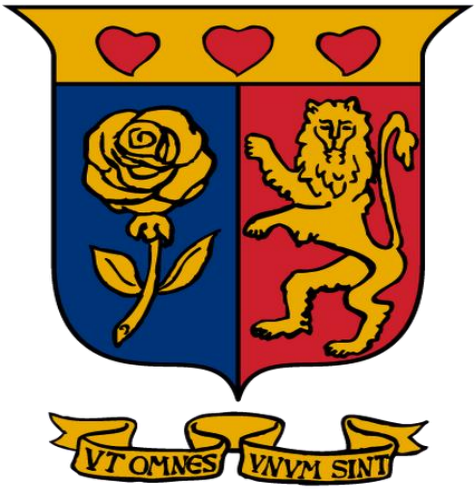

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Impact of Currency Risk Premium on Stock Returns

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Submitted in fulfillment of the requirements for the Degree of Bachelor of Business Science in Finance at Strathmore University

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Declaration

I hereby declare that this Research proposal is my original work. It has not been presented by any other person from any other institution known and unknown to me.

Grace Chege

Signed……..

Date……..

This Research proposal has been submitted for examination with my approval as the Supervisor.

Dr. John Olukuru

Signed……

Date……..

Abstract

African markets are riddled with occurrences that make it quite difficult to understand the investing environment, especially with the stock markets. Foreign and local investors hence demand greater compensation for unknown and uncertain risks. This research looks at one such major risk, exchange rate risk. The method used is one by Du & Hu (2014) that describes cross sectional returns of the Fama & French (1993) three factor model and adds one more factor of exchange rate sensitivity. The findings show a strong relationship between stock returns and exchange rate sensitivity. More precisely, we are able to determine given the constraints that the market compensates for currency risk for up to 20% of total returns.

Chapter 1: Introduction

1.1 Definition of Currency Risk

Madura (1989) defines currency risk as the effect of change of exchange rates on the firm's value. The author also goes on to describe three types of exchange rate risk. The first is translation risk. This is the risk associated with having assets and liabilities denominated in different currencies such that the value of the firm is exposed to fluctuations due to concurrent fluctuations in exchange rates. A firm having a subsidiary in a different country working with a different currency will more often than not find itself having to translate revenues and financial statements into its own currency whose exchange rate is fluctuating. The second type is transaction risk. It is the exposure of the firm to currency risk whereby transactions (receivables, payables, dividends etc.) occur in different currencies other than its own domestic currencies. The third type of risk is economic risk. Which is the risk of fluctuation of the present value of future expected cash flows of the firm owing to fluctuation of the currency exchange rate.

Adler & Dumas (1984) argue that a currency does not become risky when you expect it to devalue because that involves some form of certainty. They define currency risk as a question of randomness of movement, in other words, unexpected changes in the way the currency moves from what was anticipated. According to the author, currency risk is to be identified with statistical quantities which summarize the probability that the actual domestic purchasing power of home or foreign currency on a given future date will differ from its originally anticipated value. He describes exposures as the amounts of foreign currencies which represent the sensitivity of the future, real domestic currency value of any physical or financial asset to random variations in the future domestic purchasing powers of these foreign currencies, at some specific future date.

There are different ways for a multinational firm to be exposed to exchange rate risk. If a firm acquires or owns a subsidiary in a foreign country, devaluation of the foreign currency would make the goods produced in that foreign country cheaper for export. However, if the same subsidiary imports production inputs into the country, a devaluation of the foreign currency would interpret into a more expensive cost of production for the parent company hence cutting back on previously realized profits, (Shapiro, 1975). Firms that do not have activities in other foreign countries may also find themselves exposed to exchange rate risk as well. This is because they face foreign competition from foreign firms and might find themselves indirectly exposed to currency risk.

1.2 Trend of Currency Risk

For an unspecified period of time, people traded in different ways using barter trade and commodity money such as sea shells, gold and silver coins among others. The first globally accepted means of exchange was the gold standard which was used from 1880-1914. In this system, central banks set their currencies with reference to the price of gold. They bought and sold gold at fixed prices. There were other commodities used as well, silver and wheat for example. This standard had its own set of issues. One being that the value of gold differed with hording of gold reserves by individuals. Also, a new gold mine would devalue the value of a currency quite easily in a country. The gold standard collapsed after the World Wars because countries printed more money for defense expenditure than their gold reserves could back up in value.

