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ARTÍCULO

The Role of Hedging and Derivatives Techniques and Fintech Adoption on Financial Risk Management in Saudi Banks

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Keywords: Hedging techniques, derivatives techniques, Fintech adoption, financial risk management, effective financial decisions.

Abstract: Recently, hedging and derivatives techniques and Fintech adoption are considered the foremost elements for financial risk management, capturing the attention of academics and policymakers alike. For this reason, the current article seeks to investigate into the impact of hedging and derivatives techniques and Fintech adoption on the financial risk management in banks in Saudi Arabia. The article also analyses the mediating role of effective financial decisions at the nexus of hedging and derivatives techniques, Fintech adoption and financial risk management in the context of Saudi Arabian banks. The current study adopts the questionnaire method to collect data and uses the smart-PLS software to analyse the collected data. The results indicate that hedging and derivatives techniques and Fintech adoption have a positive linkage with financial risk management. The findings also exposed those effective financial decisions significantly and positively mediate among hedging and derivatives techniques, Fintech adoption and financial risk management in banks in Saudi Arabia. This study offers valuable insight for policymakers in terms of developing regulations related to financial risk management.

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1. Introduction

Financial risk management (FRM) is the process of using financial instruments to manage risk exposure in a company with an intention to protect the economic worth of the firm (Wang et al., 2019). The risks which FRM has to address may be an operational risk, credit risk, foreign exchange risk, market risk, shape risk, liquidity risk, volatility risk, inflation risk, legal risk, business risk, reputational risk, sector risk, and so on (So et a)l., 2020. FRM, like general risk management, recognizes identifying causes, measuring them, and devising methods to mitigate them. Quantitative and qualitative FRM are both possible. FRM is a subset of risk management that focuses on when and how firms need to hedge with the help of financial instruments to manage costly risk exposures (Srinivasan et al., 2018). A comprehensive and successful FRM program allows a company to analyze all the hazards that it may have to confront. FRM also looks at the relationship between risks and the potential for them to have a cascade effect on a company's strategic objectives (Jokhadze et al., 2020). Due to its emphasis on predicting and understanding risk across the company, this holistic approach to FRM is sometimes referred to as enterprise risk management. FRM practices also focus on managing positive risk in addition to focusing on internal and external threats to the company's financial worth, operations, and reputations (Cai, 2018). Positive risks are possibilities that, if seized, can boost a company's value or, on the other hand, harm it if not taken. Indeed, the goal of any FRM program is to regain and add to corporate value by making informed risk decisions, and not to remove all risk (Karami et al., 2020). The current study analyzes the impacts of factors like Fintech (technological based financial innovations), useful hedging (use of financial instruments to reduce the damages of risks exposure), and derivatives techniques (contractual agreements to avoid loss and gain profit) on FRM.

The present article focuses on the influences of Fintech adoption, useful hedging techniques, and effective derivative techniques on effective financial decisions on FRM in the context of the banking sector of Saudi Arabia. The banking sector in Saudi Arabia consists of financial institutions that accept deposits of money and participate in the capital market's lending process. The modern banking system is built on the 14th-century Venetian financial market. Since its inception, the banking sector in Saudi Arabia has tripled its total assets. This is important, especially given the fact that the banking sector has just gone through a massive crisis (Cai, 2018). During this time, the Gulf Cooperation Council's financial sector has risen as well, with commercial banks' assets totalling 2.3 trillion dollars and non-bank entities totalling 573 billion dollars. The Islamic banking sector is a significant part of Saudi Arabia's financial market. The Kingdom of Saudi Arabia is a Muslim country where Sharia law is in place and guides the country's economic laws, norms and regulations (Tabash et al., 2019). The worth of traded shares in Saudi Arabia's typical capital markets is estimated to be over 195 billion Saudi Riyals among the 12 largest commercial banks. The National Commercial Bank's share trading generated about 10 billion Saudi Riyal. Net special commissions account for almost 70% of commercial banks' revenue in Saudi Arabia. Businesses receive nearly 60% of loans from commercial banks, while individuals receive only 24%. Only 16 per cent of this company is issued as real estate loans, like mortgages (Mensi et al., 2018). In the private banking sector, the average ratio of credits to total deposits in the Arab world is around 69 per cent. The emerging commercial banks in the Kingdom of Saudi Arabia have a loan to deposit ratio of 93.5 per cent (Alsharif, 2021). Some statistics related to the credit provided by banks to various sectors are provided in Figure 1.

