The Effects of Exchange Rate Fluctuations on SMEs' Operating and Financial Performance Perspectives from Egypt

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Abstract

Trade has always taken place from the Stone Age till our modern days, but the medium of exchange has changed from stable goods (mostly gold) to modern fiat currencies (mostly of the G7 currencies). Unlike traditional currencies (Gold, Silver ETA), these currencies fluctuate, therefore creating a foreign exchange risk. These risks cut across both countries and organizations from big to small. This paper investigates The Effects of Exchange Rate Fluctuations on SMEs' Operating and Financial Performance Perspectives from Egypt, we find while increased volatility significantly results in increased DOL, due to greater fixed costs inflexibility, also it causes a decrease in DFL as firms deliver to reduce the financial distress costs. The study conducted by investigating the data from 24 small and medium enterprises (SMEs) listed in the Egyptian stock market, the research concludes exchange rate risk has been negatively

immense on the firm's operational and financial stability., highlighting the critical need for effective hedging strategies and supportive policies to enhance SME resilience in Egypt's volatile economic environment. Also, based on the comprehensive analysis conducted in this study, both research hypotheses are supported. Hypothesis 1 is supported as degree of operating leverage and financial leverage increase Egyptian SMEs, suffers from decrease in their profitability due to lower cost effectiveness induced in weakening the financial position , hypothesis 2 is also supported by the fact that good hedging tactics such as forwards, currency swaps and diversification lower the impact of adverse currency volatility, thus strengthening the competitive position and financial performance of SMEs in Egypt's capricious economic climate.

Key words: SMEs: Smalland Medium Enterprises,**DOL**: Degree of Operating Leverage **DFL**: Degree of Financial, **G7**: Group of Seven, **ETA**: (et cetera)

ملخص البحث

لطالما استمرت التجارة منذ العصر الحجري حتى عصرنا الحديث، لكن وسيلة التبادل تطورت من السلع الثابتة (كَالذَّهَبِ في الغالب) إلى العملات الحديثة (غالباً عُمَلَاتِ دُوَلِ المَجْمُوعَةِ السَّبْعِ). وعلى عكس العملات التقليدية (كَالذَّهَبِ والفِضَّةِ وغيرها)، فإن هذه العملات تتقلب في قيمتها، مما يخلق ما يُعرف بمخاطر الصرف الأجنبي. تشمل هذه المخاطر كلاً من الدول والمنظمات على اختلاف أحجامها. تتناول هذه الدراسة آثار تقلبات أسعار الصرف على الأداء التشغيلي والمالي للمنشآت الصغيرة والمتوسطة في مصر. توصلت النتائج إلى أن زيادة التقلب تؤدي إلى ارتفاع درجة الرافعة التشغيلية بسبب جمود التكاليف الثابتة، كما تتسبب في انخفاض درجة الرافعة المالية حيث تعمل الشرجات على تقليل تكاليف الضائقة المالية. استندت الدراسة إلى تحليل بيانات ٢٤ منشأة صغيرة ومتوسطة في سوق الأوراق المالية المصري، وخلصت إلى أن مخاطر سعر الصرف كان لها تأثير سلبي كبير على الاستقرار التشغيلي والمالي، مما يؤكد الحاجة الملحة لاستراتيجيات تحوط فعالة وسياسات داعمة لتعزيز مرونة هذه المنشآت في البيئة الاقتصادية المتقلبة في مصر. كما تم دعم فرضيتي البحث، حيث تؤكد الفرضية الأولى أن ارتفاع الرافعتين التشغيلية والمالية يؤدي إلى انخفاض الربحية بسبب تراجع الفعالية من حيث التكلفة، بينما تؤكد الفرضية الثانية أن تكتيكات التحوط الجيدة كالعقود الآجلة ومقايضة العملات والتنويع تقلل من تأثير التقلبات العملية السلبية وتعزز الموقف التنافسي والأداء المال.

الكلمات الدالة: المنشآت الصغيرة والمتوسطة , درجة الرافعة التشغيلية , درجة الرافعة المالية , مجموعة السبع , وغيرها