The gold standard was unilaterally discarded and a new system called Bretton Woods was agreed upon and adapted in 1944. In this system, the US dollar was pegged to the price of gold at $35 per ounce. Other countries then pegged their currencies to the US dollar. Central banks held reserves of both US dollars and gold. The US now faced a new challenge of not having control over their exchange rate, also, increase of dollar reserves held by other countries provided a money supply problem in the United States. This system however evolved differently for developed and developing countries.

Developed countries enjoyed free currency convertibility where they could freely buy and sell foreign currency in order to carry out transactions. Developing countries on the other hand had all foreign exchange transactions subject to government regulation. Their residents were required to sell any funds received from exporting to other countries immediately to the central bank at the set exchange rate. The government had to approve all imports as well and only allowed items that were deemed completely necessary. Central banks did this in order to maintain the balance of payments. This brought about the uprising of illegal forex markets that were later deemed to be the best barometer of the state of balance of payments and whether there existed a deficit or surplus, such was the case in Myanmar, Burma and a lot of the south eastern Asian countries. The Bretton Woods system was discarded by the US president in 1970 because the country was struggling with significantly low dollar reserves.

The Bretton Woods system was replaced by floating rate system in the Jamaica agreement of 1976 which is still in use today. Most counties either dollarized systems, pegged systems or managed

float systems. With dollarization, a country does not issue its own currency but uses the currency of another country as its own foreign currency, an example is El Salvador which uses the US Dollar. In pegged systems, a country pegs its national currency to another foreign currency such that its value and volatility is dependent on that currency and maintains a fixed foreign exchange rate. China pegged their currency to that of the dollar for 8.28 Yuan per US dollar from 1997 to July 15 2015. The managed floating rate allows a currency to fluctuate with forces of demand and supply and central banks intervene in order to stabilize it.

Exchange rate risk has shifted over time from barter trade where it existed in the form of risk that the goods exchanged with are not exactly worth the goods exchanged for. At the time of the gold standard, it existed in the form of countries having deep volatility in their balance of payments because of volatility in the trade of gold. With the Bretton woods system, currency risk existed in many different facets. One was in the fact that there were not enough US currency to hold as reserves for central banks of the world. The second facet existed in developing countries whereby the official exchange rate differed from that in the illegal exchange rate markets. The floating rate exchange rate regime provides even greater sources of risk especially in the managed floating regimes whereby exchange rates experience heightened volatility.

Financial markets have evolved to mitigate against this risks through various ways such as the use of currency options, swaps, forwards, futures. There are also money market hedging techniques whereby if a firm is expecting inflow or outflow of funds in a foreign currency, it can hedge its position by borrowing and lending in the money markets in order to obtain a home currency value of the receipt or payment. These techniques however only exist in developed countries with developed markets. In developing countries such as those in Africa, options for hedging are few and involve mainly operational techniques such as leading payments when you expect the home currency to appreciate and delaying receipts concurrently.

1.3 Trend of Currency Risk with Stock Returns

Jorion (1990) studied US stock markets using an unconditional six factor model that used trade weighted exchange rates for currency variations. Using maximum likelihood techniques, he found out that the return premium was small at 0.2 percent annually. This implies that the investors in the US do not require compensation for currency risk. (NG & Hu, 1997) Conducted research in Japan among 171 multinationals and found that 25% of these stock returns were positively related

to changes in rates of exchange. They also found out that the level of exposure was limited to level of exports and proxies for hedging strategies. They conferred that smaller firms in Japan hedged more than their larger counterparts. Firms that paid larger dividends or highly leveraged firms had smaller exposure to currency risk.

Claessens, Dasgupta, & J. D. Glen, (1995) found that a large set of emerging markets price risk and Francesca, Errunza, & Majerbi (2004) found that about 20 to 30 percent of risk premium in the same markets was attributable to exchange rate risk. Batram & Bodnar (2012) found that emerging markets are more significantly exposed to exchange rate risk.

