CURRENCY HEDGING STRATEGIES : WHAT ARE THE EXPLANATORY FACTORS FOR NON-FINANCIAL FIRMS IN SENEGAL?

Amadou Makhouredia Diop[1]
Alioune Diop University, Senegal
Email : Amadou.diop@uadb.edu.sn

Mohamed Lamine Mbengue[2]
Gaston Berger University- Saint-Louis, Senegal
Email : mohamed-lamine.mbengue@ugb.edu.sn

Modou Dieng[3]
Alioune Diop University, Senegal
Email : modou.dieng@uadb.edu.sn

ABSTRACT

We report the results of a survey on the foreign exchange risk management strategy of Senegalese non-financial firms. We focused on aspects related to hedging strategy, elements and factors that determine risk management, on a survey base composed of 54 non-financial firms in Senegal in 2020 with a purposive sampling, belonging to different sectors of activity. We used a mixed-methods analysis to process both quantitative and qualitative data. The study shows that firm size, level of foreign sales, cash ratio, financial distress, and quick liquidity ratio as well as the way hedging is organized and the industry sector are the factors that explain the adoption of the selective and systematic strategy that firms adopt in managing foreign exchange risk. The study reveals that Senegalese non-financial firms are more selective than systematic in their foreign exchange risk hedging strategy. This selective approach is used more by smaller firms. This observation is related to the difficulties in obtaining information for forecasting purposes, but also to the hedging costs that systematic hedging entails.

Keywords : Hedging strategy; foreign exchange risk; non-financial companies

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[1]Amadou Makhouredia Diop, PhD student and lecturer in Finance, Alioune Diop University
[2] Pr Mohamed Lamine Mbengue, Associate Profesor, Gaston Berger University
[3] Dr Modou Dieng, Assistant Profesor, Alioune Diop University

I. INTRODUCTION

In economics science and management, the strategy of risks management by the company is defined as the process-allowing do to uncertain assessment risks, affected orarising from internal and external events, of scenarios that could compromise an organization capacity to reach certain objectives in view to create value and protect companies, Frigo and Anderson (2011).

With globalization, which has led to an international expansion of financial markets and an explosion of international means of payment, companies that operate externally are exposed to a variety of risks. Thus, in the interest of sound risk management, firms tend to protect themselves against risks closely linked to international activities, such as market risk with fluctuations in interest rates, currency rates and the prices of certain commodities. Indeed, the last decade has seen an undeniable increase in the turbulence of the international business environment due to the instability of foreign exchange markets, Per Yann Le Floc'h (2014).

Financial innovation from globalization is determinant factor in new context, where companies face difficulties to set up an appropriate exchange rate hedging policy, to quote Shimpi (2002) to according to him financial changes impact on exchange rate hedging strategies, especially with new derivative products which are complex in their uses.

In other words, eventual losses that may affect the company's income in foreign currencies owing to variations in the exchange rates of foreign currencies (Prissert, 1973).

Some companies are threatened by price volatility, which sometimes has indescribable and perverse effects on the profitability and financial balance of the company. We can cite the case of SUNEOR with the payment of compensations due to the financial impact of prices resulting from the fluctuation of currency rates. As an example, the decree N°08769 of September 29, 2010, with the decision to freeze oil prices at all stages of trade. A decision that followed an announcement of price increases by SUNEOR, a few days earlier as the world price of crude soybean oil which hovered around 800 US dollars around 2009, came to 930 US dollars in September 2009. SUNEOR has estimated the financial impact at 18.4 billion CFA francs between 2010 and 2012. The Company is also likely to encounter difficulties in implementing its hedging strategy if hedging counterparties refuse to increase the risk limits associated with derivative instruments in their transactions with the Company.

By definition, foreign exchange risk is the possibility that an investor or a company may be negatively impacted by a change in foreign exchange rates. Thus, with the fluctuation of exchange rates, its competitiveness is called into question in view of the significant impacts. Among other examples, we can take the case of hydrocarbon companies in Senegal that are shaken by the fluctuation of the dollar when carrying out their import operations on the international market, particularly in the Qatar area. Thus, no company, large or small, which carries out an international activity can claim to be sheltered from exchange rate fluctuations which have repercussions on its performance when it uses currencies tied up by floating rates.

In the same vein, non-financial firms, i.e., those whose primary function is to produce non-financial market goods and services, have long suffered from exchange rate fluctuations, accentuated by the fixed parity between the franc of the Financial Community of Africa (CFA franc) and the euro on the basis of community laws at the level of the West African Economic and Monetary Union (WAEMU). Although this situation neutralizes exchange rate risk with the euro, exchange rate risk is still present with the largest currencies such as the dollar and the pound sterling. So, the implementation of an exchange management system is still widely shared. Many researches and others consider it necessary to use a hedging strategy to manage this risk. (Aggaraval, De Marskey 1997).

