of arrest, penalties, etc for violators. Since the number of death and infected people on a daily basis remain almost unchanged with minor fluctuation and since rural-area, where 65% of the population reside, the situation is not fully known, it is difficult to assess the effectiveness of the current strict policies in Bangladesh. But people now are familiar with consequences and preventive measures in their choices for ensuring to be on the safe side. This progression was not free-of-cost but with high-price-tag "so many precious lives", which could have been curtailed in numbers if modern strategies were in practice. However, empirical studies can approach questioning the findings.

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Antecedents of Regional Financial Independence: A Moderating Effect of Capital Expenditure at Local Government Level in Indonesia

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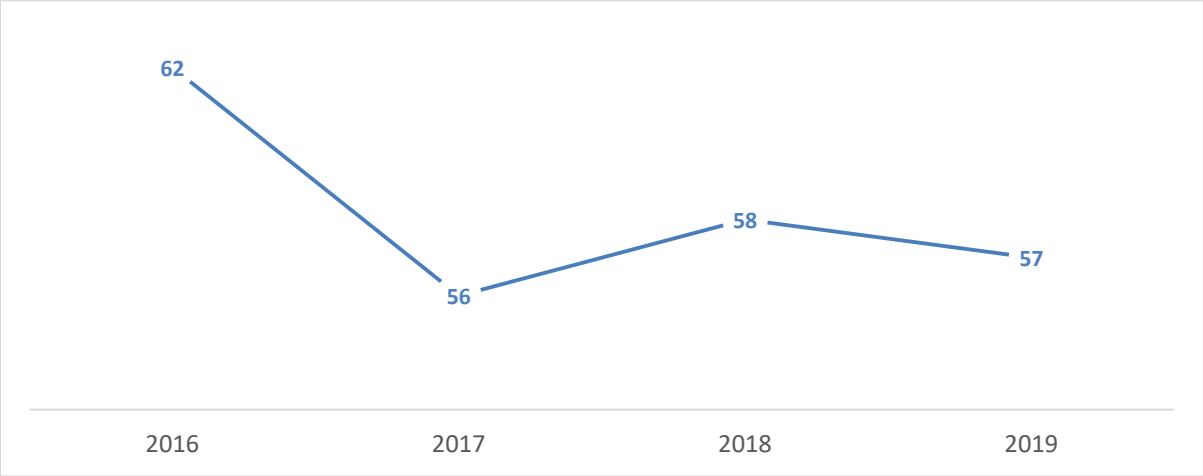
Abstract: This study aims to examine regional tax, general allocation fund, special allocation fund, and capital expenditure as a mediating on regional financial independence. Regency/City in West Java Province was used as a sample in this study. The purposive sampling method was used in this study to select a sample of 27 districts/cities in West Java Province from 2016 to 2019. Hypotheses in this study were tested using Structural Equation Model using Smart PLS 3.0 software. This study results in Regional Tax, General Allocation Fund, and Special Allocation Fund have a significant effect on regional financial independence, while capital expenditure is not able to mediate the effect of regional tax, general allocation fund, and special allocation fund on regional financial independence. For Local Governments, it is expected to optimize local taxes through the improvement of adequate public services. Then, given that the composition of general allocation funds and special allocation funds is quite dominant, the funds should be optimized for the development sectors so that their use can be efficient which will encourage economic growth and indirectly increase regional financial independence.

Keywords: *Regional Tax, General Allocation Fund, Special Allocation Fund, Capital Expenditure, Regional Financial Independence.*

1. Introduction

The state of government in Indonesia has tended to be dynamic since the reforms in 1998. Since then, various new developments have emerged in the pattern of government in Indonesia, one of which is regional autonomy. Regional autonomy gives power to autonomous regions to be able to manage their own government activities provided they follow the provisions of legislation (Pelealu, 2013). As long as it does not conflict with national goals, the granting of regional autonomy must be in line with the responsibility for the management of resources owned by the region in order to encourage regional development. Regional financial independence is the power to carry out regional activities independently without dependence on others. To realize regional financial independence, regional income received by a region must be above the minimum regional income of 25% of total regional income (Yuliyanti et al. 2019). Regional financial independence is said to be high if the independence ratio is above 75%, while if the ratio is 50% to 75%, low if the ratio is between 25% to 50% and is said to be very low if the independence ratio is below 25%. In Indonesia, it was found that the percentage of regional financial independence is still below 25% (Yuliyanti et al., 2019). This means that there are still many local governments in Indonesia that still depend on the central government in the development of their regions. This is evidenced by the still large amount of funds that the central government transfers compared to the revenue that the region generates itself that the local government uses to build its region (Ariani & Putri, 2016).

Figure 1: Financial Independence Ratio of West Java Region



Related to regional financial independence in Indonesia, data from the Indonesian Forum's National Secretariat (Seknas FITRA), which generated the Regional Budget Analysis Report (AAD) in 70 districts/cities from 2014 to 2016, in the districts/cities in West Java Province there are 7 districts/ Cities whose financial independence ratio is rated very low range from 7%-15%. Then, using statistics from the Republic of Indonesia's Central Statistics Agency (BPS), the degree of independence of West Java Province from 2016 to 2019 can be said to be moderate. Although the category of financial independence is said to be moderate, the value of the fluctuating independence ratio tends to decline. The independence ratio in 2016 is the highest ratio at 62%, while in 2019 it is only 57%. Local tax is one that can realize local financial independence. The high local taxes obtained will have an impact on the high level of regional financial independence, which means that local governments do not depend on the central government (Novalistia, 2016). According to Ermawati and Aswar (2020) found that regional financial independence is influenced by regional taxes in line with the results by Suratno and Mulyadi (2020), Novalistia (2016), Novitasari and Novitasari (2019), and Nggilu, Sabijono, and Tirayoh (2016). It can be interpreted that the level of regional financial independence will increase if the regional taxes received are high. In addition to local taxes, general allocation funds are also able to affect the level of financial independence of a region.

Based on Ariani and Putri (2016), General Allocation Funds (GAF) is a tool in overcoming financial shortcomings between regions and can be used as a source of regional funding. But the reality is that local government is inseparable from the central government, which is reflected in its high dependence on GAF. This is supported by Tahar and Zakhiya (2011) and Ariani and Putri (2016) who found that regional financial independence is negatively and significantly affected by GAF. It can be interpreted that financial independence will decrease if GAF increases. This is because GAF's revenue tends to be maintained as opposed to trying to increase its own regional revenue. Special Allocation Fund (SAF) is also a factor that can affect the level of regional financial independence. According to Ermawati and Aswar (2020), SAF is a form of regional receipt derived from central government funds to help certain regions fund basic infrastructure that is a national priority. As with the general allocation fund, SAF should only support regional development, so that the local government's dependence on the central government will be reduced. The results of Tjahjono and Oktavianti (2017) show that SAF has a negative effect on the level of regional financial independence. This indicates that regional financial independence will be said to be low if the SAF is relatively high. In contrast to the results of Ermawati and Aswar (2020) that regional financial independence is not significantly affected by SAF.

