

Commodity markets and the exchange rate risk: Theoretical framework

Les marchés des matières premières et le risque de taux de change : Un cadre théorique

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Abstract

Since the commodity markets and financial markets became more interconnected, the determination of the most potential risk factors becomes an essential step in the choice of models and tools for risk measurement and assessment in modern financial modeling. This study aims to point out, analyze and determine all the studies realized to explore the links between commodity markets and exchange rate risk as a major risk factor in these markets. This study was based on the Preferred Reporting Items for Systematic Reviews and Meta-analysis to select and determine the most relevant topics and the new recommendations. Using a sample from 2000 to 2022, 632 articles were collected and 34 articles were included as most relevant ones. We find that the great financial crisis of 2008 had a structural change in commodity markets and financial markets structures. Our findings suggest also that extreme chocs on commodity markets resulting from exchange rate, extreme values and the risk resulting from the financial position changes of investors remain the important areas which need more investigations.

Keywords : Commodités; Exchange rate ; Financial crisis ; Futures markets ; PRISMA Statement.

Résumé

Avec l'interconnexion des marchés des matières premières avec les marchés financiers, la détermination des facteurs de risques les plus potentiels devient une étape essentielle dans le choix des modèles et les outils de mesure et d'évaluation de risque dans le domaine de la modélisation financière moderne. Cet article a pour but d'identifier, d'analyser et de passer en revue toutes les études menées pour étudier la relation entre les marchés des matières premières et le risque de taux de change comme un facteur principal de risque sur ces marchés. Cette étude s'est basée sur la méthode de Preferred Reporting Items pour les Revues Systématiques et les Méta-Analyses pour sélectionner et déterminer les sujets les plus pertinents et les nouvelles recommandations. En utilisant un échantillon de 2000 à 2022, 632 articles ont été collectés et 34 articles ont été inclus comme les plus pertinents. Nous constatons que la grande crise financière de 2008 a entraîné un changement structurel des marchés des matières premières et des structures des marchés financiers. Nos résultats suggèrent également que les chocs extrêmes sur les marchés des matières premières résultant du taux de change, les valeurs extrêmes et le risque résultant des changements de position financière des investisseurs restent des domaines importants qui nécessitent plus d'investigations.

Mots clés : Matières premières ; Taux de change ; Crises financières ; Marchés à terme ; Méthode PRISMA.

Introduction

Currently, exports of commodities continue to play an important role in emerging market economies. The Middle East and North Africa and to a lesser extent sub-Saharan Africa and Latin America have been the main beneficiaries of the recent increase in commodity prices. Thus, since the last global financial crisis of 2008, the financial markets are becoming more and more interconnected, and the commodity market constitutes one of the most alternative markets for the traders, hedgers, and the speculators agents. As a result and instead of interesting in one risk factor, the market markers are interested in other risk factors. This has direct impact on their financial position.

In risk management paradigm, the financial position presents the most important component for all risk managers, and the hedgers. Each agent in the financial market is interested about what will be his gain or loss when buying or selling such asset.

According to a definition provided by Joël Priolon (2019), the financial position consists of a position arising from a holding (long position) or selling (short position) a given asset, or net position, with probable return and risk.

In the financial literature, the notion of risk is assimilated to the dispersion of possible returns around the average or return. The risk is therefore a random variable that reflects the possible loss that an investor can have when buying or selling as asset. On the other hand, the variability is a measure that quantifies the magnitude of variability of this random variable. i.e. the risk of financial position (Joël Priolon (2019)). Since the exchange rate risk can be defined as the risk resulting from a depreciation of local currency for a given foreign currency. According to Francesca Taylor (2013), this risk arises from two sources. In one hand, transactional foreign exchange risk arises because of a company's day-to-day business. In the other hand, transactional foreign exchange risk arises from expressing a foreign currency asset or liability in the company's domestic accounting currency.

The exchange rate risk constitutes, therefore, a fundamental factor of risk in commodity market, and the exchange rate risk measures most useful for making forecasts in commodity market, as it was founded by Jean-Baptiste Bonnier (2021). But, throughout the stable and unstable period, such like during the financial crisis, Simon Gachter, et al (2022) concluded that the market-makers may show some risk aversion to avoid extreme risks that may arises during this period. The aim of this article is to systematically analyze the studies which have been realized exploring the link between commodities markets and exchange rate risk during and after the global financial crisis. Specifically, the objective of this study is to discover the important

perspectives describe the relationship between the commodities markets and exchange rate risk by exploring and analyzing the appropriate previous works that has been carried out in this subject.

