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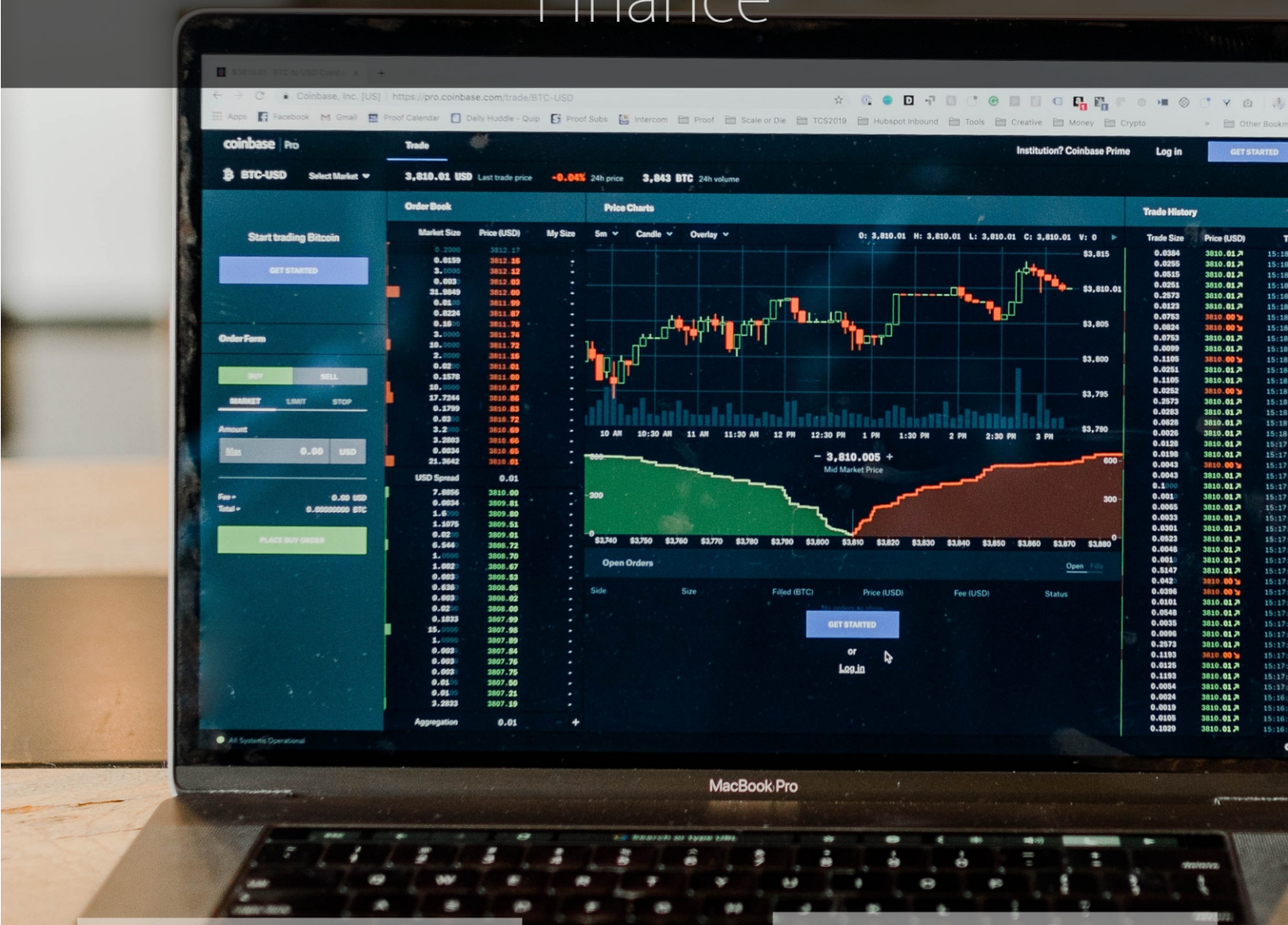

Financial Service Industry

SME Financing and Sustainability

Highlights

Exchange Traded Funds (ETFs)

The Value of Financial Information

Discovering Thoughts, Inventing Future

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The Value of Financial Information to Make Investment Decisions in the European Stock Market

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Universitat Politécnica de Valencia

Abstract- In this article we present a mathematical model of asset allocation to an investment portfolio that optimizes the returns obtained under a series of restrictions. Said allocation is made between a group of companies in the Eurostoxx 50 index that are preselected based on the evolution of their accounting and financial variables.

We tested this investment method in the period 2009-2019 and compared the evolution of the profitability and volatility of the portfolio obtained with respect to the Eurostoxx 50 index.

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The Value of Financial Information to Make Investment Decisions in the European Stock Market

El Valor De La Información Economico Financiera Para La Toma De Decisiones De Inversión En El Mercado Bursatil Europeo

Raul Barberá Beltran

Resumen- En este artículo exponemos un modelo matemático de asignación de activos a una cartera de inversión que optimiza las rentabilidades obtenidas bajo una serie de restricciones. Dicha asignación se realiza entre un conjunto de empresas del índice Eurostoxx 50 que son preseleccionadas en base a la evolución de sus variables contables y financieras.

Testeamos este método de inversión en el periodo 2009-2019 y comparamos la evolución de la rentabilidad y la volatilidad de la cartera obtenida con respecto al índice Eurostoxx 50.

Abstract- In this article we present a mathematical model of asset allocation to an investment portfolio that optimizes the returns obtained under a series of restrictions. Said allocation is made between a group of companies in the Eurostoxx 50 index that are preselected based on the evolution of their accounting and financial variables.

We tested this investment method in the period 2009-2019 and compared the evolution of the profitability and volatility of the portfolio obtained with respect to the Eurostoxx 50 index.

I. Introducción

El objetivo de este trabajo es comprobar la rentabilidad que se puede obtener mediante el sistema de inversión expuesto por (Barberá Beltran, 2019)aplicado al el índice Eurostoxx 50 tras estudiar y optimizar sus restricciones, así como evaluar su volatilidad y las rentabilidades obtenidas a lo largo del periodo 2009-2019.El experimento se lleva a cabo en el mercado europeo, proporcionando tres mejoras sobre el anterior.

a) Logra mejorar las correlaciones entre las variables financieras y el precio.
b) Proporciona al sistema un método de salida.
c) Las rentabilidades superan a otros índices además del Ibex 35.

El proceso de gestión de carteras, según (Maginn, et al., 2007), es un conjunto integrado de pasos que se emprenden de manera coherente para crear y mantener una combinación de activos adecuada para cumplir los objetivos declarados por los inversores. Existen evidencias que sugieren que la rentabilidad de una empresa está relacionada con la calidad y cantidad de información que el mercado dispone de ella (López Espinosa, et al. 2005). El estudio de los conjuntos disponibles de activos y la rentabilidad de sus diferentes combinaciones para una cartera son la base de toda la *Moderna Teoría de Carteras* y la que hizo que a Harry Markowitz le concedieran el Premio Nobel de Economía.

El problema de la selección de valores nos lleva a la constitución de una cartera que maximice la utilidad del inversor. Al hablar de función de utilidad nos referimos a aquella función que mide, en este caso, la satisfacción del inversor. Según (Levy, et al. 1979) es más conveniente para un inversor determinar el conjunto de carteras eficientes de varianza media que encontrar la cartera que maximiza la función de utilidad. Este modelo ha sido estudiado en muchas investigaciones que han tratado de aplicarlo e incluso mejorarlo, ya que el modelo clásico de selección de carteras desarrollado por Markowitz no puede acomodar criterios adicionales más allá de la rentabilidad y el riesgo (Aouni, et al., 2018).

Pero lo que los inversores esperan lograr a través de una optimización de la cartera es maximizar el rendimiento de la cartera y minimizar el riesgo de la misma. Dado que el rendimiento cambia en función del riesgo, los inversores deben equilibrar la contradicción entre riesgo y rendimiento de su inversión. Por tanto, no existe una única cartera optimizada para satisfacer a todos los inversores. La cartera óptima está determinada por las preferencias de riesgo y rendimiento del inversor (Ivanova, et al. 2005). Actualmente se han identificado un total de 23 criterios a tener en cuenta en la selección de carteras, de los cuales según su importancia destacan, además de la rentabilidad y el riesgo, el mercado y el crecimiento (Rahimnezhad Galanskashi, et al. 2020).

En esta investigación apostamos por el hecho de que, en el muy largo plazo y a falta de otro tipo de

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información, es más conveniente para el inversor buscar la cartera que maximiza la rentabilidad entre el conjunto de carteras formadas únicamente empresas con buenos resultados económico financieros. La obtención de buenos resultados operativos, expresados a través de la eficiencia, setraducen en buenos resultados financieros que las consolidan dentro del mercado bursátil, y que adicionalmente convierten las medidas de eficiencia en indicadores de apoyo para la toma de decisión de los inversionistas, complementando los ratiostradicionales del análisis financiero(Balseiro Barrios, et al., 2021).

Hemos comprobado cuales son las variables contables y ratios financieros que más correlación muestran con la cotización. Dentro del conjunto de empresas disponibles en el Eurostoxx 50 (E) escogemos un subconjunto de empresas X⊆ Eque han mostrado una evolución favorable en dichos ratios. Dentro este subconjunto de empresas, nuestro modelo limita las posibles combinaciones entre activos posibles en este subconjunto en base a tres restricciones que limitan el porcentaje máximo de capital que se puede asignar a un valor y la rentabilidad mínima que estamos dispuestos a aceptar y el capital máximo del que se dispone. Dentro del conjunto de posibilidades, la función objetivo del modelo asigna a la cartera del inversor aquellos activos que vayan a ofrecer una mayor rentabilidad por dividendo, generando de esta manera una fuente de ingresos pasivos a largo plazo. Hay muchos investigadores que centran sus estudios en la aplicación de modelos matemáticos para la selección de activos y diseño de carteras. Encontramos un ejemplo muy interesante en la investigación de (Xidonas, et al., 2009) que desarrolla un modelo de programación matemática con el fin de generar carteras óptimas de Pareto.

En un trabajo posterior (Xidonas, et al., 2014) detectaron problemas de optimización de carteras multiobjetivo de enteros mixtos en el proceso de selección de carteras. Sobre esta base desarrollaron meticulosamente procedimientos de modelado correspondientes. La consistencia en el tiempo de este análisis nos puede permitir determinar en qué factores se obtiene repetidamente más éxito y discernir entre que parte proviene de la habilidad y que parte es atribuible a la suerte. El mercado cambia a diario por situaciones y causas aleatorias. Si los investigadores logran encontrar reglas adecuadas para para pronosticar, podrán incrementar las recompensas de las inversiones. Este interés se basa en la expectativa de que el análisis de los estados financieros pueda revelar información para el valor que, quizás los inversores hayan pasado por alto y que puede emplearse para tomar decisiones más optimizadas.

Uno de los temas de discusión más polémicos entre los investigadores durante muchos años es la evidencia empírica de que las acciones de valor generan rendimientos promedio más altos que las acciones de crecimiento (Banerjee, et al., 2017). No obstante, la mayoría de algoritmos existentes no incorporan toda la información disponible del mercado. Existen problemas de disponibilidad de la información, dado que no está disponible en un tiempo adecuado (Eslava, et al., 2019). Es por ello que consideramos que estos datos solo tienen utilidad si son empleados en decisiones de inversión a largo plazo.

El principio de gestión que definiría el comportamiento de una cartera *Value*o *Valor,* sería el de la compra de acciones que se muestran infravaloradas en el mercado, si las comparamos con un análisis fundamental por ratios tradicionales o similar. El *PER* de estas empresas suele ser inferior a la media del mercado. Son empresas consolidadas que normalmente operan en la denominada *vieja economía*, sólidas y de cuentas de resultado robustas. El carácter de la inversión es defensivo. Esta filosofía de inversión, popularizada por Warren Buffett, está basada en la adquisición de valores de calidad a un precio por debajo de su valor intrínseco o real.Los estados financieros representan la fuente de información más confiable y accesible (Banerjee, et al., 2017), por lo que este tipo de análisis aplicado a la inversión se centrará en la identificación de fortalezas y debilidades a través de la evaluación e interpretación de los ratios financieros y los estados contables.

El valor es el fenómeno en el cual los valores que parecen baratos, en promedio, superan a los valores que parecen ser caros. La prima de valor es el rendimiento alcanzado al comprar (ser largo en sentido absoluto o sobre ponderar en relación con un índice de referencia) activos baratos y vender (poner en corto o infra ponderar) los costosos (Asness, et al., 2015).

El sistema que exponemos se basa en comprar acciones cuyos indicadores contables muestren crecimiento a nivel empresarial, pero cuyo precio de cotización no sea elevado. Confiamos en que si la empresa crece, la cotización crecerá más adelante mientras el inversor acumula beneficios producidos por los dividendos. En la sección 2 ofrecemos una descripción de la estrategia de inversión. En la sección 3 exponemos las bases de datos empleadas. En la sección 4 describimos la metodología y exponemos los resultados obtenidos. La sección 5 concluye.

II. Descripción De La Estrategia De Inversión

El objetivo de la metodología que proponemos es la selección de acciones que reflejen a empresas caracterizadas por una fortaleza financiera significativa. El enfoque desarrollado emplea para dicho propósito las variables contables y ratios financieros que más correlación muestren con la cotización.

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Este proceso, según (Hurson, et al., 1997), consta de dos fases.

En la primera fase, el tomador de decisiones debe evaluar y seleccionar acciones que se muestran disponibles como oportunidades de inversión. La gran cantidad de acciones negociadas en los mercados bursátiles internacionales hace que este paso sea necesario para enfocar el análisis en un número limitado de las mejores opciones de inversión.

En la segunda fase del proceso, el tomador de decisiones debe decidir la cantidad de capital que se debe invertir en cada una de las acciones seleccionadas.

En esta metodología trabajamos las dos fases, dividiendo cada una en dos sub fases. Es decir, este sistema de inversión se divide en cuatro pasos. La compra de acciones se realizara una vez al año en la que se pueden comprar una o varias empresas.

a) En enero del año n, se seleccionaran todas las empresas que hayan incrementado el valor de los fondos de los accionistas, los ingresos de explotación y el EBITDA. En la sección 3.1. demostramos que estas tres variables presentan una correlación con la cotización muy superior al resto de ratios y variables contables. Este incremento debe producirse entre el 31 de diciembre del año *n-2* y el 31 de diciembre del año *n-1*. Todas las demás empresas quedan descartadas hasta que se repita la comprobación de las cuentas un año después.
b) A las empresas que hayan superado la fase 1 se les realizara una previsión de dividendos para el ejercicio *n* en base a las series históricas de dividendos mediante el método del suavizado exponencial, el cual mostro un error cuadrático medio muy inferior al de otros métodos de previsión con los que fue comparado. Mediante un modelo matemático diseñado para optimizar la rentabilidad por dividendo obtenido durante en ejercicio *n*, realizaremos el reparto de nuestro capital. El objetivo consiste en llevar a cabo una estrategia *buy&hold* en la que de forma anual se procede al rebalanceo de la cartera. El modelo se basa en maximizar la rentabilidad por dividendo previsto, generando así una rentabilidad adicional al crecimiento de los activos y manteniendo restringidos el capital máximo a invertir tanto en total como por empresa. También queda restringido por la rentabilidad mínima aceptable para realizar nuestra inversión. El modelo decidirá el peso de cada acción en la cartera o a principios de cada año o nos avisara de que no existe inversión posible con las restricciones establecidas.
c) Un año después repetiremos las tres primeras fases con la misma cantidad.

Este sistema de inversión lo complementamos con una estrategia de salida para cual estudiamos en la sección 4.5.2 varias combinaciones para una orden *stop loss* en cada empresa. Señalar que únicamente trabajaremos con empresas pertenecientes al índice Eurostoxx 50. Si en algún momento alguna de nuestras empresas abandonara el índice, también abandonaría de inmediato la cartera.

III. Bases De Datos

Nuestro estudio toma como punto de partida el momento en el que entra en vigor el euro. Para ello utilizamos un listado de empresas que, a partir de año 2009, pertenecieron en algún momento al Índice Eurostoxx 50.

Tabla 1: Sectores

Sector	Nº Empresas
Alimentación	3
Asegurador	3
Automovilístico	3
Bienes de capital	1
Comunicaciones	2
Consumo	1
Energético	11
Farmacéutico	2
Financiero	12
Industrial	13
Inmobiliario	1
Perfumería/Higiene personal	1
Químico	1
Retail	1
Salud	1
Servicios	4
Telecomunicaciones	10
Textil	3

Fuente: Elaboración propia

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Este es el índice de referencia en la Eurozona e incluye a las 50 compañías más importantes por capitalización bursátil, incluyendo actualmente empresas de España, Francia, Alemania, Bélgica, Irlanda, Italia y Holanda. Fue creado en 1998 y está elaborado por *StoxxLimited*, una *jointventure* o empresa conjunta entre las firmas Deutsche Börse, Dow Jones & Company y SWX Swiss Exchange.

La muestra final se compone de 76 empresas. Tanto los componentes de este índice como sus fechas entrada y salida fueron obtenidos por una base de datos proporcionada por *Siblis Research.* Un proveedor de datos a nivel empresarial que se centra en los datos de valoración de capital global.

De la base de datos *Orbis* que contiene información de empresas a nivel mundial, incluyendo economías emergentes, obtenemos un balance de situación y un informe de pérdidas y ganancias. Estos datos están en dólares.

Nuestro trabajo toma como fecha inicial el 1 de enero de 2009 y como fecha final el 31 de diciembre de 2019.

Finamente empleamos la base de datos del graficador Visual Chart para obtener un histórico de cotizaciones. Los dividendos se obtuvieron de la página web de cada una de las empresas.

IV. Aplicación Del Metodo Y Resultados

a) *Elección De Variables Contables*

Los valores fundamentales pueden determinarse mediante el análisis sistemático de los datos contables disponibles públicamente. Son útiles para evaluar sus efectos en el precio de las acciones mediante en el método de análisis de componentes principales y pudiéndose así predecir el precio de las acciones e identificar factores efectivos (Zahedi & Rounaghi, 2015). Las cuentas anuales recopilan cada año la información financiera de cada empresa. De estos documentos extraemos aquellas variables contables que más correlación muestren con la cotización e invertir en aquellas que muestren una evolución positiva de dichas variables.

Para el análisis empleamos un total de 11 variables. Justificamos su elección en base a que las empresas las suelen publicar periódicamente en sus informes financieros y también por su uso por parte de otros investigadores. De manera general son las variables que se suelen emplear en la performance empresarial:

- Activos fijos.
- Inmovilizado material.
- Activo circulante.
- Activos totales.
- Fondos de los accionistas.
- Pasivos no corrientes.
- Deudas a corto plazo.
- Ingresos de explotación.
- EBIT.
- Resultado ordinario antes de impuestos.
- Ingresos netos.

Toda esta información se empleará para realizar un análisis estadístico que nos permita observar la existencia de un equilibrio en el largo plazo entre el precio de las acciones y las variables contables y financieras. Esto se consigue realizando un ANOVA de una vía donde el año es el factor, y guardamos el residuo estandarizado.

i. *Análisis De Correlaciónes*

Existen propuestas basadas en el hecho de que muchos precios de acciones están correlacionados y el conocimiento de esas correlaciones puede permitirnos mejorar modelos anteriores(Song, et al., 2017). En este trabajo también se estudia la correlación, aunque no se busca la correlación de unos precios con otros precios, sino de los precios con sus variables contables y ratios financieros.

Mediante el software estadístico SPSS calculamos una regresión lineal entre cada variable contable y el año para obtener sus residuos no estandarizados. Después estudiamos la correlación entre cada residuo de cada variable contable con el residuo del precio de cierre anual.

El programa nos realiza un contraste de hipótesis en el que nos preguntamos si la el coeficiente de correlación es igual o distinto de cero.

H0: $\rho = 0$

H1: $\rho \neq 0$

Donde ρ representa el coeficiente de correlación. Que una correlación sea o no significativa depende del valor de ρ y del número de datos con que ha sido calculada. Por tanto, un mismo valor de *rho* puede ser o no significativa si el número de datos difiere notablemente.

Por lo tanto nos interesan aquellas variables que, con un numero de datos elevado hayan obtenido un coeficiente de correlación alto con un nivel de significación bajo, que nos permita rechazar la hipótesis nula.

Podemos apreciar la combinación entre las tres variables mediante gráficos de burbujas donde, cada burbuja del mismo color representa una variable en un año concreto. El tamaño de la burbuja representa el número de datos disponibles y, los ejes X e Y, el coeficiente de correlación y el nivel de significación. Cada burbuja representa un año de la variable en cuestión.

Nos interesan aquellas variables con un nivel de significación inferior a 0.05, pero con un número de datos considerable. Si una de las pruebas ha devuelto todos los años un nivel de significación lo

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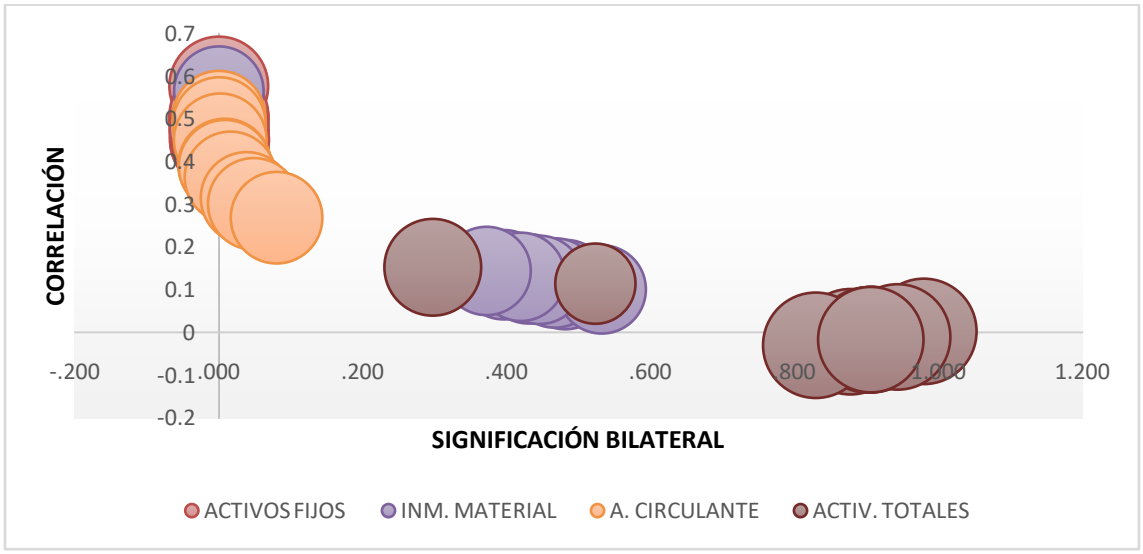
suficientemente bajo como para rechazar la hipótesis nula, consideraremos que dicha variable mantiene correlación con la cotización y la consideraremos adecuada para formar parte de nuestro sistema, independientemente del nivel de correlación que hayamos obtenido. En los pocos casos en los que se han obtenido niveles de significación bajos y se ha rechazado la hipótesis nula, la correlación siempre ha sido superior a 0,5.

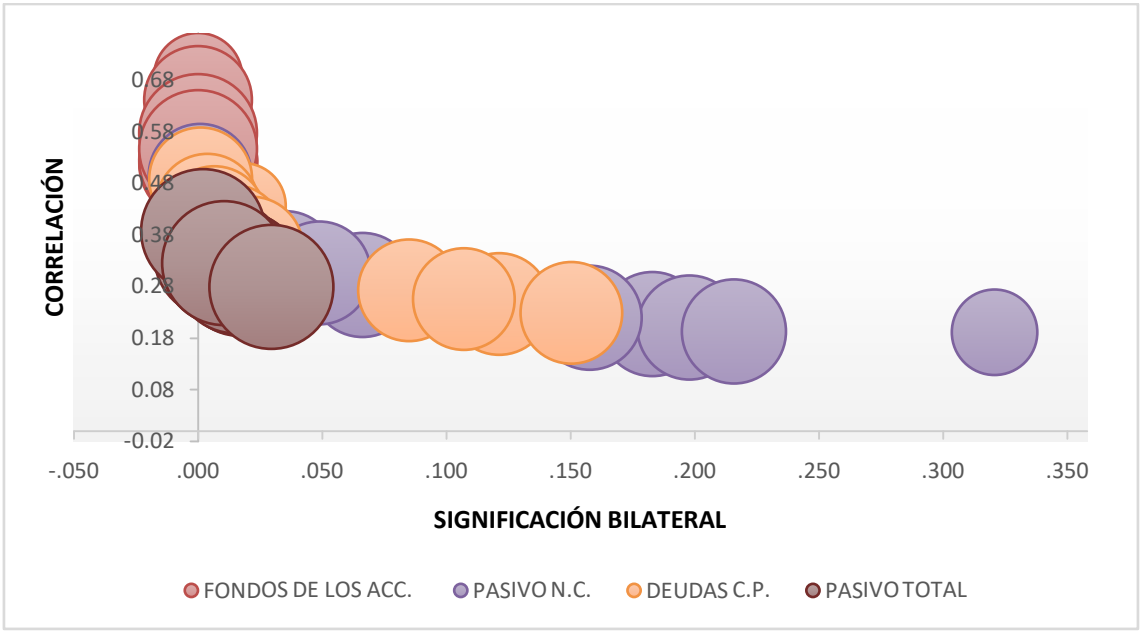
Del grupo del activo destacan los activos fijos, aunque en ningún caso se supera el nivel de 0,58 de correlación. Del grupo del pasivo y el patrimonio neto destacan los fondos de los accionistas. Con niveles de significación prácticamente nulos, sus coeficientes de correlación rozan 0,7 todos los años.

Del grupo de las variables de pérdidas y ganancias destacan los ingresos de explotación devolviendo niveles de significación bajos y correlaciones que superan el 0,7 en 5 de los 10 años y no quedando nunca por debajo del 0,53.



Fuente: Elaboración propia

Ilustración 1: Correlación de elementos del activo con los precios de cierre anual



Fuente: Elaboración propia

Ilustración 2: Correlación de los elementos del pasivo y patrimonio neto con los precios de cierre anual

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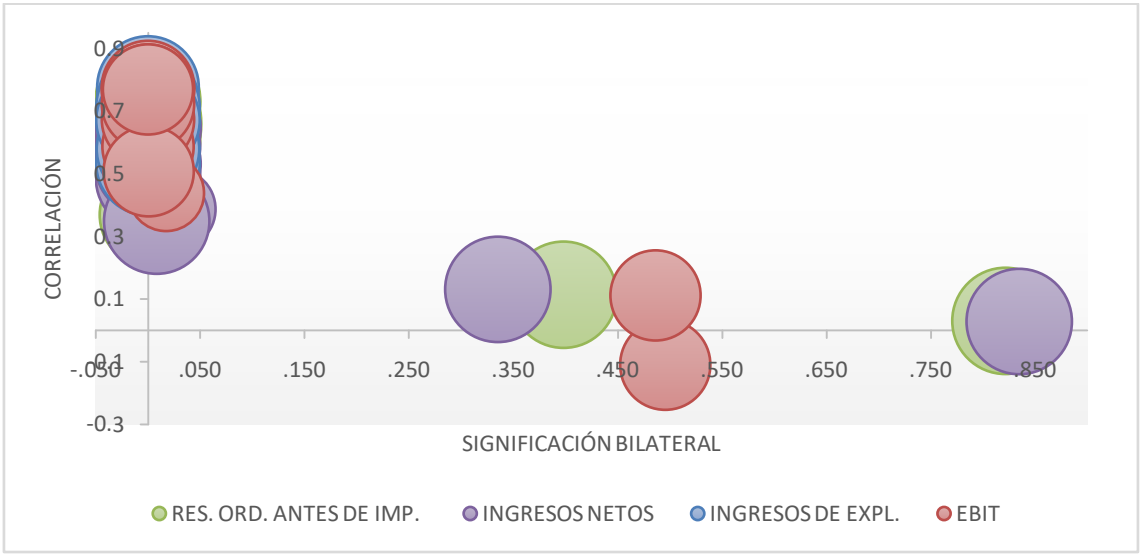
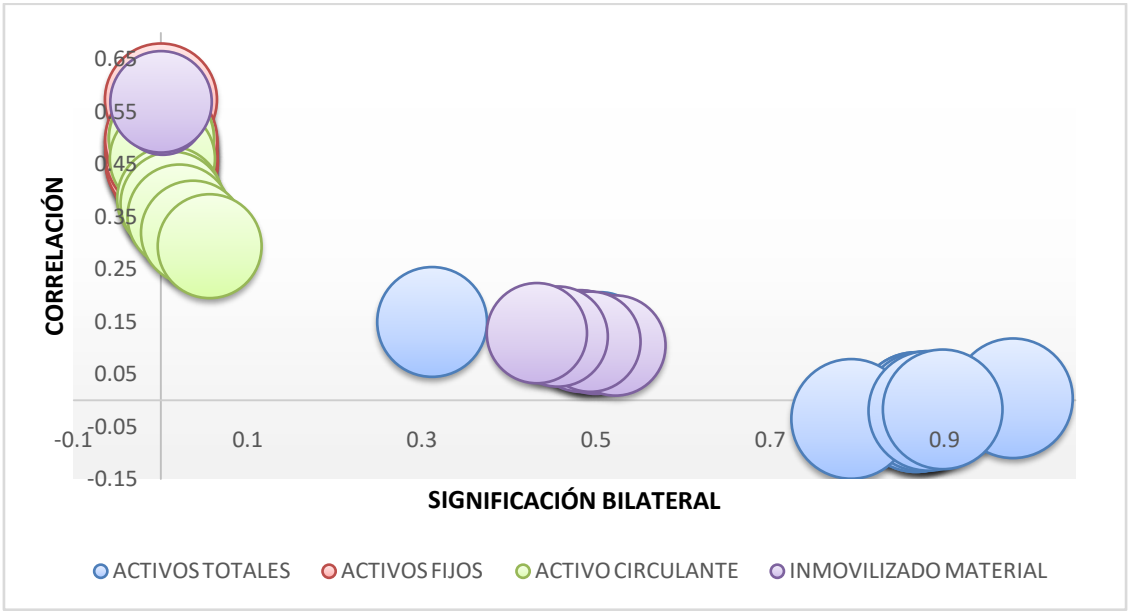


Fuente: Elaboración propia

Ilustración 3: Correlación entre los elementos del PYG y los precios de cierre anual.