Regional financial independence is further assumed as the intervening variable is capital expenditure. According to Ariani and Putri (2016) regional financial independence is proven to be influenced by capital expenditure. This is because the higher the receipt of capital expenditure will provide income for local governments to be able to increase local income. If that happens then the local government will be more independent. These results are not the same as Suratno and Mulyadi (2020), and Ermawati and Aswar (2020) who demonstrated that capital expenditure has no substantial impact on regional financial independence.

This research contributes to the literature related to regional tax, GAF, SAF, intervening such as capital expenditure, and regional financial independence. Nggilu et al. (2016) uses the regional tax and regional levy but does not consider GAF, SAF and capital expenditure. Then in the study, Ermawati and Aswar (2020) use regional tax, tax revenue share, SAF and capital expenditure but do not consider the general allocation fund. This study adds a general allocation fund according to the recommendations of Suratno and Mulyadi (2020) and there is a mediating that is capital expenditure. Furthermore, the purpose of this study is to examine the influence of regional taxes, general allocation funds, special allocation funds, and capital expenditure as mediating regional financial independence.

2. Literature Review and Hypotheses Development

Agency Theory: The relationship of the principal to the agent is described in agency theory. The principle's contract with the agent, in which the principal delegated decision-making authority to the agent, is known as agency theory (Jensen & Meckling, 1976). According to Raharjo (2007) agency theory focuses on the principal and the agent where the principal delegates responsible decision making to the agent. In this study, agency theory is very important in describing the relationship between principals represented by the central government and agents represented by local governments. The central government transfers funds and delegates authority to local governments to take care of their own regions with the aim those local governments can provide maximum services and welfare to the public. There will be agency problems if local governments fail to handle the help offered by the federal government to the federal government's harm.

Stakeholder Theory: Stakeholder theory states that groups or individuals can be influenced or influenced in achieving the goals of an organization or group (Freeman & McVea, 2001). According to Novalistia (2016), stakeholder theory is a person, community or society that has a relationship with a public sector organization. The government as a holder of power must be mindful of aspects of the public interest as a stakeholder. Ermawati and Aswar (2020) state that stakeholder theory discusses that local governments should use and utilize all the wealth they have for the benefit of society because society gives local taxes to the government so that reciprocity can be established to create balance in government. In previous research, many studies have discussed regional taxes in influencing the level of regional financial independence. Focusing on local taxes, Novalistia (2016) studied the relationship between local taxes and the level of local financial independence that results.

When local taxes earned by local governments increase can show that the higher the region is able to, receive revenue and the region is no longer dependent on the central government. The results show that the higher the regional tax received will increase the level of regional financial independence. Ariani and Putri (2016) analyzed the effect of public allocation funds on regional financial independence resulting in transfer grants having a negative impact on taxation efforts that ultimately lower regional income resulting in regional independence will be lower. This study found that public allocation funds had a significant negative effect on regional financial independence. Furthermore, Tjahjono and Oktavianti (2017) look at the special allocation funds for regional financial independence and find that receiving more SAF reduces regional financial independence, and vice versa. Special allocation funds have a considerable detrimental impact on regional financial independence, according to the findings.

Hypothesis and Conceptual Framework: The following is the formulation of the hypothesis in this, study which is based on elements that are expected to affect the level of regional financial independence:

Regional Taxes and Regional Financial Independence: Regional taxes are part of the PAD. Taxes are coercive levies made by the government. The general expenditure of a region is financed by the local government using local taxes (Novalistia, 2016). Local taxes can show an increase in the ability of a region in providing facilities to the community and high participation from the community can help local governments carry out regional development. This is in line with the stakeholder theory; it is assumed that the increasing local tax received by the local government as the incumbent should be able to provide welfare for the community as a stakeholder. Ermawati and Aswar (2020), Suratno and Mulyadi (2020) and Novitasari and Novitasari (2019) resulted in regional financial independence influenced by regional taxes.
H1: Regional taxes have a significant relationship with regional financial independence.

General Allocation Funds and Regional Financial Independence: The central government provides funds to local governments known as general allocation funds. GAF is given so that each region has the same financial equity. The level of regional financial independence will be affected by the amount of general allocation money collected by local governments. This is consistent with the agency hypothesis, which holds that if local government service to the public welfare is low but the central government has handed over a large GAF, there will be agency problems. A previous study conducted by Tahar and Zakhiya (2011) and Ariani and Putri (2016) found that regional financial independence was significantly negatively affected by GAF.
H2: General allocation funds have a significant relationship with regional financial independence.

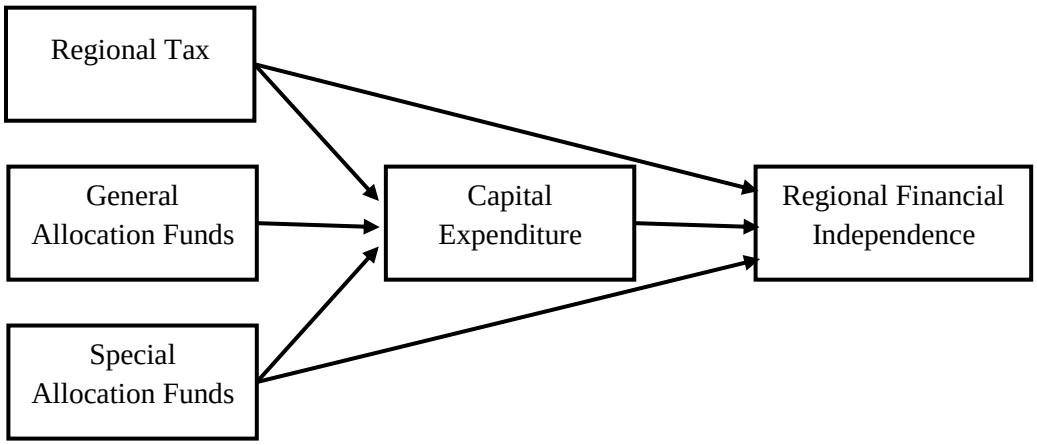
Special Allocation Funds and Regional Financial Independence: The Special Allocation Fund also comes from the balancing fund received by the regions and the provision of special allocation funds has the same purpose as the GAF, namely for equity between regions. The financial independence of the region is said to be low if the SAF received by the region is higher. The agency theory assumes that central officials transmit resources to regions by providing local officials with the responsibility of managing their regions so that public service is maximized and residents are prosperous. Special allocation funds have a major detrimental impact on regional financial independence, according to Tjahjono and Oktavianti (2017) and Marizka (2013).
H3: Special allocation funds have a significant effect on regional financial independence.