In 2015, administrations of the Central Bank of Kenya and Central Bank of Nigeria came under scrutiny for refusing to change interest rates even after their currencies faced pressure to weaken. The Nigerian Naira had dropped 10% against the dollar within the first two months of the year while the Kenyan Shilling had dropped 14%. International investors were now heavily exposed to currency fluctuation risk owing to the fact that even though markets performed well, their assets would not reflect the same once translated into their home currencies.

1.4 Research Question

What is the premium for currency risk in the South African stock market?

1.5 Research Objectives

To determine currency risk premium in South African stock markets.

1.6 Justification

This study aims to find out if African markets compensate foreign investors for this additional risk of holding assets in weaker currencies that are prone to frequent fluctuation.

1.5 Problem Statement

Currency risk, under the traditional Capital Asset Pricing Model is part of unsystematic risk. Methods for hedging against currency risk include derivatives, operational hedging techniques; they are wide and varied. However, smaller developing markets such as those in Africa face problems of insufficient liquidity and reduced robustness as compared to other global and larger markets such as those in Europe and North America. The methods for hedging currency risk in Africa are constrained. Assuming risk averse temperaments, investors will require a higher rate of return for the added exchange rate volatility risk they face for investing in developing markets.

This research aims to contribute to the pool of knowledge by finding out if developing countries, like emerging countries compensate their investors for currency risk.

Chapter 2: Literature Review

2.1 Currency Risk Measurement

Adler & Dumas (1984) suggested a statistical regression technique to measure currency risk. The coefficients of the purchasing power variables, (the exchange rates when domestic inflation is zero), in a multiple linear regression of an asset's future domestic currency market price on the set of contemporary foreign exchange rates. It decomposes the probability distribution of a risky asset's domestic currency price at a future instant into two parts: one that is correlated with the set of exchange rates and one that is independent of them.

There are studies that have been performed to investigate cross-country variation in currency exposure. Dominguez & Tesar (2001) conducted a study on exchange rate exposure in eight countries at the firm and industry level and were able to distinguish a substancial linkage between foreign activity and exposure. They did another siilar research in 2006 and found that exposure was larger for smaller firms but that they were limited to foreign axctivity. Griffin & Stulz (2001) conducted a cross country reseach as well but concluded that foreign exchange exposure was statistically and economically small. Doidge, Griffin, & Williamson (2006) used a larer sample of eighteen developed countries and found that foreign exchange exposure is statistically and economically small for individual firms.

There exists another line of studies that try to explain the insignificance of exchange rate exposure. Francis, Hasan, & Hunter (2008) used Conditional Asset Pricing Modeling in 36 industries. They found that currency exposure varies with time and that insignificant currency risk at the industry level has to do with methodological problems and not hedging. Batram & Bodnar (2012) showed that exposure effects ranged from 1.2%-3.3% per unit of exposure for their entire sample.

(Adler & Dumas, 1984) Stipulated that a reasonable measure of exposure to currency risk should meet three criteria: one, it should be in dimensions of domestic currency for domestic risk and foreign currency for foreign risk, two, it should be any asset or liability, physical or financial that an investor might be owed or owe, and three, the technique should be implementable in that it can be accomplished with what is available and exposures to currency risk can be covered or hedged with available financial instruments.

The Fisher Effect states that currencies with high inflation rates should have higher interest rates than countries with lower inflation. The purchasing power parity will require that high inflation and high interest rate conditions should be met with a depreciating currency. This is also known as the International Fisher Effect. However, in reality, low inflation rate countries do not appreciate according to the interest rate differential and neither do high inflation coutires depreciate with the same differential. One explanation for this is aggregate consumption growth risk. High interest rate countries depreciate when domestic consumption growth is low while low interest rate currencies appreciate under similar conditions. Hence low interest rate currencies provide a hedge against domestic aggregate consumption growth risk, (Lustig & Verdalhan, 2007).

2.2 Interaction of Exchange Rates and Stock Prices

Classical economic theory stipulates a relationship between the way stock markets perform and the way exchange rates behave. Stock prices and exchange rates interact either through 'flow oriented' models or 'portfolio balance' models.

Dornbusch & Fisher (1980) suggested the 'flow oriented' models where changes in exchange rates caused changes in stock prices. This follows the assumption that if markets are efficient according to the Efficient Market Hypothesis, then the stock price for the firm reveals the discounted present value of future expected cash flows of the firm and any the phenomenon that affects the firm's cash flows will herein be reflected.