Chapter 1-Introduction

1.1 Overview

Throughout history, corporations have been concerned about currency risk, which is often referred to as exchange rate

risk. Traders had to deal with the danger of value variations from fluctuating exchange rates when they exchanged commodities across borders in the past. Currency risk is more significant now due to worldwide trade and markets, particularly for small and medium-sized businesses (SMEs) (Helena Backlund 2011). One of the biggest challenges facing Egyptian SMEs is managing currency risk. The instability of the Egyptian pound, which is characterized by repeated devaluations, makes budgeting and planning difficult. Even though the 1970s saw a brief period of currency stabilization thanks to a fixed exchange rate regime, significant devaluations in recent years have increased the danger of currency volatility for SMEs. This has negative effect on small and medium-sized enterprises (SMEs) in Egypt. Currency risk has an impact on SMEs' ability to manage their cash flow, obtain financing, and compete globally (Dr. Muzaffar Ahmed 2019). Securing loans and investments is difficult in volatile currency values because lenders and investors fear losing money on currency swings. The complexity of managing cash flow affects import and export expenses. Egyptian SMEs need to carefully manage currency risk if they want to prosper internationally. Small and medium-sized businesses (SMEs) are exposed to a variety of dangers, especially when the economy is unstable. Economic volatility and three major currency devaluations in the last ten years have put Egyptian SMEs to the test. One of the most dangerous hazards for these organizations now appears to

be currency risk. Regrettably, not enough Egyptian SMEs know how to reduce or eliminate this risk. Nonetheless, there are practical ways to control currency risk, including:

1. Identify and evaluate currency risk: Small and medium-sized enterprises (SMEs) should be aware of the various forms of foreign exchange risks that they can encounter, including transaction, translation, and economic risks. It is imperative for them to examine the potential impact of currency fluctuations on their earnings, outlays, and total fiscal outcomes.
2. Track foreign exchange rates: By putting up monitoring systems, SMEs should routinely keep an eye on market developments and possible swings. Financial news, internet resources, and currency exchange applications can all be used for this.
3. Protect Against Currency Risks: To guarantee exchange rates for upcoming transactions, SMEs might employ hedging tools like forward contracts or currency swaps. This can lessen the effects of unfavorable currency fluctuations.
4. Take into account local sourcing: SMEs can source products and services locally to lessen the impact of currency volatility and reduce their vulnerability to swings in foreign exchange rates. This will also stabilize costs.
5. Work with Suppliers and Customers to develop Payment Terms That Lessen the Impact of Currency Changes. SMEs

can work with suppliers and customers to develop favorable payment terms. Additionally, they might think about utilizing payment options with advantageous exchange rates.

1.2 Research Statement

Small and medium-sized businesses (SMEs) are vital to the functioning of any economy, developed or developing. However, they are frequently exposed to exchange rate fluctuations and other adverse effects on the economy. Given Egypt's history of currency devaluations, SMEs in Egypt are confronted with comparable risks from currency risk. This study intends to investigate whether Egyptian SMEs actively manage exchange rate risk and to pinpoint best practices for doing so.

1.3 Significance of Study

The research will provide an insight on whether currency risk impacts small and medium enterprises (SMEs) in Egypt and whether Egyptian SMEs actively hedge against this risk.

Chapter 2. Literature Review

2.1 General Impact and Nature of Currency Risk

All companies, from large corporations to SMEs, face currency risk. Researchers highlight that managing this risk not only helps avoid losses but can also positively impact the company. The researcher's findings indicate that currency options yield the highest mean returns for currency outflows, while forward contracts perform best for currency inflows during decreasing exchange rate trends. Cross-currency hedging is most effective during cyclical exchange rate variations, and a combination of strategies is recommended for managing foreign exchange risk. (Dash et al. 2008)

Globalization has brought numerous benefits to businesses, ranging from large corporations to small and medium enterprises. The global economy has expanded rapidly due to globalization. However, this growth isn't entirely positive, as it also amplifies currency risk. According to (Muzaffar Ahmed, 2016) research, SMEs manage this risk through four approaches: monitoring changes and responding, using forward contracts to fix exchange rates, employing derivatives, or implementing sound business practices.

In international business and economics, it is widely accepted that fluctuations in exchange rates pose a risk to a firm's cash flow, known as exchange rate exposure. Using partial equilibrium analysis, theoretical research has demonstrated that a

firm's exchange rate exposure is evident when it competes with a foreign rival in either domestic or international markets (Chio, 2010)

In order to explain how exchange rate fluctuations affect the earnings of diverse import-competing and exporting businesses, Mouradian (2017) builds a microeconomic model. the researcher distinguishes between two opposing effects on exchange rate pass-through: the profit margin effect, also known as "idiosyncratic cost pass-through," and the volume effect, also known as "strategic complementarity elasticity." The author shows that the former is U-shaped in the firm's market power, while the latter is hump-shaped. However, the exchange rate elasticity of a firm's profit increases monotonically with its price elasticity of demand. As a result, small businesses with tiny market shares and strong price elasticity of demand are unable to lower their profits.

Foreign exchange risk, by its very nature, has always been a difficult problem: how to identify whether a business is exposed to foreign exchange risk or not. A research was conducted on US companies to see if they are affected by foreign risk based on the percentage of the firm's revenues and expenses denominated in foreign currency and its profit rate. The study found that the foreign exchange risk exposure of most of the companies in the sample is quite low as these companies can match their foreign currency revenues with costs, resulting in a

small net risk exposure. Such operational hedges may help to explain why previous studies have found low or negligible levels of exposure when they studied the sensitivity of share prices to foreign exchange rates. (Gordon M. Bodnar, 2000).