Capital Expenditure Mediates the Influence of Regional Taxes on Regional Financial Independence: Large capital expenditures will be funded by districts with high local government revenue. Local revenue in the form of taxes, according to Sumarmi (2015), might affect local government budgets. This is in accordance with stakeholder theory, the higher the capital expenditure on the provision of facilities related to community services as a stakeholder, then the community will participate in providing funds that will be used as local revenue in the form of taxes.
H4: Regional taxes, which are mediated by capital expenditure, have a big impact on regional financial independence.

Capital Expenditure Mediates the Relationship between General Allocation Funds and Regional Financial Independence: According to Sumarmi (2015), there is a strong link between the transfers granted and regional expenditure. The general allocation fund is utilized to finance capital expenditures in this situation. If the GAF allocated to the local government is high, capital spending will very certainly be high as well. High capital expenditure is expected to boost the region's financial independence. The statement is supported by the agency theory which assumes that the central government allocates general allocation funds to regions so that capital expenditure increases so that regions can improve services to the public. Harianto and Adi (2007) found that GAF affects capital expenditure. This demonstrates how the amount of capital spending is influenced by the general allocation fund. Ariani and Putri (2016) show that regional financial independence is significantly affected by capital expenditure.
H5: The financial independence of regions is significantly influenced by general allocation funds mediated by capital expenditure.

Capital Expenditure Mediates the Relationship between Special Allocation Funds and Regional Financial Independence: The Special Allocation Fund is a fund that the central government provides to local governments SAF has the function to be able to fund special activities in accordance with national priorities. In order to finance regional expenditures, local governments must manage these funds as best they can. The more optimal the utilization of specific allocation funds and in accordance with the target will grow the quality of facilities for the people that are realized in capital expenditure. This is consistent with the agency theory; it is assumed that central officials allocate SAF to the region so that capital expenditure increases so that the region can improve services to the public. Pelealu (2013) discovered that a specific allocation fund has a favorable and considerable impact on capital expenditures.
H6: Capital expenditure mediated by special allocation funds has a substantial impact on regional financial independence.

Figure 2: Research Framework



3. Research Methodology

The district/city in West Java Province that was inspected by the Financial Inspection Agency of the Republic of Indonesia from 2016 to 2019 is the subject of this study (BPK RI). A total of 27 districts/cities in West Java were chosen for this investigation. Purposive sampling approaches were used to obtain samples from the entire population of this study based on criteria established. The following are the criteria employed in this sampling process:

a) The Financial Examining Agency (BPK) has audited the report on the financial data of the district/city government in the Province of West Java in the budget year 2016 - 2019.
b) Publish a complete Budget Realization Report (LRA) from 2016 - 2019. Furthermore, data for this study was gathered through publication on connected agencies' official websites and electronic communication channels. The data collected is the Regional Government Financial Report (LKPD) contained in the Inspection Results Report (LHP) BPK. In this study, each variable has its own measure, which was derived from earlier research. Table 1 demonstrates the variable measurement method.

Table 1: Measurement of Variables

Variable	Measurement	Source
Regional Financial Independence	Regional financial independence is measured by the total original revenue of the region divided by central government assistance and loans.	Ermawati and Aswar (2020)
Regional Tax	Total regional taxes divided by total regional revenue.	Novitasari and Novitasari (2019)
General Allocation Fund	The total general allocation fund divided by the total regional revenue.	Marizka (2013)
Specific Allocation Fund	The total special allocation fund divided by the total regional revenue.	Marizka (2013)
Capital Expenditure	Capital expenditure is measured by capital expenditure divided by regional expenditure	Darwis (2015)

4. Results and Discussion

The study's population is from the Regency/City of West Java Province. Samples were selected using purposive sampling techniques. Table 2 shows the final sample of this study.

Table 2: Final Sample of the Study

Criteria	Total
Regency/City in West Java Province	27
Regency/City of West Java Province does not publish the Report of Examination Results on the Financial Report of the Local Government	(0)
Number of Districts/Cities sampled	27
Number of years of study	4
The total number of samples during the study year	108

The researcher performed data analysis utilizing the Structural Equation Model (SEM) with Smart PLS version 3.0 application after filtering the study population data as indicated in table 2. Table 3 shows data descriptive statistics.

Table 3: Statistical Descriptive Analysis

	N	Minimum	Maximum	Mean	Std. Deviation
Regional Financial Independence (RFI)	108	0,0721	0,0721	0,339866	0,2267573
Regional Tax (RT)	108	0,0119	0,3793	0,115402	0,1049577
General Allocation Fund (GAF)	108	0,2141	0,5891	0,394723	0,0748196
Specific Allocation Fund (SAF)	108	0,0494	0,1781	0,120329	0,0357869
Capital Expenditure (CE)	108	0,1056	0,3967	0,209634	0,0582258

According to Table 3, the regional financial independence level has a maximum score of 0.0721 and the lowest score of 0.0721, with the regional financial independence level's standard deviation being lower than the average regional financial independence level score. The largest regional tax score is 0.3793, the lowest is 0.0119, and the regional tax standard deviation is lower than the average regional tax score. The general allocation fund has a maximum score of 0.5891, a minimum score of 0.2141, and a standard deviation that is lower than that of the average general allocation fund. The special allocation fund has a maximum score of 0.1781, a minimum score of 0.0494, and a standard deviation that is lower than the average score of the special allocation fund. The capital expenditure score ranges from 0.3967 to 0.1056 with a standard deviation lower than the average capital expenditure score.

Table 4: PLS Path Algorithm and Bootstrapping

Description	Path Coefficient	T Values	P Values
RT -> RFI	0,621	6,981	0,000
GAF -> RFI	-0,190	3,000	0,003
SAF -> RFI	-0,199	3,102	0,002
RT*CE -> RFI	0,006	0,413	0,680
GAF*CE -> RFI	0,002	0,154	0,878
SAF*CE -> RFI	0,008	0,863	0,388

The test results in Table 4 indicate that the regional tax route coefficient is 0.621 and positive when it comes to regional financial independence. This shows that regional taxes have a 0.621 beneficial impact on regional financial independence. With a significance threshold of less than 0.05, regional taxes have a calculated t value of 6,981, which is higher than the table t value of 1,983. As a result, it can be concluded that the study's first hypothesis is correct. The results of this study stated that regional taxes have a significant influence on regional financial independence. Regional tax is a levy imposed by each local government with the applicable law (Kadafi & Putra, 2013). According to Novalistia (2016) if the local tax obtained by the local government is increasing can indicate that the higher the region is able to receive income and the region is no longer dependent on the central government. If the local tax received is higher then it can show an increase in the ability of a region in providing facilities to the community and high community participation can help local governments carry out regional development. Regional financial independence will increase as more and more people are aware of paying taxes. The results of this study are also in line with several previous studies

such as Suratno and Mulyadi (2020), Ermawati and Aswar (2020), Novitasari and Novitasari (2019), Novalistia (2016) and Nggilu et al. (2016) which resulted in Regional taxes have a significant impact on regional financial independence. These findings, however, contradict those of Kadafi and Putra (2013), who showed that regional taxes have little effect on regional financial independence. The general allocation fund path coefficient to regional financial independence is negative at -0.190.