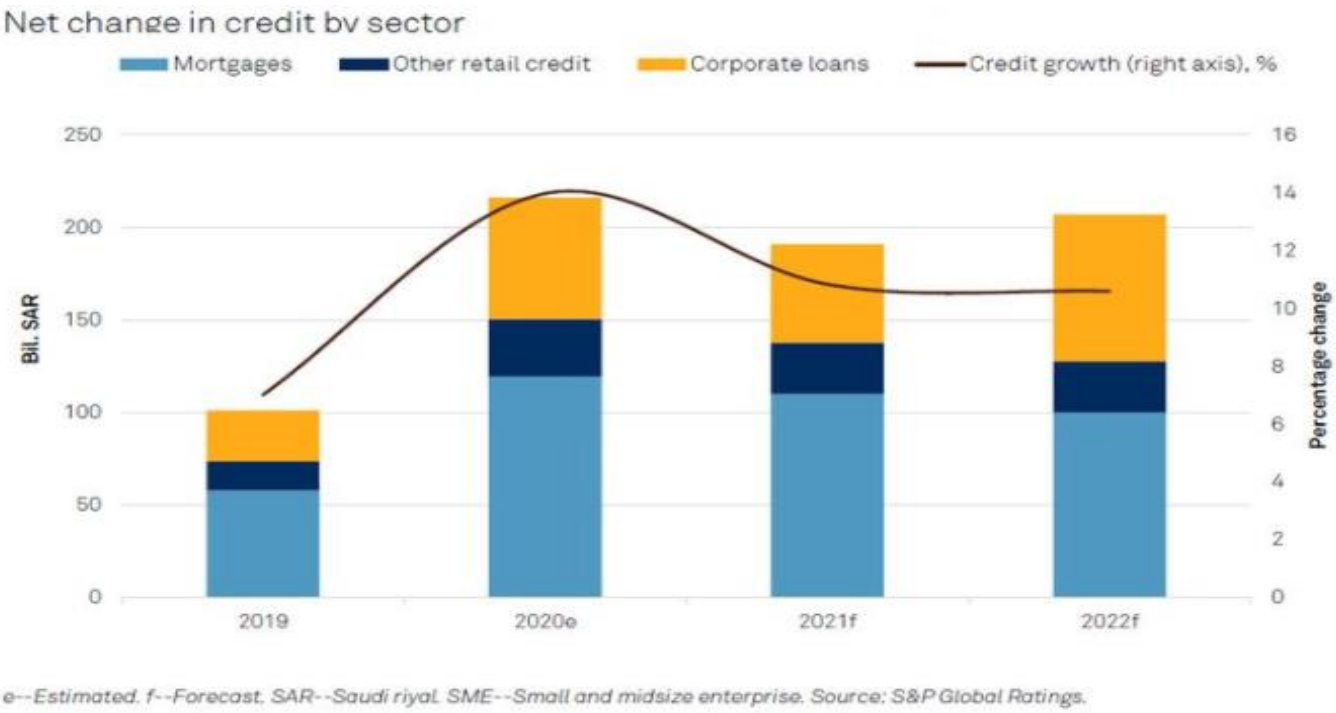

Figure 1: Credit Provided by Saudi Banks to Different Sectors

First-generation young entrepreneurs are mostly driving the Fintech sector in Saudi Arabia, which is increasingly competing with the country's top financial enterprises with 155 Fintech companies being currently registered in Saudi Arabia (Albarrak et al., 2021). In the last two years, the worth of Fintech transactions has climbed by 18.4 per cent. Fintech is providing technologies to the banking business that make it more efficient and progressive than ever before. Chatbots are being used by banks as tools to improve customer experience, smartphone apps are being used to provide users real-time

access to their bank accounts, and machine learning is being used to protect against fraud (Baber, 2019). In Saudi Arabia, the creation of the derivatives market is one of the primary projects of the Saudi Vision 2030's Financial Sector Development Program (FSDP). It also signifies a step toward offering market products and creating a trading environment that would attract local and international traders and hedgers (Glavina et al., 2021). There are two primary types of derivatives: 1: Exchange-traded futures and options, which can only be traded on regulated exchanges (the type Saudi Exchange are planning to launch). 2- OTC (over-the-counter): includes forwards and swaps that are not traded on a licensed exchange (Ourir et al., 2021).

In the economy of Saudi Arabia, banking is a significant sector that is expected to provide funds to many enterprises across multiple economic sectors and is therefore, inextricably linked to the progress of the economy. However, a large number of financial institutions, including banks, despite having high financial resources, still have to face financial risks due to large financial transactions, large deposits, a large number of loans and credits, and financial assets (Garlick et al., 2020). As exposure to risks affect the financial position of the institutions, it is necessary to pay attention to the formation and performance of FRM. The current study is an initiative to explore the effectiveness of FRM with an intention to secure the financial position of the institutions. The aim of the study is to elaborate on the impact of Fintech adoption, useful hedging techniques, and effective derivative technique on FRM. The study also aims to analyze the role of effective financial decisions among the impact of Fintech adoption, useful hedging techniques, and effective derivative technique on FRM. The study removes many limitations presented in the past studies with some significant additions. 1) Fintech adoption, useful hedging techniques, and effective derivative techniques have been investigated, and their impacts on FRM have been analyzed in the previous research articles. However, it is pertinent to note that the impact of Fintech adoption, useful hedging techniques, and effective derivative technique on FRM has been explored in separate research surveys. The current study is a simultaneous exploration of the impact of Fintech adoption, useful hedging techniques, and effective derivative technique on FRM. 2) The impacts of effective financial decisions on the goal achievement of FRM have been examined in past literature. However, this is the current study's key contribution to the literature that it explores the mediating role of effective financial decisions between the impact of Fintech adoption, useful hedging techniques, and effective derivative technique and FRM. 3) Usually, useful hedging techniques and effective derivative techniques are used as a single term to examine the performance of FRM. However, the present study, which examines the impact of useful hedging techniques, and effective derivative technique on FRM individually, seeks to bridges this literary gap.

The current study is structured as follows: The second phase reviews findings from past literature that elaborate on the relationships among Fintech adoption, useful hedging techniques, effective derivative technique, effective financial decisions and FRM. The third phase outlines the data collection process and the methods employed to analyze the validity of the present research model. Subsequently, the results are extrapolated in an effort to explore the nexus among the aforementioned factors, and these results are kept in line with previous studies for the sake of support. In the last phase, study implications, conclusions, and limitations are highlighted.

2. Literature Review

Uncertainties are common in the context of business organizations, whether they belong to manufacturing or service sectors. These uncertainties could be a threat to the reputation and operational or economic performance of the firms. Therefore, financial managers, considering the uncertain loss in the business, form risk management to be safe from threats. FRM is designed to protect the economic worth of the company with the use of financial instruments for managing risks, risks exposure, and risks damages (Finger et al., 2018). FRM is a form of risk management. Just like general risk management, FRM recognizes the sources of risk, assesses the potential of risks damages, and arranges to minimize the impacts of risks exposure. There are multiple factors that affect the performance of FRM (Leo et al., 2019). The current study examines the influences of Fintech adoption, useful hedging techniques, effective derivative technique, effective financial decisions and FRM. The interrelationships among Fintech adoption, useful hedging techniques, effective derivative technique, effective financial decisions and FRM have long been researched subject of research works. The views of scholars on the nexus among Fintech adoption, useful hedging techniques, effective derivative technique, effective financial decisions and FRM are examined below for the construction of the study hypothesis.