Del grupo de las variables de pérdidas y ganancias destacan los ingresos de explotación devolviendo correlaciones que superan el 0,7 en 5 de los 10 años y no quedando nunca por debajo del 0,53.

Para poder afianzar las conclusiones repetimos el estudio con retardos de un año. La información sobre las cuentas anuales de la empresa no se hace pública de forma inmediata. Si tomamos los datos de dichas cuentas como variables explicativas de la cotización, su efecto sobre la misma deberá producirse tras uno o más periodos. Cada una de las variables de las que disponemos se compara con el precio de cierre anual del año siguiente en lugar de comprarlas con el del año en curso. De este modo vemos la correlación entre la variable que contiene los precios de cierre en el año *t* con los residuos de cada ratio en el año *t-1*.



Fuente: Elaboración propia

Ilustración 4: Correlación de elementos del activo con los precios de cierre anual con retardos

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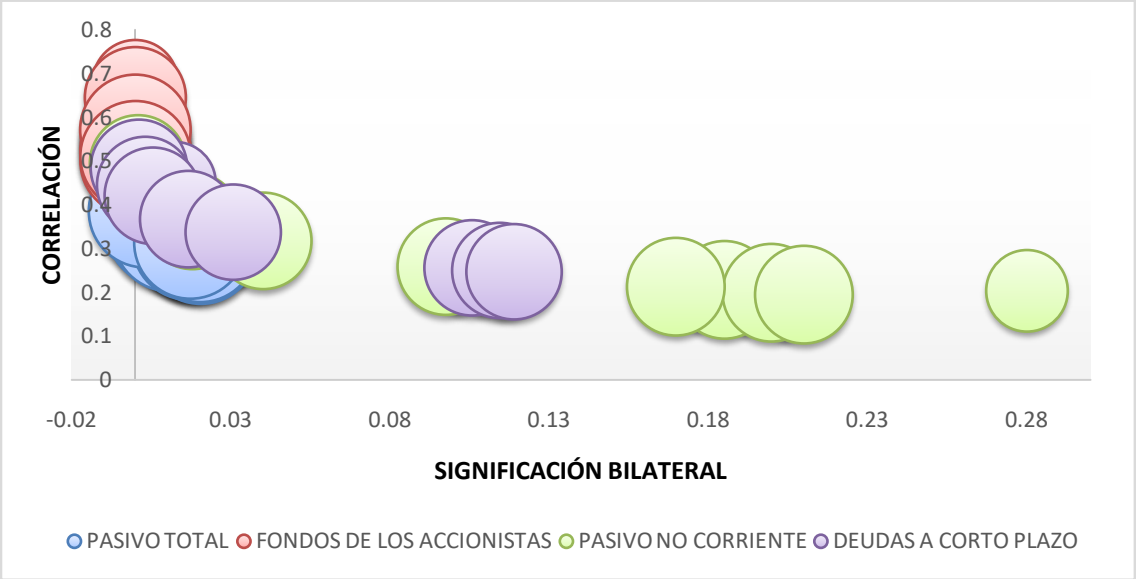
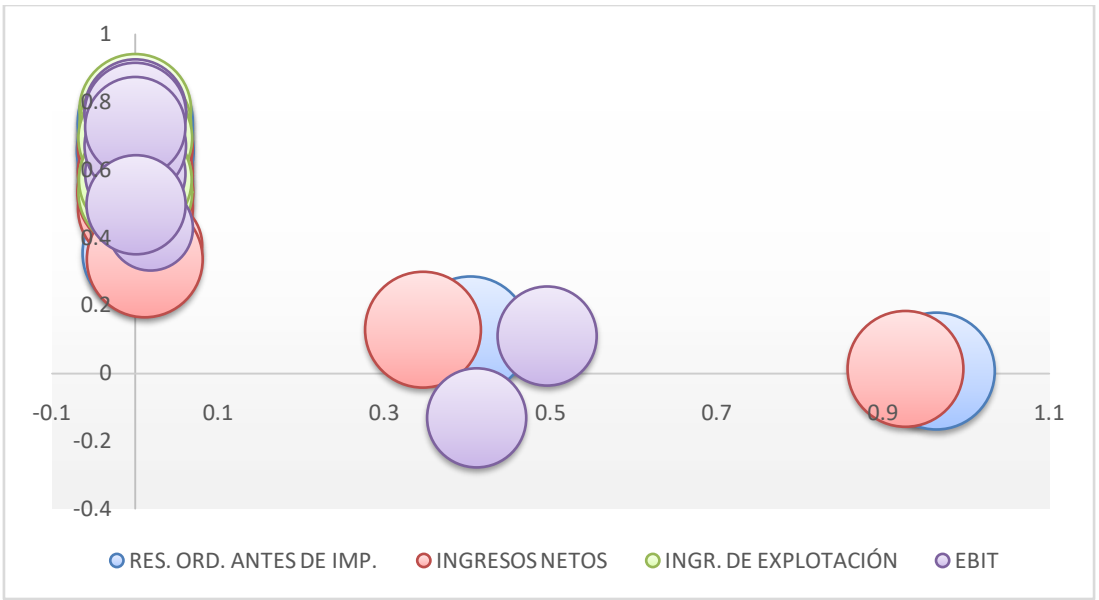


Fuente: Elaboración propia

Ilustración 5: Correlación de los elementos del pasivo y patrimonio neto con los precios de cierre anual con retardos.



Fuente: Elaboración propia

Ilustración 6: Correlación entre los elementos del PYG y los precios de cierre anual con retardos.

El estudio con retardos devuelve los mismos gráficos que el estudio sin retardos. Tanto los niveles de correlación como los de significación se mantienen en los mismos niveles en todas las variables.

Podemos concluir que existe cierta relación entre el crecimiento de la empresa y la evolución futura de la cotización. Para responder a nuestra pregunta de si el coeficiente de correlación entre el crecimiento de la empresa y la evolución de la cotización es igual o distinto de cero, debemos observar aquellas variables con un nivel de significación bajo, lo que nos lleva a no rechazar la hipótesis alternativa y asumir la existencia de correlación entre crecimiento empresarial y crecimiento bursátil.

Como podemos ver en los gráficos, las variables *activos fijos, fondos de los accionista* e *ingresos de explotación* muestran, además de un bajo nivel de significación en el contraste de hipótesis, un alto nivel de correlación.

ii. *Elección De Ratios*

El análisis financiero (FA) es un subconjunto del análisis fundamental que tiene como objetivo encontrar las empresas de élite sobre la base de ratios financieros calculados a partir de los estados financieros, tales

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como ganancias, ventas, deuda y gestión de activos (Sharma, et al., 2017). Los ratios financieros en se clasifican en general en cuatro categorías:

1. Ratios de rentabilidad.
2. Ratios de solvencia.
3. Ratios de liquidez.
4. Ratios de valoración.

Un índice de rentabilidad representa los ingresos obtenidos de los activos empleados por una empresa. Dentro de este grupo uno de los ratios que estudiamos es el ROE que se obtiene de cociente entre resultado ordinario antes de impuestos y los fondos propios (ROE I), o bien del cociente entre el resultado del ejercicio y los fondos propios (ROE II). En este grupo incluimos también el ROA y la Rentabilidad financiera.

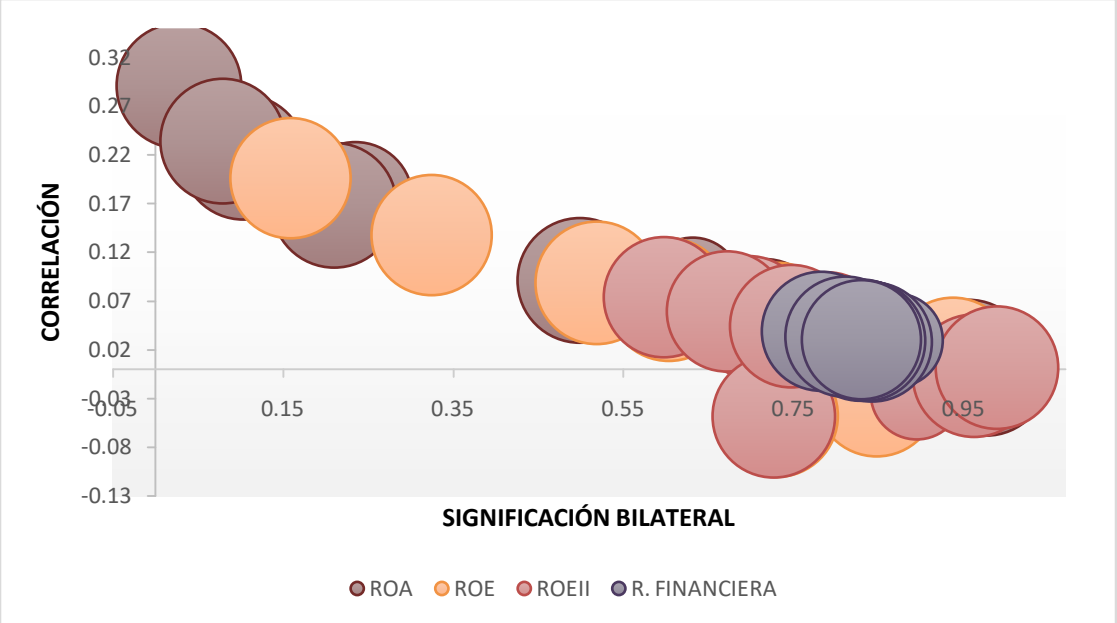
Un índice de solvencia significa riesgo financiero en términos de endeudamiento (deuda). Un índice de liquidez indica la capacidad de una empresa para pagar sus obligaciones a corto plazo. Finalmente un índice de valoración se utiliza para valorar una empresa en términos de su salud general.

Para el análisis empleamos un total de 10 ratios:

- EBITDA.
- Apalancamiento financiero.
- Masas de activo
- Capital circulante
- Ratio de Solvencia
- Rentabilidad financiera
- PayOut.
- ROE I
- ROE II
- ROA

iii. *Análisis De Correlaciónes*

La elevada dispersión de los elementos en el grafico indica que el comportamiento entre variables no se repite año tras año.



Fuente: Elaboración propia

Ilustración 7: Correlación entre los ratios de rentabilidad y los precios de cierre anual

Dentro de los conjuntos de ratios de liquidez y endeudamiento destaca el EBITDA mostrando una significación que nos permite rechazar la hipótesis nula en todos los años en los que se lleva a cabo el experimento.

El capital circulante destaca ligeramente sobre los demás. Aun así solo en cuatro de los diez años obtenemos evidencias suficientes como para rechazar la hipótesis nula, pero nunca con correlaciones superiores a 0,5.

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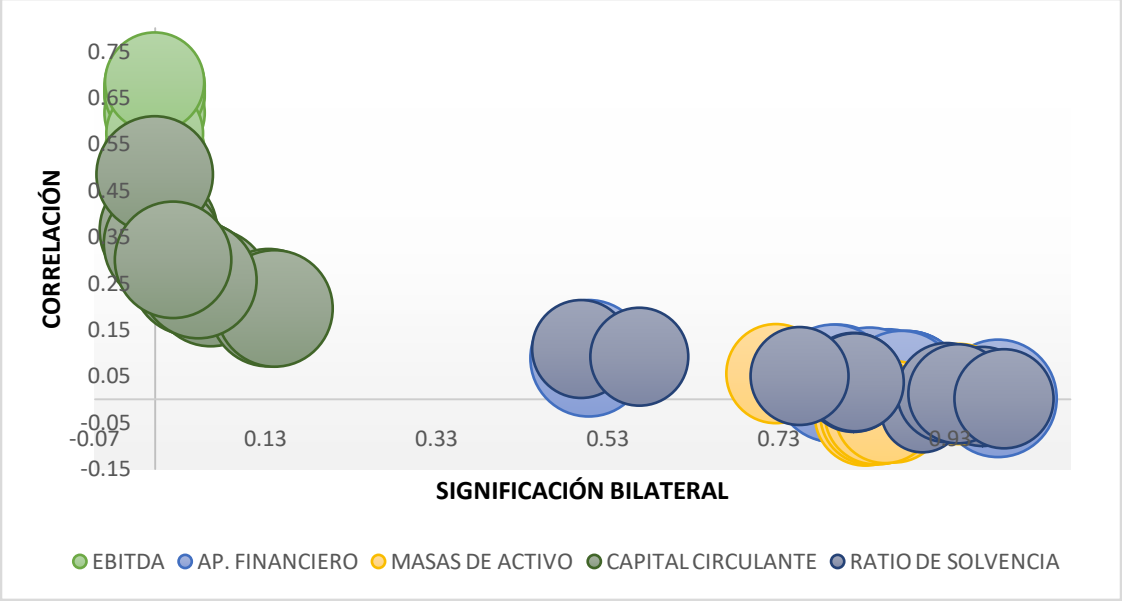

Fuente: Elaboración propia

Ilustración 8: Correlación entre ratios de liquidez y endeudamiento con los precios de cierre anual.

Al igual que en apartado anterior confirmamos los resultados repitiendo el estudio con retardos. Una vez más, obtenemos representaciones prácticamente idénticas.

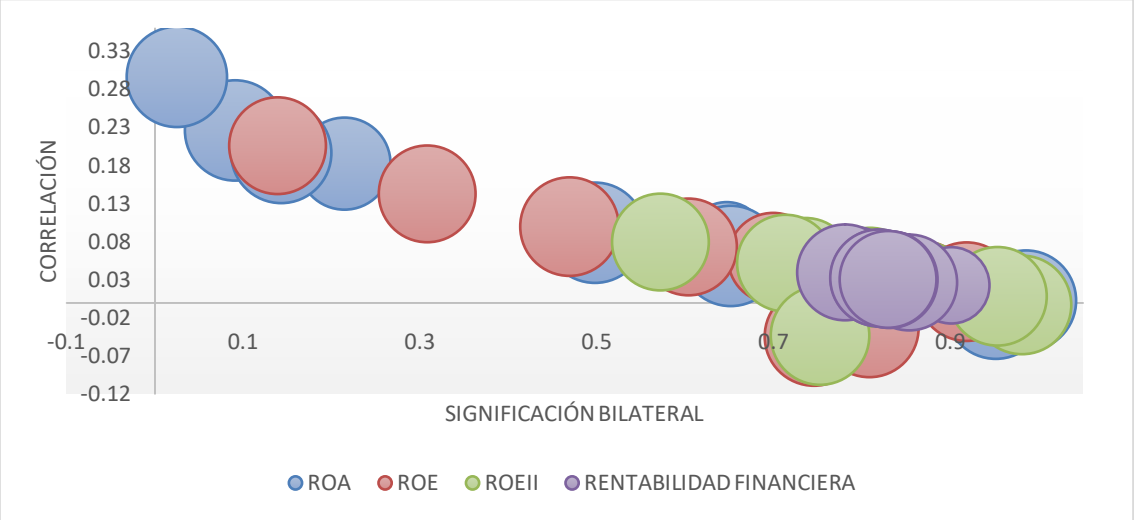

Ilustración 9: Correlación entre los ratios de rentabilidad y los precios de cierre anual con retardos

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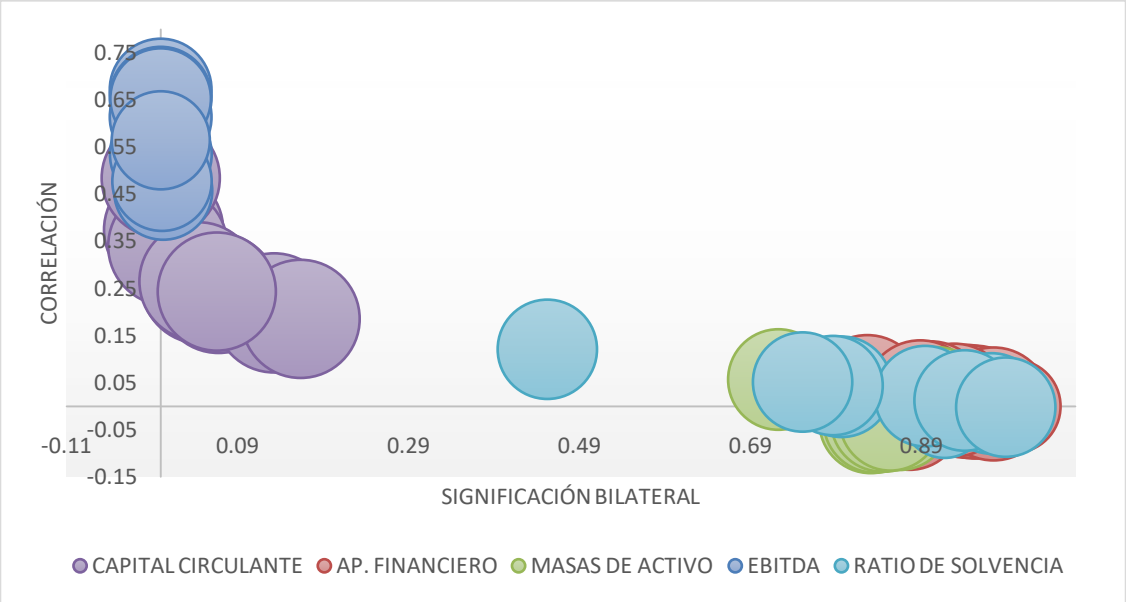

Fuente: Elaboración propia

Ilustración 10: Correlación entre ratios de liquidez y endeudamiento con los precios de cierre anual con retardos.

Estos resultados junto con las dos tablas expuestas en el ANEXO B nos llevan a concluir que, las variables que mantienen una mayor correlación con la cotización son:

- Los fondos de los accionistas.
- Los ingresos de explotación.
- El EBITDA.

Teniendo esta información elaboraremos al inicio del año un listado de empresas en las que podamos plantearnos invertir descartando todas aquellas que no hayan experimentado un incremento de estas tres variables con respecto al ejercicio anterior. De aquellas que queden en la lista se realizara una selección en base al modelo que presentamos en los siguientes apartados.

iv. *Previsión De Dividendos*

El modelo de inversión se basa en descartar aquellas empresas que no estén obteniendo buenos resultados empresariales. El objetivo es mantener la inversión en el tiempo, por lo que es necesario que aporten rentabilidades periódicas al inversor. La evolución de las variables *fondos de los accionistas, ingresos de explotación* y *EBITDA* entre un ejercicio y el siguiente nos permite llevar a cabo la detección de los valores más atractivos en función del desempeño corporativo y la viabilidad de las firmas correspondientes. Puesto que pretendemos mantenerlas en cartera a largo plazo nos interesa que ofrezcan una buena rentabilidad por dividendo y así contar con cierta liquidez mientras dura la inversión.

De entre las que superen este criterio escogeremos aquellas a las cuales se les augure una mayor rentabilidad por dividendo.

La previsión de los dividendos futuros se realiza aplicando el método del Suavizado Exponencial a las series de dividendos pasados. A la hora de predecir dividendos, el método del Suavizado Exponencial ofrece errores muy inferiores a los métodos similares alternativos (Barberá Beltran, 2019).

La calidad de un método de previsión se evalúa mediante su error cuadrático medio (RMSE), que se define en (Dash, et al., 2014) como sigue:

$$RSME = \sqrt{\frac{1}{N}\sum_{i=1}^{n}(t_i - y_i)}$$

Este índice de rendimiento mostrará una estimación del residual entre el valor real t_i y el valor predicho $y_i$donde y_i es el valor predicho producido por el modelo, t_i es el valor real y n = número total de datos de prueba.

v. *Diseño Del Modelo Matemático*

Los resultados de los análisis realizados hasta ahora serán empleados para la elaboración de un sistema de inversión profesional basado en indicadores fundamentales. A la hora de decidir dónde invertir y en qué medida contamos inicialmente por el abanico de opciones que nos ofrece la muestra de 76 empresas de las que disponemos. A partir de aquí, nuestro sistema debe responder a tres preguntas:

1. ¿Qué compañías escoger?
2. ¿Qué porcentaje del monto disponible destinamos a cada una de las compañías escogidas?
3. Estrategia de salida.

Con los resultados de los análisis realizados pondremos a prueba un modelo matemático inicial tras realizar un primer filtro entre el conjunto de valores que componen el índice.

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Escogiendo aquellos ratios financieros y variables contables que en los experimentos anterioreshan mostrado más correlación con las cotizaciones históricas reducimos el riesgo de nuestra futura inversión por considerar únicamente empresas que muestren signos de solidez y crecimiento.

A partir de aquí realizaremos el cálculo de las variaciones de los fondos de los accionistas, los ingresos de explotación y el EBITDA año a año, quedándonos solo con las empresas que hayan mostrado una evolución positiva en cada uno de ellos.

El número de acciones a comprar de cada una de estas empresas formaran el conjunto de variables de nuestro modelo. Las restricciones mantendrán la diversificación bajo control permitiéndonos así reducir el riesgo. Por otra parte, dentro de la seguridad que nos ha dado el filtro por variables fundamentales, el modelo maximizara la rentabilidad por dividendo que obtendremos durante el periodo que mantengamos la inversión. Esto también disminuye el riesgo, ya que las empresas que pagan dividendos superan a los que no pagan dividendos en mercados en declive, tal y como demuestran (Fuller, et al., 2011).

$$\boldsymbol{Max}: \sum_{\boldsymbol{i=1}}^{\boldsymbol{n}} d_i x_i$$

$$\boldsymbol{S.A} \begin{cases} \sum_{\boldsymbol{i=1}}^{\boldsymbol{n}} p_i x_i \leq \mathrm{C} \\ \sum_{\boldsymbol{i=1}}^{\boldsymbol{n}} p_i x_i + a_i \leq \lambda \left(\sum_{\boldsymbol{i=1}}^{\boldsymbol{n}} \boldsymbol{a_i} + \sum_{\boldsymbol{i=1}}^{\boldsymbol{n}} p_i x_i \right) \\ \frac{\sum_{\boldsymbol{i=1}}^{\boldsymbol{n}} d_i x_i}{\boldsymbol{C}} \leq \boldsymbol{B} \\ \boldsymbol{x_i} \in \mathbb{Z}^+ \end{cases}$$

Donde $\forall\ \boldsymbol{1 \leq i \leq n}$ tenemos:

$\boldsymbol{x_i}$: Número de acciones de la empresa *i*.
$\boldsymbol{d_i}$: Dividendos previstos de la empresa *i* para el año siguiente.
C: Capital disponible para esta operación.
$\boldsymbol{a_i}$: Cantidad en euros que ya teníamos invertida en la empresa *i.*
$\boldsymbol{p_i}$: Precio por acción de la empresa *i* en el momento de la inversión.
$\boldsymbol{\lambda}$: Porcentaje máximo admisible a invertir en una única empresa.
B: Beneficio mínimo exigible.

b) Cartera Obtenida Tras Aplicar El Modelo

Nuestro estudio se inicia en el año 2009. Toda la información que tenemos es información de cierre anual de año. Así pues, no podemos tomar decisiones de entrada hasta que finaliza el año 2010. Lo que necesitamos es saber que empresas mostraron una mejora de las tres variables desde el inicio del ejercicio 2009 hasta el inicio del ejercicio 2010. Si alguna de las 3 variaciones es negativa, la empresa queda descartada. El primer filtro lo superan 28 empresas.

Programamos el modelo y simulamos una inversión de 1000 euros.

Como restricciones se establece que la inversión en una misma empresa no pueda exceder cierto porcentaje del capital y que no se considere ninguna combinación que, en base a las previsiones calculadas en la fase anterior, devuelva una rentabilidad por dividendo inferior al 5% durante el siguiente ejercicio.

A esto se le añade una estrategia de salida basada en la introducción de un *stop loss.* Con una orden *stop loss* protegeremos la cartera de posibles pérdidas potenciales. Estas órdenes permanecerán activas desde el momento de la adquisición de cada empresa y las iremos modificando en función de la evolución del precio. Para decidir cuál es la distancia adecuada entre el *stop loss* y el precio comprobamos los resultados entre varias combinaciones entre el *stop loss* y la restricción del porcentaje máximo por valor. Las diferentes combinaciones de ambas restricciones ayudaran a optimizar la rentabilidad y mantener el riesgo bajo control.

Esta estrategia de salida no solo debe proteger nuestra cartera de las caídas potenciales, sino que también es importante que no expulse de nuestra cartera empresas con potencial de crecimiento a largo plazo cuando estén pasado por periodo bajista a corto plazo. Si el *stop loss* está demasiado cerca del precio, las fluctuaciones y el ruido nos sacaran del mercado poco después de cada adquisición.

Este sistema debe ofrecer resultados superiores a los del índice de referencia, pues de no ser así, siempre tendríamos la opción de invertir en un fondo indexado. Para tal fin testeamos el sistema con veinticuatro combinaciones diferentes. La primera columna muestra la distancia del precio en porcentajes a la cual colocaremos la orden de salida. La segunda,

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el porcentaje máximo de la cartera que admitimos para un solo valor.

Puesto que el método es a largo plazo, un factor importante consiste en anticiparse al futuro crecimiento de la empresa y no cerrar posiciones por pequeñas fluctuaciones a la baja. Por esta razón empezamos el estudio situando el *stop* a una distancia mínima del 10% sobre el precio de cierre y vamos ampliando esta distancia. Este fue el primer porcentaje en que los resultados mostraron una cierta estabilidad de la cartera a lo largo de los años. Con porcentajes inferiores la cartera quedaba sin activos tras al poco tiempo debido a cualquier pequeña fluctuación en las cotización que nos obligaba a cerrar posiciones. Esto nos obligaría a dejar la cartera vacía durante largos periodos de tiempo o bien a incrementar el índice de rotación en la gestión de la cartera, la cual cosa implica mayores comisiones de negociación que pueden deteriorar los rendimientos ajustados al riesgo de los inversores (de Mingo-López, et al., 2018). Los resultados en cuanto a TIR y volatilidad fueron prácticamente idénticos en todas las pruebas en las que se situó el *stop* a una distancia inferior a al 10%. No empezamos a apreciar diferencias sino a partir de este nivel.