This demonstrates that the general allocation fund has a -0.190-negative impact on regional financial independence. With a significance level of less than 0.05, the general allocation fund has a calculated t value of 3,000, which is higher than the table t value of 1,983. As a result, it can be argued that the study's second hypothesis is correct. According to the findings of this study, general allocation funds have a substantial impact on regional financial independence. According to Prakosa (2004), GAF is a fund that has the function to equalize inter-regional finance that comes from the state budget. The central government provides funds to local governments known as general allocation funds. GAF is given so that each region has the same financial equity. The higher the GAF obtained by the local government will affect the level of regional financial independence. If the general allocation fund given to the local government decreases it will result in increased financial independence of the region because the region is no longer dependent on the funds provided but by maximizing the original revenue of the region in carrying out its government activities. Higher public allocation funds will increase dependence on the central government and decrease regional financial independence. This study's findings are consistent with those of Ariani and Putri (2016), Tahar and Zakhiya (2011), and Naganathan and Sivagnam (2000), who found that GAF has a significant impact on regional financial independence. For regional financial independence, the special allocation fund path coefficient is -0.199, which is negative. This demonstrates that the special allocation fund has a -0,199-negative impact on regional financial independence. With a significance threshold of less than 0.05, the special allocation fund has a calculated t value of 3,102, which is higher than the table t value of 1,983. As a result, it can be argued that the study's third hypothesis is accepted.

Suratno and Mulyadi (2020) SAF is assistance that comes from the state budget and the receipt is given to areas that have certain criteria that have a purpose to help meet all special activities in accordance with national priorities. The financial independence of the region is said to be low if the SAF received by the region is higher. The region's financial independence will rise as the SAF supplied lowers. The increase in regional financial independence will be influenced by the nominal amount of special allocation funds supplied. This study's findings are consistent with Marizka's (2013) finding that SAF has a major impact on regional financial independence. The capital expenditure path coefficient, which mediates the impact of regional taxes on regional financial independence, has a positive value of 0.006 and is positive. With a significance level better than 0.05, capital expenditure mediating the influence of regional taxes on regional financial independence has a calculated t value of 0.413, which is smaller than a table t value of 1.983. As a result, the fourth hypothesis is rejected. The results of this study stated that capital expenditure cannot mediate the influence of local taxes on regional financial independence. Districts with high PADs will fund large capital expenditures. Sumarmi (2015) states that local government budgets can be influenced by local revenue in the form of taxes. The results of this study show that capital expenditure cannot mediate the influence of regional taxes on financial independence. As a result of the regional tax's inability to realize capital expenditure due to a lack of accessible money, the realization of the regional tax can still be stated to be poor.

Furthermore, the average absorption of capital expenditure is still 20.96 percent of the total budgeted capital expenditure, as shown in the table of descriptive statistics. The findings of this study are consistent with Suratno and Mulyadi (2020) which found that capital spending does not improve the influence of regional taxes on regional financial independence. The capital expenditure path coefficient, which mediates the influence of general allocation funds on regional financial independence, has a positive value of 0.002. With a significance level better than 0.05, capital expenditure mediating the influence of public allocation funds on regional financial independence has a calculated t value of 0.154, which is less than the table t value of 1.983. As a result, the fifth hypothesis of this study is rejected. The results of this study stated that capital expenditure cannot mediate the influence of public allocation funds on regional financial independence. Sumarmi (2015) states that there is a close relationship between the transfers provided with regional expenditure. In this case, GAF is used as capital expenditure financing.

If the GAF given to the local government is high, then it can be ensured that capital expenditure will also be high. With the high capital expenditure, it is expected to increase the financial independence of the region. The results of this study show that capital expenditure cannot mediate the influence of public allocation funds on regional financial independence. This indicates that the utilization of GAF in capital expenditure has not been able to be used effectively by local governments to produce useful outputs for the benefit of the people. In addition, if viewed from the table of descriptive statistics that show the absorption of capital expenditure shows that the average is still 20.96% of the total budgeted capital expenditure. The capital expenditure path coefficient, which mediates the influence of special allocation funds on regional, financial independence, has a positive value of 0.008. With a significance level better than 0.05, capital expenditure mediating the effect of special allocation funds on regional financial independence has a calculated t value of 0.863, which is less than the table t value of 1.983. According to the findings of this study, capital expenditures are unable to mitigate the impact of special allocation funds on regional financial independence.

The federal government distributes funding to local governments through special allocation funds. SAF has the ability to support unique projects based on national interests. To support regional expenditures, local governments must be able to handle funds as efficiently as feasible. The more optimal utilization of SAF and in accordance with the target will increase the quality of the public which is realized through capital expenditure. The results of this study show that capital expenditure cannot mediate the influence of special allocation funds on regional financial independence. This indicates that the utilization of SAF in capital expenditure has not been able to be used effectively and efficiently by local governments to produce useful outputs for the benefit of the people. In addition, if viewed from the table of descriptive statistics that show the absorption of capital expenditure shows that the average is still 20.96% of the total budgeted capital expenditure. The findings of this study are consistent with Suratno and Mulyadi (2020), which found that capital expenditure, does not improve SAF's influence on regional financial independence.

5. Conclusion and Recommendations

This study aims to examine regional tax, general allocation funds, special allocation funds, and capital expenditure as intervening on regional financial independence. Regional taxes, general allocation funds, and special allocation funds all have a substantial impact on regional financial independence, according to the findings of this study. While capital expenditure cannot mediate the influence of local taxes, general allocation funds, and special allocation funds on regional financial independence. There are some limitations experienced by researchers. This study is only on the Regency/City in West Java Province so it has not been able to represent all Regency/City in Indonesia. Then there are some areas of the examination report that are presented in scanned form so that it is not easy to read which results in having to check the Notes on the Financial Statements first to be able to see the budget realization report used. The findings of this study are expected for local governments, especially districts/cities in West Java Province to be able to optimize local taxes through the improvement of adequate public services. Then, given that the composition of the number of GAF and SAF is quite dominant, the funds should be optimized for the development sectors so that their use can be efficient which will encourage economic growth and indirectly able to increase regional financial independence. Further expected to use other variables that are able to affect the financial independence of the region such as other legitimate income, regional loans, and investments so on. Then, further study needs to expand the sampling, for example, all districts/cities in Java so that the research results are more valid and can be generalized.