Jakšič et al. (2019), in their literary research on the role of Fintech in FRM, defines Fintech as a blend of the word's "finance" and "technology," characterizing it as a process in which technological innovations are brought about with the motive to enhance, improve, facilitate, or automate financial services and operations. Fintech is used by both consumers and business organizations, especially those dealing in financial products or services. According to the views of these authors, the adoption of Fintech innovations assists the work of financial institutions in performing functions like savings, deposits, investment, lending, as well as ensuring other institutions are performing in an effective manner. As a result, the financial risks are minimum, and the work of FRM becomes easy. A research study was designed by Gomber et al. (2018) to investigate the contribution of Fintech adoption to FRM. This study highlights that Fintech innovations encompass Digital Lending and Credit, Mobile Banking, Mobile Payments, Crypto currency & Blockchain, Insurance, and Online Trading. These innovations assist the recording of financial transactions, provide security to data, and makes it easy to track fraud or deception. In this situation, FRM can detect the risks and design strategies to overcome the challenges associated with risks exposures. A study was conducted by Ng et al. (2017) to analyze the emergence of Fintech and its impact on FRM with evidence from the global financial centre. This study reveals that technological developments that can increase or automate financial institution services such as savings, lending money, credit spending, withdrawal money, and bill payments are valuable to FRM as they help in detecting risks, assessing risk potential, and recommending risk mitigation strategies. As a result, Fintech adoption boosts FRM. For this reason, the current study postulates the following:

H1: Fintech adoption is in a positive relationship with the FRM.

Hedging is an effective way to improve the functioning of FRM and achieving its goals. Hedging means a risk management approach that includes acquiring an opposing place in a concerned asset to balance or compensate the losses in investment. It is also likely that hedging may result in a reduction in prospective profits due to the reduction in risk which hedging provides. Derivatives, such as options and futures contracts, are commonly used in hedging tactics (Chan et al., 2019). Hedging is considered an effective tool of risk management, but it is particularly helpful at the last stage of management. It does not help in forecasting the risks event, assessing the damages caused by the occurrence of risks, or preventing the occurrence of mishaps. It can only be helpful in

minimizing the negative impacts of the risks in case these come to transpire (Fernando et al., 2017). An article by Merkert et al. (2019), reviews the theories for risk management (financial) in the context of the airline industry and examines how effective financial hedging is (that is, foreign exchange, interest rates, and commodity) in reducing financial losses and enhancing profitability. A universal data sample was collected from one hundred airlines to analyze the role of hedging techniques in the financial performance of the airline. The results indicated that commodity index hedging leads to a considerable decrease in EBIT margin volatility, mitigates the impacts of the risk but does not put a significant impact on profitability and costs of operations. As a result of these literary findings, it can be hypothesized that:

H2: Useful hedging techniques are in a positive relationship to the FRM.

The use of effective derivative techniques is useful to FRM in any financial, manufacturing, or service sector institutions in avoiding or compensating the damages from risks and thus, in securing the financial position of the institution(Asghar Butt et al., 2018). Derivatives are financial instruments that are derived from another asset or financial instruments upon which the price of the derivatives is dependent. These are the contractual agreements between two parties, while one of them has an obligation to buy or sell a specified commodity or security, and the other has the right to sell or buy the specified commodity or security. The choice of effective derivative techniques while hedging the equity, investment, or other financial sources, can be useful to FRM at the time of planning around the risks and mitigating the effects of financial risks (Bachiller et al., 2021). The research by Giraldo-Prieto et al. (2017) analyzes financial hedging through derivatives techniques and its effects on the market value. The empirical evidence for the role of effective derivatives technique in FRM and market value was taken from Colombia's listed companies. The study implies that options contracts, futures contracts, and forward contracts are some of the most popular derivative approaches. Hedging investments are made in certain derivatives that are more appropriate to overcome risks damages, based on the risks afraid and risk management goals. Hence, FRM effectiveness can be achieved with the use of effective derivative techniques. n light of the foregoing, we put forth the following hypothesis:

H3: Effective derivative techniques are in a positive relationship to the FRM.

The literary article of Kharisma (2020) studies the relationship between Fintech, financial decision making and FRM. This research is based on data from the financial sector of Indonesia. The study demonstrates that Fintech innovations in the country motivates financial institutions to reform their policies and enable them to make better decisions when conducting their financial activities. Effective financial decisions regarding investment, lending of money, and expenditures are more likely to be effective in achieving financial goals as they help FRM in implementing their practices to overcome risks or reduce the impact of risks exposures. Therefore, effective financial decisions can build a link between Fintech adoption and FRM effectiveness. According to one past study by Chaudhry et al. (2022), in a financial institution, like a bank, the management has to take several decisions to handle all the financial matters from accepting deposits to lending money, deciding interest on deposits and credits, and variety of other banking services, in order to determine its investment portfolio. If all these decisions are effective and in favor of the institution, which is possible with Fintech adoption, the burden on FRM is reduced as these effective decisions are helpful to the FRM in terms of detecting the sources of risks, planning for preventing the risks and mitigating the impacts of risks exposures. Research Xia et al. (2020) builds a link between Fintech adoption, financial management, and FRM. Financial management and FRM are interrelated, and the decisions or consequences of the decisions made by financial management affect FRM. Fintech adoption improves the effectiveness of financial decisions and thus, improves the performance of FRM. Based on the above discussions, it can be hypothesized:

H4: Effective financial decisions are a mediator between Fintech adoption and FRM.

Different hedging techniques are used by individual investors, corporations, and portfolio managers to reduce the impacts of risks whenever they are exposed to unexpected events. Hedging against risks in investment makes use of financial instruments, and financial and marketing strategies to compensate the risks arising from adverse price volatility, market conditions, and any other unexpected adverse event. Put another way, with hedging techniques, the financial managers prevent or minimize the loss on one investment by trading in another (Alam et al., 2018). Through effective hedging techniques, and financial planning, which includes financial decisions, more effective and effective financial planning is possible which assists the functioning of FRM by reducing the occurrence of risks, threats, or doubtfulness in financial matters (Sebastião et al., 2020). A study was conducted by Khan et al. (2019) to investigate hedging as an FRM strategy for electricity spot exposures. Here, the future hedging technique is applied to the top three mostly energetically traded European electricity markets, Nordpool, Phelix, and APXUK. Most actively using hedging techniques and these markets' hedging effectiveness for two hedging periods, monthly or weekly analysis, Variance and Value at threats. The key findings reveal that electricity futures are useful from the perspective of administering risks for a particular duration while employing hedging techniques. Useful hedging techniques improve the effectiveness of financial decisions and thus, improve risk management. The study of dos Santos et al. (2017) shows that hedging is a strategy for reducing the risk of financial risk exposure resulting in losses or damages. Hedging techniques in financial concerns improve the effectiveness of financial decisions, and effective financial decisions are valuable to FRM at all three levels of the risk management process to protect the institution from losses. Hence:

H5: Effective financial decisions are a mediator between useful hedging techniques and FRM.