La misma situación se dio al superar niveles del 45%. Las empresas con las que trabajamos no llegan a experimentar caídas más altas del 45% en el periodo que estamos estudiando. La única empresa de las que se repiten habitualmente que llega a superar esos niveles en algún momento y dependiendo del momento de entrada que consideremos es Orange. Eso solo modifica el momento de salida pasándolo de finales de 2012 a principios del 2013, la cual cosa apenas tiene impacto en la rentabilidad o el riesgo.

Tabla 2: Combinaciones stop loss – diversificación

STOP LOSS	% MÁXIMO POR VALOR	TIR	VOLATILIDAD
10	10	-0,92 %	1,32%
10	20	-0,93 %	2,10%
10	30	0,49 %	3,10%
15	10	-1,10 %	1,03%
15	20	-1,35 %	2,68%
15	30	4,16 %	3,30%
20	10	-1,10 %	3,67%
20	20	3,25 %	1,97%
20	30	3,32 %	3,21%
25	10	-1,16 %	1,76%
25	20	3,05 %	2,08%
25	30	3,53 %	3,20%
30	10	0,31 %	3,34%
30	20	3,88 %	2,52%
30	30	7,73 %	0,98%
35	10	4,91 %	1,58%
35	20	4,31 %	2,51 %
35	30	7,20 %	3,23%
40	10	6,33 %	2,04%
40	20	6,08 %	2,12%
40	30	6,87 %	3,24%
45	10	6,15 %	2,08%
45	20	5,89 %	2,13 %
45	30	7,13 %	3,23 %

Fuente: Elaboración propia

Después de realizar pruebas con varias combinaciones, concluimos que mantener esta restricción en el 30% ofrecía mejores resultados que las demás. De hecho, las últimas combinaciones no presentan diferencia en cuanto a las empresas que componen las carteras simuladas. Solamente varia, de forma no muy notable, el peso de estas en la cartera. Por ejemplo, podemos ver en la tabla que las combinaciones 40-30 y 45-30 ofrecen casi el mismo resultado tanto a nivel de riesgo como de rentabilidad. Esto se debe a que las carteas son iguales, con fechas de salida diferentes, pero muy cercanas. Con esto hacemos referencia solo a las empresas que salieron antes de finalizar el periodo de estudio que, con un *stop loss* tan grande, son muy pocas.

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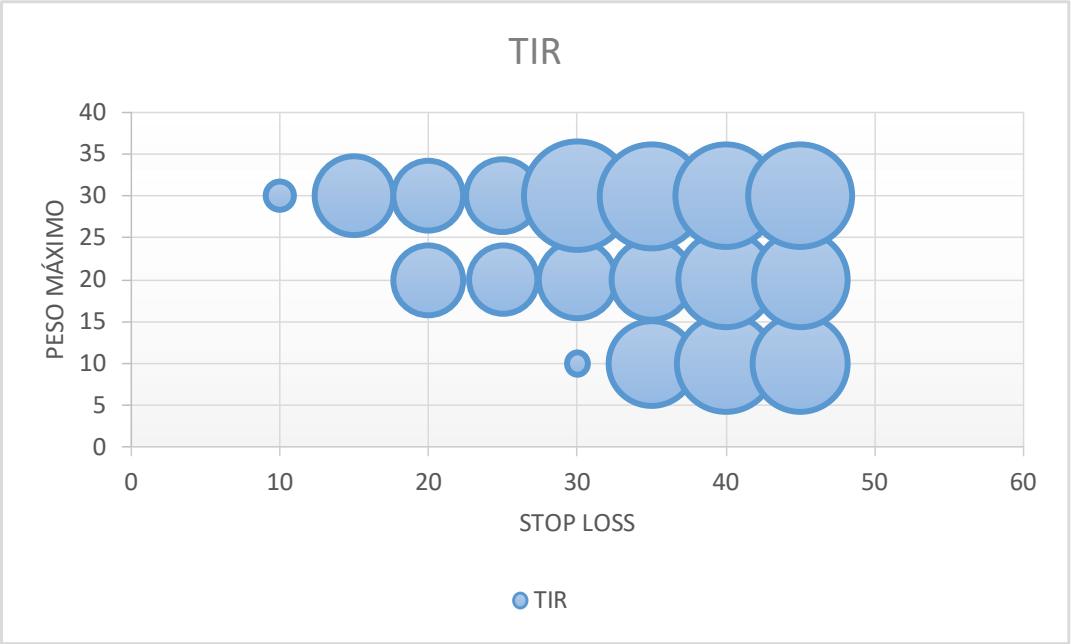

Fuente: Elaboración propia

Ilustración 13: Relación de rentabilidades por combinación entre peso y stop loss.

En este grafico podemos observar que las burbujas más grandes se concentran en la parte superior derecha danto a entender que se obtiene más rentabilidad cuando no se sitúa el stop excesivamente cerca y se apuesta por un número excesivo de empresas. Después de alcanzar un punto máximo en la combinación 30 – 30 hay una ligera disminución y luego el tamaño se mantiene en unos niveles muy parecidos. Hemos comprobado que existe una correlación elevada entre la rentabilidad y el *stop loss* con los datos que tenemos.

Tabla 3: Coeficientes de correlación.

	TIR	VOLATILIDAD
STOP LOSS	0,7931	0,04262157
% MÁXIMO POR VALOR	0,4438	0,44320851

Fuente: Elaboración propia

Se propone para futuras investigaciones la realización de un estudio en profundidad sobre la correlación del *stop loss* y el peso con la rentabilidad y la volatilidad. La volatilidad por otra parte se mantiene más estable. Todos los valores se encuentran en el intervalo 0.98 – 3,67. La volatilidad media por cartera es del 2,44% con una desviación estándar de tan solo un 0,76%

VOLATILIDAD

N	Válido	24
	Perdidos	0
Media		2,4454
Mediana		2,3200
Moda		2,08
Desviación estándar		,76519
Varianza		,586
Asimetría		-,170
Error estándar de asimetría		,472
Curtosis		-1,080
Error estándar de curtosis		,918
Rango		2,69
Mínimo		,98
Máximo		3,67

Fuente: Elaboración propia

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A modo de ejemplo, para una combinación en la que la que el porcentaje máximo por valor sea del 30%, el programa nos devuelve la siguiente solución.

EMPRESA	Nº DE ACCIONES	PORCENTAJE EN CARTERA
DTE.F	12	12%
ORA.PA	19	30%
REP.MC	22	29%
TEF.MC	27	30%

El capital invertido seria 997,49 euros, lo que según nuestras previsiones devolveria durante el siguiente año un beneficio de 97,42 euros, es decir, un 9,37% de la inversión solamente en dividendos.

Todo el proceso se repetirá año a año. Se irán extrayendo de la cartera aquellas empresas cuyo precio de cierre mensual sea inferior al *stop loss* establecido.

De todas las combinaciones probadas, la combinación 30-30 fue la que mejores resultados devolvió. Sus rentabilidades se analizan y exponen en el siguiente apartado.

c) Análisis De Las Rentabilidades Obtenidas

i. *Tasa Interna De Retorno*

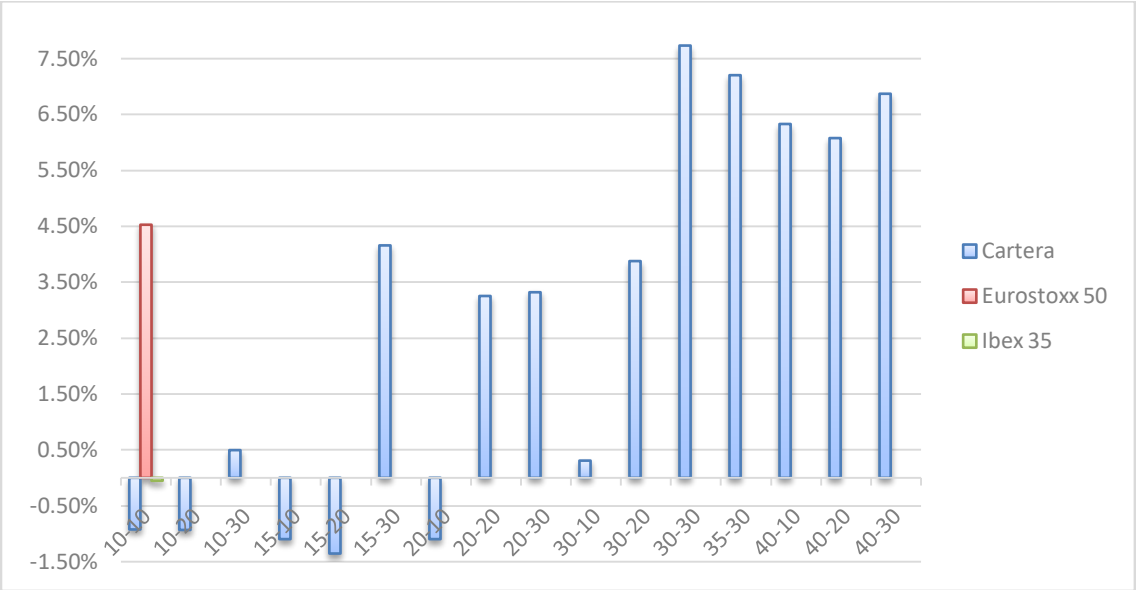
Después de elaborar la cartera calculamos la rentabilidad obtenida con los años. Este punto es complicado debido a que se han ido realizando aportaciones periódicas. Además es importante tener en cuenta que, el Visual Chart nos ofrece los gráficos con los ajustes aplicados.

Hemos revisado la bibliografía existente y existen varias formas de evaluar dicha rentabilidad. Cada una de ellas enfocada desde diferentes puntos de vista.

Para comprobar la rentabilidad obtenida nos valdremos de la tasa interna de retorno o TIR. La TIR es un criterio de decisión muy utilizado para evaluar la viabilidad de los proyectos de inversión.

Por otra parte, para poder comparar esta rentabilidad con un *Benchmark* debemos estudiar su evolución año a año. En este caso los *Benchmark* escogidos son el índice Ibex 35 y el Eurostoxx 50.

En este caso, valiéndonos de la función TIR de Excel, obtenemos las siguientes tasas de retorno:



Fuente: Elaboración propia

Ilustración 14: TIR obtenida de 2010 a 2019.

Nuestra cartera en ningún momento muestra rentabilidades negativas. No debemos olvidar que durante casi una década de inversión se han estado ingresando dividendos de forma periódica.

ii. *Tasa Interna De Retorno Año A Año*

Esta evolución la podemos apreciar más claramente estudiando a evolución de la cartera y ambos índices mediante la TIR acumulada año a año. Para ello hacemos el cálculo teniendo en cuenta todas las inversiones realizadas hasta el momento de salida, considerando como momento de salida todos y cada uno de los años del periodo total.

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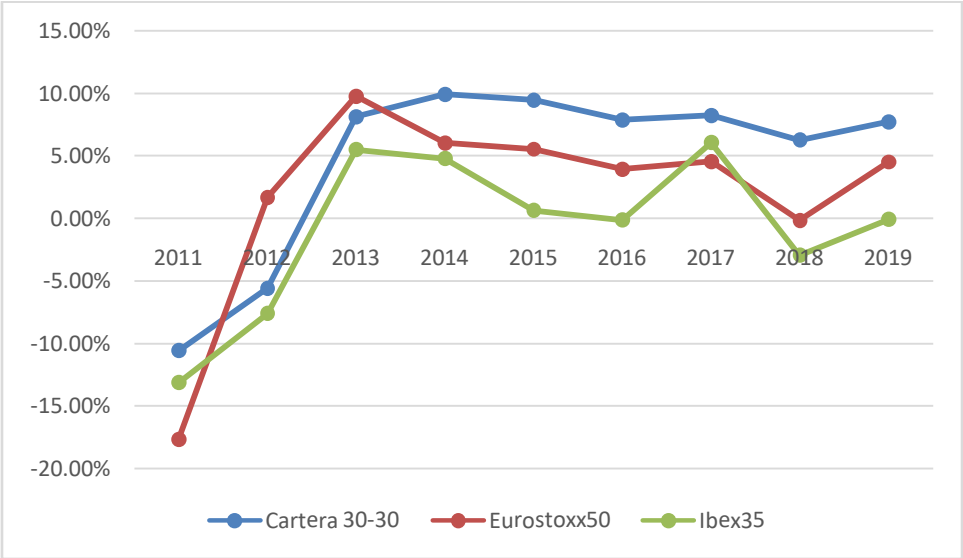

Fuente: Elaboración propia

Ilustración 15: TIR acumulada año a año

En general este sistema de inversión en valor bate a los dos índices de referencia manteniendo las inversiones a muy largo plazo.

d) Analisis Del Riesgo Obtenido

i. *Analisis De La Volatilidad*

Esta sección hace referencia a qué es el riesgo y cómo estimarlo y medirlo. Las empresas que componen las carteras elaboradas con el modelo que aquí exponemos han sido escogidas por presentar una evolución favorable de las variables contables.

El riesgo de un activo aparece definido en los manuales como el grado de incertidumbre del nivel de retornos de un activo. Partiendo de esta definición, se define el cálculo del riesgo de una cartera como el proceso de ponderar el riesgo de los activos que la conforman por su peso dentro de la cartera.

El problema que nos encontramos es que, si bien los rendimientos son fáciles de calcular y los tenemos perfectamente identificados, en el caso del riesgo, su propia definición puede ser costosa.

Una de las metodologías más habituales en relación a este tema es la gestión de carteras mediante el objetivo de reducir el riesgo asumido en la inversión mediante la diversificación del rango de inversión (Paranjape-Voditel, et al., 2013).

La desviación estándar de los rendimientos también fue utilizada por (Shin, et al., 2010) para calcular los riesgos de los ETF y los índices de referencia.

Por ello, lo primero es definir qué se entiende por riesgo, para, a partir de la definición, aplicar un método de cálculo que no presente problemas.

Una primera identificación del riesgo se hace estimando las desviaciones de la rentabilidad anual efectivamente obtenida, frente a su media. Esta idea de riesgo coincide con el concepto estadístico que se conoce como desviación típica y que genéricamente en finanzas se denomina volatilidad.

$$\sigma = \frac{1}{N}\sqrt{\sum_{t=1}^{N}(X\%_t - \overline{X\%})^2}$$

Las medidas de incertidumbre más utilizadas son:

- Rango.
- Varianza.
- Semivarianza.
- Coeficiente de variación.

No hay que olvidar la razón del porqué existe riesgo y, más concretamente, cuáles son sus fuentes principales. ¿Qué es lo que puede hacer que nuestro activo varíe su valor en el tiempo?

Los sistemas de inversión en valor se basan en el largo plazo. En estos casos la herramienta para reducir el riesgo es la diversificación. A través de la diversificación, se puede evitar parte del riesgo inherente a un activo, de modo que su riesgo total obviamente no es la influencia relevante en su precio (Sharpe, 1964). Una cartera correctamente diversificada ayudara a cubrir pérdidas cuando necesitemos liquidez. Empleamos como medida de riesgo la desviación estándar poblacional.

Nuestra cartera se elaboró mediante empresas cuyos ratios y variables financieras habían mejorado en el momento de la adquisición con respecto a ejercicios anteriores. Esto debería reducir el riesgo por el hecho de tratarse de empresas en crecimiento.

Al iniciar la elaboración de la cartera mediante el modelo diseñado insertamos una restricción que permitía un porcentaje máximo por valor de cierto porcentaje de nuestro capital. Este porcentaje se fue

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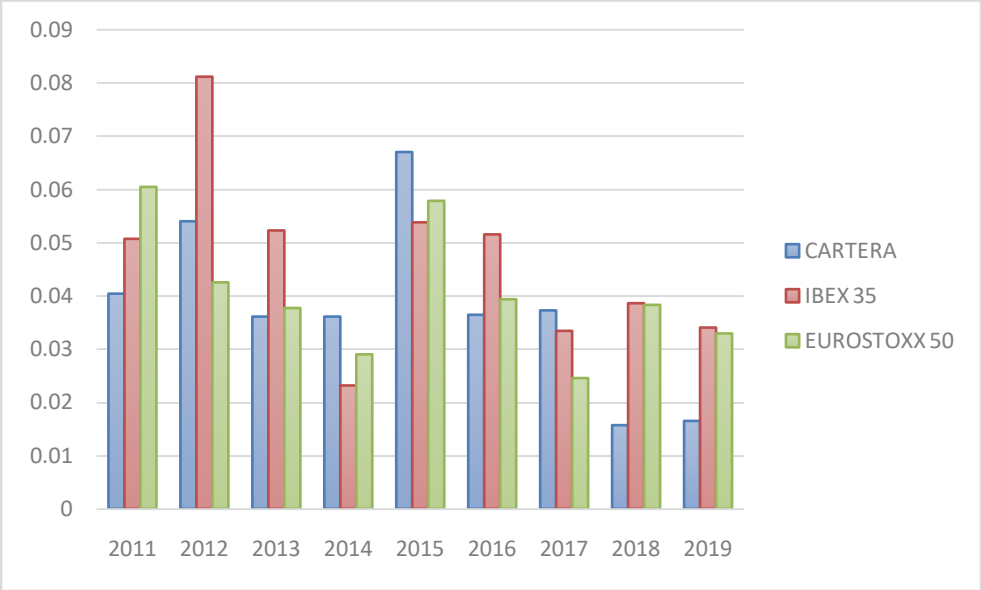
reduciendo año a año para incrementar la diversificación y, de este modo, reducir el riesgo.

Este cálculo se realiza multiplicando la rentabilidad mensual de cada valor en cartera por su peso en la cartera. Este cálculo nos devuelve un total de 12 datos por año, cuya desviación estándar es valor que le damos al riesgo. La primera entrada se realiza el 31 de diciembre de 2010. Necesitamos estar al menos un año invertidos para poder calcular el riesgo de un año, mes a mes. Por lo que nuestro primer año es el 2011.



Fuente: Elaboración propia

Ilustración 16: Comparación volatilidades.

La volatilidad de los índices con los que comparamos suelen superar la de la cartera salvo en contadas ocasiones. Lo que sí que se aprecia claramente es un descenso periódico de la misma con los años y la incorporación de más valores a la cartera.

ii. *Analisis Del Tracking Error*

El conjunto de índices financieros que seguimos para medir sus resultados y el cual caracteriza la rentabilidad – volatilidad de la cartera nos dan pie a definir otra medida de riesgo. El *Tracking Error*(TE) es la media de las desviaciones de los retornos entre el fondo y el benchmark.

El TE es definido por (Chen, et al., 2017)como la desviación entre un ETF y su índice subyacente. Los errores de seguimiento se definen como la desviación entre el rendimiento de los ETF y sus índices de referencia, y se miden de varias maneras en la literatura (Shin, et al., 2010).

Formalmente, lo que se hace es calcular las diferencias de retornos entre el fondo y su benchmark y a partir de ahí, se calcula la volatilidad de dichas diferencias sustrayendo su promedio.

$$TE = \sqrt{\frac{\sum_{i=1}^{n}(dif_i - dif_m)^2}{N}}$$

Donde:

dif_i = diferencia de retornos entre el fondo y el benchmark.

dif_n = diferencia media de retornos entre el fondo y el benchmark.

El TE es cero si el fondo se alinea perfectamente con el índice de referencia. Sin embargo, en la práctica, el desempeño de un ETF en el seguimiento del índice se ve afectado por algunos factores, como los honorarios de administración y los gastos administrativos / operativos, las diferentes composiciones del fondo indexado y el índice, y los costos de negociación (Frino, et al., 2001).

Por lo tanto, el error de seguimiento no es cero en la práctica, como lo observaron muchos estudios empíricos (véase, por ejemplo, Murphy, et al., 2010).

Así pues, si buscáramos fondos que simplemente sigan a los índices preferiremos los que tengan un tracking error más bajo. En cambio, si buscamos fondos en los que los gestores tengan mayor impacto en los resultados del fondo buscaremos un tracking error lo más alto posible.

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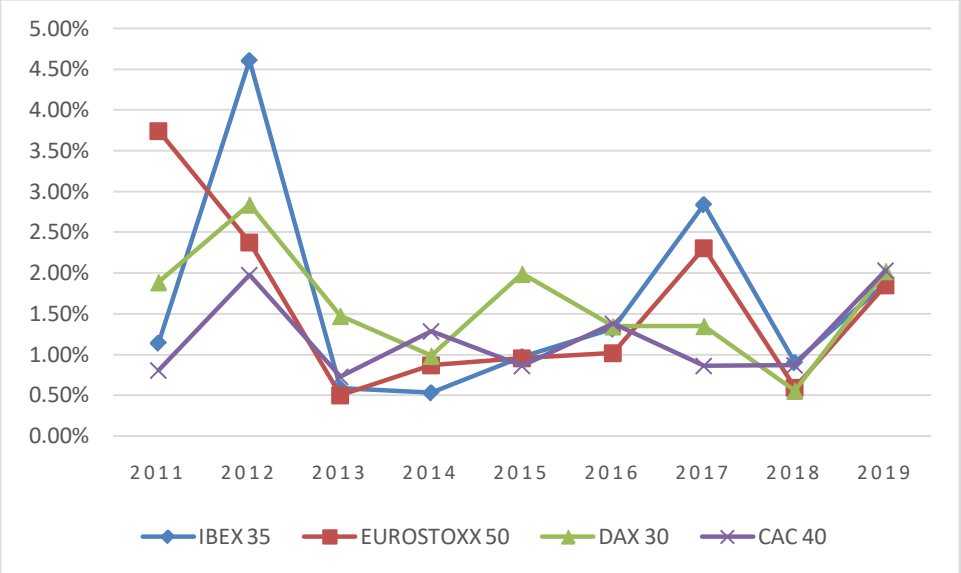

Fuente: Elaboración propia

Ilustración 17: Tracking Error.

En ambos casos obtenemos resultados parecidos. El *traking error*, ya sea mucho o poco va en el mismo nivel de consonancia con los índices. Al principio es elevado ya que la cartera dispone de pocos títulos, la cual cosa incrementa la volatilidad de la cartera respecto a sus índices de referencia. Con los años las cifras van disminuyendo hasta establecerse más de dos puntos porcentuales de los niveles en los que empezó, lo cual dota de fiabilidad al argumento de que la diversificación reduce el riesgo.

La cifra en la que el grafico se estabiliza se sitúa alrededor de los dos puntos porcentuales. Esto se traduce en que, durante los años venideros la rentabilidad del fondo se moverá entre el intervalo formado por la rentabilidad prevista para los índices de referencia más menos dos puntos porcentuales, aproximadamente.

El tracking error es una ratio muy utilizado, ya que nos indica en términos de rentabilidad, cuanto se sale del índice de referencia el gestor de una cartera. Es una medida que hay que tomar con cuidado, ya que estas desviaciones pueden ser tanto positivas como negativas, por lo que si creemos firmemente en la gestión de la cartera lo buscaremos lo más alto posible, pero si no queremos asumir riesgo gestor deberemos de buscarlo próximo a cero.

iii. *Análisis De La Beta*

Otra forma de estimar riesgos y tomar decisiones de inversión sobre activos es a través del coeficiente beta. Beta es un número que indica como varia el precio de un valor bursátil en respuesta a la fuerza del mercado o en respuesta al movimiento del mercado en su conjunto. Cuanto más afectado se vea el precio de un valor bursátil ante un movimiento en los precios del mercado, más alto será el coeficiente beta de ese valor bursátil.

Recordemos que la segunda etapa de un sistema de inversión en valor consiste en sintetizar las carteras teniendo en cuenta todos los aspectos del problema de selección de activos. Con este fin, cuestiones como el efecto de la diversificación entre valores o la inclusión de determinadas medidas de riesgo, como la desviación estándar de los rendimientos de las acciones o el coeficiente beta se deben incorporar plenamente en el proceso de decisión dentro de esta segunda etapa (Xidonas, et al., 2009).

Sería lógico pensar que, ya que las empresas de nuestra cartera mostraron unas variables contables y financieras optimizadas en el momento de la compra, la beta de la cartera mostraría más seguridad que la beta de mercado. Así pues, el objetivo de esta investigación es comprobar si esta premisa se cumple.

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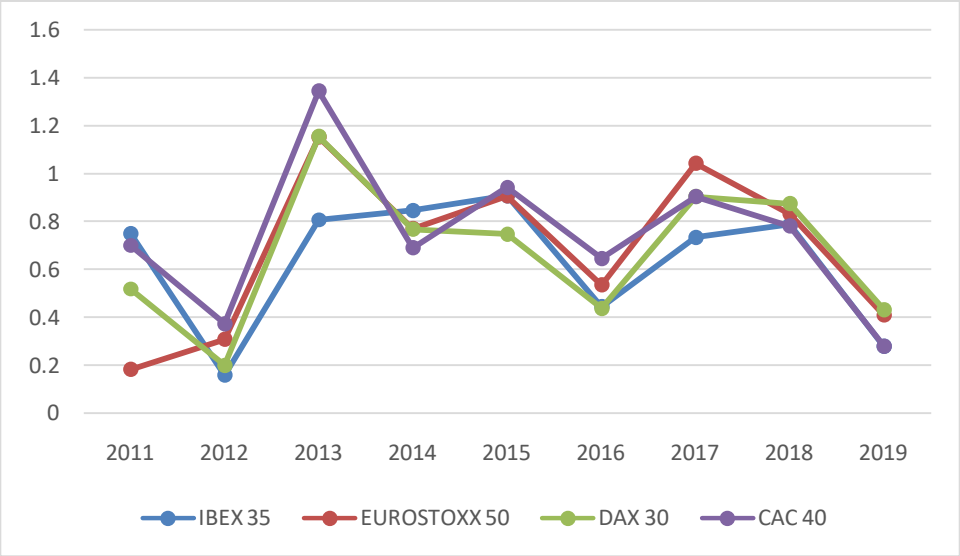

Fuente: Elaboración propia

Ilustración 17: Beta.

El coeficiente beta tiende a descender fuertemente durante la segunda mitad del periodo, es decir, cuando la cartera empieza a estar compuesta por un número de empresas considerable. Esto quiere decir que, con el tiempo y las nuevas adquisiciones, la cartera va ganando independencia respecto a las fluctuaciones de los índices.

V. Conclusiones

Esta investigación presenta una estrategia de inversión enfocada en la relación entre el crecimiento de una empresa y su cotización. Destacamos la validez de las variables económico-financieras publicadas en las cuentas anuales y la información que nos aportan en las estrategas de inversión a largo plazo. Para ello se estudia el coeficiente de correlación entre un conjunto de variables contables y ratios financieros con la evolución de los precios de las acciones de un conjunto de empresas cotizadas en el índice Eurostoxx 50.

En el grupo de empresas que han pasado por el Eurostoxx 50 se aprecia cierta relación en el crecimiento de la empresa a nivel contable y la evolución de su cotización en el medio y largo plazo. Identificar que las variables *fondos de los accionistas, ingresos de explotación* y el ratio *EBITDA* han mostrado más correlación en el largo plazo con la cotización nos ha ayudado a seleccionar aquellas empresas que se encontraban en fase de crecimiento. Cuando las tres han presentado una variación positiva la empresa ha crecido y posteriormente ha crecido la cotización. Esta información elimina la incertidumbre del corto plazo debida a noticias, rumores o malas situaciones puntuales. Una mejora de la actividad empresarial al final del ejercicio son noticas bien recibidas por los accionistas que llevan a futuras compras. No obstante, no se trabaja con informaciones puntuales como puedan ser la presentación de informes trimestrales. Se trabaja con información anual que además se publica meses después del cierre del ejercicio. Es por ello que estas compras deben realizarse muy poco a poco ya que la información que aparece publicada con mucho retardo. La información es desconocida para la mayoría de los inversores hasta que se hace pública, pero no para todos. Gran parte de ella ya suele estar descontada por el mercado.

La información se emplea posteriormente para diseñar una cartera de inversión mediante un modelo matemático que nos facilita la toma de decisiones de inversión escogiendo entre aquellas empresas para las que se prevé un mayor crecimiento y unos mayores retornos anuales, manteniendo el nivel de riesgo bajo restricción.

Tomando como referencia los índices Ibex 35 y Eurostoxx 50, concluimos que este sistema de inversión muestra una fortaleza superior a ambos índices desde un primer momento, haciéndose esta más evidente con el paso de los años. No exceder un porcentaje máximo por valor del capital invertido ayuda a disminuir periódicamente la volatilidad de la cartera con el paso de los años, manteniéndose está en niveles inferiores a la de los índices de referencia.