Empirical studies on risk management practices and the analysis of hedging strategies by financial firms are numerous in Europe. Mefteh (2005) and Glaum (2002) have studied the factors that justify the choice of a hedging process. Similarly, Weber and Hsee (1998) have analyzed the perception of risk and the corporate culture between countries. The work of Ramey (1995) on the relative aversion to exchange rate risk and the social cost of risk for French companies, etc., is a good example of this.

This is sufficient evidence that managing foreign exchange risk remains a concern for all entities, with markets characterized by fluctuating currencies such as the dollar, but also emerging currencies. In February 2021, in the French newspaper Les Echos, an article was published by Nessim Ait-Kacimi, highlighting companies that are reluctant to hedge against the exchange rate risk of emerging currencies. It turns out that they have negative impacts on the results of companies, because those European in 2020 have neglected the coverage of currency risk because of the high cost it generates. These studies are rare in Africa. We can cite the work of Karima Lamrani and Laila Bennis (2021) in Morocco, who have conducted research on the hedging of foreign exchange risk among Moroccan firms, hence the interest of this exploratory analysis of a sample of firms. Taking into account the current state of knowledge and the context in terms of foreign exchange risk management, the relationship between the size of the firm and the type of hedging, which has always been the subject of mixed conclusions, economies of scale with large firms, and the use of derivatives, to quote Cooper and Melo (1999), who asserted that the cost of hedging could increase the probability of default and reduce hedging capacity.

In Senegal, many firms have international relationships and it is important to note that the WAEMU market is limited in terms of hedging arrangements.

This is why it was unanimously agreed at the outset that the exchange rate risk was not managed, but rather was the subject of a passive recognition that was suffered and then recorded in the accounts. From then on, the unanimous observation at the outset was that the exchange rate risk was not managed, but was the subject of passive recognition, then recorded in the accounts. The fact that the company is open to shocks emanating from variations in the exchange rate, poses the problem of the risk incurred and from this point onwards must put in place a hedging strategy.

There are three possible scenarios : either systematic hedging (this consists of automatically hedging as soon as a foreign currency commitment or asset appears) or a more systematic approach (this consists of automatically hedging as soon as a foreign currency commitment or asset appears). This attitude is recommended if your company deals with clients from various

countries offering volatile currencies. In this case, hedging methods such as netting are impossible to implement, which forces the company, if it wants to hedge against the exchange risk, to take an automatic hedge. Similarly, if the transactions envisaged are for very large amounts, the treasurer may have to systematically hedge the exchange risk, as any variation could lead to a significant loss. This attitude can also be found when, for a continuous stream of business, the slightest exchange rate loss leads to a significant erosion of the margin), or selective hedging (in this case, the treasurer decides on a methodology that will determine when he will or will not hedge the exchange rate risk. This policy implies the application of selection criteria that correspond to a level of risk acceptance as well as to an anticipation of the evolution of exchange rates. Selective hedging should not be applied in the case of low levels of international activity. It cannot justify the implementation of a foreign exchange risk management structure that would cost more than the probable losses due to currency variations) or an internationalization of the risk (this alternative can be adopted if you deal with stable currencies, or if you transfer the totality of the risk to your partner through a clause in the contract. On the other hand, some companies use it even if the currency is unstable, with the aim of making an exchange rate gain. In this case, it corresponds to a speculative attitude. In some cases, protecting oneself against currency risk can be so expensive that the protection is not worth it. This attitude can also be the result of a lack of understanding of the risk involved. Not hedging against currency risk is obviously the most discouraged attitude, or should only be applied in exceptional cases.) Even if some consider that the decision to hedge is dependent on the exchange rate forecast, the first step after realizing that there is a risk is to decide on a hedging strategy. This is why it is necessary to decipher hedging behavior in a general way and specifically study all the elements and factors that contribute in a determining way in the adoption of the risk management policy declined by the company. Today, foreign exchange risk management is of paramount importance for non-financial companies in the Senegalese context, as it contributes to the improvement of performance and the development of the local economic fabric and is accelerated by the advent of modern international finance.

This management necessarily involves hedging strategies, an efficient organization following arbitrages taking into account the volatility of currencies as theorized by Simon (1972) in the rationality of the economic agent, Eugene Fama (2013) on the efficient market, Oliver Williamson (1974) in the theory of transaction costs. The study of this foreign exchange risk management is the concern of this article.