The research conducted by Avgouleas et al. (2019) seeks to determine the link among a choice of derivatives techniques, financial decisions, and risk management in financial institutions. The study implies that the facility of effective derivatives techniques and employment of these suitable techniques on the part of financial managers improves financial decisions, including investments, loans, policy purchases, and expenditures. Effective financial decisions lower risks and help the FRM mitigate the negative effects of hazards later on. Štulec (2017), examine the effectiveness of weather derivatives as an FRM technique in food retail in Croatia. The evidence concerning derivative techniques, financial decision making, and FRM performance was taken from sixty large food points in Croatia, and during the summer season, monthly temperature and effect on sales and financial performance was examined. For analysis, panel regression was employed. This study focuses on effective derivatives that are useful to make a future decision about using financial resources, marketing, and sales, and effective financial decisions are necessary for the FRM to make effective strategies and achieve the goals, to prevent or minimize the risks damages.

Table 1: Measurements

Variables	Items	Questions	Sources
Financial Risk Management	FRM1	"The firm's executive management regularly reviews the organization's performance in managing its business Risks."	(Muhammad et al., 2018)
	FRM2	"Your firm is highly effective in continuous review/feedback on risk management strategies and performance."	
	FRM3	"Your firm's risk management procedures and processes are documented and guide staff about managing risks."	
	FRM4	"Your firm's policy encourages training programs in the area of risk management as well as in commercials ethics."	
	FRM5	"This firm emphasizes the recruitment of highly qualified people having firm knowledge in the risk management area."	
	FRM6	"Efficient risk management is one of the objectives of the firm."	
	FRM7	"It is too dangerous to concentrate firm's funds in one specific sector of the economy."	
	FRM8	"I consider the level of risk management practices of this firm to be excellent."	
Effective Financial Decisions	EFD1	"How much confidence do you have in your ability to make sound financial decisions?	(Valentine, 2012)
	EFD2	"If you had to choose between more job security with a small pay rise or less job security and a big pay rise, which would you pick?"	
	EFD3	"When faced with a major financial decision, do you concentrate more on possible gains or possible losses?"	
	EFD4	"Would you borrow money to invest?"	
	EFD5	"How do you rate your willingness to take financial risks?"	
	EFD6	"When you think of 'risk' in a financial context, which comes to mind first?"	
	EFD7	"How easily do you adapt when things go wrong financially?"	
Useful Hedging Techniques	UHT1	"Your firm is using hedging techniques against risk."	(Čadek et al., 2011)
	UHT2	"Your firm is using different instruments to hedge against risk."	
	UHT3	".If your firm hedges against risk, does it hedge."	
	UHT4	"Your firms' P&L affected by hedging/no hedging?	
	UHT5	"Do you expect (or plan) any change in your hedging behaviour due to the recent crisis?"	
Effective Derivate Techniques	EDT1	"Does your firm have a documented policy on the use of derivatives?"	(Mallin et al., 2001)
	EDT2	"Your firm is frequently involved in derivatives activities and reported to your Board of Directors?"	
	EDT3	"Your firm frequently valued its derivatives portfolio?"	
	EDT4	"Does you're your firm used effective methods for evaluating the riskiness of specific derivatives transactions or portfolios?"	
Fintech Adoption	FA1	"Using Fintech can meet my service needs."	(Hu et al., 2019)
	FA2	"Fintech services can save time."	
	FA3	"Fintech services can improve efficiency."	
	FA4	"Overall, Fintech services are useful to me."	
	FA5	"I think the operation interface of Fintech is friendly and understandable."	
	FA6	"I believe Fintech services keep my personal information safe."	
	FA7	"Overall, I believe Fintech services are trustable."	
	FA8	"It is easy to have the equipment to use Fintech services."	
	FA9	"This firm can provide good services and products."	
	FA10	"It is easy to use Fintech services."	

A study conducted by Vo et al. (2019) investigates the relationship among derivatives approaches, financial decisions, and financial risk management (FRM). According to the study, derivative techniques, which include various forms of contracts such as options, futures, forward contracts, and swaps, improve decision-making ability and expand alternatives for FRM when developing strategies at various phases to mitigate risk. Based on the above discussions, the following hypothesis is developed:

H6: Effective financial decisions are a mediator between effective derivative techniques and FRM.

3. Methodology

The current article investigates the impact of hedging and derivatives techniques and Fintech adoption on financial risk management while also analysing the mediating role of effective financial decisions on the linkage of hedging and derivatives techniques, Fintech adoption and financial risk management in banks of Saudi Arabia. The current study adopts the questionnaire method to collect pertinent data. These questionnaires are adopted from past studies, such as financial risk management (FRM) which is used as the dependent variable is measured using eight items adopted from the research of Muhammad et al. (2018). Similarly, effective financial decisions (EFD) is taken as the mediating variable with seven items adapted from the study of Valentine (2012). Moreover, three predictors have been used such as useful hedging techniques (UHT) with five items taken from the article of Čadek et al. (2011) while effective derivative techniques (EDT) is measured using four items taken from the research of Mallin et al. (2001) and Fintech adoption (FA) with ten items adopted from the article of Hu et al. (2019). Table 1 shows these measurements.