El TE va en nivel de consonancia con ambos índices manteniéndose elevado al principio por disponer aun de pocas empresas en cartera y reduciéndose paulatinamente conforme se van incorporando valores a la cartera.

También el coeficiente Beta tiende a descender fuertemente cuando la cartera empieza a estar compuesta por un número de empresas considerable. Esto quiere decir que, con el tiempo y las nuevas

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The Future of Work in the Financial Service Industry Post COVID-19: A Case of Costa Rica

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Abstract- The health crisis caused by COVID-19 transformed the operational paradigm of financial industry in Costa Rica. The context demanded high levels of resilience and innovation to face the effects of the pandemic. Therefore, the general objective of this research is to describe the main variables that characterize the future of work in the Costa Rican financial service industry in a post-COVID-19 scenario.

This research applied both a qualitative and quantitative methodology and was developed using statistical data collection and a thorough literature review related to the topic. As a primary data collection tool, a structured questionnaire was applied to 400 people from a specific population. This was to inquire about the technological platforms used in remote work and measure productivity, the perception of change in functional roles, processes which can be automated, and key variables related to the characteristics of the future of work.

Keywords: remote work; future of work; financial industry; automation.

GJMBR-C Classification: JEL Code: G00



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Tom Okot-Orcid [α], Rebeca Hernández [σ] & Eyleen Jiménez [ρ]

Abstract- The health crisis caused by COVID-19 transformed the operational paradigm of financial industry in Costa Rica. The context demanded high levels of resilience and innovation to face the effects of the pandemic. Therefore, the general objective of this research is to describe the main variables that characterize the future of work in the Costa Rican financial service industry in a post-COVID-19 scenario.

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The results demonstratea broad characteristics, opportunities, and trends into the future, the relevance of working remotely and the main contributions of telecommunications equipment. Finally, a series of recommendations are made to provide tools for financial companies to deal with the changes in the future of the work. Additionally, this research contributes to increasing the access of Small and Medium Enterprises (SME) to financial services including affordable credit, and their integration into value chains and markets.

Keywords: remote work; future of work; financial industry; automation.

I. Introduction

Working from home has been improving the quality of work peoples' life. Some of the main advantages of teleworking are energy saving, day to day cost saving, protection of environment, facilitation of job mobility and companies could reduce overheads and property fees (Vayre, 2021). Allthese situations represent a huge impact in the way many industries operate, some of them represent a big step forward regarding climate change impact for example, the pandemic has positively impacted environment and helped to re-think if many of production and operating costs are truly necessary.

Examples of this are transportation costs, office rental expenses, utilities costs, parking expenses among others that for years were part of many organizations budgeting. This crisis has revealed that these items might not be that necessary and that resources must be focus on connectivity, technology, human capital benefits, and others matters.

According to McKinsey Global Institute (2020) there is a high probability that hybrid models remain in the industry after the pandemic, it is most likely to fit with a portion of work force with high level of education and with higher salaries and benefits.

This statement offers us a clear view that things might not be the same than before, more and more companies will adopt these hybrid models, beginning with most qualified and professional employees, but in long term, companies will look for the way to make the most possible procedures remotely and try to get the less physical interaction in their companies. Of course, this will be suitable for some industries only, other will remain needing their collaboratorsin place but automation and technology will lead to changes in these industries such as manufacturers, tourism, food, and others.

The future of work is based on the role of technology and automation. The future employees must increase their technical knowledge to learn a new talent and adapt to the development of the new era and consider being competitive in the service industry. The World Economic Forum (2020) affirms that labor markets were transformed in the emerging economies due to technological changes and tendencies, and this scenario will remain in the future in a faster and deeper way.

Technology and automation such as streamlined collaboration and remote work have been improving efficiency and productivity. Today's technology services are essential for financial service industry success and continuity (Brem, Viardot & Nylund, 2021). It provides effective communication and increases flexibility in companies, and people that are working from home or traveling for work around the world. Telecommunications, digital media, and automation systems are improving customer service as well. With these tools, organizations can identify and analyze customer data, surveys, statistics and more to

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develop or create better solutions for the customers (Arribas, 2020).

Additionally, it is important to mention that all the described items involved in this research are related to the fulfillment of the Sustainable Development Goals, specifically with Goal 9 that includes the development of industry, innovation, and infrastructure. Considering that Costa Rica is a signatory of the 2030 Agenda for Sustainable Development, this research is aimed at describing the main variables that characterize the future of work in the Costa Rican financial service industry in a post-COVID-19 scenario. Additionally, the knowledge generated from this study contributes to increasing the access of small industries and other businesses, to financial services, including affordable credit, and their integration into value chains and markets. Thus, creating more resilient financial organizations that can continue to provide their services.

With the results of this investigation, financial service organizations will have valuable information regarding how their operation will be like in the near future, and how trends and opportunities will impact the way they do things today. As mentioned before, this makes it easier for financial institutions to be prepared for further changes.

II. Methodology

a) Investigation type

The research carried out is exploratory with a quantitative and qualitative approach, since it uses statistical data collection and analysis techniques, as well as qualitative elements related to primary sources of information on the central theme of the research. Through the quantitative approach it was possible to obtain information about the main variables that characterize the future of work in the Costa Rican financial service industry in a post-COVID-19 scenario. It should be noted that this approach allows to eliminate biases in the research process, since it is possible to complement the bibliographic review with the responses of the selected target population.

b) Population of interest

According to the Instituto Nacional de Estadística y Censos as of December 30, (2020), the number of people working in the financial service sector totals up to 40,535 employees. For the purpose of this research, it will be taken as part of the target population every adult, of any gender and age, working for one of these organizations and have had the opportunity to work remotely during the COVID-19 crisis.

c) Sample and sampling type

For the calculation of the sample of this investigation, a margin of error of 5% and a confidence level of 95% were used which results in a sample of 382 people. However, 400 responses were received and analyzed. The type of sampling used for this research is directed and non-probabilistic, since it is subject to the decision-making of the researcher and the selected sample is related to the research criteria described above.

d) Instruments and data collection techniques

A structured questionnaire was designed with 17 questions where 14 of those questions have a quantitative nature nad the remaining three questions have a qualitative nature. The questionnaire was elaborated using Microsoft Office Forms platform and distribute to the participants via social media like WhatsApp, Email, and Facebook. The closed questions were intended to quantify key variables related to the main variables that characterize the future of work in the Costa Rican financial service industry in a post-COVID-19 scenario. The objective of the qualitative questions was to investigate the technological platforms used in the organization to do telework and measure productivity, also there is a question regarding the personal perception of the respondent about the possible transformations of tasks and processes into automated ones.

III. Results

The demographic characteristics of the surveyed population are summarized as follows: 60% identify themselves as female, 39% with male and 1% with another gender. Regarding age ranges, Figure 1 shows the distribution in different age ranges, most of the respondents are between 35 and 45 years old (33%) followed by 30% who are between 30 and 35 years old.

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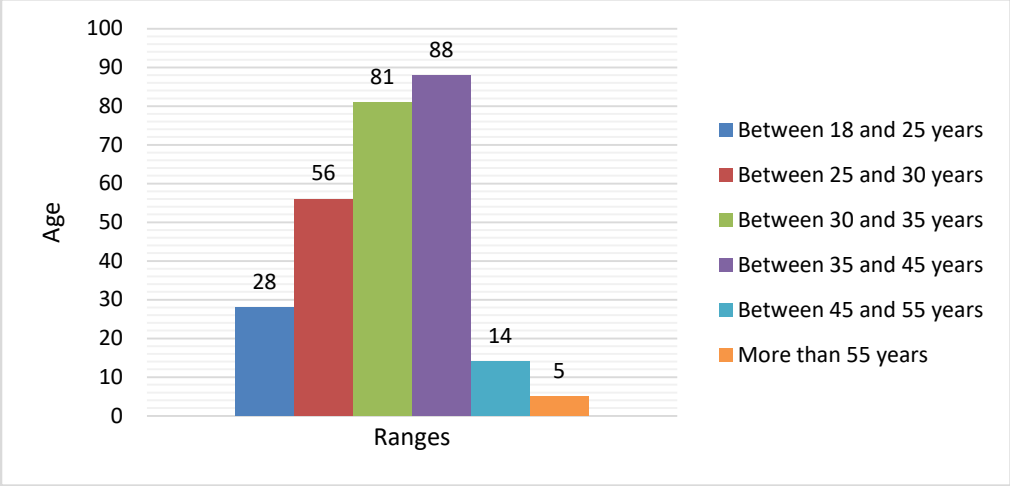
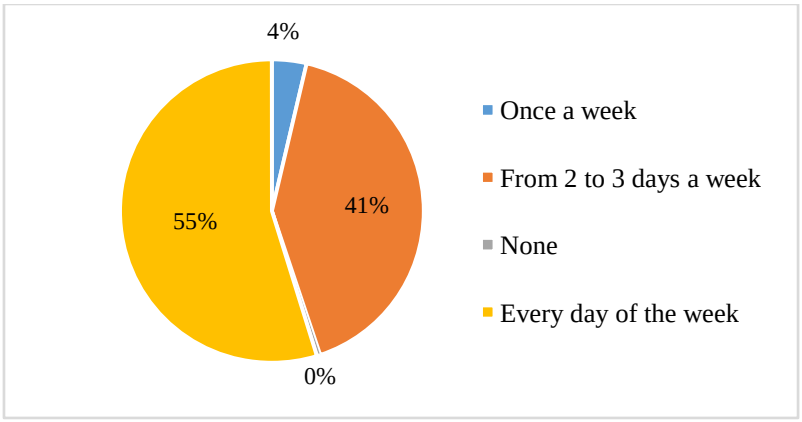


Source: Own elaboration.

Figure 1: Age ranges of the surveyed population.

Regarding the geographic location where the respondents work, 60% are concentrated in the province of San José, 14% in Heredia, 10% in Alajuela, 8% in Cartago, 5% in Guanacaste and 3% remaining in the provinces of Limón and Puntarenas.

Continuing with the relevant data of the study, and as part of the objective of investigating the relevance of telework in the financial industry of Costa Rica, the number of days of preference that respondents want to telework was consulted. In Figure 2 the detailed results are shown.



Source: Own elaboration.

Figure 2: Preference number of days for teleworking

When asked about whether they consider that they have the necessary resources to carry out teleworking from home effectively, 86% of those surveyed affirmed that they do, and 14% indicate that they do not have the conditions to do so. Along the same lines, the frequency with which people who telecommute communicate with their work team was investigated. Figure 3 shows the results on this frequency.

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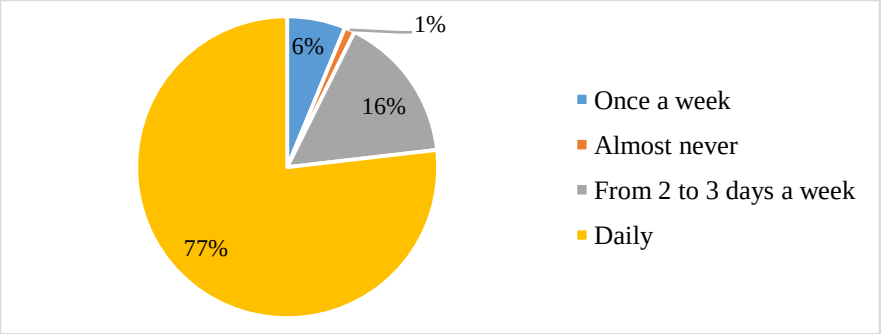


Source: Own elaboration.

Figure 3: Communication routines among work mates

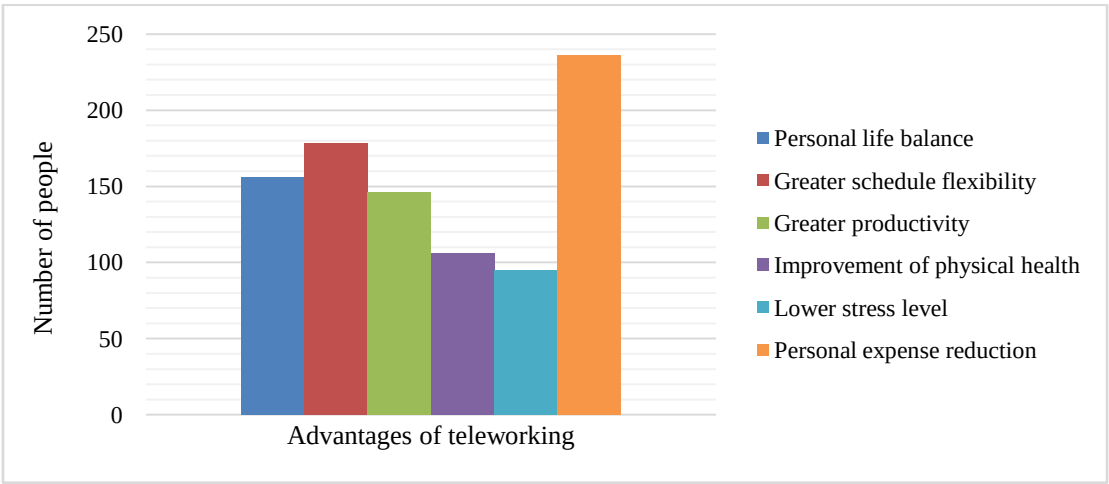
As part of the attributes of this work modality, the perception of whether teleworking has increased the time available to attend to their family tasks and responsibilities was consulted, to which 74% of the respondents answered affirmatively and 26% indicated no. To identify the main contributions of telecommunications and digital media in the continuity of the operations of the financial services industry, we consulted about the technological platforms that people who telework use to communicate with their work team. Table 1 shows their distribution.

Table 1: Platforms used for communication

Through which technology platforms do you communicate with your work team?	% of respondents who say they use the tool
Teams	65.56%
WhatsApp	26.67%
Zoom	25.56%
E-mail	25.19%
Skype	13.33%
Phone calls	7.04%
Webex	4.44%
Others	18.15%

Source: Own elaboration.

In figure4 it can be observed that 236 respondents indicated that the greatest benefit acquired by teleworking was the reduction of personal expenses, followed by the greater flexibility of schedulesbeing a 'lower stress level' the lowest advantage of teleworking perceived by the participants.



Source: Own elaboration.

Figure 4: Advantages of remote working.

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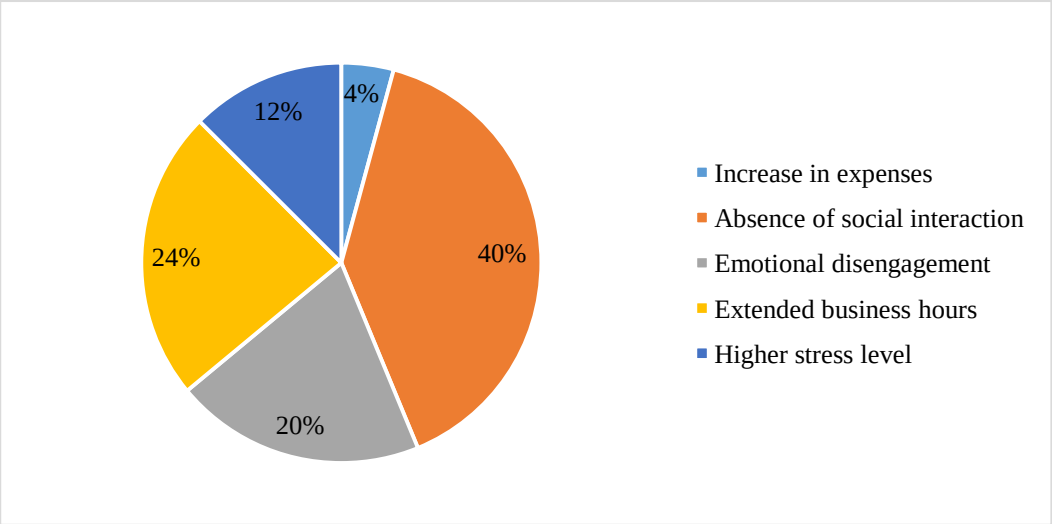
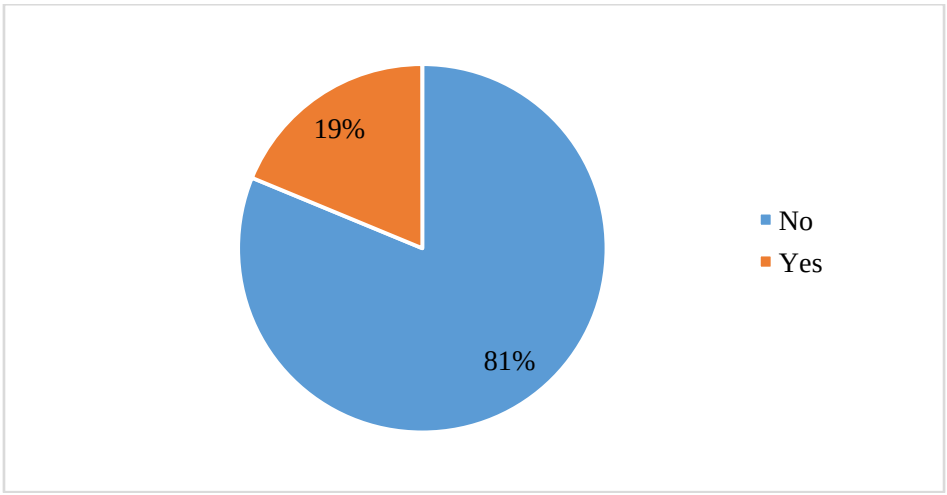
Figure 5 shows important information about the main disadvantages of teleworking; 40% of the respondents have identified the absence of social interaction as the number one, followed by a 24% who believe that the working hours have been extended, and a 20% who considered important the emotional disengagement.



Source: Own elaboration.

Figure 5: Disadvantages of teleworking

Another important factor that the research helped us to find out was if the organizations of the financial industry of Costa Rica are evaluating the productivity of the collaborators who perform telework. Figure 6 shows that 19% of the population indicates that they are evaluated while 81% indicates that they are not.



Source: Own elaboration.

Figure 6: Technological systems used to evaluate productivity in organizations.

Continuing with the objectives of the study, another objective was to identify if companies are using new technologies, systems, or applications to measure the productivity of their employees to contribute with business continuity. According to the data obtained, figure 7 shows that 81% of the respondents did not answer, however 7% indicated they are using software to measure productivity, followed by 5% who make manual reports.

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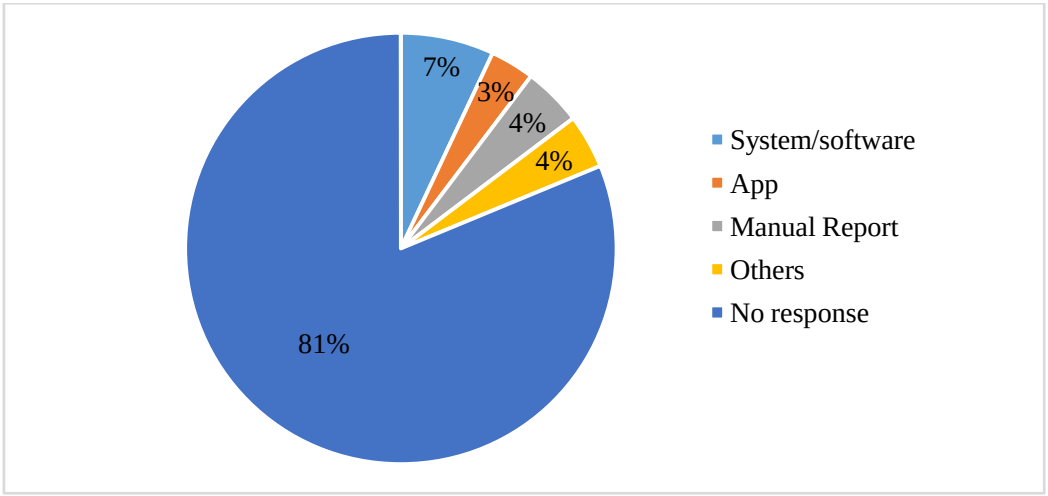
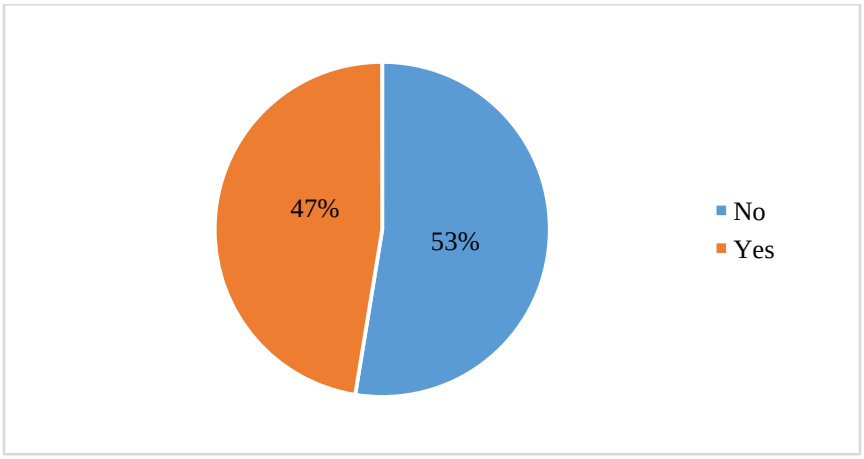


Source: Own elaboration.

Figure 7: Indicate the technology system/application.

To identify the existence of processes or functions that can be automated in Costa Rica's financial organization, this question was included in the survey and the data obtained shown in figure 8 is that 53% of the population consider that there are no processes that can be automated in their companies, while the remaining 47% indicate that there are.



Source: Own elaboration.

Figure 8: Tasks/processes feasibility to be automated.

As part of the research on the processes that can be automated, relevant information was obtained about the functions or tasks that organizations can improve by automating them. Most respondents (51.47%) did not answer, followed by 25.74% indicating that administrative processes can be automated as shown in figure 9.

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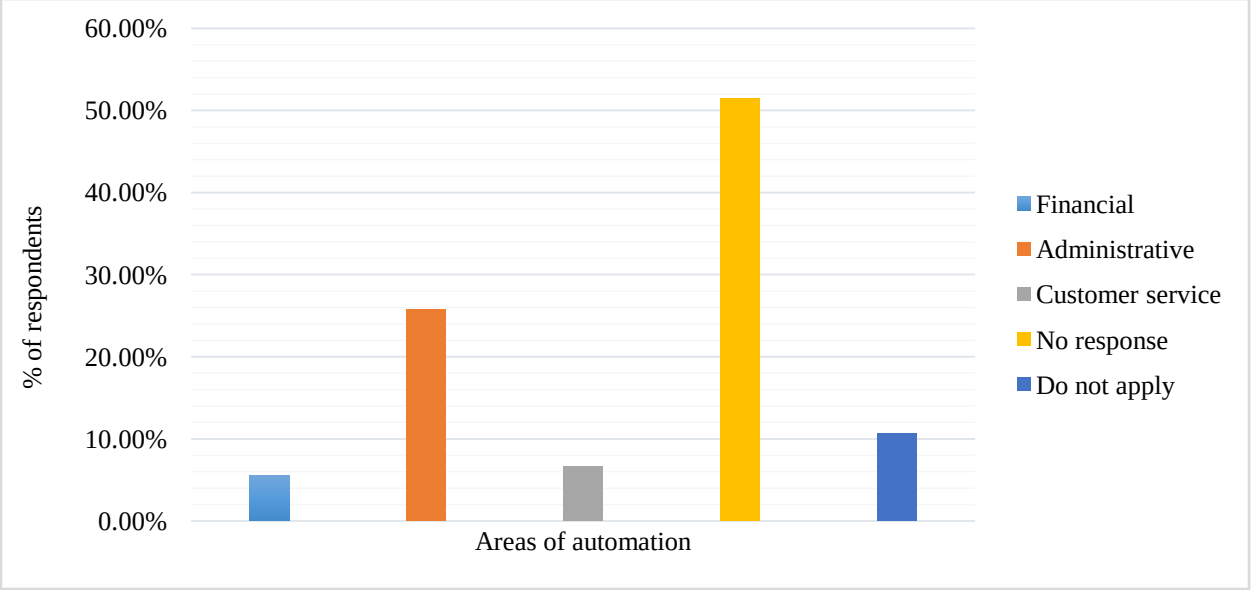
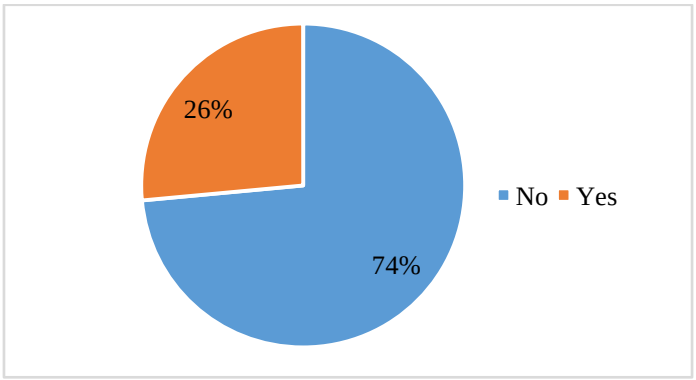


Source: Own elaboration.

Figure 9: Tasks/processes can be automated in your organization.

The study also considered if people were aware about any existence of an increase in cyber-attacks or fraud in their organizations to continue with the objective of investigating the relevance of telecommunications, digital media, and business continuity. The figure 10 shows that 26% of the surveyed population consider that they had an increase, while 74% considered that there were no fraud or cyber-attacks in their organizations.



Source: Own elaboration.

Figure10: Perception of cyber-attacks or fraud increase in workplace.

Another important objective considered in the research was to determine if the organizations in the financial industry in Costa Rica conduct training for their employees in cybersecurity, fraud prevention and business continuity topics. The study reveals that 33% of the surveyed population has never been trained, while the other 54% indicated that they were trained last year, and the rest received at leastone training more than a year ago.

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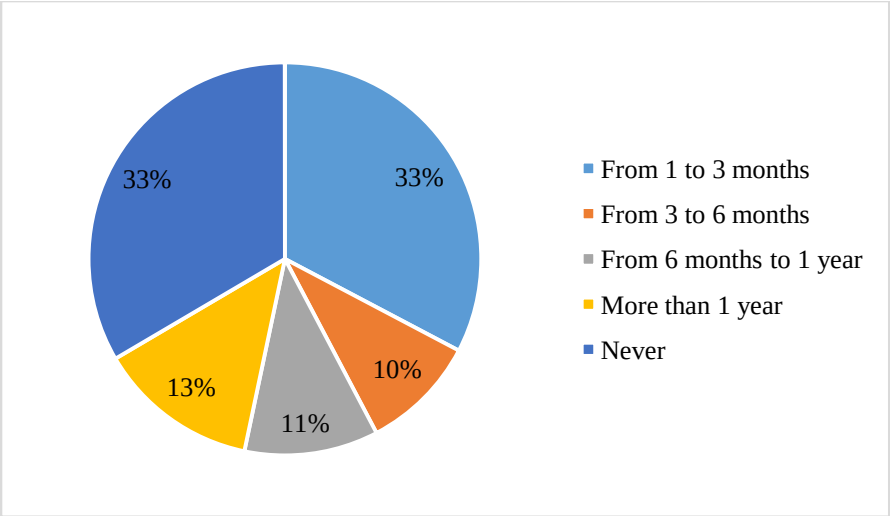

Source: Own elaboration.

Figure 11: Last time of fraud prevention, business continuity, cybersecurity, or similar trainingreceived

IV. Discussion

We want to highlight the relevance that our respondents indicate about their preference when teleworking, most of them mention that they have a high willingness to work from home. This element is very important due to the relevance that teleworking has taken for both companies and individuals. Before the pandemic, this was a very unknown situation for companies in our country and the financial industry was no exception. There was a lack of knowledge and little familiarity about this type of work, it was the transnational companies that began to popularize this mechanism that little by little and in the context of the pandemic spread to the rest of the industries. According to Barquero (2020)teleworking was not implemented for only 3% of existing national and multinational organizations in Costa Rica, remaining 97% has developed teleworking in their organization as part of the business continuity strategy due to the social distance requirements and moving restrictions across the country.