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Lebanese Investors' Decision Making Analysis from Conventional and Behavioral Perspectives Simultaneously

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Abstract: The investment decision Process varies from one individual to another and from one country to another respectively. These decisions are usually taken based on either a Conventional basis or linked to the sentimental side of investors and reflected through behavioral finance gateway, where biases and psychological side of investors control their way of thinking and affect their investment decisions endlessly. Furthermore, based on previous literature the majority of investors tend to incorporate both gateways during their investment process as they don't depend solely on Conventional gate, but their psychological part appears to play a big role while deciding and similarly for Lebanon. However, the main aim of this paper lies in investigating the main factors from both gates triggering Lebanese individual investors' decision-making during their investment process. Moreover, the empirical part lies on focusing on a bunch of samples from individual Lebanese investors distributed along with most Lebanese districts; where 211 complete responses are interpreted within the SPSS program, undergoing factor analyses and Regression models. Results obtained indicates that Lebanese individual investors tend to incorporate both gateways in their investments decision, where the main goal stays utility and profit maximization; that to say tending to seek profits regardless of the investment field and approach. Nevertheless, during seeking profits Lebanese investor is being exposed to certain behavioral errors and biases that appear to impact and control his decisions significantly during investment making the process so far, and theses biases are affecting the Lebanese individual investors clearly more than that of conventional ones.

Keywords: *Opportunity Cost, behavioral biases, mental accounting, Regret aversion, overconfidence, Utility maximization, Social cause enhancement.*

1. Introduction

Opportunity cost is considered as one of the most important decision cost concepts by many economics mainly in London by the 1930s (Edward, 1937). Moreover, individual choices during the decision-making process were based on the opportunity cost concept, where each investor adopts a unique way of thinking to take his own choice which he believes that it's the perfect one for him and he cannot transfer it to other's knowledge. As a result, Hayek in 1935 suggested that the concept of Opportunity cost shall be utilized for demonstrating the inconceivability within ideal socialist calculations so far. However from the other side "Behavioral Finance becomes a basic part for decision-making process where it highly impacts investors' performance" (Barberis & Thaler, 2003). Parikh has recalled also in 2011 that "An understanding of how feelings and emotions lead to irrational behavior which is essential for any investor". As a result, in-depth education regarding the different biases that may be faced is very needed to all investors, in order to know how to face them whenever they have been surprised with, to obtain a more effective and efficient work.

Furthermore; investors usually do lots of mistakes without recognizing, a simple example regarding what is mentioned previously is when investors hold on for a long period while facing big losses, not regretting or waiting for any happy news that would reverse the entire situation. As a result, Parikh (2011) had discovered a global key that helps investors to make the right decision which lies in combining both sound judgment skills along with emotional regimen, and so they obtain the aimed rational and sound behaviors. Moreover, It is noticeable to mention that Lebanese investors are being faced with various types of investments where they usually prefer bending toward family investments or joint ones to minimize the risk level that they may be encountered to a way forward; additionally to social responsibility investments that appeared recently and addressed in a separate article accordingly under the title of "Social Responsibility investments in Lebanon"; where "Social responsibility investment advocates mainly Charity investment; where it tends to spread worldwide especially using pension funds, as 2008 financial crises have been the main push toward ethical financial tools.

Which focuses mainly on "social and environmental investments" (Baron, 2001). This paper examines the reality behind Lebanese investment decision-making through studying factors affecting their decision-making process from both sides; as a section from a circulated questionnaire in arrange to handle divergent views for several individual Lebanese investors spread all over Lebanon. Acquired figures are inserted, analyzed and interpreted through SPSS. Nevertheless, the paper is directed as follows: the theoretical Framework of decision-making is presented in the Second Section. Furthermore, the Third Section focuses on the used methodology moving to the fourth Section that presents data analysis of Lebanese individual investors. Section 5 presents the Test results and analysis pertaining to Lebanese individual investors' decision making; to end up with a general conclusion conducted in section 6.

2. Theoretical Framework behind Lebanese Investors' Decision Making

The study of decision behavior is based on the comprehension of circumstantial elements; which stands as a theoretical framework known by "Expectancy Decision Processing Model", that is build based on behavioral decision theories, in addition for REMM model accompanied with agency theories and appropriation for opportunity cost concept during unlike decision states, which is suggested by both (Watts and Zimmerman, 1990). The Expectancy Decision Processing Model has been developed using the help of the REMM model along with Expectancy Theory and behavioral Decision Theories, additionally to Theory of Choice which stands as the corner base for opportunity cost concept. The core framework for model analysis is as follows; taking into account the primary presumption that decision-maker (investor) already built in his mind and focuses on a certain or adjusted choice objective, where it's debated that decision taker tends to adjust either the situation for factors' existing under concern, or selected choices regarding a behavioral decision or both; for obtaining bigger chances of accomplishing the already set objective. Based on the selected approach that lies under opportunity cost and is utilized during the investment decision-making process, it can be clearly noticed that the opportunity cost approach is considered as one of the numerous costing approaches that are cited and utilized by decision-makers.

Additionally, it's clearly realized that distinctive costing approaches lead to diversified results (Clark, 1923). Furthermore, those types of cost stand for being real indicators during the prioritization process of different preferences among various decision options; where distinctive cost models provide a certain distinctive positioning list along with an option set list in different positions. Furthermore, the elected/option that may stand first with respect to a certain specific model would as well stands in a lower position while implementing another cost model. Therefore, the appropriation for a certain specific cost approach and model results in a real effect on the finalized selection and adaptation for a particular resolution alternative and borrowing of a specific decision behavior expressed by the decision taker himself. Nevertheless, "Previously done researches recommended that decision behavior techniques are a loop for task characteristics, along with decision-maker characteristics additionally for the reaction between both of them (Hogarth and Reder, 1987)". Furthermore; taking to account the numerous existing variables, the main measurement tool/ratio that stands to be very useful and essential; especially when various investment choices are available and selection must take place during the decision making process, stands to be the Opportunity cost measurements (Gul, 1984).

However, During 2008, various studies toward this issue started appearing, emerging with the business students (Chira, Adams and Thornton) that acquired the curiosity to investigate how specific errors impact them; where there existed about 68 surveys and disseminated to undergraduate and graduate business students at Jacksonville University- the USA where researchers prevailed that students are not so much exposed to act in an overconfident and excessive Optimism, whereas on the contrary objectivity has restrained their decisions. Moving to the Nairobi Stock Exchange; Waweru, Munyoki, and Uliana (2008) that "have studied how institutional investors have been impacted by specific behavioral variables such as Herding, representativeness, overconfidence, anchoring, loss aversion and availability bias during taking their investment decisions using a Questionnaire". Thus "various debates rose to investigate about the choice of different practices that helps in identifying the utilization of the opportunity cost idea in business choices; as it is uncertain if the concept is adopted in practices by managers and executives" (Frederick, et al., 2009). Nevertheless, they have focused on studying the effects of constraint on opportunity cost consideration without any previous reminders for consumers or investors.