Given the above, our problem is the following: what are the different hedging strategies adopted by Senegalese non-financial firms to respond to the erratic fluctuation of currency rates at the time of settlement of their import or export operations? Specifically, it will allow us to see: What are the determinants that explain currency hedging? What are the different strategies of currency hedging? To answer these questions, the article is divided into three parts: the literature review, the methodology and the presentation and discussion of the results.

II. LITERATURE REVIEW

Based on the trichotomy of Dumas (1979), the control of foreign exchange risk inevitably involves five (5) steps, including the identification of the various sources of risk by highlighting the nature of the activity and the business environment or the competitive

environment, the study of the overall foreign exchange position that can be influenced by exchange rate fluctuations, the prevention of future changes in the rates of currencies in question, the determination of the amount to be hedged and the appropriate hedging instrument and finally the measurement and control of performance.

This fluctuation of exchange rates pushes companies to set up hedging strategies by taking into account the level of efficiency of the markets, Eugéne Fama (2013). For this author, market efficiency is described by the arbitrage theory, i.e. markets where profitable speculation is particularly difficult and risk-free arbitrage is impossible. However, in such markets, the volatility of currencies is maximum, and since the markets are not efficient naturally volatilities exist and therefore it is necessary to resort to hedging strategies.

Thus, the arbitrage situation must take into account the most optimal expenses to carry out certain operations. This means that the strategy to be adopted by arbitrage must take into account the costs, whatever the selective or systematic logic.

From then on, we can mobilize the theory of transaction costs, based on the normative principle that saving on transaction costs is preferable to wasting them as a result of choices guided by chance or managerial intuition. This theoretical approach of Oliver Williamson (1947), a great author of organizational management, allows us to highlight the strategic choice of a selective and systematic exchange rate hedge. To this end, it constitutes an extension of Simon's rationality of economic agents, which sheds light on the problem of adequate decision making with regard to the purchase, sale and value of goods that are the object of exchange. The hedging strategy, being dependent on decisions, obeys rational choices. Thus, since the mid-1980s, the question of why and how companies should hedge against currency risks has decorated the financial literature.

In our case, it is a descriptive and analytical study of foreign exchange risk, of the behavior of firms in the face of exposure to this risk based on both a qualitative and quantitative approach.

Over the last two decades, most authors have used surveys to study the dynamics of the use of derivatives by firms. Bodnar et al (1995, 1996, 1998) and Phillips (1995), Bodnar and Bartow (1994), Chow, Lee and Solt (1997) on the US market. Berkeman et al (1997) on the New Zealand market; De Ceuster et al (2000) on the Belgian market, Malin et al (2001) on the British market, Salma Mefteh (1996), on the French market, Adam, T, C Fernando, Salas (2010), Albay, M Dupay, (2015 and 2017) on the French market. Overall, they looked at the factors that determine the hedging of foreign exchange risk. The conclusions were mixed following the different elements retained as explanatory factors but especially the dynamics of currency formation technically depends on the manifestation of psychological behavior of companies through their decision makers who are shaped by the level and evolution of prices. To this end, most of the models are built in the form of forecasting and appeals to the assumptions of market behavior (efficient markets) and comes into play in the inefficiency of forecasting models, which gives a high meaning to the study of strategies for managing currency risk. This means that exchange rate risk management is based on the choice of a model through a theoretical representation of the market. Consequently, the market typology proposed by Eugéne Fama is well suited to the analysis and study of foreign exchange hedging choices and strategies. It is based on the way in which information is integrated by companies to implement hedging strategies and make decisions. It is important to mention the position of

Mickel Sion (2015) regarding systematic hedging, which he believes is not always optimal due to two factors : the fact that hedging mechanisms are not free of charge ; and competition from firms in the same sector.

III. METHODOLOGY

Our methodology consists in answering the problematic which poses as interrogation the strategies which determine the cover of exchange of the nonfinancial companies in Senegal to answer the modifications of the exchange rate. It allows us to use a mixed analysis to shed light on this research question. The approach used is based on the use of an established questionnaire and firms will respond online. The main axes of the questionnaire are the design phase, the sending

The companies will answer directly online. They will have the possibility to provide comments and explanations, so that we can better process the raw information with exhaustiveness but also avoid certain biases. We will work on a sample of companies with specifications of large, medium and small sizes at the same time, to say that the field of study includes all non-financial companies. The requirement is for an activity that requires the use and transfer of foreign currency internationally.