Branson (1983) conferred a 'portfolio balance' approach where stock markets determined exchange rates. Here, stock markets have a negative correlation with exchange rates such that a decrease in stock prices leads to a decrease in domestic wealth thus lower domestic money demand and interest rates, it leads investors to demand less of domestic assets and consequently domestic currency. Nyamute (1998) studied the relationship of stock prices and other financial variables such as interest rates, money supply, inflation and exchange rates in Kenya. His analysis showed a positive relationship between exchange rates and stock prices. However, he used a non-stationery series which might affect results adversely.

Hatemi & Irandoust (2002) studied the causal relationship between stock prices and currency exchange rates in Sweden using granger causality tests. They found that stock prices have a unidirectional effect on exchange rates. They used monthly nominal exchange rates and stock

prices from 1993 to 1998. Sifunjo & Mwasaru (2012) Carried out a similar causality granger test on the causal relationship among stock prices and exchange rates in Kenya from November 1993 to May 1999 and found that exchange rates granger causes stock prices in Kenya.

Ibrahim & Aziz (2003) analyzed four macroeconomic variables that affected stock prices in Malaysia and found a negative relationship between stock prices and exchange rates. They used monthly data from 1977-1998. Tsoukalas & Dimitrios (2003) observed a strong relationship between stock prices and foreign exchange rates in Cyprus owing it to the fact that the country mainly depends on services such as tourism and offshore banking.

Phylaktis & Ravazzolo (2005) Aimed to find out the long run relationship between stock prices and exchange rates among pacific basin countries. They found no long term relationship between the real exchange rate and the local stock market in each country except for Hong Kong. They also found that the US stock market and local markets have strong linkages and the US market can be thought of as a strong 'causing variable' in performance of local markets. Foreign exchange restrictions were also found to not be important link between domestic stock and foreign exchange markets and also domestic capital markets and world capital markets.

2.3 Currency Risk and Stock Returns

Bernard & Solnik (1995) used a conditional framework to price assets according to their stochastic function and payoff. Risk prices are made as linear functions of a set of variables. This model implied that the stock market significantly compensated investors for currency risk. Some research has however uncovered the time varying nature of risk premiums and a strong negative relation to interest differentials, (Carlson & Osler, 2003). Their study reveals that currency microstructure may have macroeconomic implications.

The Capital Asset Pricing Model-CAPM compensates investors for the time value of money and provides an additional market risk premium. One development of the CAPM has been the International CAPM that compensates investors for exchange rate risk in addition to time value of money and market risk. The ICAPM has better results in practice. The foreign currency risk premium (FCRP) is calculated by finding the difference between the expected future spot exchange rate and the forward rate divided by today's current spot rate. The ICAPM is then featured as;

$$R_i = R_f + \beta(R_m - R_f) + (\beta_i * FCRP_i) \quad (1)$$

Where Ri is the expected return, $(Rm-Rf)$ is the premium for global market risk and $(\beta i * FCRPi)$ is the foreign currency risk premium with βi being the sensitivity of domestic currency returns to fluctuations in foreign currencies.

Santis & Gerard (1998) tested a conditional version of the ICAPM using a parsimonious multivariate GARCH process with a parametric approach. They found that with the exception of the US equity market, the premium for bearing currency risk represents a significant fraction of the total premium.

Lettau, Maggiori, & Weber (2013) used a different version of CAPM, the Downside Risk CAPM. In this model, currency returns are explained by a model in which investors are concerned with downside risk. They evaluated assets across different asset classes, currencies, commodities, sovereign bonds among others. They found out that assets with higher downside risk beta earn higher excess returns even when controlling for their CAPM beta.

There also exists another improvement to the CAPM, the Arbitrage Pricing Model (Ross, 1976) which explains different risk factors and their contribution to the excess return premium. However, the APT can be fixed for a considerable number of factors with and they would still maintain a strong explanatory power, it remains impossible to refute empirically, (Shanken, 1992a).

The enhanced asset pricing model takes into account general risk factors across firms using (Fama & French, 1993) model and adjusts for illiquidity problems with (Amihud, 2002).