By adopting two versions of the scenario targeting 194 students to know the way of their decision making (constrained version and unconstrained version) with the help of two independent coders blind to hypotheses and conditions where they coded their responses; to get that constrained individuals to consider their opportunity costs more frequently than unconstrained individuals and those who considered opportunity costs were more sensitive to their value. Nevertheless, Spiller (2011) addresses research to know where consumers consider opportunity costs, and what are the consequences of considering opportunity costs, investigating whether consumers should incorporate opportunity costs into every decision they make, using online surveys targeted more than 400 people, where it appeared to be that Consumers who consider opportunity costs are less likely to buy focal options than those who do not when opportunity costs are attractive. As Stated by Sinha (2012) "a new crisis raised in the form of Sovereign debt which was initially originated in Europe to spread all over the world, hitting all the financial markets consequently". Nevertheless "Volatility has been the most famous word that controlled the prices of the financial markets starting since 2008; horrible movements have taken place in prices due to the extreme fear and anticipation of the investors, which turned the life for all kind of investors upside down".

Hence markets begin to end day after day and so understanding the irrationality within investors' behaviors has been clearer and the reasons lying behind become well known. Moreover, the core problem is found in numerous numbers of psychological biases which are impacting investors' behaviors leading to irrational thinking during the decision-making process. Subsequently, Zhang (2013) explored cultural differences between Chinese and European Canadians in considering opportunity cost while making purchase decisions, taking into account mainly individual differences in the habit of considering opportunity cost using Two different scenarios to decide whether to buy a single product or not on 121 Euro-Canadians and 119 Chinese, where results confirmed that Chinese were also more likely to mention the opportunity cost thoughts than did European Canadians while making the decision thus it can be confirmed that opportunity cost consideration varies, at least to some extent, across cultures. Lately, studied the impact of uncertainty on firm-level capital investment, and examines whether this effect depends on the degree of competition that firms face or other factors, focusing mainly on an empirical setting to construct a time-varying uncertainty measure that is exogenous to economic conditions and firm behavior, obtaining that higher uncertainty results in a decrease in investment for firms in more concentrated industries and on the other side it was concluded that the degree of competition plays an important role in the link Between uncertainty and investment.

3. Methodology

When making any research, two main approaches help in studying and verifying the studied theories which are "Deduction and Induction". Whenever, the researcher finds that his study usually starts with a certain theory, thus he tends directly to the Deductive approach and starts collecting empirical evidence that would support this theory and this thing is completely in contrast with the inductive approach that starts from empirical evidence to get a theory. However, the following paper aims to investigate the impact of opportunity cost and behavioral factors (biases) which would affect the majority of individual investors in a dissimilar way during uncertainty; therefore deductive approach seems to be the most appropriate. Moreover, we have noticed that our research starts to give an overview regarding opportunity cost's impact and behavioral finance on investor's decision making during uncertainty, based on different and various researches done before that contain their own or similar model and hypotheses to be studied, as a result, our own questionnaire have been built based on this previous literature. Moreover, the suggested hypotheses have been tested through the help of collecting various data to analyze them. Nevertheless, whenever talked about the Deductive method, it is noticed that the Quantitative method which is descriptive in nature and is used by researchers to understand the effects of various inputs on the individual investors and how do they react in return, is going to accompany it, in addition to various statistical methods to arrive together to generalize the tested hypothesis and prove that opportunity cost accompanied with numerous biases can affect an individual's investment decision taking in an uncertain environment so far.

Data Source: The Data used in this paper is collected based on a questionnaire distributed to target different Lebanese investors all across Lebanon. The core aim of this paper is to target mainly individual investors (males and females) ages varies from 22 years old and more; as individual investors could be either young

and are still fresh investors, or mature one's that have enough experience in this field; in order to realize the difference between them and how would years of experience in the field affect mainly the decision taken.

Sample Frame and Size: In this paper probability sampling technique mainly "Random Sampling" is adopted, as this type looks after diversified categories from investors distributed among different regions in Lebanon, for ensuring Representativeness and precision toward the obtained results; through utilizing Simple random sampling technique, where each included sample has the same specific probability to be chosen, which in turn characterizes it for being more accurate and would help in testing hypotheses under study in order to generalize results obtained all over the population; as a result, the questionnaire was sent via a link to tackle the biggest number of investors in order to obtain different views to validate and ensure credibility to the paper. Nevertheless, the utilized sample profile is based on a diversified judgmental criterion like respondents' age, Experience, most investment preferable market, additionally for the most preferred range of prices to invest in. Moreover, The study targets individual investors (males and females) starting from 22 years old and above, where these kinds of investors could be either young (unexperienced) or the ones acquiring enough experience in the domain to compare differences lying between them and how would years of experience affect the decision taken additionally for main choices seeking toward.

Hypotheses Under Study: Various hypotheses have been tested throughout this study to tackle the reality of Lebanese investor's decision-making and whether they are more likely exposed to conventional finance ways or to other psychological parts which fall under behavioral finance attributes. However, based on this several hypotheses were under study.
H1: All types of individual investors are affected by certain behavioral biases during decision-making.
H2: Most of the investors tend to be more overconfident and have excessive optimism while taking decisions regarding their portfolios.
H3: Most of the investors tend to face representativeness bias.
H4: Most of the investors tend to face Herding bias during decision making.
H5: Investors usually feel in fear to get out from their investment even if they knew that it's a losing one.
H6: All types of individual investors tend to face Mental accounting bias.
H7: Most individual investors tend to face cognitive Dissonance bias.
H8: Transaction cost theory is taken into consideration during decision-making.
H9: Utility maximization is the main target of Lebanese individual investors.
H10: Social Cause enhancement is one of the main goals during investment decision-making.
H11: Agent-principle theory is taken into consideration during the decision-making process.
H12: Satisfaction level and motivation process play a big role during decision making.
H13: Value judgment is taken into consideration during the decision-making process.
H14: ROI/ROE ratios are taken into consideration during the investment decision process, thus investing in high debt companies to maximize profits.

Data Analysis: The used questionnaire construct from 29 questions where obtained sample registered 211 complete respondents. The questionnaire was sent through a link to individual investors ranging between 22 years old and above out of which 211 questionnaires were sent back. Moreover, the utilized questionnaire is decomposed into three main sections: starting with demographics questions, moving to investments basic and finally questions related to different investment decisions and behavioral biases that would be faced by various investors. Furthermore, investors are being questioned to respond based on a continuous scale where some of them follow the Five-Points Likert based scale while others follow the three-point Likert scale.

Quality Criteria: Any research study is not considered appreciated until it meets the Quality requirements that business research should acquire. For that we were interested in studying basics criteria that may support the keys of scientific research so far, which are Reliability and Validity, however, Validity has been expressed via measuring internal, external and ecological validity. While reliability is verified while studying stability and internal reliability across all inter-observer consistency.

Validity: Validity is demonstrated through four basic points which are: measurement, internal-external and ecological validity (Bryman & Bell, 2011, p.42).