We will, in the processing of information, focus on the analysis of descriptive statistics on the one hand and generate a linear model to move to econometric regressions on the other hand with SPSS and STATA following a dependent variable selective coverage (SYS) according to other independent variables, the size of the company, the level of exposure, the debt ratio, the liquidity ratio. They will be defined in this same section.

We used the purposive sampling method. It is explained from the outset by the filter. This filter allows us to highlight companies that operate internationally and are located in Senegal, particularly in the regions of Dakar, Thiès, Saint-Louis and Diourbel. They may have subsidiaries abroad.

Out of 101 companies surveyed, 54 responded, for a response rate of 53.46%. This rate is close to the average, exceeding it by 3 points. The lack of responses, estimated at 46.64%, can be explained by the lack of a corporate communication culture.

A regression model

Dependent variable constructions and processing tools

- Binary variable construction

The test measures the adoption of systematic or selective coverage. It is made from a regression on a dependent variable defined by a binary. Let the binary variable take the value of 1 if the firm covers itself systematically, or 0 if it covers itself selectively. It is measured by a Logit or Probit model (depending on the statistical assumptions of the variables).

The independent variables will be determined according to the survey items.

Name of the ratio	Code	Measure
The size of the company	TAENT	log of the book value of the company's total assets
Debt to equity ratio	RENDT	ratio of book value of long-term debt to total assets
Cash ratio	RENCAI	cash to total assets
Quick liquidity ratio	RAQ	current assets to current liabilities
Sales ratio	RDVTE	ratio of foreign sales in foreign currency to total sales

Table 1. Model variables

$$SYS = a_0 + a_1\text{TAI} + a_2\text{RENDT} + a_3\text{RAQ} + a_4\text{RENCAI} + a_5\text{RDVTE} + £$$

Si SYS = 1 Systematic hedging policy

Si SYS = 0 Selective Hedging Policy

IV. RESULTS

The sample of 54 companies studied includes only non-financial companies, all of which are in the private sector. The survey covered several sectors of activity, including: Agribusiness, Construction, Trade, Mining, Service, Energy, Armory, Hotel, Industrial fishing, Hydrocarbons.

In this table below, we present the frequencies of the sectors of activity to which the 54 companies that responded out of the 101 surveyed belong. The table shows that five (5) sectors are dominant in the context of foreign exchange risk management. A large proportion of the companies that responded are in services (29.6%), food processing (13%), hydrocarbons, trade and construction (11.1% each). Apart from the energy sector, the other sectors are not very present, with representation frequencies of less than 6%, and apart from the services, construction and trade companies, which are in the import business, the other companies are exporters.

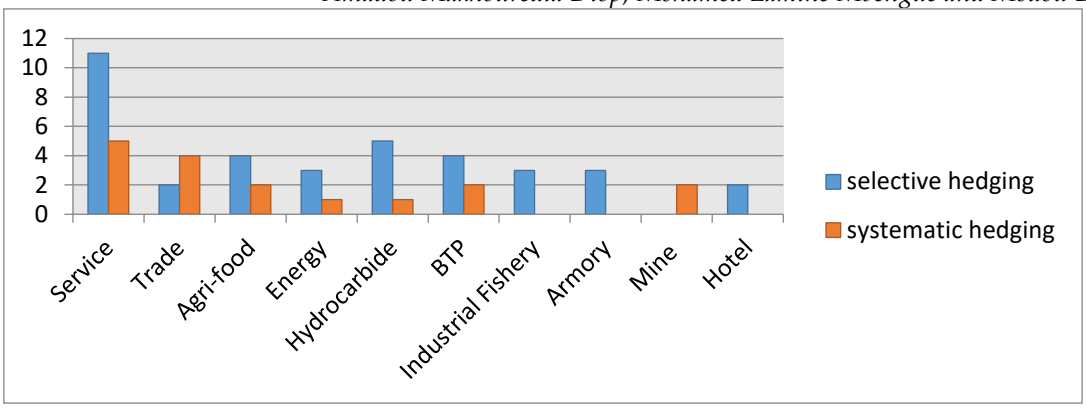

Figure 1. Distribution of the sample by sector of activity

Source : author's construction

4.1. Foreign exchange risk forecasting behavior of Senegalese non-financial firms

From the responses, it is possible to identify firms that forecast foreign exchange risk. It turns out that firms that do so are identified through the hedging actor. They only use forecasters to provide a response to the management of exchange rate risk.

The group of companies that carry out forecasts represents 5.6% of the sample. The rest use other means different from forecasting. And the interviews show that the forecasting is mainly based on qualitative methods that take into account the different opinions of the main departments, sometimes by the local managers, and then communicates to the executives or financial management. The most determining factors in forecasting are the level of exposure of the company and the cost of the forecast. However, the limits of the means and techniques of forecasting, the effectiveness of the method sometimes among others justifies the low level of the number of companies that engage in such a practice.