The teleworking modality represented a challenge for many organizations during the year 2020 and continues to this day, especially on how to address the risks related to this modality from a technological, operational and information security risk standpoint. Much resilience has been demonstrated regarding certain processes, and others have had to adjust during the process of isolation and remote work of collaborators, there is no doubt that today there is a new normal in which organizations operate globally (Vasic, 2020; Vayre, 2021).

This "new" way of operating financial organizations is supported by the fact that respondents have confirmed (86%) that they have the necessary resources to effectively work from home, this undoubtedly denotes that employees and organizations have both technological and economic resources to adapt spaces and platforms to continue working remotely. Today almost in every home in Costa Rica, families have adapted a place or location in their houses to work, study or attend other remote sessions such as meetings, video conferences, etc. This scenario demonstrates that virtuality has come to stay, and that people have adopted progressively the idea that many of their interactions with groups of people can happen without getting out of their place.

In another similar report for the newspaper La República, Barquero (2020) highlights that with the pandemic, the number of teleworkers in the country went from 21,524 in September 2019 to 282,632 in the same period of 2020. This information was reported in the Continuous Employment Survey of the INEC, meaning a total growth of 1,213% from one year to another.

According to Brem *et al*. (2021), the entire world is changing, and each country lives it at its own level, effectively COVID-19 accelerated the adaptation to innovation in processes, techniques, and technologies for the financial industry sector in Costa Rica, including telework. This comes as a solution to the global crisis and as a method of security for the population. Telework is in constant growth in the country and the first sectors where this new way of working has been adopted are telecommunications, insurance, and finance. The research carried out shows us interesting data about the financial sector of Costa Rica regarding how respondents visualize the disadvantages and advantages of this new modality.

One of the main advantages indicated by most respondents, 236 people to be exact, was the reduction of fixed costs that they could perceive and consider that

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this even helped to have a better economy and balance on family life. According to the Ministry of Health of Costa Rica (2021) in the scenario of the pandemic, teleworking is offering advantages for both the employee and organizations and even for society, which translates into a cost-benefit for each of the parties.Is important for Costa Rica to start this discussion based on the results obtained from the health crisis, because we think it is a great opportunity to change and improve procedures not only in the private sector but in the public one, activities carried out have to have an efficient use of resources, including the ones related to human capital and technology.

Following the same line of teleworking, most respondents affirm to have daily contact with their work teams (55%) while 41% indicate that they have it 2 to 3 days a week, these results highlight that it is important for financial companies to maintain communication channels within the organization and the need to replicate the levels of interaction that were having in a face-to-face environment. This effort by organizations to maintain internal communication responds to what Arribas (2020) qualifies as one of the adverse effects of teleworking. The author further mentions thatto maintain compromise and engagement within the organization internal communication must be increased. To do socompanies must take advantage of collaboratives platforms to encourage teamwork, discussions, and informal sessions; this will help improve communication and commitment maybe

We consider that the absence of communication compromises the objectives of financial companies that are teleworking, for this reason it is of extreme importance to keep this volume of communication high as long as it is productive and open. In this effort to support communication channels in financial companies, the study shows the high use of collaborative tools such as Microsoft Teams. According to the results of the survey, this tool is used by 65% of the respondents, these data from Costa Rica do not escape the global trend of its use in the world. According to Herranz (2020), Microsoft affirms that it has had a 50% increase in the number of users in 2020, reaching the record figure of 115 million users in the world.

At this point, it is essential to highlight the role of information technology as an ally of the financial business to provide continuity to operations. The technological investment of companies has increased substantially in the last year and budgetary items have even been created for the implementation of this type of platforms, making it clear that financial services must be progressively digitized and strengthen information risk control processes to prevent information loss and technological fraud.

Also, we inquired about training exercises for personnel. When dealing with risk management in a dynamic and changing exercise, it is very important to keep employees updated on these issues toreinforce the organization's preventive controls. When asking about whether financial companies have provided training in fraud prevention, business continuity, cybersecurity or similar, about half of the respondents (46%) agreed that they have never received training or have more than one year without attending to any training sessions.

Keeping the staff of an organization updated and trained on these aspects translates into an improvement in internal control that allows mitigating risks that may arise from external and internal threats. This helps making the organization's risk culture stronger, bearing positively on daily decision making. Leaver & Reader (2017), Carretta *et al.* (2017) &Deloitte (2012), states that risk culture is a very important indicator to measure how well risk management is driven across the organization, and how well the employees adopt the associated policies and procedures.

Another important discovery in this study relates to how productivity is being measure for those who are working remotely. Barquero (2020) in a note for the newspaper La República refers to a study called "Telework: Did it come to stay?" of the firm Search Latin America, where it is evidenced that 74% of workers have the tools to carry out their work from home, however, 66% of companies say they do not have the appropriate tools and procedures to evaluate their performance. This situation is replicated in this study where 81% of the respondents affirmed that in the organizations where they work, they do not have any system or procedures to evaluate their productivity.

We consider that what is not possible to measure is difficult to control, therefore, the productivity levels of the different areas of the company must be aligned with the strategic objectives of the organization, so that they contribute to its integral development. In the absence of information on its performance, it is not possible to make decisions for the improvement and optimization of the processes that are part of its business model. It is essential that the strategy and its objectives permeate at all levels in the organization. Additionally, they must be integrated into the operational plans and the operations strategy which is of greater scope and understanding by the collaborators, since it involves the daily processes, they know and perform.

This issue is a critical point that Costa Rica's financial industrial organizations must manage due to the importance of maintaining adequate performance results. This situation, plus the degree of uncertainty that exists about how long the pandemic will last or even if teleworking will be a modality that will last over time, represent very important challenges that companies must address in the short term. In this regard, Van, Murat & Sousa (2020) state that hybrid models have

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come to stay in the new normal, people will have to get used to this trends that have transformed the way things are done. The winners will be those companies managing the risks coming from remote working modality (technological, cybersecurity, business disruption and others).

However, this new reality is also aligned with innovation, automation, new ways of working and how it helps to improve the way in how communication takes place to continue working in the middle of a global crisis, also it comes to help families and their ways of communication with their relatives even when those are inside or outside the country.

Cutting edge technology nationwide is a model of development that came to stay and generate opportunities for improvement in our work and family life; according to the study conducted, the percentage of people who did not want to provide information about how their organizations are adapting to innovation was considerable (81%). This suggests that in Costa Rica it is clear that people continue showing resistance to changes technology wise which will have a considerable impact as for a developing country, organizations in Costa Rica need to find better ways to adapt to innovative processes, products, concepts and others to fulfill existing needs.

According to the CINDE (2021) Costa Ricais catalogued as a multifunctional business destination, where many multinational companies has settled their service centers. Nowadays, Costa Rica offers more than one hundred different processes and activities in more than twelve different languages. Technical support, human resources, accounts payable, accounting and others are the most common professional activities performed by Costa Rican workforce, placing our country as the perfect location to improve organizational structure and digital transformation.

It can be highlighted with this information that Costa Rica is a country where the evolution towards cutting-edge technology at the level of services, goods and products has placed it on the radar of many countries that need to adapt to the digital transformation. Costa Rican organizations must take into consideration that the digital transformation is already happening, and it will remain, and it is a must to seek how to align the current strategies to this transformation and be part of the change and not victims of it.

The results and discussion presented reveal very important elements on the variables that characterize the future of work in the financial industry in our country, as well as the main contributions that technology and telecommunications have made on this matter and the opportunities and threats of the future of work in the Costa Rican financial service industry in a post-COVID-19 scenario. Based on these results, the conclusions and recommendations of this research project are detailed below.

V. Conclusions

The capacity to adjust and adapt to new trends is very important because the financial sector is a dynamic axis of the economy and is fundamental for the growth and development of the country. In addition, this sector is crucial for the country's small and large industries to have access to working capital that allows them to improve their production processes. On the other hand, it is responsible for providing tools to satisfy the debt and investment needs of both individuals and the country's business sector, thus meeting their short and long-term requirements.

As a result of this research, it is possible to establish the main variables that characterize the future of work in the country's financial industry. These characteristics are the remote mode, either from homes or specialized centers for teleworking, the continuous use of collaborative technological tools, a higher level of technological risk in the management of work and human capital (due to the increase in cyberattacks, fraud, among others) and emerging trends towards process automation.

Technology through telecommunications and digital media are the tools that have supported financial companies to give continuity to their operations in this pandemic. The technological investment of companies has increased substantially in the last year, allocating resources for the implementation of collaborative platforms and connectivity. Companies need to improve their information risk control processes to prevent information loss and technological fraud

Among the opportunities presented by the future of work in this industry is an improvement in the quality of life of people, this because there is a strong tendency for teleworking to be a permanent modality, since people consider that they have enough tools to do it and at the same time employees have agreed that teleworking has increased the time available to cope with their tasks and family responsibilities. This last point has a direct impact on improving people's quality of life, for which we consider that this change represents an important opportunity for both employees and companies, since this modality helps to improve the level of commitment and motivation.

Based on the study, it is possible to determine that most of the financial companies in Costa Rica have implemented the teleworking modality, however, based on the research, not all companies have platforms for connections to secure networks, collaborative tools, and other technological elements for its safe implementation. This represents a challenge for companies that want to protect their assets and information from cybercriminals and fraudsters.

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Carry out training: Companies in the financial sector should carry out constant training exercises for their collaborators, since people constitute a relevant risk factor, being the entry point of many of the threats that a financial organization faces every day. Updating on issues of cyber security, fraud and information security risks must be carried out periodically in response to the sophistication and constant proliferation of fraud modalities, with the aim of safeguarding the assets and information of the entity and the trust of the different interest groups.

Manage collaborative tools: Companies should formalize the official tool (s) to communicate with their collaborators, from the study it was noted that sometimes up to 3 or 4 collaborative tools are used with different degrees of security and formality. There are some tools that are more secure than others, so the company must ensure that the organization's information is shared through the appropriate channels. Hand in hand with the definition of these tools, a policy of use must be established, to regulate the type of information that is shared, the times in which the collaborator must be available, the form and type of meetings that are established, among other elements that arise from the remote mode of work. This recommendation also improves the internal communication system because it helps to identify potential PROBLEMS that may affect the work environment. Based on the problems identified, it is proposed to develop a plan of changes and improvements at the different levels of the organization (when necessary) managed by the Human Resources department, this with the aim of having a formal process of capturing the voice of the collaborators.

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Capital Structure and Financial Performance of Commercial Banks in Nigeria

By Aliyu Ahmed Alhaji

Abstract- Capital Structure is an important concept in business which have accounted for financial performance of businesses in literature. Thus, this study was conducted to examine the relationship between capital structure and financial performance of commercial banks in Nigeria for the period of (2010 to 2019). Five (5) commercial banks were selected using Judgmental sampling technique. Data were collected from financial statements of selected banks. The data was analyzed using E-View 2010. Unit root test, Granger causality test and panel regression Analysis was conducted in this study. We concluded that, capital structure variables used are good predictor and significant with financial performance of commercial banks in Nigeria. In addition, we concluded that, Debt to Equity Ratio, Total Debts and Total Equity over the period under study, do not contributed to the financial performance (Return on Assets) of commercial banks in Nigeria. Furthermore, Equity to Capital Ratio and Debts to Capital Ratios improves the financial performance(Return on Assets) of commercial banks over the years. We therefore, recommended that, the bank managers should ensure that, capitals are spent on productive assets in other to improve financial performance of the banks, among others.

GJMBR-C Classification: *JEL Code: G01*

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Capital Structure and Financial Performance of Commercial Banks in Nigeria

Aliyu Ahmed Alhaji

Abstract- Capital Structure is an important concept in business which have accounted for financial performance of businesses in literature. Thus, this study was conducted to examine the relationship between capital structure and financial performance of commercial banks in Nigeria for the period of (2010 to 2019). Five (5) commercial banks were selected using Judgmental sampling technique. Data were collected from financial statements of selected banks. The data was analyzed using E-View 2010. Unit root test, Granger causality test and panel regression Analysis was conducted in this study. We concluded that, capital structure variables used are good predictor and significant with financial performance of commercial banks in Nigeria. In addition, we concluded that, Debt to Equity Ratio, Total Debts and Total Equity over the period under study, do not contributed to the financial performance (Return on Assets) of commercial banks in Nigeria. Furthermore, Equity to Capital Ratio and Debts to Capital Ratios improves the financial performance(Return on Assets) of commercial banks over the years. We therefore, recommended that, the bank managers should ensure that, capitals are spent on productive assets in other to improve financial performance of the banks, among others.

I. Introduction

Businesses are brought into existence with aid of finance. As such, finance, can be said to be the money used to established businesses. Businesses require money to acquire assets which are used to provide relevant goods and services conceived in the business. Finances are sourced either as equity (contributions made by the owners of the business) or debts (contributions accrued from the creditors). Therefore, business finance ideally, is the combination of equity and debts, which is referred to as capital structure.

Firm's combination of debt and equity results in a given capital structure Brealey, Myers & Allen, (2011); Nirajini & Priya, (2013).Capital structure represents the proportion of funds attributed to the firm through different sources, which may comprise of internal and external financers, Martis, (2013).Capital structure explains the owners' rights and interests of creditors' proportional relationship; it indicates the ratio between the corporate structure and the various sources of financing, and their mutual combinations Bauer (2004). The capital structure theory is an essential theory in finance as it addresses sources of finance available to business organizations wishing to raise funds to finance their operations. Myers (2001) explains capital structure as an attempt to explain the mix of securities and financing sources used by corporations to finance real investment. Capital structure is a combination of the ratio of debt and equity for the firm to finance it assets. Pandey (2010) posits that capital structure decision is significant managerial decisions that represent the proportionate relationship between debt and equity. Debt comprises of long term debt such as debenture while equity is made up of ordinary share capital, share premium, reserves and retained earnings.

The impact of capital structure on either financial or productive business performance cannot overlook simply because, it is essential to assets accumulations, production of either goods or services that enhances wealth maximization and profit realization by the business organization. The goal of capital structure is to minimize the cost of capital and maximize the firm's value. This suggests that an optimal capital structure decision is essential for firm's survival Ganiyu, (2015).

Banks as a financial sector deals with services of collecting money as deposits and giving out money in form of loans to the people in the society. The banking institutions are financial institutions that play the intermediation role between the surplus and deficit sectors in any economy. Banking sector enhances the flow of funds for productive purposes. It is possible that the amount given as loan is less than the total sum paid by the deficit sector and in that case, the banking institution is supposed to payback the surplus sector from the equity of the banks Al-Mutairi&Naser, (2015).

From the forgoing, the bank managements are tasks to make use efficiently the business funds because, the shareholders as well as the creditors are expecting returns on their respective investment in banks. The decision of the banks management in Nigeria concerning optimal capital structure level in other to achieved organizational goals is a crucial factor on the banks financial performance. Financial performance expresses the optimum utilization of resources and the ability to make a profit Aymen, (2013). The roles of banks in the Nigerian economy are enormous, as such; banks financial performance is an essential factor that should be recon with from the bank's management. The successes achieved on financial performance increases shareholders, creditors

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and potential investors' confidence on banks. Hence, financial performance brings about stakeholders' confidence in banks. A favorable bank financial performance engenders creditors' confidence in terms of the ability of the banks to meet their obligations, gives assurance to depositors about the safety of their deposits, rewards shareholders with return for their invested funds, to managers it is an assurance of their jobs security and to the state it shows bank's ability to pay tax Aymen, (2013).

However, the Central Bank of Nigeria (CBN) capitalization policy regulations that mandated banks to have capital structure of tune of 25Billion Naira makes it a demanding task for banks management to determine optimal capital structure. Aremuet al. (2013), opines that, banks needed to mix both debt and equity strategically to attain capital structure at an optimal level. Thus, banks are left with decisions on what optimal capital structure mix between debts and equity accounted to success in financial performance? What mix of equity and debts will ensures lower cost of capital and subsequently improves the financial performance? From the forgoing, many researches had been carried out on capital structure and financial performances of banks in Nigeria. This study aim to examine the capital structure and financial performances of commercial banks in Nigeria for the period of ten (10) years, that is, from 2010-2019. This period was chosen because, it best examine the capital structure mix of commercial banks in Nigeria after the 2010 capital structure regulation by Central Bank of Nigeria (CBN). Many studies do not make use of this period for their studies, thus, making this research a step ahead of other researches. In addition, the study shall focus on five (5) commercials banks. These banks were selected randomly from listed commercial banks in the Nigerian Stock Exchange (2020)

II. Review of Literatures

a) *Financial Performance*

Financial performance simply refers to the potential returns made from the transactions of goods and services rendered by the business organization. Financial performance is a yardstick to measure the used of equity finance and debts finance, as well as general wellbeing of the business organization. Bhunia et al. (2011), defined financial performance as firm's overall financial health over a given period of time. They added that analysis of financial performance is aimed at assessing the feasibility, solidity and fertility of a business. Similarly, Nyor and Yunusa (2016) see financial performance as the level of performance of a firm over a specified period of times, expressed in terms of overall profit or losses during that time. It is measuring the results of a firm's policies and operation in monetary terms.

Financial managers use ratios from company financial statement to assess its financial performance Watson & Head, (2007), Bhunia et al., (2011). One of the key factors used in measuring financial performance of an entity is its profitability. (K.D Mihajlov 2014) said, profitability is the unique measure of corporate success and essential indicator of financial performance. Profits are generators of retained earnings within a firm. Moreover, they are often used ascomponents of the businesses overall income and competitiveness appraisal. Business Organization profitability affects the decision of shareholders and creditors, its ability to invest and provide sustainable growth rates as well as its capability to boost returns on equity and debts. Even though profitability is a sufficient indicator of the current competitiveness of a company, it is better if it is measured over an extended period of time.

b) *Theories of Capital Structure*

For the purpose of this study, Tradeoff theory, Agency Cost theory and Pecking Order theory will be discussed.

i. *Pecking Order Theory*

This theory explains the decision hierarchy to be follow by the banks managers when determining the sources of additional finances to the business. This theory was postulated by Myers and Majluf in 1984. The theory stated that, asymmetric information increases the cost of financing. Because of information asymmetries between the firm and potential investors, the firm will prefer retained earnings to debt, short-term debt over long-term debt and debt over equity. Myers and Majluf (1984) suggest that the problem of information asymmetric can be solved if firms did not issue new security but rather use only its retained earnings to support the investment opportunities at its disposal. This presupposes that issuing equity becomes more expensive as asymmetric information insiders and outsiders increases. Priority is then given to the internal fund because it is the easiest fund to obtain. Thus, the theory concluded that, it is less costly when sourcing for additional finances when retain earnings are used, then follow by debts and lastly equity.

ii. *Tradeoffs Theory*

This theory propounded from the works of Kraus and Litzenberger (1973), Miller (1977), Scott (1977) and Kim (1978) among others. This theory of capital structure gives an assumption that the management of a company will always choose how much debt and equity to use in financing the operations of the entity and that this is obtained by balancing off the cost and benefits associated with each source of finance. According to the theory, firms should select an optimum capital structure that balances the benefits and risks of both debt and equity.

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iii. *Agency Cost Theory*

This theory assumed that, the manager as an agent many not act in the best interest of the shareholders and he determines the best optimal capital structure for the organization. This theory was postulated by Jensen and Meckling (1976). They define the agency relationship inside the firm as: "A contract under which one or more person (the principal) engages another person (the agent) to perform some service on their behalf which involves delegating some decision-making authority to the agent". According to this theory, the agent manager may pursue his personal objective or deliberately act in such a way that portrays lack of commitment, self-centeredness which may lead to firm losing its value significantly in contrast with the overall firm's objectives that will maximizes its value. Consequently, conflict of interest may arise between the manager and the firms' owners. Taking up more debt financing may reduce agency cost problems, apart from meeting up the expectation of shareholders, managers must strive hard to redeem the fixed obligation of debt. Therefore, managers are motivated to act in such a way that will protect their interest in terms of job security and welfare.

c) *Empirical Reviews*

The following are researches that establish the impact or relationship between capital structure and financial performance of banks in Nigeria.

Ningi S. I. and Usman H. A. (2017) examined the effect of capital structure on financial performance of deposit money banks in Nigeria. It was observed that capital structure has direct impact on financial performance of Deposit Money Banks (DMBs). It is one of the important financing decisions of banks that is closely related to its survival. Taken into consideration the advantages of using debts, such as monitoring the conducts of managers as well as tax shielding ability, it is imperative for banks managers to explore less costly debtfinancing opportunities to finance their operations. DMBs should ensure optimum mix of debt and equity in their capital structures to maximize financial performance.

Adeniyi, A. J., Marsidi, A., Babatunji, A. S. (2020) study capital Structure and Commercial Banks Performance in Nigeria. This study used profit after tax and earnings per share as a measure of performance and employed panel regression technique to analyze data collected from a sample of fourteen quoted commercial banks between 2009 and 2016. The result shows a significant relationship between debt and profitability of commercial banks in Nigeria. The study concludes that debt can be significantly influenced by liquidity and shareholders' wealth. Consequently, the study recommend that commercial bank managers should not depend on debt capital as a source of financing the organization capital structure but rather use retained earnings of the business and consider debt as the least alternatives.

Adeoye and Olojede (2019) examined the effect of capital structure on the performance of some selected banks in Nigeria. The objectives were to examine the relationship that exists between capital structure and financial performance and to investigate the effect of capital structure on the financial performance of quoted deposit money banks in Nigeria. To achieve these, a cross sectional time series secondary data covering the period of seven years (2012-2018) was extracted from the audited financial statement of ten (10) banks listed on the floor of stock exchange. The descriptive statistics, Pearson moment correlation and multiple linear regressions were used. The correlation results showed that capital structure is negatively correlated with financial performance (ROA and ROE). Result from panel regression revealed that debt to equity though significant, impacted negatively on return on assets and return on equity, asset tangibility significantly impacted return on asset but insignificantly impacted return on shareholder's assets. Also Age have a significant impact on return on asset and insignificant effect on return on equity. They therefore concluded that capital structure have a negative effect on the financial performance of deposit money banks in Nigeria and recommended that appropriate proportion of capital should be tailored towards viable investment opportunities for maximum return of shareholders wealth and increase in value of the firm. More so, while finance manager is alert to the movement in the stock market, banks should take precautionary measures for mitigating credit risk associated with lending and borrowing.

E Chuke Nwude and Kenneth Chikezie Anyalechi, (2018), examine Impact of Capital Structure on Performance of Commercial Banks in Nigeria. The study evaluated the influence of financing mix on the performance of commercial banks, and the causal link between debt-equity ratios. Data collated were analyzed using correlation analysis, pooled OLS regression analysis, fixed effect panel analysis, random effect panel analysis, granger causality analysis, as well as post estimation test such as restricted f-test of heterogeneity and Hausmantest. The findings show that while debt finance exert negative and significant impact on return on asset, the debt-equity ratio has positive and significant influence on return on equity. There was neither unidirectional nor bidirectional relationship between capital structure and performance of commercial banks in Nigeria.

Hafiz U. A, (2018), studied capital structure and performance of deposit money banks in Nigeria. Accordingly, the general objective of this study is to assess the impact of capital structure on the financial performance of Bank in Nigeria with specific reference to how debt ratio and equity ratio affect return on equity

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and net interest margin of banks in Nigeria. The population of the study is the entire 21 licensed DMBs in Nigeria (CBN, 2017). The sample size of 12 banks was determined using convenience sampling technique for the period 2007- 2016. The study utilizes panel design to analyze the data based on random effect estimation. The study found a positive relationship with financial performance measured by Net Interest Margin (NIM). The study recommends that more incentives need to be given to STD suppliers to effectively adjust the maturity structure of STDs. Similarly, debt should be used with caution in order to explore its tax shield and managerial efficiency benefits.

III. Methodology

a) Research Design and Sources of Data

The study adopted a descriptive research design. A descriptive approach in data collection is able to collect accurate data on and provide a clear picture of the phenomenon under study. In addition, the principal method common to this kind of research is empirical method. This method entails the use of quantitative, statistical or regression techniques in evaluating the research issues or problems.

The judgmental sampling design was used to select five banks from the Nigerian Stock Exchange to carry out the empirical analysis. These banks are First Bank plc, First City Monument Bank; Guarantee Trust Bank (GTB), Union Bank, and Zenith Bank. Ten years, between 2010 and 2019 were used for the empirical analysis. Data were sourced from the Nigeria stock exchange and annual report of the respective banks.

b) Regression Model and Variables

The financial performance that is the dependent was proxy by Return on Equity (ROA), which simply means the returns accrued from the use of business assets. Thus, this was used in proxy of financial performance because, both equity and debt finances are used to purchase assets of the business. On the other hand, independent variable, which is capital structure, is proxy by: Debt to Equity Ratio (DTER), the leverage ratio showing how the business uses its debt and equity to finances its assets, Debt to Total Capital Ratio (DTCR), which shows the quantum of debts in total capital of the business, Equity to Total Capital Ratio (EQCR), the ratio of equity in total capital structure of the business, Total Equity (TEQ), the total amount of equity contributed by shareholders and lastly, Total Debts (TDBT), the total liabilities or debts finance in the business

i. *Model I*

$$ROA_{it} = \alpha_0 + \alpha_1 DTER_{it} + \alpha_2 DTCR_{it} + \alpha_3 EQCR_{it} + \alpha_4 TEQ_{it} + \alpha_5 TDBT_{it} + \delta_{it} + \gamma_{it} + \varepsilon_{it}$$

Where;

a = intercept
ROA = Return on Equity
DTER = Debt to Equity Ratio
DTCR = Debt to Total Capital Ratio
EQCR = Equity to Total Capital Ratio
TEQ = Total Equity
TDBT = Total Debts

In the equation, i is the individual dimension and t is the time dimension. The α_i and β_i parameters represent the overall constant in the respective model.

ii. *Model II*

In other to achieve the first objective of the study, the study employs the granger causality test so as to see the direction of causality between capital structure and financial performance of banks. The model takes the form as specified below:

$$ROA_{it} = \beta_0 + \sum_{i=1}^{k} \beta_1 DTER_{it-1} + \sum_{i=1}^{k} \beta_2 DTCR_{it-1} + \sum_{i=1}^{k} \beta_3 EQCR_{it-1} \sum_{i=1}^{k} \beta_4 TEQ_{it-1} + \sum_{i=1}^{k} \beta_5 TDBT_{it-1}$$

Where; It is assumed that the error terms are uncorrelated. Model II is used to determine the causality between ROA and other independent variables used for the capital structure. The null hypothesis is that ROA does not granger cause independent variables. The F-statistics is compared. If the F-statistics is significant for any of the coefficient then the null hypothesis is rejected.

c) Method of Data Analysis

Unit root test was conducted to establish if there is stationarity in the data used for this research. Since time series data are proneto spurious regression thus, a way out of this is to test for stationarity of all variables using the Augumented Dickey Fuller Unit Root Test. The null hypothesis is that, the data has unit test root. If the P-value is less or (0.05 or 5%), the null hypothesis will be rejected and vice versa.

In addition, in other to check if there is muticollinearity, that is if there is correlated relationship between the dependent and independent variables, correlation Matrix table will be used to examine the relationship between the variables.

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IV. Data analysis and Presentation of Results

Table 4.1: Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
ROA	10	.07	.22	.1480	.04517
DTER	10	23.21	33.60	28.1980	3.59973
DTCR	10	4.00	4.31	4.1880	.09414
EQCR	10	.69	.96	.8170	.08015
TEQ	10	1122336	2443981	1750909.30	484129.744
TDBT	10	5294135	15531117	9845646.60	3221889.668
Valid N (listwise)	10				

Author's Computations, 2020.

From the above table which shows the descriptive statistics results of the variables used in the research. Thus, from the mean results, each variables in the research improves significantly over the years

Table 4.2: Pairwise Granger Causality Tests

Null Hypothesis:	Obs	F-Statistic	Prob.
DTCR does not Granger Cause ROA	8	0.65444	0.5809
ROA does not Granger Cause DTCR		2.74412	0.2101
DTER does not Granger Cause ROA	8	1.19583	0.4150
ROA does not Granger Cause DTER		3.02217	0.1910
EQCR does not Granger Cause ROA	8	1.65610	0.3276
ROA does not Granger Cause EQCR		5.10023	0.1083
TDBT does not Granger Cause ROA	8	0.97585	0.4716
ROA does not Granger Cause TDBT		0.18175	0.8424
TEQ does not Granger Cause ROA	8	0.29607	0.7632
ROA does not Granger Cause TEQ		0.32148	0.7473

Author's Computations 2020.