- ✓ Measurement validity as Bryman and Bell (2011, p.165) states that questions that are found in the questionnaire can be considered true for measuring the targeted concept; however our questionnaire was built mainly on previous used theoretical models pertaining to previous studies, moreover, various indices have been applied to show the real image of different behavioral factors that could influence individual's investor's decision making. However, using the Likert scale in our questionnaire increases the accuracy of our measurement, in addition, that all of our collected data has been analyzed and processed through SPSS software in order to obtain the main factors that can affect individual's investor's opinions while taking his decision and their correlations; As a result measurement validity was obtained in our study.
- ✓ Internal validity was obtained in this research due to the unpremeditated relation existing between independent (Biases) and dependent ones (Decision taken); however the strong correlation between the different biases and the dependent one was just considered after testing, therefore internal validity was spread all over the research.
- ✓ External validity, however because of the random sampling that we have chosen in our study to obtain to a certain extent a relatively large sample through choosing different random respondents all across Lebanon to generalize outcomes over the population.
- ✓ Ecological validity focuses on question to discover whether obtained outputs are eligible or applicable to people's every day (Bryman & Bell, 2011, p.43)", however, our questionnaire was designed to tackle different opinions from different respondents and to know approximately the real reactions of how an individual investor would behave when faced with such cases, therefore we can tell that our research can give to a certain extent a general overview about an investor daily life.

Reliability Test Results

Table 1: Reliability Test Result-Overall

Reliability Results		
Cronbach's Alpha	**Cronbach's Alpha Based on Standardized Items**	**N of Items**
0.612	0.624	18

Source: The author

The reliability test results obtained in the above table indicates 62% reliability which is considered as an acceptable percentage indicating internal reliability, but from the other side it is also considered "Questionable" to a certain extent and this is very normal in our case since Cronbach's alpha measures the internal consistency of the scale and therefore used mostly when the study contains a questionnaire based on Likert scale questions and researcher wishes to test if the scale used is reliable or not. However in this study there exists various response formats such as the five-Likert scale, three-Likert scale and others were closed-ended; so it's very normal for Cronbach alpha to be questionable in our case due to the absence of unification of the utilized Likert scale all over.

Table 2: Descriptive Statistics-Overall

	N	**Minimum**	**Maximum**	**Mean**	**Std. Deviation**	**Variance**
Sex	211	1	2	1.45	.498	.248
Age	211	1.00	4.00	2.5071	.65734	.432
Years of investment	211	1	31	12.48	6.378	40.679
Preferred market	211	1	2	1.46	.500	.250
Investing Choice	211	1	5	2.06	.895	.801
Preferable Price range	211	1.00	3.00	1.9289	.78659	.619
Valid N (listwise)	211					

Source: Prepared by the Author

Above is a descriptive statistics table pertaining to basic demographics and investment results. We were interested in studying the mean, std. deviation and variance and the above results were obtained.

4. Results and Analyses

Detailed Results' analysis pertaining to the obtained results from different Tests is presented below.

Correlations: While investigating the correlation among dependent variables (decision making) and independent ones (Opportunity Cost variables, uncertainty and behavioral biases variables: Overconfidence, Representativeness, Herding, Anchoring, Regret aversion, mental accounting, and Cognitive dissonance…) results' obtained were as follow: Satisfaction level was positively correlated with taking an investment decision at the level of (0.05) where Pearson correlation between the two indices registered 0.154 and significant at 0.05 (positive correlation). Social cause enhancement was positively and highly correlated with taking an investment decision at 0.05 levels with 0.193 Pearson correlations (positive correlation). Utility maximization and the dependent index have a high and positive correlation (0.333) significant at 0.01, thus it can be said that the main goal for an investor is maximizing his utility and profits no matter the investment way. However, pertaining to ROI/ROE measures was correlated negatively with decision making (-0.048) and not significant.

Meaning that Lebanese individual investors don't look for numbers and previous studies in most cases but there is another part that is interfering during the decision-making process. Furthermore, the agent-principle relation was negatively correlated with investment decision making (-0.05), investor preference (-0.137) and Value judgment (-0.108), Transaction cost theory measurement (-0.151) they were negatively correlated with decision making. Furthermore, the Lebanese mind state while facing a loss (which falls under the mental accounting variable) appears to be highly correlated with taking an investment decision (0.216), that's to say a Lebanese investor is able to forget his losses once faced with a "Win". Nevertheless, Holding on to an investment not to regret later appears to be positively correlated and significant with decision making (0.184) whereas the other variables lying under behavioral finance variables (Representativeness, Hindsight, Gambler's fallacy and anchoring) is negatively and not significant as shown in the correlation table.

Factor Analysis

Table 3: KMO and Bartlett's Test-Overall

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		**.539**
Bartlett's Test of Sphericity	Approx. Chi-Square	138.763
	Df	45
	Sig.	.000

KMO and Bartlett's test varies usually between 0 and 1, Kaiser (1974) ensures that records more than 0.5 shall be valid for factor analysis to obtain reliable variables; whereas values less than 0.5 oblige researchers for collecting either more data or rethinking another time in the included and studied variables. In the table above Kaiser's value recorded 0.539, which is considered "Acceptable" according to Hutcheson and Sofronie (1999), thus researchers shall be confident that the factor analysis technique is appropriate for the data collected. Moving to Bartlett's that tests a null hypothesis and shall be significant only if (<0.05). However regarding the used data; Bartlett's test is highly significant ($p<0.001$) therefore it can be clearly confirmed that factor analyses are very appropriate for conducting the study way forward.

Regression (Model Building): Linear regression is conducted between independent factors and dependent ones (Opportunity Cost variables, and behavioral biases variables: Overconfidence, Representativeness, Herding, Anchoring, Regret aversion, mental accounting, and Cognitive dissonance…) and the dependent variable (investment decision making).

Table 4: Model Summary-Overall

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.433[a]	.288	.251	.793

a. Predictors: (Constant), Social Cause enhancement, Satisfaction level, Utility maximization, Value judgment, Overconfidence and excessive optimism, Agent/principle, ROI/ROE measurements, Investment preference, Hindsight, Herding, Representativeness, Anchoring, Regret aversion, Gambler's fallacy, Mental accounting.
b. Dependent Variable: investment Decision taken.

Table 5: ANOVA[b]-Overall

Model		Sum of Squares	DF	Mean Square	F	Sig.
1	Regression	39.707	11	3.610	5.212	.000[a]
	Residual	137.819	199	.693		
	Total	177.526	210			

a. Predictors: (Constant), Social Cause enhancement, Satisfaction level, Utility maximization, Value judgment, Overconfidence and excessive optimism, Agent/principle, ROI/ROE measurements, Investment preference, Hindsight, Herding, Representativeness, Anchoring, Regret aversion, Gambler's fallacy, Mental accounting

b. Dependent Variable: investment Decision taken

Table 4 shows that R square is equal to 0.288 indicating that 28.8% of the total variance in supporting investment decisions taken has been explained. Nevertheless, obtaining F significant for less than 0.05 suggests a specific linear Relationship amongst applicable variables and ensuring the significance of the overall model used and obtained so far.