In addition, the authors have selected fifty banks based on purposive sampling to collect the data. Moreover, the respondents were also selected based on purposive sampling. They selected those employees who possess adequate knowledge regarding hedging and derivatives techniques and Fintech to reduce bank risk. Thus, a total of 520 surveys were sent to the selected employees, and after twenty days, only 376 surveys were received, representing a 72.31 per cent response rate. Moreover, the current article has used the smart-PLS to check the validity and reliability of the items and constructs and to check the association among variables. The measurement model reveals the convergent validity which showed the items correlation which was checked using average variance extracted (AVE), Alpha, factor loadings and composite reliability (CR). The standard values of loadings and AVE are more than 0.50, while standard values for CR and Alpha are higher than 0.70. In addition, the measurement model also reveals the discriminant validity that shows the correlation between the study constructs. The current study has used Fornell Larcker, Heterotrait Monotrait (HTMT) ratio and cross-loadings to test the discriminant validity. Finally, the current study has also shown the structural model that shows the association among constructs. Figure 2 shows the relationships between the variable's understudies.

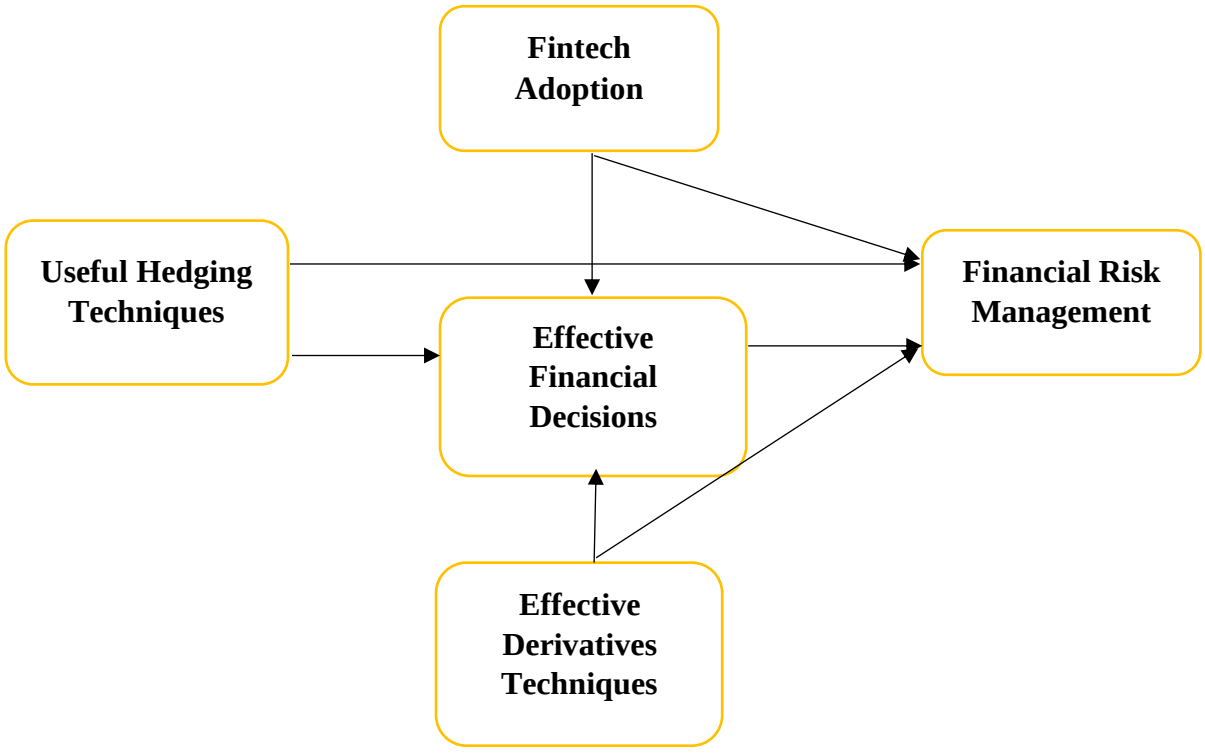

Figure 2: Theoretical Model

4. Research Findings

The measurement model exposed the convergent validity that shows the correlation between the items. The results indicate that loadings and AVE figures are more than 0.50 while CR and Alpha values are higher than 0.70. These values point to the high correlation between items and valid convergent validity. Table 2 highlights these convergent validity results.

Table 2: Convergent Validity

Constructs	Items	Loadings	Alpha	CR	AVE
Effective Derivate Techniques	EDT1	0.864	0.857	0.901	0.696
	EDT2	0.797			
	EDT3	0.891			
	EDT4	0.780			
	EFD1	0.840	0.868	0.901	0.605
Effective Financial Decisions	EFD2	0.830			
	EFD4	0.754			
	EFD5	0.788			
	EFD6	0.767			
	EFD7	0.678			
Fintech Adoption	FA1	0.559	0.917	0.931	0.579
	FA10	0.614			
	FA2	0.725			
	FA3	0.847			
	FA4	0.799			
	FA5	0.807			
	FA6	0.854			
	FA7	0.752			
	FA8	0.790			
	FA9	0.805			
Financial Risk Management	FRM1	0.673	0.892	0.916	0.611
	FRM2	0.767			
	FRM3	0.870			
	FRM5	0.853			
	FRM6	0.829			
	FRM7	0.739			
	FRM8	0.718			
Useful Hedging Techniques	UHT1	0.850	0.887	0.918	0.690
	UHT2	0.776			
	UHT3	0.856			
	UHT4	0.838			
	UHT5	0.831			

In addition, the measurement model also exposed the discriminant validity that shows the constructs correlation. The current study uses Fornell Larcker to examine the discriminant validity. The figures indicate that the first value was higher than the rest of the values in the column, pointing to the low correlation among variables and valid discriminant validity. Table 3 highlights these Fornell Larcker results.