The Granger Causality Test carried out to examine if there is a causal relationship between the dependent variable and independent variables. The Table 4.2 above show that, Return on Asset (ROA) don not have a causal relationship with Debt to Equity Ratio (TDER). This was in line with the study of Adeoye and Olojede (2019). In the same vein, Return on Assets (ROA) does not have causal relationship with Total Equity (TEQ), Total Debts (TDBT), and Total Debts to Capital Ratio (DTCR) and Equity to Capital Ratio (EQCR). The p-values of all the variables as shown in the table 4.2 are less than (0.05), thus, there is unidirectional or bidirectional relationship between capital structure and financial performance of commercial banks in Nigeria. This was in line with the study of E Chuke Nwude and Kenneth Chikezie Anyalechi, (2018). Therefore, we reject the null hypothesis which says the dependent variable Granger caused the independent variables.

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Table 4.3: Multicolinearity Test. Correlation Matrix

	ROA	TDBT	TEQ	DTCR	DTER	EQCR
ROA	0.001836 1.000000					
TDBT	0.169337	9.34E+12 1.000000				
TEQ	-0.017695	1.28E+12 0.915220	2.11E+11 1.000000			
DTCR	0.051219	213823.4 0.783305	21900.20 0.533915	0.007976 1.000000		
DTER	-0.073287	5472200. 0.524250	456362.8 0.290962	0.201246 0.659847	11.66226 1.000000	
EQCR	-0.554345	-173441.0 -0.746309	-16665.19 -0.477228	-0.005556 -0.818216	-0.112886 -0.434758	0.005781 1.000000

Author's Computations 2020.

Table 4.3 above show the results of correlation relationship between the viable which is used to examine if there is multicolinearity among the variables used in the study. Total Debts (TDBT) with coefficient of (0.169) exhibits positively insignificant relationship with Return on Assets (ROA). Total Equity (TEQ) with coefficient of (-0.017) shows negative significant relationship with Return on Assets (ROA). Debt to Capital Ratio (DTCR) with coefficient of (0.05) shows positive significant relationship with Return on Assets (ROA). Debt to Equity Ratio (DTER) with coefficient of (0.07), shows negative insignificant relationship with Return on Assets (ROA). And lastly, Equity to Capital Ratio (EQCR) with coefficient of (-0.55) also revealed a negative insignificant with Return on Assets (ROA). Form the forgoing; we can conclude that, there is no multicolinearity between the variables, because independent variables are insignificant with the Return on Assets (ROA).

Table 4.4: Unit Root Test

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.125697	0.0149
Test critical values:	1% level	-4.420595	
	5% level	-3.259808	
	10% level	-2.771129	

**MacKinnon (1996) one-sided p-values.*

Warning: Probabilities and critical values calculated for 20 observations and may not be accurate for a sample size of 9

Table 4.4 which show the result f unit root test carried out to examine if the data used for the variables are stationarity over the period of the study. This test was carried out using E-View 10, thus, revealed that, the P-value (0.0149< 0.05), there is no unit root in the data, thus, at the first difference; the Return on Assets (ROA) is stationary. Therefore, we reject the null hypothesis which says there is unit root in the data over the years.T his result is line with the study of Adeoye and Olojede (2019).

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Table 4.5: Panel Regression Table

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	23.50160	6.081689	3.864321	0.0181
LOG(EQCR)	-4.726575	1.055664	-4.477350	0.0110
LOG(DTCR)	-18.62110	6.940146	-2.683100	0.0551
LOG(DTER)	-0.634583	0.538052	-1.179409	0.3036
LOG(TDBT)	1.113754	1.116107	0.997891	0.3748
LOG(TEQ)	-1.083294	0.916618	-1.181839	0.3027

R-squared	0.915320	Mean dependent var	-1.957468
Adjusted R-squared	0.809470	S.D. dependent var	0.334952
S.E. of regression	0.146206	Akaike info criterion	-0.723897
Sum squared resid	0.085504	Schwarz criterion	-0.542346
Log likelihood	9.619487	Hannan-Quinn criter.	-0.923058
F-statistic	8.647338	Durbin-Watson stat	1.433486
Prob(F-statistic)	0.028758		

Author's Computations, 2020.

a) Panel Regression Results

From the above table, R-squared (0.915) means that, the independent variables together explained 91.5% of the Return on Assets (ROA), thus, the remaining (8.5%) are other factors not captured in this study.

In addition, the Prob (F-statistics, 0.028< 0.05), shows that, there is a significance relationship between capital Structure and financial performance of commercial banks in Nigeria. This result is line with the study of Adeoye and Olojede (2019), Ningi S. I. and Usman H. A. (2017) and Hafiz et al (2018).

The regression result also shows the coefficient relationship between the independent variables and Return on Assets (ROA). Debts to Equity Ratio (DTER), was statistically insignificant (coefficient -0.6345, p-value 0.3036) and have a negative relationship with the Return on Assets (ROA). This implies that, the Debt to Equity Ratio over the years do not improve the financial performance of commercial banks in Nigeria over the years. This was in line with the study of E. ChukeNwude and Kenneth Chikezie Anyalechi, (2018),. Equity to Capital Ratio (EQCR) and Debts to Capital Ratio(DTCR)shows a negative but statistical significant relationship (coefficient -4.7365, p-value 0.0110 and (coefficient -18.6211, p-value 0.05 respectively) with the Return on Assets (ROA). This mean Equity to Capital Ratio (EQCR) and Debts to Capital Ratio (DTCR) has positive influence on the financial performance. The negative coefficient may be as result of Equity and debts capital incurred on non-performing Assets. This was in line with researches conducted by Ronoh and Ntoiti (2015) and Ramadan and Ramadan (2015). Total Debts (TDBT) is positively insignificant (coefficient 1.1137, p-value 0.3748) with the Return on Assets (ROA). This implies that, the Total Debts (TDBT) is irrelevant to the financial performance of commercial banks in Nigeria. Total Equity (TEQ) shows negative insignificant relationship (coefficient -1.0833, p-value 0.3027) with Return on Assets (ROA). Therefore, it is immaterial and do not improves financial performance of commercial banks in Nigeria.

V. Conclusions and Recommendations

This study carried out to examine the relationship between capital structure and financial performance of banks in Nigeria. The study used five (5) commercial banks and financial statements of the 10 years period form (2010-2019). From the study, we concluded that, capital structure variables used are good predictor of financial performance of commercial banks in Nigeria. In addition, we concluded that, Debt to Equity Ratio, Total Debts and Total Equity over the period under study, do not contributed to the financial performance of commercial banks in Nigeria. Furthermore, Equity to Capital Ratio and Debts to Capital Ratios improves the financial performance of commercial banks over the years. Lastly, from the unit

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test root, we concluded that, the Financial performance proxy by Return on Assets (ROA), at first difference, is stationary and do not have unit root.

From the forgoing, we recommended that:

1. The statistical insignificant of Debts to Equity Ratio to Financial performance: thus, we recommended that, the bank managers should ensures adequate and robust capital structure mix between equity and debts finances in other to yield favorable outcome in the future.
2. We also, recommend that, the commercial banks should not depend highly on the debts finances, thus, they should make use of their retain earnings to boost their capitalization, as this is in line with pecking order theory.
3. The bank managers should ensure that, capitals are spent on productive assets in other to improve financial performance of the banks.
4. Finally, the government should put in place relevant policies that will improve performance of capital markets where finances are source from, and also, put in place polices that will make commercial banks find retain earnings more attractive than debts.

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Predicting SME Insolvency in Sub-Saharan Africa: A Cameroonian Evidence

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GJMBR-C Classification: *JEL Code: G33, M41, C25*



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Predicting SME Insolvency in Sub-Saharan Africa: A Cameroonian Evidence

Marius Ayou Bene [α], Cyrille Onomo [σ] & Romuald Kenmoe Siyou [ρ]

Abstract- This paper aims to propose a model for predicting SME insolvency in the Sub-Saharan context. Based on a sample of 1183 Cameroonian SMEs from 2013 to 2015, we performed a logistic regression in panel data. The results show a persistence of insolvency over time when effected in an SME. It is also seen in the results that SME insolvency is determined by financial variables related to business management, financial structure, and profitability. On the other hand, it is determined by non-financial variables such as management quality, staff compensation, and SME size, which reinforce the power of insolvency prediction models. However, some determinants of insolvency in small firms are insignificant in medium-sized firms.

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I. Introduction

The difficult access of Small and Medium-sized Enterprises (SMEs) to credit is an impediment to their development and stands as a major economic concern in African countries (Honohan and Beck, 2007). This constraint has been eased in developed and emerging countries thanks to the dynamism of financial markets and the establishment of interconnected systems, including the credit guarantee system (OECD, 2015). In Southern countries, financial systems offer few solutions to the problem of SME financing (Beck and Cull, 2014), especially since in these contexts, financial markets are poorly developed and bank credit financing is predominant (Masetti and Mihr, 2013, Allen et al., 2011). Because of the high uncertainty about borrowers' repayment capacities, banks considerably ration credit to SMEs (Wamba and Tchamambé, 2002).

Several factors explain the rationing of credit to SMEs. A distinction must firstly be made between micro-rationing, which consists of capping the amount of credit granted, and macro-rationing, which refers to situations in which applications for credit from certain borrowers are randomly rejected (Ghosh et al., 1990).

In general, credit rationing is justified by information asymmetries that can accentuate problems of adverse selection and moral hazard (Stiglitz and Weiss, 1981, Sharpe, 1990). In Sub-Saharan Africa, these phenomena are prevalent because firms, and especially SMEs, suffer from weaknesses in the production and dissemination of quality information (Seca Assaba, 2002). As a result, credit institutions face a significant rate of delinquency, which is the corollary of high exposure to credit risk.

In an attempt to control credit risk, these entities insist on the requirement of real guarantees (Bester, 1985) and a long-term customer relationship (Bodenhorn, 2003). However, despite the improvement in the reliability of guarantees [1], their use as a solution to the problem of non-repayment of credit remains controversial. In this vein, the rigorous use of techniques to predict borrower default is indicated (Stiglitz and Weiss, 1981). Moreover, the prudential regulations enacted by the Basel Accords encourage banks to adopt internal models for predicting the default of credit applicants, but many banks in Africa have not yet done so.

Much of the work on prediction of credit applicant default or firm failure focuses on developed economies and large firms. There are few studies on the subject in relation to SMEs (Altman and Sabato, 2007, Altman et al., 2010) and in sub-Saharan Africa. Yet the recent financial crisis has led to an increase in the number of firm failures in all countries of the world (Alaminos et al., 2016). In African countries, studies available address the consequences of credit risk for financial institutions (Kolapo et al., 2012, Afriyié and Akotey, 2012, Gizaw, 2015), credit risk mitigation mechanisms (Gweyi, 2013), and models for predicting the failure of African firms (Appiah, 2011, Ncube, 2014). A few rare studies such as Bushe (2019) or Adalessossi (2015) deal with insolvency in SMEs in Africa. However, an effective insolvency management system can facilitate access to financial resources and improve the growth and viability of SMEs (World Bank, 2013, p109).

Moreover, SME insolvency management systems in sub-Saharan Africa are less effective than those in OECD countries. Between 2014 and 2015, the insolvency management ranking of OECD countries improved. On average, these countries moved from a rank of 27 to 22. During the same period, countries in the African region moved from a ranking of 134 to 128. However, Central Africa is the area with the worst performing arrangements, and North Africa is the area with the best performing arrangements in the continent. In OECD countries, the debt recovery rate rose from

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70.6% in 2014 to 71.9% in 2015. In the CEMAC zone, this rate rose from 6.6% to 8.8%. In Sub-Saharan Africa, it stands at 24.1% in 2015 while it is 17.3% in the OHADA area (World Bank, 2013 p109-116, World Bank, 2014, p112-118). In terms of insolvency management, Cameroon is ranked lower. It ranked 151 in 2014 and 123 in 2015. Over this period, the debt recovery rate in this country was 15.4%. However, in Botswana, which is one of the highest ranked African countries, this rate rose from 61.9% to 62.67%, which seems to justify the good quality of the insolvency management system in this country compared to Cameroon.

However, the lack of a clearly defined procedure for determining business failure in many countries in the region makes it difficult to capture SME bankruptcy. Nevertheless, because a sharp deterioration in the financial health of an SME can result in an intermediate or definitive insolvency situation and lead to the non-repayment of credit, predicting SME insolvency would promote better credit decision making in favor of these entities.

This work proposes a model for predicting SME insolvency in a sub-Saharan African country to help lenders make better credit decisions. Based on financial and managerial information drawn from a sample of 1183 Cameroonian SMEs over the period 2013-2015, a logistic regression in panel data is performed to define insolvency predictors. It emerges that insolvency is determined by business management, financial structure and profitability, management quality, staff remuneration and the size of the SME. As a result, the set of insolvency predictors changes as one moves from small to medium-sized firms.

The rest of the article is structured as follows: in Section 2, a review of the literature on the determinants and predictive models of insolvency in the SME dimension is conducted. Section 3 explains the data and methods. Finally, in section 4, empirical results are presented and discussed. The last section concludes the paper.

II. Insolvency Prediction in SMEs: A Review of the Literature

Credit decisions for SMEs are based on an assessment of their risk profile in order to mitigate the risk of non-repayment (Dohnal, 2008). This is especially true because they are very opaque in terms of information, with financial statements that are sometimes uncertified. Also, they do not have sufficient material assets to guarantee the loans requested (Blanco et al., 2012). Insolvency determines the company's inability to pay its debts and is a major credit risk event (Wood, 2012). Therefore, building insolvency prediction models becomes a feasible solution of SME financing issue (Blanco et al.,). However, the literature on insolvency prediction does not provide a unified definition of the concept, and in the absence of a theory to explain the phenomenon, insists on the variables to be included in the model and the analytical techniques used (Alaminos et al., 2016).

a) Definition of insolvency

Attempts to define insolvency are given by several fields: law, economics, accounting, finance. Armour (2001) presents several approaches to the analysis of corporate insolvency. From an accounting perspective, insolvency means that the book value of a firm's assets is lower than that of its debts. The argument developed by studies in finance is different. Insolvency is associated with cash flow and takes on the meaning of the situation of a firm that is unable to extinguish its debts when they come due (Cohen, 1998, p22). It is observed when the firm encounters difficulties in settling its creditors, and this depends on the structure of debt repayments and the nature of the assets used to satisfy them. The accounting and financial approaches are not always consistentand may conflict in the context of an analysis.

Insolvency is a signal of a firm's bankruptcy (Beaver, 1966), which makes it possible to distinguish between high-risk and low-risk firms (Ooghe and Van Wymeersch, 1996). It refers to a set of default situations characterized by the non-repayment of debts, the non-payment of dividends or "financial distress", which may lead to the initiation of legal proceedings (Levratto, 2013). For Wood (2012), in the dimension of the firm, the term bankruptcy is widely used to translate the insolvency process. It refers to a legal situation of insolvency and financial distress (Alaminos et al., 2016).

Nevertheless, there is a lack of consensus on the definitions of bankruptcy, insolvency and financial distress. This is why these terms are often used interchangeably in the literature (Van Der Colff and Vermaak, 2015).

b) Predictors of insolvency in SMEs

Work on bankruptcy prediction is helping to separate the good companies from the bad ones (Levratto, 2013). The objective is to disentangle these two types of firms and to encourage good selection in a situation of information asymmetry. For Cultrera and Brédart (2016), the prediction of bankruptcy focuses on the economic, strategic, organizational and managerial, and financial approaches, although most of the work has focused on the financial approach. Thus, in this vein, work has emphasized financial indicators as predictors of bankruptcy (Beaver, 1966, Altman, 1968). The aim was to identify the symptoms of bankruptcy from a financial perspective. For Altman and Sabato (2007), an application of models for predicting the bankruptcy of large firms in the SME dimension would lead to poor results.

In the work of Blanco et al., (2012) on English SMEs, it appears that liquidity, debt, activity, profitability

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and size ratios are good predictors of the bankruptcy of these entities. In the same context, Lin et al., (2012) use these main financial variables for the prediction of SME bankruptcy. Camacho-Minano et al., (2013), in predicting the insolvency of Spanish SMEs, consider indicators of financial structure, liquidity, profitability and financial viability among other indicators. Ptak-Chmielewska (2019), finds in the case of Polish SMEs, the same financial indicators. Efficient SMEs and highly liquid SMEs have a low probability of bankruptcy. For Cultrera and Brédart (2016), profitability and liquidity ratios are good predictors of insolvency in Belgian SMEs. Regarding Russian SMEs, Lugovskaya (2010) predicts insolvency based on liquidity and profitability indicators. In the case of SMEs in the hospital sector in Portugal, Pacheco (2015) concludes that only financial structure variables predict the insolvency of these entities.

In addition to financial measures, a set of non-financial factors are presented as predictors of SME bankruptcy. The quality of management (mainly strategic management errors) of the firm determines its bankruptcy (Charan and Useem, 2002). According to these authors, the experiences of several firms show that bankruptcy is related to bad managerial decisions favored by a lack of rigor linked to long periods of success, by a lesser consideration of market threats, by a management style that hinders good feedback, by excessive risk-taking, by the strategic approach and dysfunctions of the board of directors. In addition to these factors, Ooghe and Prijcker (2006), by analyzing bankruptcy as a process, point out the errors in the definition of corporate policy and external factors. From these analyses, it emerges that among the non-financial factors, managerial limitations and the inefficiency of the governance system further explain corporate bankruptcy. In SMEs, Altman et al., (2010), show that non-financial indicators reinforce the power of bankruptcy prediction models. El Kadak and Hudson (2016), Gupta et al., (2018), Mihajlovic et al., (2015) or Tobbak et al., (2017), show that the size of the SME, its sector of activity, its network and its organizational and managerial factors affect the probability of bankruptcy. Thus, non-financial measures complement financial measures for a better prediction of insolvency in SMEs.

In Africa, a few rare works have dealt with the prediction of SME bankruptcy. Bushe (2019) shows that entrepreneurial incapacity, environmental threats and weak firm skills are factors in SME failure in South Africa. In the same context, Fatoki (2014) identifies the internal and external causes of SME failure. Among the internal causes, he identifies mainly managerial shortcomings. Adalessossi (2015) draws on the financial indicators used by Altman (1968) to predict SME failure in East Africa.

From these various studies, it emerges that the causes of SME failure, even in Africa, are both financial and non-financial. For powerful predictive power, SME analysis models need to integrate financial and non-financial indicators.

c) Insolvency prediction models in SMEs

The identification of predictors of business failure is based on scoring models. These models refer to statistical methods used to determine the probability that a credit applicant, or a borrower in a credit relationship, will default or become delinquent (Mester, 1997). They thus make it possible to evaluate the quality of the firm in terms of solvency, bankruptcy, and voluntary or involuntary default. This assessment leads to the assignment of a score (Feldman, 1997), or probability of default, that classifies firms as "good" or "bad" customers.

The work of Beaver (1966) and Altman (1968) using discriminant analysis is among the most widely cited in this area. For Beaver (1966), the probability of firm failure is conditional on the value that a given financial ratio would assume. Based on a sample of 79 healthy and 79 bankrupt firms, the author identifies predictors of bankruptcy. One of the limitations of Beaver's model is that the bankruptcy phenomenon can be explained by a single factor. This model does not take into account the existence of correlations between the explanatory variables. The author recommends a multivariate approach. Altman's Z-score (1968) is part of this approach. The author applies multiple discriminant analysis to a sample of 33 bankrupt and 33 viable firms. His model identifies financial ratios capable of better simultaneously predicting a firm's bankruptcy.

Following the Z-score model, several authors have proposed models for predicting business failure using the technique of Multiple Discriminant Analysis (MDA) in different contexts. However, the literature identifies limitations in the use of this technique, all related to the violation of the main assumptions underlying it. On the one hand, the bankruptcy explanatory variables included in the model still do not jointly follow a normal density distribution. On the other hand, the identical character of the covariance matrices of the two groups of firms in the sample is not always verified. Moreover, this type of model, whose final result is a score, does not allow for a clear identification of the contribution of each variable to the explanation of the bankruptcy phenomenon (Sabato, 2000).

Studies by Ohlson (1980), which use logistic regression to predict bankruptcy, provide an alternative. This technique makes it possible to estimate the bankruptcy probability of a firm, conditional on its membership in the group of those that have gone bankrupt. The analysis covers a sample of 2163 firms, and the author identifies determinants of bankruptcy. He also identifies a threshold value of bankruptcy probability that allows him to classify the firms in one of the two groups. Thus, a firm with a probability of less

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than 0.038 is considered bankrupt. Several subsequent studies analyze bankruptcy using techniques borrowed from the fields of operational research and artificial intelligence. These studies use data envelopment analysis (DEA) (Simak, 1997), artificial neural networks (Boritz et al., 1995, Charitou et al., 2004), decision trees (Friedman, 1976) and genetic algorithms (Holland, 1975).

The multitude of insolvency prediction models provides food for thought on the power of some analyses compared to others. Comparative analysis of market information is more powerful than those using accounting data. Paradoxically, univariate insolvency prediction models seem to perform better as compare to multivariate ones. According to Aziz and Dar (2006), insolvency prediction models can be grouped into three classes: statistical models, artificial intelligence models and theoretical models. The models in the second group appear to be better. However, models based on MDA or logistic regression dominate the research on the subject.

In addition, work on the prediction of bankruptcy in SMEs focuses on several statistical techniques. Some authors use the data mining technique (Tobback et al., 2017), the DEA model (Monelos et al., 2014), discriminant analysis (Lugovskaya, 2010), and the genetic algorithm (Gordini, 2014). However, most studies use logistic regression (Alaminos et al., 2016, Altman and Sabato, 2007, Altman et al., 2010, Cultrera and Brédart, 2016, Blanco et al., 2012, Pacheco, 2015).

However, few studies address the prediction of insolvency in SMEs in sub-Saharan African countries. Yet such analyses would encourage the proper allocation of resources to SMEs through good credit decision making. Especially in a context where access to credit remains very difficult for this type of enterprise.

III. Data and Specification of the Model for Predicting the Insolvency of SMEs in Cameroon

This section presents the data used in this study, specifying the sources of the data and outlining selection criteria of firms under study. Then, it presents the insolvency prediction model proposed by the study and its rationale.

a) *Study data*

The data used are taken from the accounting statements of 1183 Cameroonian SMEs over the period 2013 - 2015. They cover 3549 observations. This information is provided by the INS[1] of Cameroon. The sample of SMEs under consideration is composed of entities operating in different sectors of activity. In addition, it is made up of small companies (with less than 50 employees) and medium enterprises (with between 50 and 100 employees). The extraction of the two subgroups was done by excluding companies that changed subgroup over the study period. Thus, the subgroup of small companies accounts for 77.88% of all observations; while the subgroup of SMEs operating in the tertiary sector accounts for 84.19%.

The explanatory variables in our study correspond to the financial ratios used in studies dealing with bankruptcy prediction (Charitou et al., 2004, Ciampi and Gordini, 2009, Blanco et al., 2012) and non-financial measures such as SME size (Gupta et al., 2018), management quality (Charan and Useem, 2002) and staff remuneration. All of these variables are listed in the table below:

Table I: Study Variables

Code	Names of variables	Calculation method
Tdta	General solvency ratio	Total liabilities / Total assets
Cptd	Financial Autonomy Ratio	Shareholders' equity/ Total liabilities
Cpta	Equity Multiplier	Shareholders' equity/Total assets
Actd	Short-term repayment capacity ratio	Current assets /Total liabilities
Acpc	Current ratio	Current assets /Current liabilities
acstockspc	Quick ratio	(Current assets – Inventories)/Current liabilities
Acca	Current asset turn over ratio	Current Assets / Sales
Créances Dispopc	Reduced liquidity ratio	(Receivables<1year + cash)/ Current liabilities
Pctd	Debt structure ratio	Current liabilities / Total liabilities
Dispopc	Immediate liquidity ratio	Cash and cashe quivalents / Current Liabilities
Dispotd	Immediate debt coverage rate	Cash and cashe quivalents / Total debt
Dispota	Ability to finance assets with cash and cash equivalents	Cash and cashe quivalents / Total assets
Ebeta	Return on capital employed	Earnings before taxes & interests /Total assets
Ebecp	Gross margin ratio	Earnings before taxes & interests /Shareholders' Equity

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Ebepc	Short-term debt coverage ratio	Earnings before taxes & interests /Current Liabilities
Ebetd	Debt coverage ratio	Earnings before taxes & interests /Total liabilities
Chpersoebe	Weight of personnel expenses	Personnel expenses/Earnings before taxes & interests
Chexpta	Quality of management	Operating expenses/Total assets
Logta	Size of the company	Log(total active)
Cata	Asset Turnover Ratio	Sales / Total assets
Pcca	Short-term financing turn over ratio	Current Liabilities/Sales
Ebeca	Economic margin	Earnings before taxes & interests/Sales
Rnca	Net Profitability Ratio	Net income/Sales
Rncp	Financial profitability ratio	Net income / Shareholders' equity
Rnta	Return on assets ratio	Net income/Total assets
Reta	Economic Profitability Ratio	Gross operating income /Total assets
Cperta	Asset coverage ratio	Long term capital/Total assets
Chfiebe	Ability to repay interest	Financial expenses/Earnings before taxes & interests

[1] *National Institute of Statistics in Cameroon*

Insolvent companies represent 36.99% of all observations. It emerges that in the sample studied, 95.80% of small businesses in one year remain insolvent the following year. Only 4.20% of medium-sized companies in one year change status from small companies in the previous year. However, 65.30% of SMEs that are insolvent in a given year may remain so the following year. However, this proportion is 66.72% in the small business sub-sample and 62.69% in the medium business sub-sample. On the other hand, 19.66% of SMEs insolvent in one year may be the result of those solvent in the previous year. In the group of small companies, this proportion is 20.17%, while it is 16.56% in the group of medium-sized companies. Thus, for a very large number of insolvent SMEs, poor financial health is persistent over the years. However, this persistence is stronger in small companies. Also, it is more in the small business group that entities that are solvent in one year may become insolvent in the following year.

The probabilities of transition from solvency to insolvency from one year to the next are given in the table below.

Table II: Transition Matrix

Set					Small Businesses				Medium-sized companies			
		Solvency			Solvency				Solvency			
		0	1	Total		0	1	Total		0	1	Total
Solvency	0	80,34	19,66	100	0	79,83	20,17	100	0	83,44	16,56	100
	1	34,70	65,30	100	1	33,28	66,72	100	1	37,31	62,69	100
	total	63,44	36,56	100	Total	61,77	38,23	100	Total	69,82	30,18	100

Source: data of current study

In companies in the sample, equity represents 71.76% of the volume of debt. It represents 126.29% of the volume of debt in solvent SMEs and -21.11% of the volume of debt in insolvent SMEs. In the same vein, it represents 80.18% of the debt volume in small companies and 42.12% in medium-sized companies. Medium-sized enterprises, compared to small enterprises, finance themselves more with debts. In these entities, current assets represent 86.3% of the volume of debts. Also the current ratio is 111.09%, the reduced liquidity ratio is 99.36% and the immediate liquidity ratio is 29.97%. The immediate liquidity ratio show an average value of 31.38% in small firms, and 25% in medium ones. These entities are therefore not very exposed to liquidity risk.