4.2. The practice of managing foreign exchange risk

The plurality of financial instruments for hedging against foreign exchange risk, as well as the techniques in their application and conditions, being well taken into account by companies, we will try to make a dichotomous analysis of the behavior of companies in terms of their risk management following a mixed approach. The first thing is to see if the company sets up a hedging system and which operations are covered. Either yes or no. Within the framework of the study of 54 companies, 30 firms hedge against foreign exchange risk, i.e. 56.6% of the sample. The companies studied are in a very selective dynamic than systematic. For the sample considered, 69.6% of the companies adopt a selective cover against 30.4% which are in systematic strategic logic. A fact that can be easily explained through the theory of costs in terms of absolute advantage. Systematic hedging requires more financial means, which is why the selective trend is more evident. Among other things, the level of risk perception of the management is an important factor, because the principle of prudence is to systematically hedge and justifies the decisions of companies in this direction, but the level of risk and activities push some to adopt a selective strategy. The fact that the treasury department is not a profile center for 61.1% of companies, justifies in part the choice of the hedging strategy. Apart from these factors, speculation is the last element that justifies the attitude of selective hedging. For those who want to speculate, it would be paradoxical to invest in a systematic

Strategy. For hedging strategy, several exist, but Senegalese companies, in view of the sample, use more futures contracts with a proportion of 35.2%.

Valid	N	Percent	Valid Percent	Cumul Percent
Futures contract	19	35.2	35.2	35.2
Forward contract and structured products	2	3.7	3.7	38.9
Structured products	14	25.9	25.9	64.8
Options	3	5.6	5.6	70.4
Other	16	29.6	29.6	100
Total	54	100	100	

Table 2. Statistical evaluation of hedging strategy

Thus the main hedging tool is the forward contract, which remains the simplest instrument to use, and technically easy for a company that imports and exports, and is therefore adapted to the needs of foreign exchange market players.

The second tool is the structured product, its use is cited by 25.9% of companies and options with a low use as well as the mixed use between futures and structured products respectively 5.6% and 3.7%.

However, 29.6% of the companies use other hedging instruments and strategy, as we did not take into account all the instruments such as offsets, currency advances and alternation systems.

For hedged transactions, most of them are those related to real net cash flows. 27. 8% of companies hedge such transactions, followed by sales and purchases for 13%.

To hedge, 27 companies out of 54 use banks, i.e. 50% in absolute value, 13% of companies rely on external advisors, 16.7% on internal models and 13% on other unidentified means. These frequencies and statistics of actors that companies use partly justify the lack of sophisticated human and financial resources for risk management. The bank and external advisors play decisive roles in supporting the management strategy and are called upon considerably. The most important element, which is dependent on all strategies, is the nature of the risk. In fact, it must be determined and known before being able to develop the following strategy and tools. In our study, Senegalese financial companies are more exposed to transaction risks. The level of transaction risk in the sample is estimated at 66.7%.

It is important to note that some companies, up to 46% of those adopting selective hedging, wait until they have fears about the market before triggering this hedging strategy. In this respect, accountants are the first to coordinate the management of foreign exchange risk and are mentioned 29 times, i.e. 53.7%. Next come the administrative and financial managers 29.6%, and finally the financial directors and treasurers who respectively make 9.3 and 7.4%.

Here are the results of the regression of the binary dependent variable risk coverage on the independent variables firm size, debt ratio and Quick ratio, cash flow ratio and sales ratio.

logit SYS TAENT RENDT RENCAI RAQ TVTEDE						
LogisticregressionNumber of obs = 54						
					LR chi2(5) =	10.57
Prob> chi2 = 0.0207						
Log likelihood = -25.61					Pseudo R2 =	0.5710
SYS |	Coef.	Std. Err.	z	P>|z|	[95%	Conf. Interval]
TAENT |	0.77	0.96	0.81	0.018	-1.10	2.66
RENDT |	2.28	1.34	1.70	0.049	-0.34	4.91
RENCAI |	-3.72	1.52	-2.44	0.015	-6.71	-0.72
RAQ |	- 0.71	0.83	-0.85	0.0395	-2.35	0.93
TVTEDE |	1.2	0.80	1.57	0.018	-0.317	2.83
_cons |	-1.15	0.61	-1.87	0.061	-2.35	0.054

Table 3. Regression results

4.3 Interpretation and analysis of the regression results

We find that the variables TAENT, RENDT, RENCAI, RAQ, TVTEDE whose coefficients are assigned respective probabilities 0.018, 0.049, 0.015, 0.039 and 0.018 are significant. The debt ratios, still called financial distress, as well as the size of the firm are sensitive to the firm's foreign exchange risk coverage. The different ratios of the liquidity model have a positive effect on the currency risk coverage. Therefore, they are decisive in the hedging strategy.