Table 3: Fornell Larcker

	EDT	EFD	FA	FRM	UHT
EDT	0.835				
EFD	0.499	0.778			
FA	0.520	0.507	0.761		
FRM	0.552	0.585	0.616	0.781	
UHT	0.412	0.470	0.605	0.597	0.831

The current study has also used cross-loadings to examine discriminant validity. The figures show that all the values of the items of the current variable are higher than the rest of the item's values of other variables, indicating the low correlation among variables and therefore, valid discriminant validity. Table 4 highlights these cross-loading results. The current study has also used the HTMT ratio to examine the discriminant validity. The figures show that the values are lower than 0.90 which indicates the low correlation among variables and valid discriminant validity. Table 5 highlights these HTMT ratio results. Finally, the current study has also used the structural model that shows the association among constructs. The results indicate that hedging and derivatives techniques and Fintech adoption positively link with financial risk management and accept H1, H2 and H3. Table 6 shows the direct associations.

Table 4: Cross-loadings

	EDT	EFD	FA	FRM	UHT
EDT1	**0.864**	0.400	0.451	0.512	0.350
EDT2	**0.797**	0.412	0.394	0.365	0.330
EDT3	**0.891**	0.469	0.507	0.581	0.399
EDT4	**0.780**	0.375	0.361	0.334	0.282
EFD1	0.485	**0.840**	0.445	0.545	0.383
EFD2	0.369	**0.830**	0.401	0.429	0.383
EFD4	0.368	**0.754**	0.444	0.511	0.455
EFD5	0.432	**0.788**	0.361	0.445	0.303
EFD6	0.334	**0.767**	0.341	0.356	0.320
EFD7	0.310	**0.678**	0.350	0.404	0.330
FA1	0.472	0.419	**0.559**	0.373	0.418
FA10	0.596	0.457	**0.614**	0.537	0.457
FA2	0.322	0.431	**0.725**	0.580	0.386
FA3	0.324	0.299	**0.847**	0.614	0.466
FA4	0.306	0.327	**0.799**	0.584	0.410
FA5	0.271	0.290	**0.807**	0.571	0.458
FA6	0.394	0.434	**0.854**	0.719	0.537
FA7	0.346	0.371	**0.752**	0.700	0.509
FA8	0.295	0.244	**0.790**	0.537	0.373
FA9	0.383	0.495	**0.805**	0.694	0.515
FRM1	0.535	0.392	0.637	**0.673**	0.426
FRM2	0.398	0.319	0.616	**0.767**	0.469
FRM3	0.454	0.406	0.717	**0.870**	0.458
FRM5	0.426	0.392	0.696	**0.853**	0.467
FRM6	0.441	0.475	0.729	**0.829**	0.524
FRM7	0.428	0.569	0.535	**0.739**	0.457
FRM8	0.325	0.677	0.497	**0.718**	0.460
UHT1	0.307	0.378	0.504	0.502	**0.850**
UHT2	0.404	0.407	0.506	0.535	**0.776**
UHT3	0.311	0.422	0.528	0.502	**0.856**
UHT4	0.321	0.388	0.471	0.460	**0.838**
UHT5	0.365	0.350	0.498	0.471	**0.831**

Table 5: Heterotrait Monotrait Ratio

	EDT	EFD	FA	FRM	UHT
EDT					
EFD	0.568				
FA	0.575	0.554			
FRM	0.612	0.665	0.789		
UHT	0.465	0.530	0.663	0.670	

Table 6: Direct Path

Relationships	Beta	S.D.	T Statistics	P Values	L.L.	U.L.
EDT -> EFD	0.293	0.055	5.297	0.000	0.185	0.395
EDT -> FRM	0.104	0.040	2.579	0.010	0.027	0.181
EFD -> FRM	0.175	0.037	4.771	0.000	0.104	0.249
FA -> EFD	0.226	0.062	3.643	0.000	0.105	0.348
FA -> FRM	0.612	0.035	17.585	0.000	0.544	0.675
UHT -> EFD	0.213	0.056	3.802	0.000	0.106	0.322
UHT -> FRM	0.101	0.036	2.802	0.005	0.031	0.168