The SMEs in the sample bear operating expenses per unit of assets of 1.85. This ratio is 1.79 in solvent SMEs and 1.97 in insolvent SMEs. Thus, insolvent SMEs appear to have a low quality of management compared to solvent SMEs. Also, this ratio is 1.88 in small firms and 1.77 in medium firms. The latter would then be better managed than the former. Moreover, the SMEs studied have an average financial profitability of 32.93%. Paradoxically, it is 30.19% in the group of solvent SMEs and 37.58% in the group of insolvent ones. In the group of small enterprises, it is

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Table 3: Descriptive statistics

Sample		All		Solvent		Insolvent		Primary		Secondary		Tertiary		SE		ME	
Observations		3549		2236		1313		48		561		2940		2764		785	
Variables	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Cptd	0,72	1,86	1,26	2,13	-0,21	0,53	0,39	1,60	0,44	1,36	0,78	1,95	0,80	1,98	0,42	1,32
Cpta	0,01	1,10	0,37	0,57	-0,61	1,45	-0,21	1,04	0,04	0,78	0,01	1,15	-0,01	1,18	0,09	0,69
Actd	0,86	1,00	1,15	1,15	0,37	0,28	0,70	1,07	0,74	0,70	0,89	1,05	0,88	1,08	0,80	0,65
Acpc	1,11	1,30	1,43	1,44	0,56	0,78	0,81	1,10	1,06	1,16	1,13	1,33	1,10	1,36	1,14	1,07
Créancesdispopc	0,99	1,34	1,30	1,50	0,47	0,77	0,62	1,30	0,88	1,12	1,02	1,38	1,00	1,39	0,97	1,15
Pctd	0,86	0,24	0,87	0,23	0,84	0,26	0,88	0,20	0,82	0,26	0,87	0,24	0,88	0,23	0,80	0,25
Acstockspc	0,69	1,05	0,89	1,17	0,34	0,68	0,50	0,89	0,66	0,92	0,69	1,08	0,68	1,10	0,70	0,84
Dispota	0,12	0,19	0,13	0,19	0,12	0,18	0,09	0,17	0,10	0,16	0,13	0,19	0,13	0,19	0,10	0,15
Dispotd	0,24	0,66	0,34	0,81	0,07	0,12	0,16	0,52	0,17	0,50	0,26	0,69	0,26	0,70	0,17	0,48
Dispopc	0,30	0,75	0,41	0,90	0,12	0,28	0,17	0,52	0,21	0,57	0,32	0,78	0,31	0,76	0,25	0,68
Ebeta	0,10	0,53	0,16	0,45	-0,01	0,64	0,08	0,29	0,10	0,50	0,10	0,54	0,10	0,55	0,10	0,45
Ebepc	0,43	1,29	0,63	1,52	0,08	0,63	0,18	0,46	0,34	1,13	0,45	1,33	0,47	1,34	0,27	1,09
Ebecp	0,45	1,64	0,74	1,47	-0,05	1,79	0,72	1,76	0,45	1,78	0,44	1,61	0,43	1,63	0,49	1,67
Ebetd	0,34	1,09	0,53	1,32	0,03	0,36	0,16	0,38	0,25	0,82	0,37	1,15	0,39	1,15	0,18	0,85
Acca	0,68	1,09	0,66	1,11	0,70	1,05	0,79	1,22	0,72	0,95	0,67	1,11	0,68	1,16	0,66	0,81
Rnca	-0,08	0,48	-0,02	0,45	-0,18	0,51	-0,04	0,22	-0,11	0,51	-0,07	0,48	-0,09	0,51	-0,03	0,33
Cata	1,86	1,66	1,88	1,59	1,83	1,76	1,71	1,97	1,61	1,39	1,91	1,70	1,88	1,68	1,78	1,57
Chpersoebe	0,69	2,08	0,94	1,86	0,28	2,34	0,26	1,77	0,76	2,08	0,69	2,08	0,63	2,09	0,91	2,01
Chexpta	1,86	1,63	1,79	1,51	1,97	1,81	1,72	1,95	1,61	1,33	1,91	1,67	1,88	1,65	1,78	1,58
Logta	18,05	1,76	18,17	1,73	17,86	1,78	18,55	1,49	18,59	1,76	17,94	1,74	17,57	1,52	19,74	1,47
Pcca	1,11	1,55	0,76	1,26	1,70	1,78	1,77	2,10	1,12	1,47	1,09	1,55	1,16	1,61	0,92	1,26
Ebeca	0,03	0,45	0,07	0,43	-0,06	0,48	0,08	0,19	0,02	0,42	0,03	0,46	0,02	0,48	0,06	0,32
Rncp	0,33	1,03	0,30	0,93	0,38	1,17	0,38	1,17	0,32	1,17	0,33	0,99	0,34	1,01	0,31	1,09
Rnta	-0,01	0,58	0,07	0,44	-0,15	0,73	-0,01	0,30	-0,01	0,55	-0,01	0,58	-0,02	0,59	0,00	0,50
Reta	0,04	0,55	0,12	0,44	-0,10	0,67	0,02	0,29	0,02	0,50	0,04	0,56	0,03	0,56	0,07	0,50
Cperta	0,12	1,09	0,43	0,57	-0,42	1,48	-0,09	1,06	0,16	0,76	0,11	1,14	0,08	1,16	0,23	0,73
Chfiebe	0,04	0,63	0,06	0,46	0,00	0,85	0,05	0,29	0,07	0,65	0,03	0,63	0,03	0,34	0,05	1,18

First column lists the covariates analyzed and their failed and non-failed status. The remaining columns report the Mean and standard deviation (SD) of firms of the primary, secondary and tertiary sectors, small and medium sizes firms.

33.57% and 30.66% in the group of medium enterprises. The economic profitability ratio is on average -1.37% for all SMEs. It is 6.91% in solvent SMEs and -15.47% in insolvent structures. This ratio is respectively -1.63% in small and -0.45% in medium-sized companies. In these structures, long-term resources per unit of assets are 11.51%. They are 42.75% in solvent SMEs and -41.69% in insolvent ones. These long-term resources represent 8.33% of the volume of assets in small companies and 22.71% in medium-sized companies.

b) Specification of the empirical insolvency prediction model

To predict the insolvency of SMEs in Sub-Saharan Africa based on the financial variables that characterize their health, we use a binary logit model in panel data. Logistic regression was chosen firstly because it does not depend on the constraining assumptions of other statistical techniques frequently used in the literature, such as multiple discriminant analysis or linear models for predicting the probability of default (Ohlson, 1980, Sabato, 2010). Furthermore, this is the most widely used model in studies on the prediction of insolvency in SMEs (Altman and Sabato, 2007, Altman et al., 2010). Finally, the dependent variable in our solvency model is dichotomous, as in the case of several studies that have dealt with this issue (Ohlson,1980, Ciampi and Gordini, 2009).

A logit model describes the relationship between a dependent variable that can assume the value 1 (bankrupt firm) and 0 (healthy firm), and n other explanatory variables that can be quantitative or qualitative $x_1, x_2, \ldots, x_n$.

Since the dependent variable is binary, it follows a Bernoulli distribution such that $P_i = P(y_i = 1)$is the probability of bankruptcy and $1 - p_i$ is the probability of non-failure.

The estimated model considers an endogenous variable which is a linear combination of the exogenous variables:

$$y^* = \beta X_i + \varepsilon_i (1)$$

where ε is the error term and β the vector of coefficients and where

$$y_i = 1 \; if \; y_i^* > 0; y_i = 0 \; if \;\; y_i^* \leq 0$$

The probability of non-default (a posteriori) of company i is given:

$$P(y_i = 0) = P(y_i^* \leq 0) = P(\beta X_i + \varepsilon_i \leq 0) = P(\varepsilon_i \leq -\beta X_i)$$

$$F(-\beta X_i) = 1 - F(\beta X_i) = 1 - P_i (2)$$

Similarly, the probability of insolvency (a posteriori) of firm i is represented by:

$$P(y_i = 1) = P(y_i^* > 0) = P(\beta X_i + \varepsilon_i > 0) = P(\varepsilon_i > -\beta X_i)$$

$$1 - P(\varepsilon_i \leq -\beta X_i) = F(\beta X_i) = P_i (3)$$

The Logit model assumes that the error terms follow a logistic law where the distribution function is:

$$F(x) = (1 + e^{-x})^{-1} (4)$$

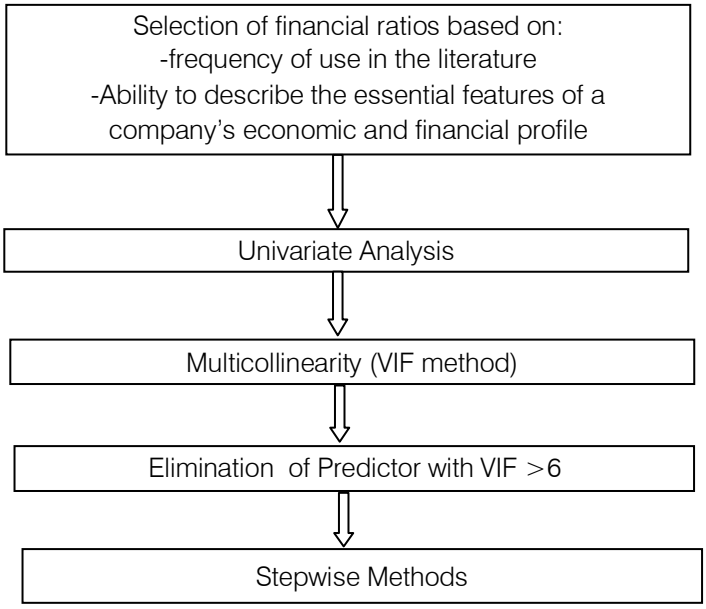
Therefore, it is possible to calculate the probability of non-default of firm$i$ as follows:

$$P(y_i = 0) = F(-\beta X_i) = \left(1 + e^{\beta x_i}\right)^{-1} = \; 1 - P_i (5)$$

Similarly, the probability of default of firm i is:

$$P(y_i = 1) = F(\beta X_i) = \left(1 + e^{-\beta x_i}\right)^{-1} = \; 1 - P_i (6)$$

The estimation of the parameters β is made by the Maximum Likelihood Method. Our analysis approach is strongly based on the study of Ciampi and Gordini (2009). First, a considerable number of financial and non-financial ratios are retained, based on the literature. Then, significant ratios are selected after a univariate analysis. Subsequently, a choice of variable is made with the objective of alleviating collinearity problems. Finally, to determine the predictors, a logistic regression is performed using the stepwise method. This approach is clearly defined in the figure below.



Source: Ciampi and Gordini (2009)

Figure I: Selection process for financial ratios

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Table IV: Collinearity test

Sample	Collinearity statistics	
	Tolerance	VIF
ACTD	,186	5,379
ACPC	,152	6,593
ReceivablesDispoPC	,042	23,641
ACStocksPC	,065	15,407
PCTD	,460	2,176
DispoPC	,118	8,480
EBETA	,122	8,226
EBECP	,773	1,294
EBETD	,345	2,898
ChpersoEBE	,914	1,094
ChEXP/TA	,620	1,612
LogTA	,659	1,517
PCCA	,629	1,591
EBECA	,570	1,754
RNCP	,761	1,314
RNTA	,153	6,551
RETA	,138	7,221
CperTA	,510	1,961
ChfiEBE	,908	1,102
CPTD	,339	2,952

IV. Results and Discussions

Table III above presents descriptive statistics for default firms and the non-default firms. We can see that the average values of ratios in the non-default firms tend to be positive while in bankrupt firms they are mostly negative. In general, the financial ratios of insolvent firms tend to fluctuate more than those of non-default firms. It can therefore be inferred that financial results in bankrupt firms are highly volatile. This result corroborates that of Guo (2008). Indeed, it is very easy to find extreme values in the balance sheets of insolvent firms, especially when insolvency has just occurred.

The multicollinearity between the explanatory variables is tested by using the variance inflation factor (VIF). Referring to studies by Ciampi and Gordini (2009), where the VIF>6 condition is adopted, we exclude the following explanatory variables: ACPC, Creances DispoPC, ACstocsPC, DispoPC, EBETA, RNTA, RETA. In order to reduce the number of explanatory variables by retaining only the important ones in the insolvency prediction model, we used the stepwise method. The variables retained differ according to the models contained in Table V.

From the logistic regression carried out, it appears that, overall, the insolvency of the SME depends on several exogenous variables. It is strongly explained by the management of the operations, productivity, quality of management, financial structure and profitability of the company.

The probability that a firm is insolvent is not related to the different liquidity ratios. Thus, this result is contrary to those obtained by Ptak-Chmielewska (2019), Cultrera and Brédart (2015), Camacho-Minanoet al., (2013), Blanco et al., (2012) in the SME field, who find a negative link between the probability of insolvency and the liquidity of these entities. On the other hand, it corroborates that of Pacheco (2015) in Portuguese SMEs.

In the SMEs investigated, short-term repayment capacity is negatively related to insolvency. An increase in the volume of current assets per unit of debt induces a decrease in the probability of SME insolvency. This relationship is observed in SMEs operating in the secondary and tertiary sectors, in groups of small and medium-sized enterprises. Indeed, in Cameroon, the debt recovery rate is only 24.1% (World Bank, 2014, p114). In this context, inventories and cash and therefore current assets are more mobilized to extinguish debts in SMEs. The short-term financing turnover ratio is positively related to insolvency. Thus, an increase in current liabilities per unit of sales leads to an increase in the probability of insolvency of the SME. These results show that business management ratios determine the probability of SME insolvency as advocated by Blanco et al., (2012).

Moreover, insolvency is negatively related to the debt structure in SMEs as a whole. In these entities, the lower the proportion of short-term debt increases, the lower the probability of insolvency. Indeed, the current

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liabilities in these companies are essentially made up of operating and non-operating debts, and to a small extent of bank loans. In this context, an increase in current liabilities helps to reduce the working capital requirement and ensure the financial equilibrium of the company. However, this relationship is not observed in the medium-sized companies group. Also, equity per unit of debt is negatively related to the insolvency of the SME. An increase in equity per unit of debt is associated with a reduction in the probability of insolvency of the entities studied. Indeed, an increase in the weight of equity capital results in a reduction in the weight of debt in relation to the SMEs assets, and thus a decrease in the insolvency ratio. These results show that in Cameroonian SMEs, insolvency is determined by financial structure ratios. These results confirm those of Pacheco (2015) or Camacho-Minano et al., (2013).

The insolvency of the SME is negatively related to the gross margin ratio. An increase in gross wealth creation per unit of equity in an SME contributes to reducing the probability of insolvency of that structure. As a result, profitable SMEs are more solvent. These results confirm those obtained by Blanco et al.,(2012), Cultrera and Brédart (2015). Thus, profitability determines the insolvency of the SME.

In the firms investigated, regardless of their size or sector of activity, the weight of personnel expenses is negatively related to insolvency. A decrease in total staff compensation relative to a level of gross operating surplus is associated with an increase in the probability of SME insolvency. Therefore, for SMEs, good employee compensation leads to solvency. However, operating expenses per unit of assets are positively related to the company's insolvency ratio. An increase in operating expenses per unit of assets leads to an increase in the probability of insolvency of the SME. Therefore, low quality of management in the SME is associated with insolvency. This result corroborates that obtained by Charan and Useem (2002). Thus, in insolvent structures, bad managerial decisions can be observed, favored by lack of rigor, lesser consideration of market threats, a management style that hinders smooth bottom-up reporting, and excessive risk-taking. To ensure its solvency, an SME must improve the quality of its management and the remuneration granted to its employees in view of its gross operating surplus. In the different models, the size of the SME is negatively related to insolvency. Thus, whether in the overall sample, in the small business group or in the medium business group, an increase in the size of the SME reduces its probability of insolvency. These results confirm those of Gupta et al., (2018) and are contrary to those of Blanco et al., (2012).

In addition to financial variables, the models highlight the importance of non-financial variables in predicting SME insolvency in the Cameroonian context. Staff remuneration, quality of management, and SME size are key explanatory factors for insolvency in these entities. These results corroborate the findings of Altman et al., (2010). Therefore, in order to improve their probability of solvency and provide an attractive credit profile, Cameroonian SMEs need to ensure better business management and high profitability of their activities. They must also improve the remuneration of their staff in view of the increase in gross operating surplus and adopt more professional management styles.

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Table V: Logit regression (dependent variable: bankruptcy)

Model 1											
	ACTD	PCTD	CHPERSEBE	CHEXPTA	LOGTA	PCCA	CPTD	EBECP	EBETD	CONST	$N.R^2$
Parameters	-2,55***	-0,45**	-0,12***	0,14**	-0,17***	0,28**	-1,51***	-0,39***	0,55***	4,33***	60%
E.S.	0,17	0,21	0,02	0,04	0,03	0,04	0,10	0,03	0,1	0,69	
Wald	351,24	4,70	25,61	13,26	27,77	52,49	215,15	139,29	30,58	39,23	
Model 2											
	ACTD	PCTD	CHPERSEBE	CHEXPTA	LOGTA	PCCA	CPTD	EBECP	EBETD	CONST	$N.R^2$
Parameters	-2,10***	-1.34***	-0,13**	0,19	-0,38***	0,40***	-3,42***	-0,29***	0,30	8,60***	65%
E.S.	0,40	0,52	0 ,07	0 ,14	0,10	0,12	0,48	0,07	0,29	2,05	
Wald	27,66	6,66	4,21	1,87	14,91	10,76	51,62	18,37	1,87	17,59	
Model 3											
	ACTD	PCTD	CHPERSEBE	CHEXPTA	LOGTA	PCCA	CPTD	EBECP	EBETD	CONST	$N.R^2$
Parameters	-2,55***	-0,35	-0,12***	0,13***	-0,14***	0,25***	-1,43***	-0,41***	0,59***	3,73***	59%
E.S.	0,15	0,23	0,03	0,04	0,04	0,04	0,11	0,04	0,11	0,74	
Wald	305,62	2,36	20,23	10,82	14,98	38,19	176,02	122,21	28,05	25,24	
Model 4											
	ACTD	PCTD	CHPERSEBE	CHEXPTA	LOGTA	PCCA	CPTD	EBECP	EBETD	CONST	$N.R^2$
Parameters	-2,47***	-0,43*	-0,12***	0,12***	-0,16***	0,30***	-1,32***	-0,36***	0,38***	4,08***	59%
E.S.	0,15	0,24	0,03	0,04	0,05	0,04	0,10	0,04	0,11	0,88	
Wald	272,42	3,24	20,16	7,48	12,61	47,22	160,06	99,58	11,42	21,33	
Model 5											
	ACTD	PCTD	CHPERSEBE	CHEXPTA	LOGTA	PCCA	CPTD	EBECP	EBETD	CONST	$N.R^2$
Paramètres	-3,07***	-0,42	-0,11*	0,24**	-0,2*	0,19*	2,96***	-0,47***	1,63	5,06	60%
E.S.	0,36	0,46	0,06	0,1	0,11	0,1	0,40	0,08	0,35	2,25	
Wald	72,62	0,86	3,34	6,12	3,49	3,80	55,51	36,16	21,54	5,06	

***,**,* significant at 1%, 5% and 10% respectively

$N.R^2 = NagelkerkeR^2 adjusted$

Model 1 (general model)
Model 2 (tertiary sector companies)
Model 3 (primary and secondary sector companies)
Model 4 (very small businesses)
Model 5 (medium-sized companies)

V. Conclusion

Easy access to credit for SMEs remains one of the most important economic problems in sub-Saharan African countries. Inadequate or non-existent accounting and financial information provided by these entities feeds the reluctance of credit institutions to provide them with financing. To alleviate this problem, in addition to the use of collateral and customer relationships, it is necessary for lenders to develop models to predict SME default.

By analyzing insolvency as a vector of SME default, this study aimed at identifying the predictors of SME insolvency in order to promote good credit decision making by lenders and improved credit market efficiency in this context. The study conducted on Cameroonian SMEs using panel data logistic regression shows that insolvency is dependent on financial variables related to the management of the operations, financial structure, and profitability of the SME. On the other hand, it is also determined by non-financial variables relating to the quality of management, size, and remuneration of the staff of these entities. As a result, SMEs must take financial measures concerning the management of their business, financial structure and profitability in order to reduce the probability of insolvency. They must also improve the quality of management through rigorous managerial decision-making that takes into account market threats. To achieve this, they must ensure that their staff is properly remunerated.

For the SMEs investigated, insolvency, when it is observed, remains persistent over time. This persistence of insolvency is more pronounced in small enterprises compared to medium-sized enterprises. Moreover, while debt structure and debt coverage ratios determine insolvency in small firms, they do not explain it in medium-sized firms. Thus, with respect to SMEs, rather than adopting a systematic credit rationing behavior, an analysis of the financial and non-financial variables specified by the models defined can encourage the selection of the right firms, and especially the adoption of a differentiated analysis depending on the group to which the SME belongs.

The prediction rate could be increased if the insolvent sample can be paired with non-insolvent. Furthermore robustness check of the model can be also investigated. Further investigations in that sense will be the object of future research.

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Growth and Development of Exchange Traded Funds (ETFs) Market in India

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Abstract- Exchange Traded Funds (ETFs) are similar to mutual funds but unlike mutual funds, they are listed on an exchange and traded throughout the day, similar to stocks. ETFs generally have lower expense ratios and certain tax advantages compared to traditional mutual funds, and they allow investors to buy and sell shares at intra-day market prices. ETFs are one of the most innovative and successful products introduced on exchanges and have grown tremendously over the years. The original ETFs were simple, providing diversification benefits at a low cost and allowing intra-day trading. This study aims at studying the growth and development of Exchange Traded Funds (ETFs) in India during the last ten years. The growth of ETFs is studied by analysing the increase in the Assets Under Management (AUM) of ETFs and number folios in the gold and non-gold ETF funds in India. ETFs are broadly grouped into Gold ETFs and ETFs other than gold.

Keywords: *exchange traded funds, gold and non gold etfs, indian etf market, equity derivative.*

GJMBR-C Classification: *JEL Code: F65*



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Growth and Development of Exchange Traded Funds (ETFs) Market in India

Dr. Abbas Vattoli

Abstract- Exchange Traded Funds (ETFs) are similar to mutual funds but unlike mutual funds, they are listed on an exchange and traded throughout the day, similar to stocks. ETFs generally have lower expense ratios and certain tax advantages compared to traditional mutual funds, and they allow investors to buy and sell shares at intra-day market prices. ETFs are one of the most innovative and successful products introduced on exchanges and have grown tremendously over the years. The original ETFs were simple, providing diversification benefits at a low cost and allowing intra-day trading. This study aims at studying the growth and development of Exchange Traded Funds (ETFs) in India during the last ten years. The growth of ETFs is studied by analysing the increase in the Assets Under Management (AUM) of ETFs and number folios in the gold and non-gold ETF funds in India. ETFs are broadly grouped into Gold ETFs and ETFs other than gold. It is found that total AUM of ETFs has increased continuously from Rupees 2547.21 crores at the end of Mar 2010 to Rupees 49915.45 crores by the end of March 2017, which translates into a compound annual growth rate of 52.97 per cent for the same period. During this period Gold ETFs and ETFs other than gold have reported a CAGR of 19.33 per cent and 73.04 per cent respectively. It can also be observed that the number of folios in ETFs has grown from 1,83,945 at the end Mar 2010 to 9,15,127 by the end of Mar 2017, which translates into a compound annual growth rate of 25.76 percent for a period of 7 years from 2010 to 2017. In short ETFs have reported decent growth over the years both in terms of assets and number of investors.

Keywords: exchange traded funds, gold and non gold etfs, indian etf market, equity derivative.

I. Introduction

Exchange Traded Funds (ETFs) are similar to mutual funds but unlike mutual funds, they are listed on an exchange and traded throughout the day, similar to stocks. ETFs generally have lower expense ratios and certain tax advantages compared to traditional mutual funds, and they allow investors to buy and sell shares at intra-day market prices. Moreover, investors can sell ETF shares short, write options on them, and set the market, limit, or stop-loss orders. The shares of ETFs often trade at market prices close to the net asset value (NAV) of the shares, rather than at discounts or premiums. ETFs are one of the most innovative and successful products introduced on exchanges and have grown tremendously over the years. The original ETFs were simple, providing diversification benefits at a low cost and allowing intra-day trading.

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II. Objectives of the Stydy

ETFs have grown tremendously during the last decade and have become a significant part of the equity market activity; ETFs are one of the most successful products introduced on exchanges in recent years. This study aims at studying the growth and development of Exchange Traded Funds (ETFs) in India during the last ten years. The growth of ETFs is studied by analysing the increase in the Assets Under Management (AUM) of ETFs and number folios in the gold and non-gold ETF funds in India.

III. Research Design and Methodology of the Study

This study is descriptive in nature. Secondary data relating to the number of folios and Asset Under Management (AUM) of Exchange Traded Funds have been compiled from Association of Mutual Funds in India (AMFI) official website for a period from financial year 2010 to financial year 2017. Proportionate share of gold ETFs and non-gold ETFs in the total AUM of ETFs also studies for the above reference period. Similarly growth indicators like average annual growth rate and compound annual growth rate were computed and reported for qualifying the growth rate of exchange traded funds in the total mutual funds turnover.

IV. Significance of the Study

Exchange Traded Funds were an innovative product in the mutual fund's industry. It attracted new investments and new investors over the years. In developed markets like the US, ETFs occupy a significant share in the mutual fund assets. However their contribution is comparatively lower in India. At the same time ETFs are showing steady increase in volume and participation over the last few years. Hence this study will be useful to understand the real growth and contribution of ETFs in the Indian capital market. This study will be useful to the fund management houses and investors both institutional and individual in further diversifying their investment portfolios.

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V. Data Analysis and Interpretations

Institutions, such as some pension funds, that have restrictions on investing in derivatives can invest in ETFs. Other institutions find them to be an alternative to futures that have margin requirements and expiration dates. Hedge funds can use them to take long or short positions. They are also used to temporarily park cash during transitions in investment strategy or change in management. ETFs are increasingly being used by institutional investors for both strategic and tactical purposes; they are also popular among retail investors. These products are often bought on a commission basis and investors pay brokerage commissions when they buy or sell. Similar to stocks that trade on an exchange, ETFs can be bought on margin. In comparison to mutual funds, the tax efficiency of ETFs arises because mutual funds need to sell shares for investors' redemption, and this can result in capital gains. These capital gains have to be distributed to investors, hence investors may incur taxes. ETFs don't have to sell shares to meet redemptions. The ETF itself and also the underlying stocks are lendable. They are being used for active and passive strategies. Liquidity, expense ratios and tracking error are important factors for investors investing in ETFs. ETF shares are purchased and redeemed directly from the fund sponsor, in large blocks called creation units.

In the U.S., aggregate ETF ownership is estimated to be 50 percent retail and 50 percent institutional investors, however, institutions account for more than 80 percent of the trading activity. New ETFs are typically held entirely by institutional investors and retail ownership builds up over time as investors become familiar with the product. In many emerging markets, ETFs are mostly owned by retail investors.

ETFs have grown tremendously during the last decade and have become a significant part of the equity market activity; ETFs are one of the most successful products introduced on exchanges in recent years. The growth of Assets Under Management of ETF funds across the globe are shown in Figure 1

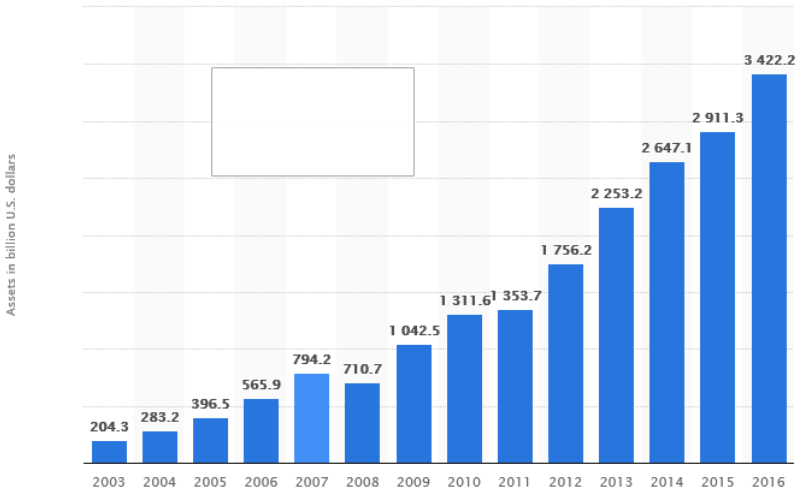

Figure 1: Development of Assets of Global Exchange Traded Funds (ETFs) from 2003 to 2016 (in billion U.S. dollars)

The bar diagram shows the development of assets of Exchange Traded Funds worldwide from 2003 to 2016. The assets under management of ETF funds world wide was approximately 0.20 trillion U.S dollar in the year 2003. It has grown to approximately 3.42 trillon U.S dollars in 2016. The total ETF assests has reported a decrease from previous year's figure only in the year 2008. It may be due to the global financial crisis which broke out in 2008. The increasing trend of ETF assets is a positive of stable development of capital market across the world.