Table 6: Coefficients [a]

		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	2.487	.397		6.265	.000
	Hindsight	.107	.152	.048	.704	.483
	Herding	-.015	.029	-.035	-.512	.609
	Representativeness	.179	.121	.105	1.484	.139
	Anchoring	.041	.074	.040	.560	.576
	Regret aversion	.171	.073	.164	2.322	.021
	Gambler's fallacy	.254	.086	-.217	-2.963	.063
	Mental accounting	.270	.081	.234	3.320	.001
	Social Cause enhancement	.060	.079	.052	.758	.044
	Satisfaction level	.095	.069	.092	1.378	.170
	Utility maximization	.321	.073	.302	4.394	.000
	Value judgment	-.068	.063	-.073	-1.082	.281
	Overconfidence and excessive optimism	.082	.130	.041	.628	.031
	Agent/principle	-.606	.249	-.165	-2.437	.016
	ROI/ROE measurements	.116	.079	.095	1.469	.143
	Investment preference	-.075	.066	-.076	-1.137	.257

a. Dependent Variable: investment decision

The way forward, Table 6 presents Factor analysis results indicating a negative, Relationship among the six independent factors, omitting eleven which are mentioned above but regression was made to confirm results. The relative importance for each independent variable presented in standardized terms is expressed by Beta. It is noticed that Hindsight, Representativeness, Anchoring, Regret aversion, gambler's fallacy, mental accounting in addition to Social cause enhancement, Satisfaction level, Utility maximization, Overconfidence & excessive optimism, ROI/ROE measures indicates significance with dependent factor (investment decision making). However, The coefficient table supports in concluding the equation; while over viewing the T-test column, it is noticed that (Utility maximization, Mental Accounting, Regret Aversion, Over Confidence &excessive optimism and Social cause enhancement) are significant while others are not with (beta=0.321, beta=0.270, beta=0.171, beta=0.082 and beta=0.060).

Model Estimation: Results indicate the relationship presented between Independent variables and dependent ones (Investment decision making) per the below:

Y=2.487+0.321Utilitymax+0.270mentalAcc+0.171regretaversion+0.082OverConf+0.60Socialenhancment.

This result indicates that five independent variables from both sides (conventional and behavioral finance) affects significantly the dependent variable which is (Investment decision making of the Lebanese individual investor); where Utility maximization and Social cause enhancement lies under opportunity Cost variables; whereas Mental Accounting, Regret aversion and overconfidence reside under behavioral finance variables. However, Lebanese individual investors when being faced by various choices to choose from during decision-making process; they are exposed to face different factors that impact their decision taken from both sides (conventional and behavioral). Moreover, the main aim behind any decision lies in Utility maximization, followed by three biases that control their way of thinking and shall realize their high impact during taking the decision (Mental accounting. Overconfidence/excessive optimism and Regret aversion); in addition to enhancing socially responsible investments that appear to be a new trend, regarding the variables that affect the Lebanese investor decision making. These variables must be taken into account seriously, especially enhancing socially responsible investments that are becoming one of the main investment choices that a Lebanese investor would choose whenever faced with numerous investment choices.

Summary for Findings

- ✓ Hypothesis one (H1) was accepted, where all types of individual investors are exposed to behavioral biases during taking decisions regarding their portfolios, where it is noticed while studying whether individual investors have heard about "Behavioral finance", the majority of them which record 51.7% appear to have a fair knowledge toward this concept.
- ✓ Hypothesis two (H2) was also accepted, as we have found that 64% have been taking so far the right decision in their decisions and 75.4% build their portfolios according to its past performance and historical records, in addition to that this factor was the main contributor that has appeared when building our model.
- ✓ Hypothesis three (H3) regarding facing Representativeness bias was rejected.
- ✓ Hypothesis four (H4) regarding facing Herding bias was rejected.
- ✓ Hypothesis five (H5) that was related to facing Regret aversion impacts highly and significantly in Lebanon, thus it was strongly accepted.
- ✓ Regarding hypothesis six (H6) that talks about mental accounting bias tend to be highly significant (P>0.005) so hypothesis 6 is strongly accepted.

- ✓ Hypothesis seven (H7) regarding facing Cognitive dissonance bias was rejected.
- ✓ The transaction cost theory is taken into account during the decision-making process, thus H8 is accepted.
- ✓ Utility maximization is the most dominant factor that controls the way of thinking of the Lebanese investor (H9 is strongly accepted).
- ✓ Hypothesis ten (H10) regarding enhancing socially responsible investments is one of the contributors that impact significantly the investors' decision-making in Lebanon, thus it is also strongly accepted.
- ✓ Agent-principle theory is the main theory that a Lebanese individual investor takes into account during decision making; therefore H11 is accepted as well.

- ✓ Hypothesis twelve (H12) regarding the effect of the rewarding process on decision making plays also a big role during decision making thus H12 is accepted.
- ✓ Value judgment contributes clearly during decision-making seeking for utility maximization and more profits, thus H13 is accepted also.
- ✓ ROI/ROE wasn't the main ratio that the Lebanese investor looks for during his decision-making process, therefore H14 is rejected.

5. Conclusion and Recommendations

This paper assesses the different factors impacting Lebanese individual investors' decision-making, from both levels of Conventional and behavioral finance considering uncertainty. Thus this paper takes into consideration numerous variables which lie under opportunity cost factors; assuming that a cost must be paid whenever choices exist in an uncertain environment, additionally to the biases/errors that fall under behavioral or psychological considerations which in turn impact the investor's decision making so far. This paper ensures that Lebanese individual investors incorporate factors from both sides (traditional and psychological ones) during their decision-making process, but Utility maximization stays the main goal that a Lebanese investor seeks during any decision-making process. However, a combined theoretical model is conducted to address the simultaneous effect for both fundamentals and behavioral factors together. Results show that factors from both sides (conventional and behavioral) affecting the decision-making process for the Lebanese investors; Where the main goal stays utility and profit maximization; that to say tending to seek profits regardless of the investment field and way. Additionally during seeking profits, Lebanese investor is being exposed to certain behavioral errors and biases that appear to impact and control his decisions significantly during the investment making process so far.

Moreover and to recap; Mental accounting bias ensures that the mindset of the Lebanese investor is programmed to forget his losses whenever faced with gains or profits; overconfidence or excessive optimism factors ensures that the Lebanese investor lives on the glories of the past, so he tends to overestimate his abilities and skills leading him to face big risks in order to gain more and more, which in turns leads him to underestimate the overall situation. Moreover, Regret aversion affects significantly the decision-making process; as the latter holds on always his wrong investment choices even when being faced with continual loss; fearing regret that would control his life later especially if he has been working on so long. Thus, this paper ensures that Lebanese investors face factors from both sides (opportunity cost variables and behavioral one); more precisely it appears that the psychological part participates a lot in the decision making process than that of conventional one, where three factors (Mental accounting, Regret aversion, Overconfidence) is encountered in the model versus two from the fundamentals and falls under opportunity cost variables(Utility maximization and Social cause enhancement), therefore this paper ensures that Lebanese investors shall take into account seriously and be more aware their sentimental side which is leading them unconsciously to take risky and wrong decisions so far without realizing their dire consequences.

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