This article seeks to find the answer of the following question: What kind of relationship exists between the exchange rate risk and the commodity markets? And how can we quantify this relationship during stable and unstable period?

To the best of our knowledge, this paper constitutes the first work that focuses on a literature review of the previous studies on the relationship between the commodity market and the exchange rate risk especially, in Morocco.

Contents

In this systematic literature review, after introducing a global perception on commodity markets and the exchange rate risk in section 1, section 2 describes the method of the Preferred Reporting Items for Systematic Reviews and Méta-Analysis (PRISMA). This method is introduced to screen and select the articles and the other bibliographic sources. Section 3 presents the bibliographic sources appear the most appropriate ones to be analyzed. Section 4 explains the results obtained from this study. Finally, the last section is reserved for the conclusion.

1. Methodology

In the last years, several studies in economics and finance are based on the systematic review. According to David Moher, et al (2019), this type of literature review seeks to systematically research for, apprise and synthesise research evidence, often adhering to guidelines on the conduct of the review.

It aims for exhaustive, comprehensive searching, and it allows to find out what is known; new recommendations for practice, what remains unknown; uncertainty around the findings; and recommendations for future research.

In this paper, our kind of literature review was constructed using the PRISMA process (the Preferred Reporting Items for Systematic Review and Meta-Analysis). This method is developed by specialists in methodology to manage systematic reviews. It systematically determines screens and designates the most important and pertinent studies in a specific area via four phases namely: Identification, selection, eligibility and inclusion (David Moher, et al (2019)).

Table 1: The selected keys words and their expressions and combinations

Latter	Mot clè	Key Words	Synonym	Expression	Combination
A	Marché des matières premières	Commodity market	Future market	A-A1-A2	A+C+E
B	Position financière	Financial position	Trading position	B-B1-B2	B+A+C
C	Taux de change	Exchange rate	Currency	C-C1-C2	C+A+B
D	Variabilité	Variability	Magnitude	D-D1-D2	D+B+A
E	Aversion au risque	Risk aversion	Risk attitude	E-E1-E2	E+A+B

Source: Authors' own proceedings (Using Excel software).

To determine and fix this specific area of the research, it is crucial that the keywords linked to the paper's topic are well fixed, which is a first step of the PRISMA's method. Main keywords selected are: financial position, variability, exchange rate risk, commodity market, risk aversion. To increase the probability of obtaining the best results, the table 1 displays the most fitted keywords their synonyms, their expressions, and their combinations using in this study. The study was conducted based on online journals and databases.

Most of the papers which have been seemed appropriate were obtained from the sources recited below:

- IMIST Electronic Resources
 - ScienceDirect
 - Scopus
 - Springer Link
 - Jstor
 - Web of Science
 - Cairn
- Erudit
- Academia
- Z-Library: which is the world's largest e-book library;
- Wiley Online Library: which is an international research library and contains various e-books, articles and journals;
- Theses.fr: which is a French catalog of thesis collections;

- Open Archive Hal: which is a multidisciplinary open archive, and contains articles and theses from French and foreign teaching and research institutions;
- Worldcat: which is a worldwide catalog of library collections.

Since the scientific and professional literature on the subject of the financial position of agents who are risk averse, whose premises go back to the 1980s, is very important. As an exhaustive reading of all the research works is impossible, it was necessary to have recourse to a set of significant and representative documents of this field of study. Our sample contains bibliographic sources whose publication date is between 2000 and 2022. Hence, in order to determine the important ones, the principal criterion for choosing articles is their relation with the following subjects:

- Commodity markets and financial position
- Commodity markets and exchange rate
- Commodity markets and risk aversion

On the other hand, the main criteria for excluding articles are the following:

- Duplicated articles;
- The publication date of the articles is before 2000
- Articles published in other languages than English and French.
- Off-topic articles.

Table 2: Number of Articles using inclusion and exclusion criteria

Database	Documents collected	Number of documents excluded after the introduction of the criteria					Selected documents
		Type of documents	Repeated	Date: >=2000	Language: English & French	Off-Topic	
Web of Science	123	30	6	0	0	1	86
Springer Link	67	11	2	5	0	4	45
Science Direct	225	20	8	0	0	5	192
Scopus	189	24	0	0	0	7	158
Wiley Online	28	9	0	0	0	2	17
Total	632	94	16	5	0	19	498

Source: Authors' own proceedings (using Excel software).