Bartram & Bodnar (2012) researched the importance of the return generating process from non-financial firms from 37 countries. They found out that the effect of exchange rate exposure on stock returns is conditional and show a significant firm-level effect on return impact by currency exposure when exchange rates are conditioned. They found out that realized return to exposure is directly related to the size and sign of the exchange rate. When exchange rates fluctuate, currency premia adopts a time variation factor. They inferred from their analysis that return impact ranges from 1.2%-3.3% per unit of currency exposure. The impact was larger in in emerging markets compared to developed markets. They concluded that the relationship between currency exposure and stock returns is more consistent with a cash flow effect than a discount effect.

Akhtekhane & Mohammadi (2012) measured exchange rate fluctuations using Value-at-Risk with parametric and historical methods. The parametric approach provided a very large error margin. The historical method was proven to be the best measure for currency risk.

The mode of measurement that will be used in this research is the model described by (Du & Hu, 2014). The model identifies the sensitivity of each firm's operating cash flows to currency fluctuations over time and constructs a zero investment portfolio that takes long positions in stocks whose operating cash flows have positive sensitivity to exchange rate movements and short positions in stocks whose operating cash flows have negative sensitivity to currency movements. The return of the portfolio is then driven by currency movements hence showing the return premium for pure currency risk.

2.4 Conclusion

Prevailing literature leaves a gap when it comes to measuring currency risk premium especially in African markets. This study aims to contribute to the pool of knowledge by measuring sensitivity and return attributable to exchange rate risk.

Chapter 3: Methodology

This research aims to provide a robust explanation of currency risk premium in stock returns for equity investors in South Africa. It then follows that the model used is one with high explanatory power that provides the specific solution to the problem and one that is applicable with the available data and market constraints prevalent in the South African equity market.

3.1 Research Design

This research will use a quantitative analysis approach. The model used as described by (Du & Hu, 2014) has two major benefits. One is that the factor mimicking portfolio captures only information in currency movements that is pertinent to stock returns thus reducing noise in estimations. The second benefit is that the firm estimates sensitivity to exchange rate fluctuations with a rolling regression to give it a time-varying quality in firm level exposure.

3.2 Population/Sample

The population selected is stocks listed on the Johannesburg Stock Exchange. This is because of availability of data as well as the depth and tightness observed in the market. This research will include collection of data such as stock price, operating profit and market cap data for individual firms and corresponding market indices and bond yields.

In order to construct the factor mimicking portfolio, we need to construct portfolios based on size and sensitivity breakpoints. Two portfolios will be formed on size according to market capitalization and three formed on cash flow sensitivity.

3.3 Data and Description and Sources

This data to be collected will be from January 2005 to December 2015. An eleven year period is selected in order to provide robustness and enhance suitability of findings.

We will use annual data to construct Fama French (1993) factors for size, market cap and value. Cash flows will be measured as operating profit (Du & Hu, 2014). For each set of portfolio, five firms will be selected at random from the population that fulfills proper accounting data needed. Annual exchange rates will be used in the measurement of sensitivity to cash flows.

Sources for exchange rate data include the central bank of South Africa. Stock prices will be extracted from investing.com, other stock particulars from sharedata.com.

3.4 (Du & Hu, 2014) Model Description

The main approach of the model is to create a zero investment portfolio whereby they take long positions in stocks with positive sensitivity to currency movements and short positions in stocks with negative sensitivity to currency fluctuations.

In order to determine sensitivity, quarterly cash flows are standardized with total assets and regressed as the dependent variable and the specific's country's percentage change in annual nominal exchange rate index (ERI) as the independent variable. This is done through the function:

$$\frac{\Delta CF_{i,t}}{Assets_{it}} = a_i + b_i \Delta ER_{It} + \varepsilon_{it} \qquad (2)$$

Portfolios are held for one year (time t) and rebalanced at the end of the year (time t+1) where the stocks are reclassified based on size and cash flow sensitivity based on coefficient estimate over prior 5 years (time t-4).

Currency movements are rationalized to mostly affect large stocks because of the wider base of operations. Hence, the model uses three big stock portfolios to construct the factor mimicking portfolio of currency risk.