4.3.1 Principal component analysis

In this phase, we work on the basis of mixed variables. The PCA analysis will allow us to reduce the number of variables into synthetic variables coded according to factors that translate the contents of the initial variables. Beyond that, it gives us information on the validity of the model.

At the same time, we are going to ask, through the analysis on the uni-varied statics, the correlation matrix, the levels of significance for each correlation coefficient, the calculation of the determinant which must satisfy a condition. The latter must not be equal to zero, because it would mean that there is a multi-collinearity, in other words there are at least two variables that are perfectly correlated, it will be necessary to systematically exclude one of the variables.

Afterwards, still using PCA analysis, we will determine the KMO index, which is an adequacy index of the database we are submitting. We will ask if the sample is adequate to conduct such an analysis. This index must imperatively be higher than 6 or 7%. On the other hand we will

ask for the BARTLETT test. It seeks to know if the correlation matrix is equal to the unity matrix which means that the variables are two by two independent.

So necessarily we need :

Determinant ≠ 0

Determinant ≠ 1

KMO > [0.6-0.7]

Bartlett test : p-value < 0.05

The PCA analysis shows a determinant DET = 0.05. And below is the KMO index and the BARTHELET test.

Kaiser-Meyer – Okin Measure of Samply Adequacy	0.626
Bartlett's test of SphericityApprox- Chi-Square	256.75
Sig	0.000

The KMO index must be at least equal to 0.6 or 0.7; our model has a KMO index of 0.626. So we can conclude that the database we submit is adequate.

The BARTLETT'S test has an associated probability equal to 0.00 at the 5% threshold, the specificity is acceptable because it is less than equal to 0.05.

The eigenvalues are important for the selected factors and for the rest of the variables from 5 to 14 the values are lower than 1. In what follows we will present the matrix of the four components with their eigenvalues. In the following we will present the matrix of the four components with their eigenvalues. Factor number 1 is called the elements that determine the coverage, but from a qualitative point of view with variables that it groups, the second factor, the financial determinants of the coverage, the third the organization of the coverage and the fourth the internal management.

Component	Initial Eigen values			Extraction sums of square loading			Rotation sums of Squaredlodind a
	Total	% of variance	cumulative %	Total	% of variance	cumulative %	Total
1	3.487	29.057	29.057	3.487	29.057	29.057	2.891
2	2.457	20.477	49.533	2.457	20.477	49.533	2.606
3	1.349	11.241	60.774	1.349	11.241	60.774	1.320
4	1.114	9.284	70.058	1.114	9.284	70.058	2.388

Table 4. Extraction Method: PCA.

a. When components are correlated, sums of Squared loading scannot beadded to obtain a total variance.

The PCA analysis, as shown in the table below, indicates that four variables account for 70.058% of the total information in the model. Therefore, it highlights four factors as the main components of the model.

6.1. Hedging strategy and sectors of activity

Sectors of activity	Selective hedging	Systematic hedging
Service	**********	*****
Trade	**	****
Agri-food	****	**
Energy	***	*
Hydrocarbon	*****	*
Construction	****	**
Industrial fishing	***	
Armory	***	
Mining		**
Hotel industry	**	

**** number of citations

Table 5. Hedging strategy and sectors of activity

The descriptive analysis shows that the sector of activity is a determining factor in defining the hedging strategy to be adopted. In other words, the nature of the coverage varies from one sector to another.
Service, oil and gas, agribusiness and defense companies are more selective in managing foreign exchange risks, unlike companies in the trade sector, which adopt a systematic strategy in most cases.
However, the use of risk hedging products is not explained by the sector of activity. The regressions performed with the results presented below allow us to formulate an idea about this tested relationship.
Strategies and sectors of activity
Logit STRAT1 SECT
This is the regression of the hedging strategy 1 based on the hedging with futures contracts and the sector of activity. The associated probability is 0.5323 > 0.05 at the 5% threshold. Here the null hypothesis is retained, there is an independence between the hedging strategy based on the CAT derivative and the sector of activity.
Logit STRAT2 SECT
Here it is the regression of the hedging strategy 2 based on the hedging with the structured products and the sector of activity. The associated probability is 0.2357 >0.05 at the 5% threshold. Here the null hypothesis is retained, there is an

independence between the hedging strategy based on the PS derivative and the sector of activity.
Logit STRAT3 SECT
This is the regression of the hedging strategy 3 based on the hedging with the Options and the sector of activity. The associated probability is 0.8357 > 0.05 at the 5% level. Here the null hypothesis is retained, there is an independence between the hedging strategy based on the Option derivative and the sector of activity.
We can say that the sector of activity allows us to determine the risk hedging strategy, but not the hedging elements to be used.