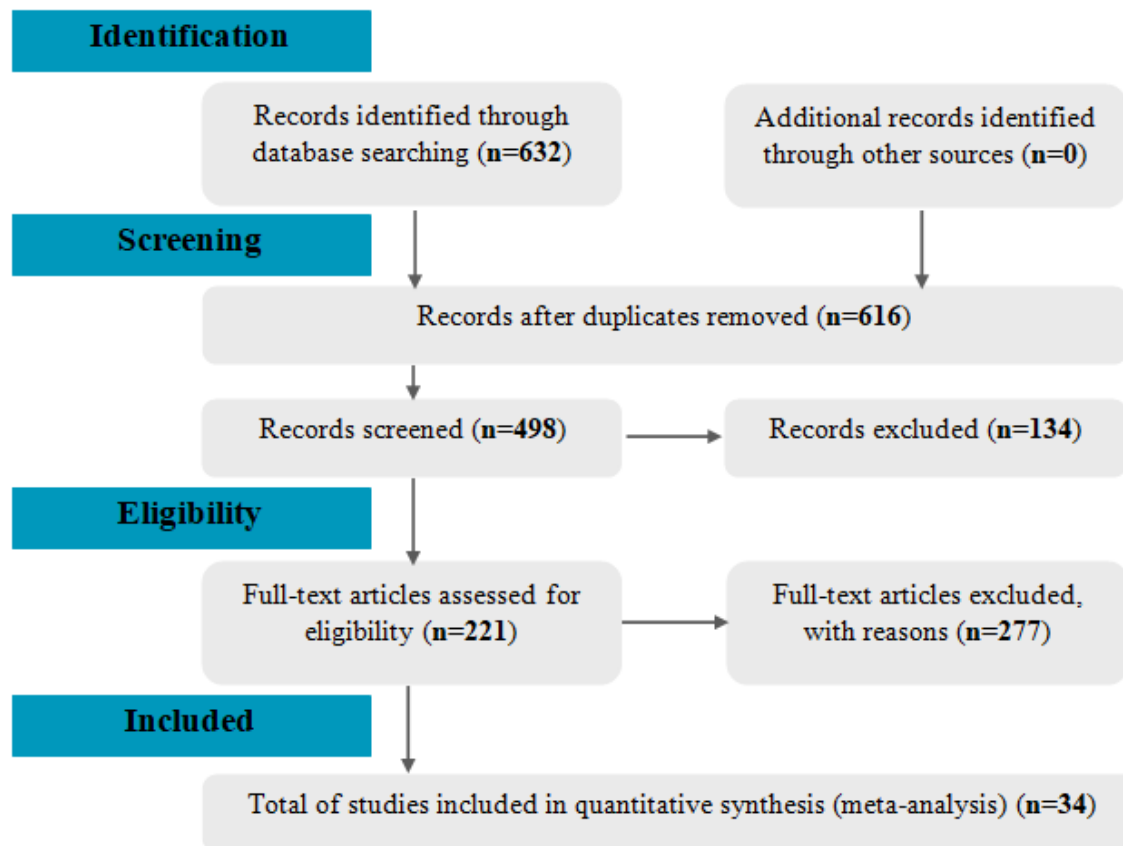
2. Results of the study: Meta-Analysis

It can be observed from the data in table 2 and figure 1 that from a total of 632 papers, only 34 were included in the study of their pertinence. The remained articles were considered irrelevant to our study, and there were removed based on exclusion criteria. The figure 1 exhibits the searching phases and the number of articles obtained in each phase.

These phases are recapitulate in four phases, namely identification of the articles, screening them via introducing exclusion requirements, eligibility and inclusion of the final articles considered pertinent to the study.

In the identification phase, we have identified 632 articles after entering in the fixed keywords in the previous databases. In the second phase (screening phase), a list of filters were applied in the report of some exclusion requirements. In this phase, 16 duplicates articles were eliminated.

Figure 1: schemes display the four steps in the systematic review process



Source: Authors' own proceedings.

The last 616 papers were reduced to just 498 articles according to the criteria previously cited. That is, regarding the publication date, 5 papers were excluded because of their appearance date, and then 94 documents were removed for their type, and 19 documents were eliminated because of their topic). In the third phase (the eligibility phase). One task was essential is to read, analyze, and review the integral-text of the considered articles to decide whether or not these articles will be included. In this paper, after having screened 498 in the two previous phases, 156 integral-text articles were examined for eligibility and 277 were excluded because their lack of relevance. In the end, 34 final articles were included in our study.