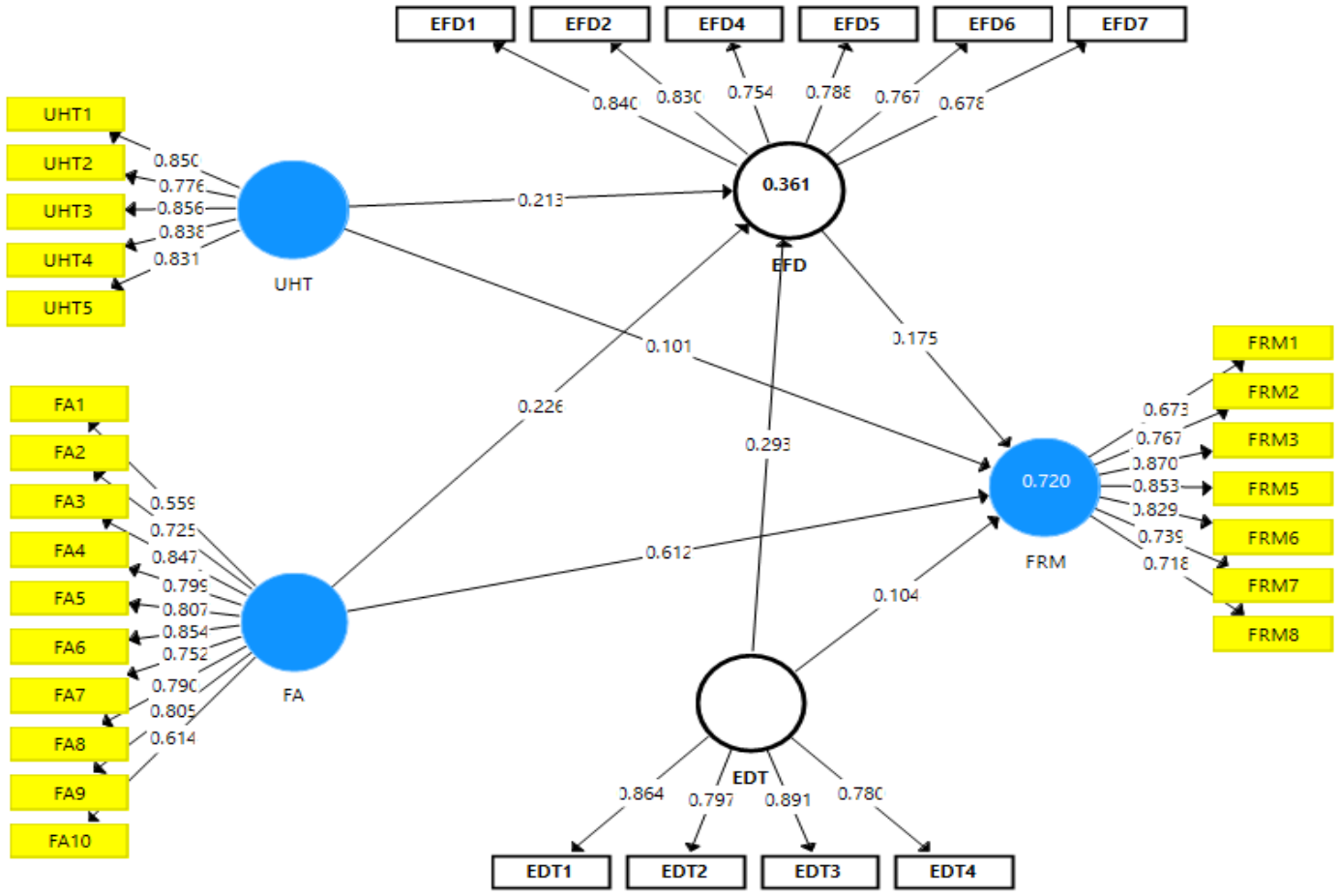

Figure 3: Measurement Model Assessment

The findings also reveal that the effective financial decisions significantly and positively mediate among hedging and derivatives techniques, Fintech adoption and financial risk management in banks of Saudi Arabia and therefore, the study accepts H4, H5 and H6. Table 7 shows the indirect associations.

Table 7: Indirect Path

Relationships	Beta	S.D.	T Statistics	P Values	L.L.	U.L.
EDT -> EFD -> FRM	0.051	0.015	3.330	0.001	0.024	0.083
UHT -> EFD -> FRM	0.037	0.011	3.258	0.001	0.017	0.061
FA -> EFD -> FRM	0.040	0.015	2.555	0.011	0.015	0.078

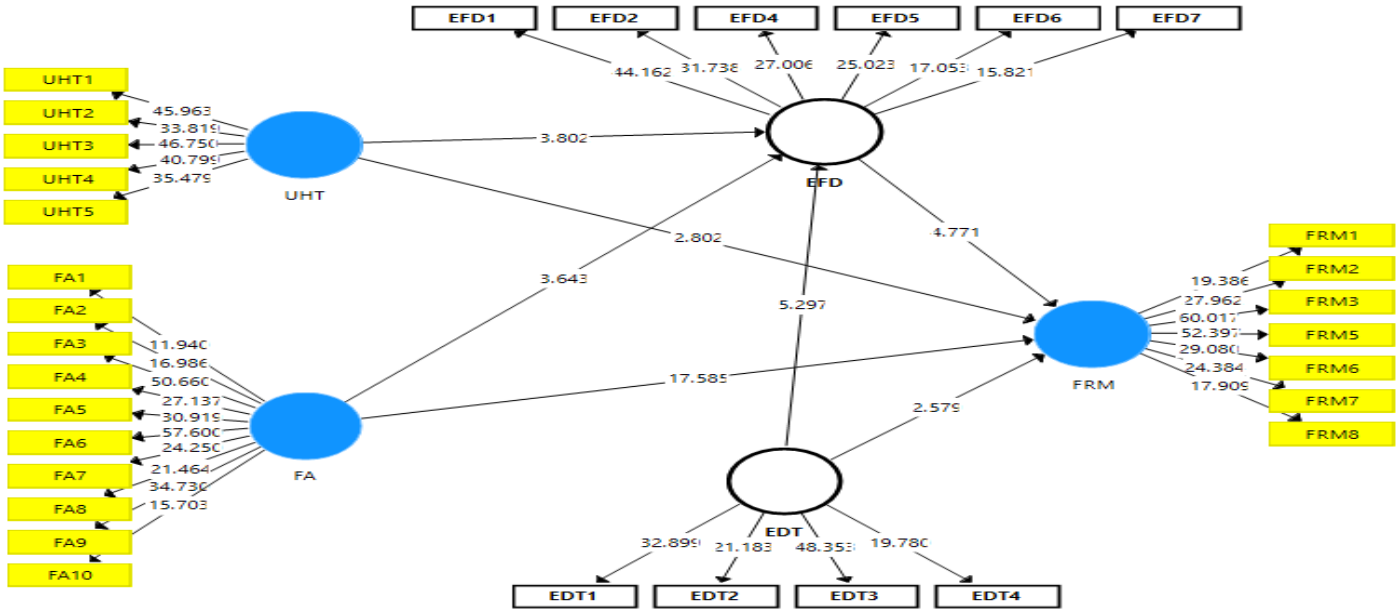

Figure 4: Structural Model Assessment

5. Discussions of the Findings

The findings have indicated that Fintech adoption is in a positive relationship to the FRM. These results are supported by the recent article of Atikah (2020), which examines the role of Fintech in the performance of FRM. This article implies that technological innovations which can enhance or automate the services of financial institutions like savings, lending money, credit spending, withdrawal money, and bill payments are useful to FRM in detecting risks, checking the risk potential, and formulating ways to adopt precautions. Hence, Fintech adoption improves FRM. These results are also in line with the past study of Giudici et al. (2019), which shows that when financial institutions adopt Fintech innovations like digital lending, digital credit, crypto currency, mobile banking, and mobile payments to perform their functions, it is easy for the FRM to protect the institution from risk damages.

The findings indicate that useful hedging techniques are in a positive relationship to the FRM. These results agree with the study of Giambona et al. (2018), which show that the adoption of useful hedging techniques with an intention to cope with the contingent losses is helpful to FRM in terms of making decisions on how to manage the risk elements when they actually materialize. Although the right decision to employ useful hedging techniques according to the nature of risks to the financial position cannot prevent the risks but it can minimize the destruction in results of risks exposure. These results are also supported by the previous study of Carter et al. (2017), which reveals that hedging is a strategy peculiar to risk management on the part of individuals or institutions. Even though it requires money and may reduce the total estimated profits, it is useful in overcoming the financial damages when the risks materialize, as estimated by risk management. Hence, useful hedging techniques improve FRM functioning and help achieve FRM goals.