VI. The Growth of ETFs Assets in India

ETFs provide an alternative to derivatives and stocks when investors are looking to increase or decrease exposure. They can be used for a buy and hold strategy or for market timing purposes. Exchange Traded Funds or ETFs have revolutionized the Investment Industry in recent times due to their simplicity, low costs and ease of use. The first Exchange Traded Fund in India was Nifty Bees launched by Benchmark mutual fund. Indian ETFs can be broadly divided into two categories namely Gold ETFs and ETFs other than gold. A comparative analysis of the growth of ETFs assets and number folios under both categories of funds are being made for a period from 2010 to 2017. The summary of analysis is given in the table 1.

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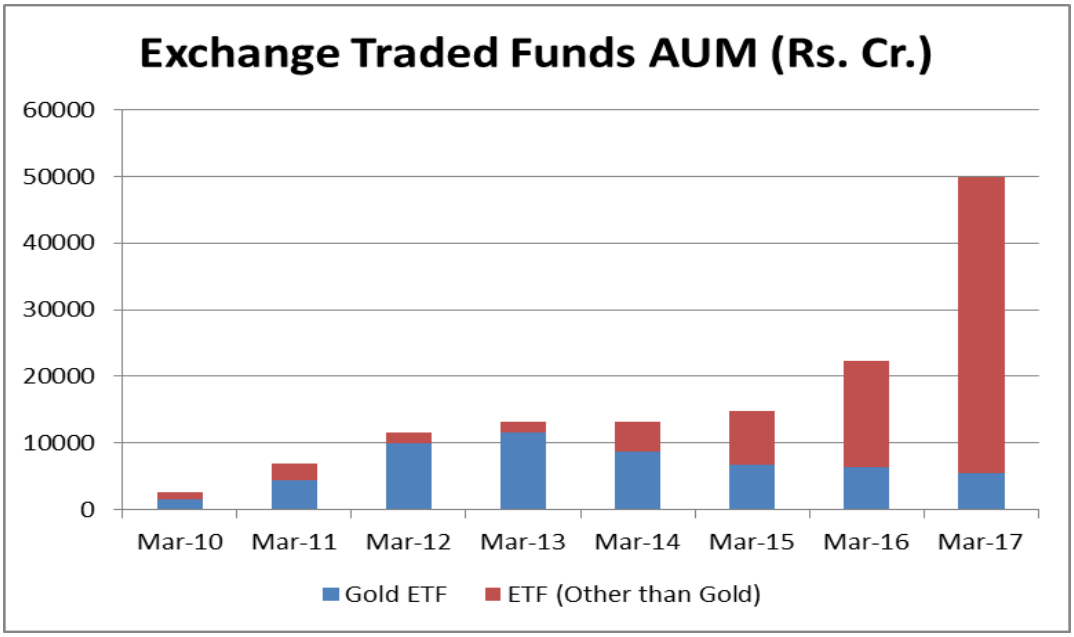

Source: AMFI

Figure 2: Assets under Management of Gold ETF and ETF (Other than Gold) in India

Figure 2 show that ETFs total assets have shown a continuous increase during the period 2010-2017. However, its composition has almost reversed from the year 2010 to the year 2017. Gold ETFs were in dominance up to Mar 2015 but thereafter ETFs other than Gold accounted for a major share in the total ETFs assets under management.

Table 1: Growth of Assets of Gold and Non-gold ETFs

Year	Types of Schemes	AUM (Rs. Cr)	Percentage	No of Folios	Percentage
Mar-10	Gold ETF	1590.64	62.45%	147047	79.94%
	ETF (Other than Gold)	956.59	37.55%	36898	20.06%
	Total	2547.23	100.00%	183945	100.00%
Mar-11	Gold ETF	4400.2	63.62%	319679	75.61%
	ETF (Other than Gold)	2516.43	36.38%	103122	24.39%
	Total	6916.63	100.00%	422801	100.00%
Mar-12	Gold ETF	9886.06	86.02%	475314	76.20%
	ETF (Other than Gold)	1606.53	13.98%	148443	23.80%
	Total	11492.59	100.00%	623757	100.00%
Mar-13	Gold ETF	11647.82	88.75%	569169	76.95%
	ETF (Other than Gold)	1476.67	11.25%	170445	23.05%
	Total	13124.49	100.00%	739614	100.00%
Mar-14	Gold ETF	8676.32	65.71%	502613	71.31%
	ETF (Other than Gold)	4528.47	34.29%	202228	28.69%
	Total	13204.79	100.00%	704841	100.00%
Mar-15	Gold ETF	6654.87	45.23%	465765	66.56%
	ETF (Other than Gold)	8059.93	54.77%	233961	33.44%
	Total	14714.8	100.00%	699726	100.00%
Mar-16	Gold ETF	6345.55	28.32%	425914	61.05%
	ETF (Other than Gold)	16062.63	71.68%	271700	38.95%
	Total	22408.18	100.00%	697614	100.00%
Mar-17	Gold ETF	5479.81	10.98%	364110	39.79%
	ETF (Other than Gold)	44435.64	89.02%	551017	60.21%
	Total	49915.45	100.00%	915127	100.00%
CAGR	Gold ETF	19.33%		13.83%	
	ETF (Other than Gold)	73.04%		47.14%	
	Total	52.97%		25.76%	

Source: AMFI

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Table 1 presents the growth of Asset Under Management (AUM) of ETFs in India from the year 2010 to 2017. ETFs are broadly grouped into Gold ETFs and ETFs other than gold. It can be observed from the table that total AUM of ETFs has increased continuously from Rupees 2547.21 crores at the end of Mar 2010 to Rupees 49915.45 crores by the end of March 2017, which translates into a compound annual growth rate of 52.97 per cent for the same period. During this period Gold ETFs and ETFs other than gold have reported a CAGR of 19.33 per cent and 73.04 per cent respectively. It indicates that ETFs other than Gold has grown much faster than Gold ETFs. Index based ETFs comes under ETFs other than Gold category.

From Table 1 it can also be observed that the number of folios in ETFs has grown from 1,83,945 at the end Mar 2010 to 9,15,127 by the end of Mar 2017, which translates into a compound annual growth rate of 25.76 percent for a period of 7 years from 2010 to 2017. During this period number of folios in Gold ETFs and ETFs other than Gold has reported a CAGR of 13.83 per cent and 47.14 per cent respectively. This fact also supports the view that ETFs other than Gold has a faster growth rate compared to Gold ETFs in India.

The proportion of Gold ETFs and ETFs other than Gold in the total Asset Under Management (AUM) of ETFs in India by the end of Mar 2010 was 62.45 per cent and 37.55 per cent respectively. This proportion has been reversed over the years to reach 10.98 per cent and 89.02 per cent respectively for Gold ETFs and ETFs other than Gold. This figure also confirms the fact that non-Gold ETFs has outpaced its counterpart in growth over the years. The higher growth rate of non-gold ETFs can be attributed to the introduction of new funds and higher return history of non-gold ETFs including index-based ETFs.

VII. Percentage Share of ETFs in the Total Assets of Mutual Funds

Exchange Traded Funds were an innovative product in the mutual fund's industry. It attracted new investments and new investors over the years. In developed markets like the US, ETFs occupy a significant share in the mutual fund assets. In order to understand the contribution of ETFs to the total AUM of mutual funds, a percentage analysis of ETFs share in the total mutual fund assets and total mutual fund folios have been undertaken. The results of the analysis have been presented in Table 2.

Table 2: Percentage share of ETFs in the Total assets of Mutual Funds

Year	AUM (Rs. Cr)					No. of Folios				
	ETFs	AGR	All Schemes	AGR	%	ETFs	AGR	All Schemes	AGR	%
Mar-10	2547		614546		0.41	183945		47964062		0.38
Mar-11	6917	171.5	596977	-2.9	1.16	422801	129.9	47234833	-1.5	0.90
Mar-12	11493	66.2	587659	-1.6	1.96	623757	47.5	46452499	-1.7	1.34
Mar-13	13125	14.2	702494	19.5	1.87	739614	18.6	42828315	-7.8	1.73
Mar-14	13205	0.6	825243	17.5	1.60	704841	-4.7	39548410	-7.7	1.78
Mar-15	14715	11.4	1082757	31.2	1.36	699726	-0.7	41740203	5.5	1.68
Mar-16	22408	52.3	1232824	13.9	1.82	697614	-0.3	47663024	14.2	1.46
Mar-17	49916	122.8	1754619	42.3	2.84	915127	31.2	55399631	16.2	1.65
CAGR	52.97		16.17			25.76		2.08		
AAGR	62.71		17.14			31.63		2.48		

Source: AMFI

It can be observed from Table 2 that the percentage share of ETFs in the total Assets Under Management of mutual funds has increased from 0.41 per cent at the end of Mar 2010 to 2.84percent by the end of Mar 2017. Similarly, the percentage share of ETFs in the total mutual fund folios also has increased from 0.38 percent in March 2010 to 1.65 percent in March 2017. So it can be concluded that investments in ETFs are increasing both in terms of numberthe of investors and amount of investment. However, a share of less than 3 percentof the total AUM of mutual funds is very low for ETFs when compared to the developed nations like the U.S, where ETFs form nearly half of the mutual fund assets.

The compounded annual growth rate of ETFs funds from Mar 2010 to Mar 2017 is 52.97 percent against 16.17 percent CAGR formutual funds' assets of all schemes during the same period. It indicates that ETF funds have grown three times bigger than assets under management of all mutual funds schemes during 2010 to 2017 period. The average annual growth rate of ETF assets and All schemes assets are respectively

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62.71 and 17.14 for the study period. Regarding the number of folios, ETF folios have reported a CAGR of 25.76 percent from Mar 2010 to Mar 2017 period as against a CAGR of 2.08 percent for all schemes mutual fund folios during the same period. Similarly the average annual growth rate of ETF folios and All schemes folios are respectively 31.63 per cent and 2.48 percent. It further shows that the addition in theentry of new investors in ETFs is at a much faster rate when compared to the growth rate of all schemes of mutual fund folios.

VIII. Findings and Conclusion

Recently SEBI has taken certain initiatives to discourage speculative retail investors from the risky derivatives market with a motive of protecting interests of retail investors. Exchange Traded Funds were a major innovation in India in the year 2001. ETFs are broadly grouped into Gold ETFs and ETFs other than gold. It is found that total AUM of ETFs has increased continuously from Rupees 2547.21 crores at the end of Mar 2010 to Rupees 49915.45 crores by the end of March 2017, which translates into a compound annual growth rate of 52.97 per cent for the same period. During this period Gold ETFs and ETFs other than gold have reported a CAGR of 19.33 per cent and 73.04 per cent respectively. It can also be observed that the number of folios in ETFs has grown from 1,83,945 at the end Mar 2010 to 9,15,127 by the end of Mar 2017, which translates into a compound annual growth rate of 25.76 percent for a period of 7 years from 2010 to 2017. In short ETFs have reported decent growth over the years both in terms of assets and number of investors. However, the share of ETFs in the total assets of mutual funds remains as low as 2.85 percent in the Financial year 2016-17 which is significantly lower than that of developed markets like the US.

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Acknowledgments

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The following is the official style and template developed for publication of a research paper. Authors are not required to follow this style during the submission of the paper. It is just for reference purposes.

Manuscript Style Instruction (Optional)

- Microsoft Word Document Setting Instructions.
- Font type of all text should be Swis721 Lt BT.
- Page size: 8.27" x 11'", left margin: 0.65, right margin: 0.65, bottom margin: 0.75.
- Paper title should be in one column of font size 24.
- Author name in font size of 11 in one column.
- Abstract: font size 9 with the word "Abstract" in bold italics.
- Main text: font size 10 with two justified columns.
- Two columns with equal column width of 3.38 and spacing of 0.2.
- First character must be three lines drop-capped.
- The paragraph before spacing of 1 pt and after of 0 pt.
- Line spacing of 1 pt.
- Large images must be in one column.
- The names of first main headings (Heading 1) must be in Roman font, capital letters, and font size of 10.
- The names of second main headings (Heading 2) must not include numbers and must be in italics with a font size of 10.

Structure and Format of Manuscript

The recommended size of an original research paper is under 15,000 words and review papers under 7,000 words. Research articles should be less than 10,000 words. Research papers are usually longer than review papers. Review papers are reports of significant research (typically less than 7,000 words, including tables, figures, and references)

A research paper must include:

a) A title which should be relevant to the theme of the paper.
b) A summary, known as an abstract (less than 150 words), containing the major results and conclusions.
c) Up to 10 keywords that precisely identify the paper's subject, purpose, and focus.
d) An introduction, giving fundamental background objectives.
e) Resources and techniques with sufficient complete experimental details (wherever possible by reference) to permit repetition, sources of information must be given, and numerical methods must be specified by reference.
f) Results which should be presented concisely by well-designed tables and figures.
g) Suitable statistical data should also be given.
h) All data must have been gathered with attention to numerical detail in the planning stage.

Design has been recognized to be essential to experiments for a considerable time, and the editor has decided that any paper that appears not to have adequate numerical treatments of the data will be returned unrefereed.

i) Discussion should cover implications and consequences and not just recapitulate the results; conclusions should also be summarized.
j) There should be brief acknowledgments.
k) There ought to be references in the conventional format. Global Journals recommends APA format.

Authors should carefully consider the preparation of papers to ensure that they communicate effectively. Papers are much more likely to be accepted if they are carefully designed and laid out, contain few or no errors, are summarizing, and follow instructions. They will also be published with much fewer delays than those that require much technical and editorial correction.

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It is necessary that authors take care in submitting a manuscript that is written in simple language and adheres to published guidelines.

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The title page must carry an informative title that reflects the content, a running title (less than 45 characters together with spaces), names of the authors and co-authors, and the place(s) where the work was carried out.

Author details

The full postal address of any related author(s) must be specified.

Abstract

The abstract is the foundation of the research paper. It should be clear and concise and must contain the objective of the paper and inferences drawn. It is advised to not include big mathematical equations or complicated jargon.

Many researchers searching for information online will use search engines such as Google, Yahoo or others. By optimizing your paper for search engines, you will amplify the chance of someone finding it. In turn, this will make it more likely to be viewed and cited in further works. Global Journals has compiled these guidelines to facilitate you to maximize the web-friendliness of the most public part of your paper.

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A major lynchpin of research work for the writing of research papers is the keyword search, which one will employ to find both library and internet resources. Up to eleven keywords or very brief phrases have to be given to help data retrieval, mining, and indexing.

One must be persistent and creative in using keywords. An effective keyword search requires a strategy: planning of a list of possible keywords and phrases to try.

Choice of the main keywords is the first tool of writing a research paper. Research paper writing is an art. Keyword search should be as strategic as possible.

One should start brainstorming lists of potential keywords before even beginning searching. Think about the most important concepts related to research work. Ask, “What words would a source have to include to be truly valuable in a research paper?” Then consider synonyms for the important words.

It may take the discovery of only one important paper to steer in the right keyword direction because, in most databases, the keywords under which a research paper is abstracted are listed with the paper.

Numerical Methods

Numerical methods used should be transparent and, where appropriate, supported by references.

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Authors must list all the abbreviations used in the paper at the end of the paper or in a separate table before using them.

Formulas and equations

Authors are advised to submit any mathematical equation using either MathJax, KaTeX, or LaTeX, or in a very high-quality image.

Tables, Figures, and Figure Legends

Tables: Tables should be cautiously designed, uncrowned, and include only essential data. Each must have an Arabic number, e.g., Table 4, a self-explanatory caption, and be on a separate sheet. Authors must submit tables in an editable format and not as images. References to these tables (if any) must be mentioned accurately.

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Figures are supposed to be submitted as separate files. Always include a citation in the text for each figure using Arabic numbers, e.g., Fig. 4. Artwork must be submitted online in vector electronic form or by emailing it.

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Although low-quality images are sufficient for review purposes, print publication requires high-quality images to prevent the final product being blurred or fuzzy. Submit (possibly by e-mail) EPS (line art) or TIFF (halftone/ photographs) files only. MS PowerPoint and Word Graphics are unsuitable for printed pictures. Avoid using pixel-oriented software. Scans (TIFF only) should have a resolution of at least 350 dpi (halftone) or 700 to 1100 dpi (line drawings). Please give the data for figures in black and white or submit a Color Work Agreement form. EPS files must be saved with fonts embedded (and with a TIFF preview, if possible).

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Tips for writing a good quality Management Research Paper

Techniques for writing a good quality management and business research paper:

1. Choosing the topic: In most cases, the topic is selected by the interests of the author, but it can also be suggested by the guides. You can have several topics, and then judge which you are most comfortable with. This may be done by asking several questions of yourself, like "Will I be able to carry out a search in this area? Will I find all necessary resources to accomplish the search? Will I be able to find all information in this field area?" If the answer to this type of question is "yes," then you ought to choose that topic. In most cases, you may have to conduct surveys and visit several places. Also, you might have to do a lot of work to find all the rises and falls of the various data on that subject. Sometimes, detailed information plays a vital role, instead of short information. Evaluators are human: The first thing to remember is that evaluators are also human beings. They are not only meant for rejecting a paper. They are here to evaluate your paper. So present your best aspect.

2. Think like evaluators: If you are in confusion or getting demotivated because your paper may not be accepted by the evaluators, then think, and try to evaluate your paper like an evaluator. Try to understand what an evaluator wants in your research paper, and you will automatically have your answer. Make blueprints of paper: The outline is the plan or framework that will help you to arrange your thoughts. It will make your paper logical. But remember that all points of your outline must be related to the topic you have chosen.

3. Ask your guides: If you are having any difficulty with your research, then do not hesitate to share your difficulty with your guide (if you have one). They will surely help you out and resolve your doubts. If you can't clarify what exactly you require for your work, then ask your supervisor to help you with an alternative. He or she might also provide you with a list of essential readings.

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7. Revise what you wrote: When you write anything, always read it, summarize it, and then finalize it.

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10. Use proper verb tense: Use proper verb tenses in your paper. Use past tense to present those events that have happened. Use present tense to indicate events that are going on. Use future tense to indicate events that will happen in the future. Use of wrong tenses will confuse the evaluator. Avoid sentences that are incomplete.

11. Pick a good study spot: Always try to pick a spot for your research which is quiet. Not every spot is good for studying.

12. Know what you know: Always try to know what you know by making objectives, otherwise you will be confused and unable to achieve your target.

13. Use good grammar: Always use good grammar and words that will have a positive impact on the evaluator; use of good vocabulary does not mean using tough words which the evaluator has to find in a dictionary. Do not fragment sentences. Eliminate one-word sentences. Do not ever use a big word when a smaller one would suffice.
Verbs have to be in agreement with their subjects. In a research paper, do not start sentences with conjunctions or finish them with prepositions. When writing formally, it is advisable to never split an infinitive because someone will (wrongly) complain. Avoid clichés like a disease. Always shun irritating alliteration. Use language which is simple and straightforward. Put together a neat summary.

14. Arrangement of information: Each section of the main body should start with an opening sentence, and there should be a changeover at the end of the section. Give only valid and powerful arguments for your topic. You may also maintain your arguments with records.

15. Never start at the last minute: Always allow enough time for research work. Leaving everything to the last minute will degrade your paper and spoil your work.

16. Multitasking in research is not good: Doing several things at the same time is a bad habit in the case of research activity. Research is an area where everything has a particular time slot. Divide your research work into parts, and do a particular part in a particular time slot.

17. Never copy others' work: Never copy others' work and give it your name because if the evaluator has seen it anywhere, you will be in trouble. Take proper rest and food: No matter how many hours you spend on your research activity, if you are not taking care of your health, then all your efforts will have been in vain. For quality research, take proper rest and food.

18. Go to seminars: Attend seminars if the topic is relevant to your research area. Utilize all your resources.

19. Refresh your mind after intervals: Try to give your mind a rest by listening to soft music or sleeping in intervals. This will also improve your memory. Acquire colleagues: Always try to acquire colleagues. No matter how sharp you are, if you acquire colleagues, they can give you ideas which will be helpful to your research.

20. Think technically: Always think technically. If anything happens, search for its reasons, benefits, and demerits. Think and then print: When you go to print your paper, check that tables are not split, headings are not detached from their descriptions, and page sequence is maintained.

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22. Report concluded results: Use concluded results. From raw data, filter the results, and then conclude your studies based on measurements and observations taken. An appropriate number of decimal places should be used. Parenthetical remarks are prohibited here. Proofread carefully at the final stage. At the end, give an outline to your arguments. Spot perspectives of further study of the subject. Justify your conclusion at the bottom sufficiently, which will probably include examples.

23. Upon conclusion: Once you have concluded your research, the next most important step is to present your findings. Presentation is extremely important as it is the definite medium though which your research is going to be in print for the rest of the crowd. Care should be taken to categorize your thoughts well and present them in a logical and neat manner. A good quality research paper format is essential because it serves to highlight your research paper and bring to light all necessary aspects of your research.

Informal Guidelines of Research Paper Writing

Key points to remember:

- Submit all work in its final form.
- Write your paper in the form which is presented in the guidelines using the template.
- Please note the criteria peer reviewers will use for grading the final paper.

Final points:

One purpose of organizing a research paper is to let people interpret your efforts selectively. The journal requires the following sections, submitted in the order listed, with each section starting on a new page:

The introduction: This will be compiled from reference matter and reflect the design processes or outline of basis that directed you to make a study. As you carry out the process of study, the method and process section will be constructed like that. The results segment will show related statistics in nearly sequential order and direct reviewers to similar intellectual paths throughout the data that you gathered to carry out your study.

The discussion section:

This will provide understanding of the data and projections as to the implications of the results. The use of good quality references throughout the paper will give the effort trustworthiness by representing an alertness to prior workings.

Writing a research paper is not an easy job, no matter how trouble-free the actual research or concept. Practice, excellent preparation, and controlled record-keeping are the only means to make straightforward progression.

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Specific editorial column necessities for compliance of a manuscript will always take over from directions in these general guidelines.

To make a paper clear: Adhere to recommended page limits.

Mistakes to avoid:

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- Submitting a manuscript with pages out of sequence.
- In every section of your document, use standard writing style, including articles ("a" and "the").
- Keep paying attention to the topic of the paper.



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- Use paragraphs to split each significant point (excluding the abstract).
- Align the primary line of each section.
- Present your points in sound order.
- Use present tense to report well-accepted matters.
- Use past tense to describe specific results.
- Do not use familiar wording; don't address the reviewer directly. Don't use slang or superlatives.
- Avoid use of extra pictures—include only those figures essential to presenting results.

Title page:

Choose a revealing title. It should be short and include the name(s) and address(es) of all authors. It should not have acronyms or abbreviations or exceed two printed lines.

Abstract: This summary should be two hundred words or less. It should clearly and briefly explain the key findings reported in the manuscript and must have precise statistics. It should not have acronyms or abbreviations. It should be logical in itself. Do not cite references at this point.

An abstract is a brief, distinct paragraph summary of finished work or work in development. In a minute or less, a reviewer can be taught the foundation behind the study, common approaches to the problem, relevant results, and significant conclusions or new questions.

Write your summary when your paper is completed because how can you write the summary of anything which is not yet written? Wealth of terminology is very essential in abstract. Use comprehensive sentences, and do not sacrifice readability for brevity; you can maintain it succinctly by phrasing sentences so that they provide more than a lone rationale. The author can at this moment go straight to shortening the outcome. Sum up the study with the subsequent elements in any summary. Try to limit the initial two items to no more than one line each.

Reason for writing the article—theory, overall issue, purpose.

- Fundamental goal.
- To-the-point depiction of the research.
- Consequences, including definite statistics—if the consequences are quantitative in nature, account for this; results of any numerical analysis should be reported. Significant conclusions or questions that emerge from the research.

Approach:

- Single section and succinct.
- An outline of the job done is always written in past tense.
- Concentrate on shortening results—limit background information to a verdict or two.
- Exact spelling, clarity of sentences and phrases, and appropriate reporting of quantities (proper units, important statistics) are just as significant in an abstract as they are anywhere else.

Introduction:

The introduction should "introduce" the manuscript. The reviewer should be presented with sufficient background information to be capable of comprehending and calculating the purpose of your study without having to refer to other works. The basis for the study should be offered. Give the most important references, but avoid making a comprehensive appraisal of the topic. Describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will give no attention to your results. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here.

The following approach can create a valuable beginning:

- Explain the value (significance) of the study.
- Defend the model—why did you employ this particular system or method? What is its compensation? Remark upon its appropriateness from an abstract point of view as well as pointing out sensible reasons for using it.
- Present a justification. State your particular theory(-ies) or aim(s), and describe the logic that led you to choose them.
- Briefly explain the study's tentative purpose and how it meets the declared objectives.

Approach:

Use past tense except for when referring to recognized facts. After all, the manuscript will be submitted after the entire job is done. Sort out your thoughts; manufacture one key point for every section. If you make the four points listed above, you will need at least four paragraphs. Present surrounding information only when it is necessary to support a situation. The reviewer does not desire to read everything you know about a topic. Shape the theory specifically—do not take a broad view.

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This part is supposed to be the easiest to carve if you have good skills. A soundly written procedures segment allows a capable scientist to replicate your results. Present precise information about your supplies. The suppliers and clarity of reagents can be helpful bits of information. Present methods in sequential order, but linked methodologies can be grouped as a segment. Be concise when relating the protocols. Attempt to give the least amount of information that would permit another capable scientist to replicate your outcome, but be cautious that vital information is integrated. The use of subheadings is suggested and ought to be synchronized with the results section.

When a technique is used that has been well-described in another section, mention the specific item describing the way, but draw the basic principle while stating the situation. The purpose is to show all particular resources and broad procedures so that another person may use some or all of the methods in one more study or referee the scientific value of your work. It is not to be a step-by-step report of the whole thing you did, nor is a methods section a set of orders.

Materials:

Materials may be reported in part of a section or else they may be recognized along with your measures.

Methods:

- Report the method and not the particulars of each process that engaged the same methodology.
- Describe the method entirely.
- To be succinct, present methods under headings dedicated to specific dealings or groups of measures.
- Simplify—detail how procedures were completed, not how they were performed on a particular day.
- If well-known procedures were used, account for the procedure by name, possibly with a reference, and that's all.

Approach:

It is embarrassing to use vigorous voice when documenting methods without using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result, when writing up the methods, most authors use third person passive voice.

Use standard style in this and every other part of the paper—avoid familiar lists, and use full sentences.

What to keep away from:

- Resources and methods are not a set of information.
- Skip all descriptive information and surroundings—save it for the argument.
- Leave out information that is immaterial to a third party.

Results:

The principle of a results segment is to present and demonstrate your conclusion. Create this part as entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Use statistics and tables, if suitable, to present consequences most efficiently.

You must clearly differentiate material which would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matters should not be submitted at all except if requested by the instructor.



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Content:

- Sum up your conclusions in text and demonstrate them, if suitable, with figures and tables.
- In the manuscript, explain each of your consequences, and point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation of an exacting study.
- Explain results of control experiments and give remarks that are not accessible in a prescribed figure or table, if appropriate.
- Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or manuscript.

What to stay away from:

- Do not discuss or infer your outcome, report surrounding information, or try to explain anything.
- Do not include raw data or intermediate calculations in a research manuscript.
- Do not present similar data more than once.
- A manuscript should complement any figures or tables, not duplicate information.
- Never confuse figures with tables—there is a difference.

Approach:

As always, use past tense when you submit your results, and put the whole thing in a reasonable order.

Put figures and tables, appropriately numbered, in order at the end of the report.

If you desire, you may place your figures and tables properly within the text of your results section.

Figures and tables:

If you put figures and tables at the end of some details, make certain that they are visibly distinguished from any attached appendix materials, such as raw facts. Whatever the position, each table must be titled, numbered one after the other, and include a heading. All figures and tables must be divided from the text.

Discussion:

The discussion is expected to be the trickiest segment to write. A lot of papers submitted to the journal are discarded based on problems with the discussion. There is no rule for how long an argument should be.

Position your understanding of the outcome visibly to lead the reviewer through your conclusions, and then finish the paper with a summing up of the implications of the study. The purpose here is to offer an understanding of your results and support all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of results should be fully described.

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