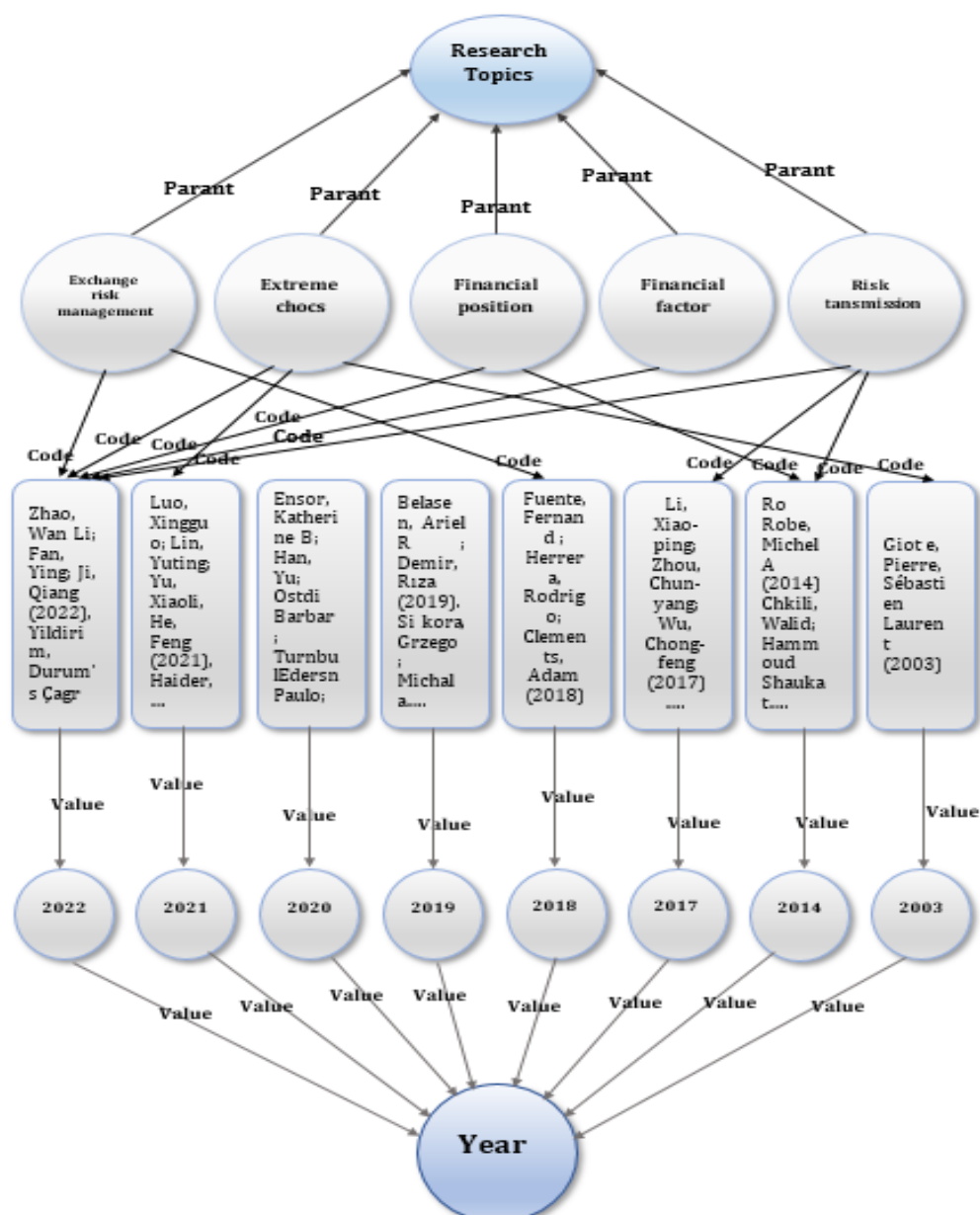
3. Analysis of results: State of Art

We now develop our theme tree that is related to the content analysis of these last 34 articles, as shown in figure 2. After the analysis and exploration of the different articles included in the systematic review, it has been found that they are all related to some extent to the research problem. That is, five central themes were selected, namely: Extreme chocks on commodity market, financial factors in commodity markets, financial position problems, risk transmission and exchange risk management.