The study results indicate that effective derivative techniques are in a positive relationship to the FRM. These results are in line with the study of Campbell et al. (2019), which discusses the use of derivative techniques in FRM and its role in maintaining the financial performance of firms. The study suggests that there are various derivative techniques like options contracts, futures contracts, and forward contracts etc. According to the risks in store and risk management goals, investment is made in specific derivatives, which are more suitable for overcoming the risks damages. Effective derivative techniques can improve FRM performance. These results are also in line with the literary work out of Kim et al. (2018), which demonstrates that investment in effective derivative techniques is helpful in terms of avoiding the risks exposure and minimizing the adverse impacts of risks with minimum reduction in potential profits.

The study findings have represented those effective financial decisions are a mediator between Fintech adoption and FRM performance. These results are supported by the previous study of Zhang et al. (2021). According to this study, participation in financial decision making or amendment in financial strategies decided and executed earlier are an integral part of FRM and essential for it to achieve goals. Effective financial decisions have become possible for the institutions with the development and adoption of Fintech, and thus, the goals of FRM can easily be achieved. These results are also supported by the previous study of Suryono et al. (2020), which shows that the technology-based financial innovations and their adoption in the financial operations enable the financial management to make effective decisions in the best interest of the institution. When effective decisions are made to manage financial matters, the chances of risks are rendered minimum and less severe. This facilitates the work of FRM.

The study findings show that effective financial decisions are a mediator between useful hedging techniques and FRM performance. These results are supported by the research of Kélani et al. (2017). This study highlights that hedging is meant to minimize the potential of losses or damages because of financial risk exposure. The strategies used for hedging in financial matters improve the effectiveness of financial decisions, and effective financial decisions are useful to FRM at all three stages to protect the institution from risks damages. These results are also supported by the previous article of Hanly et al. (2018), which states that financial decisions are necessary for the management of overall business operations and hedging develops effective decision making, which is helpful to FRM when formulating and implementing financial strategies to prevent or reduce the risk damages.

The study findings have stated that effective financial decisions are a mediator between effective derivative techniques and FRM performance. These results are supported by the research of McShane (2018), which shows that the availability of effective derivative techniques and their adoption at the right time improves the effectiveness of financial decisions related to investment, loans, credits, purchase of any policy and expenditures. Effective financial decisions minimize the risks and therefore assists the FRM in reducing the negative impacts of risks. These results are also supported by the past study of Pernell et al. (2017), which states that derivative techniques, which are the different types of contracts like options contract, futures contract, forward contracts or swaps, improve decision making ability and expand the choices for FRM while making strategies at different stages more risk-proof.

6. Theoretical and Empirical Implications

The present study assumes a significant place in the theory and practice on FRM. This study makes a valuable contribution to the literature on the development in the financial sector. This study examines the impact of Fintech adoption, useful hedging techniques, and effective derivative technique on FRM performance. In existing literature, authors have investigated the contributions of the Fintech adoption, useful hedging techniques, and effective derivative technique in achieving FRM goals but in separate articles or under separate frameworks of study. The collective and simultaneous analysis of the impact of Fintech adoption, useful hedging techniques, and effective derivative technique on FRM is an addition to the existing literature on the subject. This research throws light on effective financial decisions as a mediator between Fintech adoption, useful hedging techniques, and effective derivative technique on FRM, which is a key contribution to literature, as this was not done by any author earlier. This study also has great value for stakeholders in the financial sector of the emerging economy of Saudi Arabia and other similar economies. This study helps secure the financial strength as it offers guidance on how to overcome threats and mitigate their impact on the company's financial resources, market worth, and public reputation. The study suggests that with Fintech adoption, useful hedging techniques, and effective derivative technique, FRM performance can improve.

7. Conclusions and Limitations

Through this work, the author seeks to protect economic enterprises, especially in the financial sector, from threats or contingent events and their adverse impacts. The research was designed to determine the impact of Fintech adoption, useful hedging techniques, and effective derivative technique on FRM,

along with the aim of analyzing the influences of the same on effective financial decision as well as the link between effective financial decisions on FRM. Through a quantitative research survey of the banking institutions in the economy of Saudi Arabia, it has been possible to examine the impact of Fintech adoption, useful hedging techniques, and effective derivative technique on FRM and the influences of Fintech adoption, useful hedging techniques, and effective derivative technique effective financial decisions in specific country context. The study demonstrates the positive influence of Fintech adoption, useful hedging techniques, and effective derivative technique on FRM. The results indicate that with the adoption of Fintech innovations for facilitating and improving financial services, the work of FRM becomes easy, and FRM goals can be attained. The results also show that through useful hedging techniques, FRM can develop better strategies to protect the company from threats or hazards and thus, it can reduce the adverse impacts of risks exposures. Moreover, the results show that FRM can take the help of different financial instruments like derivatives to pick opportunities and reduce the losses from risks exposures. The study also concludes that Fintech adoption, useful hedging techniques, and effective derivative techniques improve the effectiveness of financial decisions, and more effective financial decisions can, in turn, improve the performance of FRM.

The current study has sought to give a detailed description of FRM. However, it has several limitations. Authors or scholars in future must remove these limitations to achieve more meaningful and conclusive study outcomes. This study emphasizes only specific variables, that is, Fintech adoption, useful hedging techniques, and effective derivative technique and their influences on FRM. Besides these factors, there are other additional factors or variables that may affect the performance of FRM. Therefore, future authors

must examine these factors along with the ones mentioned above while analyzing the FRM effectiveness. Moreover, in this study, effective financial decisions have been taken as a mediator between the Fintech adoption, useful hedging techniques, and effective derivatives techniques and FRM. In future, authors are urged to also examine the moderating influences of effective financial decisions on Fintech adoption, useful hedging techniques, and effective derivative technique and FRM.

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