Currency hedging and organization
The factors from the component analysis are used to determine which variables in the model are directly related to the organizational function of the hedge.
The third and fourth factors contain variables directly related to the organization. The third factor concerns the function of risk managers in the company and the sector of activity. The fourth factor concerns the actors who constitute the hedging levers or hedge managers.
The organization of the hedge explains at least 20.52% of the hedging strategy, i.e. the information that determines the hedge is explained by the way the hedge is organized.
Thus, variables such as the size of the company, the level of foreign sales, the debt ratio or financial distress, the ratio of receipts and the quick ratio, in the same way as the organization of the hedge, significantly explain the hedging strategies adopted by non-financial companies in Senegal in terms of managing foreign exchange risk.
In addition, the study reveals that systematic and selective hedging strategies are adopted by companies at the same time. We note that the proportions of use of the two strategies vary according to the sectors of activity of the companies.

- **Comparison of foreign exchange risk management of Senegalese non-financial firms and their international counterparts**

It is very difficult to make international comparisons on the basis of surveys because the lack of comparability in the design of the questions is sometimes a constraint.

In addition, all of the surveys cited and used as comparative elements in this document cover a minimum period of three years, and the results must be read and compared with the most recent results because the economic context and the legal and institutional framework may change or evolve in the meantime. A significant example is the European companies that since 2005 have to declare the fair value of their derivatives in their income statement or balance sheet, and consequently effects would be noted on the use of derivatives as Zhang (2009) has shown.

Given all of the above aspects, we will discuss the similarities and differences between the main findings of our study of Senegalese firms and previous surveys conducted in other countries, notably the United States, the United Kingdom, Germany and Morocco. Insofar as the industrial structures and the culture of the companies in these countries are different in the use of derivatives, in the management of the exchange rate risk, in the strategies of cover of the exchange rate risk and the visions of the market.

Several surveys have shown that many non-financial firms link their hedging strategies to their own views of future exchange rate valuation. One example is Loderer and Ptchler (2001) who found that 68% of Swiss firms change the size and timing of their hedges. In the same vein, Bodnar et al (2012) found that 58 of the American companies condition their coverage decision on the basis of their market vision and that this number could reach 45% on a worldwide scale. The same decisions are noted in Germany according to the studies of Glaum (2002) and estimated at 54% at the same time in the United Kingdom by El Masry (2003). In France, contrary to the other countries, the number is low, the majority of companies, especially those of large size, are in a systematic coverage dynamic, making little reference to market prospects which rhyme more with a selective approach. In Senegal, the results of our survey indicate that companies are in a very selective dynamic 69.6%, and therefore they base their hedging strategy according to the situations of fears of the market 46% without counting the other market parameters. This can be explained by the fact that when a market vision is formulated, it is often based on technical analysis and short-term concerns.

In general, it seems that Senegalese companies are on average somewhat conservative in managing their risks, as are their foreign counterparts, particularly in the UK and the US. This behavior is difficult to understand because systematic hedging policies have a cost that could be somewhat reduced by conditioning hedging decisions according to the market outlook. However, the impact of cultural differences on risk and risk perception as outlined by Weber and Hsee (1998), in addition to the findings of Bartram, Brown and Fehle (2009), justify the use of derivatives. Thus, Senegalese firms are not spared because the use of derivatives by nature is defined in part by the cultural conception, the level of savings.

In our results, Senegalese firms seek above all to cover operational cash flows. This finding is consistent with the results obtained in the United States and the United Kingdom by Bodnar, Hayt and Marson in 1998, and El (Masry (2003), respectively. However, the situation is not the same with German and Italian firms, which are respectively in a logic of hedging profit volatilities (Bodnar and Gebhardt, 1998), and the others of simple derivatives for extreme risks. In this respect, the hedging objective of Senegalese firms seems closer to the market position of American and British firms.

With respect to the types of derivative instruments, companies at the international level are mainly focused on the use of futures contracts, according to the results of surveys conducted by several researchers and through certain articles. Thus, Senegalese non-financial firms are in the same dynamic of using derivative instruments with futures contracts for the most part.