Regarding the extreme shocks in commodity market, there was improved that the several commodities markets became more volatile. Thus, as shown in Salim Lahmiri (2017), Paul Cashin, et al (2000), and Wan-Li Zhao, et al (2022), these researchers have concluded the same conclusions whatever their difference if location sample and methodology, these conclusions can be concluded in the existence of a large and persistent shocks in commodity markets whatever their origins. Indeed, after the great financial crisis of 2008, the financial agents became risk averse and start to seek new sources of returns other than the traditional financial markets such as the stock markets and the foreign exchange markets. Thus, Renan Alves de Freitas, et al (2020) have proved the existence of the risk aversion in renewable energy portfolio. Also, Bahattin Büyüks, et al (2014), and Bogdan Włodarczyk, et al (2018) have improved that the financialization of commodity markets can help the investors to diversify their portfolios of financial assets; these results are deal with those funded in Ivar Ekeland, et al (2018).

In the recent years there has been marked an increase in commodity investment by different investors, for this new direction of investments, various researchers and studies have

Figure 2: Displaying of the principal themes evolving from the systematic literature review



Source: Authors' own proceedings (Using Nvivo software)

tried to explicate the financial position problems in the commodity markets in the last years. Thus, as shown by Xingguo Luo, et al (2021) and Ivar Ekeland, et al (2018), the authors improve the existence of the change in the agent behavior between the speculation and the hedging which have an impact of financial position risk of these agents. Furthermore, Xingguo Luo, et al (2021) improve that the commercial and noncommercial position change shows the opposite relationship towards the return.

Moreover, since the great financial crisis of 2008, the commodity markets became more interacted with the financial markets. Hence, there are several factors that can impact the commodity price such as the financial markets and exchange rates (such as mentioned by Joël Priolon (2019), and by Tom James (2016)). Indeed, according to Pierre Giot, and Sebastian Laurent (2003), and Katherine B. Ensor, et al (2020), fluctuations of price and volatility of commodity are caused fundamentally by the financial markets and the exchange rates risks.

Remaining in the same logic, and based on the frequency of the words displayed in the figure 3, another important theme can have also a great impact and can cause an extreme chocks is the risk transmission, what is called risk spillover, between the commodity market and the other financial markets in general as demonstrated by Dr. P. Sri ram (2017), and Francesca Taylor (2013), and between the commodity market and the exchange rates in particular, as improved

by Afees A. Salisu, et all (2022), Walid Mensi, et all(2017), Durmus, çagri Yildirim, et all (2022), Wan-Li Zhao, et (2022), and by Ariel R. Belasen, et all (2019).

On one hand, studying the exchange rate risk management, and using a different samples and different methodologies, several recherche studies such as Grzegorz Sikora, and all (2019), Xiaoyu Ji, and all (2019), Louis R. Piccotti (2018), Milan Ficura (2016). And Kook-Hyun Chang, and all (2001), have examined and explored the existence of jumps risk in exchange rate dynamic as extreme values.

In another hand, as improved by Robert Ready, and all (2017), and by Tantatape Brahmasrene, and all (2014), the great financial recession of 2008 has generated large and structural movements in exchange rates and curry trade returns, and the exchange rates chocks has a significant negative impact on commodity prices.

These research studies were supervised in different region using different time series and different methodologies.

Furthermore, as shown in Kenneth W. Clementsa, and all (2008), and Ranran Guo, and all (2021), Xiao-Ping Li, et all (2017), and Fernanda Fuentes, and all (2018), almost all finding agree on the existence of risk spillover, and the jumps spillover.

Consequently, this risk transmission impacted the commodity market in several ways, and a remarkable change in market participants have emerged. For this purpose, Mesias Alfeus, and all (2022) have explained that the commodity market exhibit recently, which we call the rough volatility.

Conclusion

In this paper, we have attempted to determine, explore and analysis, the research studies related to commodity markets and exchange rate. Based on the Preferred Reporting Items for Systematic Reviews and Meta-Analysis procedure, 34 research studies from a total of 632 were selected as pertinent to our review analysis. From the results, the first funding is related to the structural change that the great financial crisis of 2008 has caused in financial aspect. The financial markets became more interconnected which has made the task of modeling financial risks more difficult and complicated for both academics, researchers and practitioners in the presence of extreme chocks and the correlation between this markets.

Indeed, the increasing in number of participants in commodities markets caused the extreme chocks and the risk spillover between the commodity markets and other financial market. As the exchange rate risk has great importance in commodity exchange, the investors in these markets are exposed to the challenge of their financial position risk. Regarding the lack

observed in the literature in this area, we found that it is important to more investigate this research domain in detail to quantify and modeling the financial position variability of these investors.

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