The factor mimicking portfolio (XMI) is defined as the average return on two sensitivity portfolios minus the insensitive big stock portfolio.

$$\mathrm{XMI}_t = \left(\frac{\mathrm{BP}_t - \mathrm{BN}_t}{2}\right) - BI_t \qquad (3)$$

Where $XMIt$ is the currency return factor mimicking portfolio, BPt is the big stock portfolio with positive correlation to currency risk, BNt is the big stock portfolio with negative correlation to currency risk and BIt represents big stock portfolios insensitive to currency risk.

In order to find out if return attributable to exchange rate risk is economically significant and a priced factor in the market, we compute mean returns of (Fama & French, 1993) over the sample period by regressing through

$$r_{it} = \alpha_i + \beta_{i,MKT} MKT_t + \beta_{i,SMB} SMB_t + \beta_{i,XMI} XMI_t + \beta_{i,MOM} MOM_t + \varepsilon_{i,t} \qquad (4)$$

$MKTt$ Is the excess market return, $SMBt$ is the difference between returns from large cap and small cap stocks, $XMIt$ is the excess return attributable to currency risk and $MOMt$ is the difference between the month t returns on diversified portfolios of the winners and losers of the past year. β represents the factor loadings for the different sources of return in the portfolio.

Chapter 4: Results and Discussions

The tables featured below provide results for the time series regression carried out against the four factors outlined in Equation 4 above.

Table 1: Time Series Regression

Size	Cash flow Sensitivity	Alpha	Market Premium	XMI	SMB	MOM
Big	Positive	-0.055	0.292	0.918	0.136	0.001
	Negative	-0.011	0.8129	0.765	0.066	-0.36
	Insensitive	-0.008	0.873	-0.583	-0.015	-0.127

The table above reports that a significant size of asset return is represented by the XMI and market premium factors. The XMI factors seem to distribute among the sensitivities in ranking order implying that the greater the volatility of exchange rate changes, the higher the premium provided for the same. The fact that the SMB and MOM factors have reasonably low explanatory power shows a likelihood that there may be other factors that account for returns in the South African stock market more adequately and comprehensively.

Table 2: Regression Statistics

Size	Cash flow Sensitivity	Multiple R	Adjusted R^2	Standard Error
Big	Positive	0.955	0.911	0.014
	Negative	0.767	0.576	0.056
	Insensitive	0.888	0.782	0.027

The multiple R and the adjusted R^2 statistics show a particularly strong linear relationship among the four factors citing the big portfolio with a positive sensitivity to exchange rate fluctuations as the most formidable of the three portfolios. This could be an implication that despite having larger operation scale and thus greater opportunity to hedge away currency risk, uncertainty of exchange rate fluctuations is high and has a much higher impact on cash flows generated by the firm. Another explanation would be the unavailability of edging opportunities for South African companies considering that the derivatives market exists in its infancy stage still.

Table 3: Beta Coefficients

Size	Market Premium	XMI	SMB	MOM
Beta Coefficients	-0.087	0.198	-0.079	-0.181

The XMI beta sensitivity factor seems to stand out in Table 3 as the highest among all four factors. This would imply that the market takes into account the uncertainty faced by investors looking to purchase stocks with greater sensitivity to fluctuation in return due to exchange rate changes and compensates them for it.

The findings show that stock returns compensate investors for exchange rate risk for up to 20% of total return. However, it also shows that the Fama, French (1993) factors do not contribute majorly to stock returns.

Chapter 5: Recommendations and Conclusions

5.1 Scope and Limitations of the Study

Unavailability of data was a major drawback in this research, especially finding performance data for 10 years prior to the date of this research. Small firms were the hardest to find data for. Large firms also listed their financial information in foreign currencies and lacked uniformity in how they translated their financials to local currencies.

5.2 Conclusions

The findings from this study show a strong relationship between stock returns and exchange rate fluctuations. The findings also go ahead to prove that the South African stock market does compensate investors for exchange rate risk.

5.3 Recommendations

The same study can be carried out by sampling different African markets and interpreting the results as an African holistic point of view. Though stock markets that can match the depth and history of the South African market are few.

The results posted above show a strong relationship between stock returns and exchange rate volatility. The model used seems to imply that besides the Fama & French (1993) factors of SMB and MOM, there may be more factors to be considered when trying to explain cross sectional returns especially in African countries. Such factors that could be priced by the market include an illiquidity premium and political risk.

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