V. CONCLUSION

The research objectives were to see, analyze and study the foreign exchange risk hedging strategy adopted by the Senegalese non-financial firm, and the factors that govern such strategies. We found that the firms studied adopt a selective strategy rather than a systematic one in general, and are no less speculative as well. The use of forward contracts is more evident and that operational cash flow management is a major concern for them.

The way in which risk is perceived by the actors leads to the generating fact to bring answers against the erratic fluctuation of currencies otherwise the exchange risk. The management of foreign exchange risk requires the involvement of several departments of the organization, taking into account the hierarchical situation of the company. The managerial objectives of this research work are numerous but can be summarized as follows: To identify and control the

foreign exchange risk at a much more micro and restricted level of Senegalese non-financial companies according to the sectors studied (oil and gas, fishing, trade, information technology, construction and public works, hotel industry, etc.).

In addition, the results of this study have managerial implications that allow firms to improve their performance and better respond to competition by adopting the most optimal strategies to hedge against foreign exchange risk, but also to minimize costs for a more rational management. To managers to make strategic decisions in terms of strategy and to optimize their organizations in terms of foreign exchange policy. To shed light on non-financial companies in the context of their international operations like their Moroccan counterparts as outlined in the work of Lamrani Karima (2021).

Finally, the research done in the framework of this work aims to implement the practice and professional experience to generate new or other knowledge concerning the management of financial risks, especially that of foreign exchange risk in the way it is practiced in Senegalese non-financial companies but to make a specific comparative state with other counterparts especially in Morocco, the United States and Europe. Our results show that the choice of a hedging process for foreign exchange risk management in Senegal is partly based on the characteristics of the firms and the market view. The comparison of results at the international level is limited by the lack of homogeneity of the questions and the different observation periods, as well as the limited number of firms in the sample. It clearly points to the need for a single, larger research survey that could cover a large number of countries at the same time. Thus, the latter would seem to be an interesting future project for academics, in a grouped form and each for its targeted country.

Thus all the limitations of this research could be overcome through horizons that are yet to be crossed. These determine some research tracks not yet explored. In addition, there is the absence of a clear legal framework for the exchange rate policy of non-financial firms at the WAEMU levelFinally, foreign exchange risk management in Senegal is still not taken into consideration in the strategic areas vital to our economy and financial system. To this end, there are many things to improve and which will necessarily allow the management of foreign exchange risk to meet the current need.

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APPENDICES :

APPENDIX 1 : Questionnaire

Q1. Name of your company and industry?

Q2. Do you or anyone in your company hedge foreign exchange risk?

Q3. Is your foreign exchange hedging systematic or selective?

Q4. Do you hedge transaction risk and/or consolidation risk or other?

Q5. Are you hedging actual and operational cash flows? Expected sales and purchases? Future earnings or dividends, balance sheet accounts?

Q6. What types of derivative instruments do you use? Futures contract? Option, which one? Structured products?

Q7. Do you have a written hedging policy document?

Q8. Who approved it?

Q9. Do you expect to have capital market concerns before hedging?

Q10.

Elements

What is the sales value or market capitalization for the year 2020?

What is the hedged foreign currency sales value for the year 2020?

What is the value of total assets for the year 2020?

What is the value of total current liabilities for the year 2020?

What is the value of long-term liabilities for the year 2020?

What is the value of total cash assets for the year 2020?

APPENDIX 2: List of companies surveyed in our sample

Service : grafcom, senegal handling services, gama & freres, garecgo, ceca sarl, telogik sarl, illimitis sas, servair senegal, pellicules prod, hubso sarl, international staffing sarl, international staffing human capital isc hc, international staffing human capital sa, sensoft sa holding, sensoft sarl, sun telecom sarl
Mine : AFRICAN MINING SERVICE, GROUPE GPC
Agri-food: botting company aquaterra, a.p. lopez sarl, aprovag, patisen, complex agro- alimentaire de tawfeekh cait, societe des produits industriels et agricoles
BTP : atc, greenbeach platform sau, gaits-immo, general alu sarl, global engins, africa love
Trade: inspire sas, ets seydi djamil sy, almadia, senteranga, 18 safar company, soumari
Energy : 3md energy, peg senegal, man diesel & turbo senegal, enersa

Hydrocarbide : wms oil, neptune oil, petroflamme senegal sarl, total senegal, edk oil, petrodive
Armory : societe d'armement maritime et de services-sarl ; chereault & cie, sas societe d'armement senegalaise sas
Industrial - fishary : hann fishing senegal, tamou fishing international, ms distribution
Hotel : royam hotel sa, terra lodge senegal