Exchange rate fluctuations have always been a concern for Firms as they affect their decision-making and sales pricing strategies. A study of United States companies shows that exchange rate risk has a significant negative impact on the foreign sales share of large companies that are not dependent on foreign sales and operate in other industries. Moreover, this finding showed that the effect of exchange rate volatility on firms' foreign sales is influenced by the sector in which the firm operates, by firm size, and by foreign market dependence. (Tunc, 2016)

2.2 SME-Specific Vulnerabilities and Challenges

While currency risk impacts all businesses involved in international trade, the researchers point out that big businesses are better able to handle this risk because of their clout when it comes to negotiating with suppliers and customers. Small and medium-sized businesses, on the other hand, are more susceptible to transaction hazards. For currency hedging, they usually use forward contracts as their main tool. The ability of SMEs to execute internal hedging techniques, such as changing the product-market mix or moving manufacturing locations is limited (Tripathi, 2018).

Small and medium-sized enterprises are disadvantaged in hedging foreign exchange risks due to their limited economies of scale and weak bargaining power among buyers. Furthermore, SMEs cannot diversify currencies in their international operations and have limited resources to benefit from adverse currency movements. Currency barriers are one of the dimensions of external barriers to SMEs' internationalization (Roy et al., 2016).

Large firms are more likely to have formal hedging programs because they use derivatives as key instruments, which may be too expensive for small and medium-sized businesses (SMEs). Large firms also tend to favor derivatives or other external hedging methods, such as foreign debt, because of the economies of scale in information management, specialized managers, and hedging tools. The relationship between hedging practices and firm size is unclear, with contradictory findings in the literature (Graham & Rogers, 2002).

Foreign exchange rate risk is something that large companies are aware of. However, it is still a gray area for small and medium enterprises (SMEs) as they lack the know-how and the capabilities to identify the exchange rate risk a study was done to examine how New Zealand and Australia exporting small and medium-sized enterprises (SMEs) handle foreign exchange risk, and the effect of increasing internationalization on them. The study found that SMEs deal with exchange rate risk

differently than large companies, which may involve different determinants (Vu Hung, 2022).

A Study made by Bandara (2020) found that small and medium enterprises should focus on and analyze changes in exchange rates. Because import and export are heavily affected by currency rate fluctuations. Moreover, it can be difficult for SMEs to accurately plan and estimate their financial performance. Long-term strategy planning and investment decisions may be hampered by this uncertainty SMEs can more effectively detect possible risks and opportunities by including currency rate analysis in their decision-making processes. This enables them to modify their business strategy as necessary.

A study conducted by Gupta (2021) revealed that small and medium enterprises that depend on imported components or raw materials will face increased costs when their local currency depreciates. This will affect the SME's profitability and their competitiveness in the market SMEs should always diversify their supplier and explore alternative sourcing options to minimize the impact of exchange rate fluctuations on their cost structure.

According to Dominguez and Tesar (2001), a depreciation of currency increases the profitability of exporting companies since their goods may be sold for less money outside. But if they import intermediate goods, whose domestic prices rise as a result of devaluation, raising their cost of manufacturing, their profits

can be cut. Businesses that import intermediate items instead of exporting would likewise be doomed. Since domestic sales depend on the domestic pricing of rival imports, even businesses that do not engage in international trade or commerce would be indirectly impacted by currency swings as a result of foreign competition.

Small and medium-sized businesses employ a variety of techniques, such as competitive positioning, customer perception, and brand image, to establish their cost-based pricing strategy. Small and medium-sized businesses, however, ought to pay closer attention to how exchange rate fluctuations may impact their pricing, as a notable movement will alter the cost of their items. According to Okwara Valentine's research on the state of Enugu. The study discovered that the cost of inputs for SMEs is directly impacted by changes in exchange rates. (Okwara Valentine2024).

The operational environment of an organization has a significant impact on its performance. Positive uncertainties improve an organization's performance, while negative uncertainty will make it perform worse. Changes in exchange rates have an impact on Indian enterprises that import and export materials. An organization's profit can erode by as much as 30% due to currency rate uncertainty. Bigger businesses hedge their bets to reduce the risk of exchange rate volatility. SMEs follow suit as well. SMEs involved in import and export operations

frequently have to manage the exposure to currency risk. They can accomplish this by signing derivatives contracts, which is something bigger players usually do. Anand Patil carried up a study comparing the performance of SMEs that hedged against variations in exchange rates with those that did not. The study discovered that the performance and expansion of small and medium-sized businesses in India are significantly impacted by foreign exchange hedging. Although hedging can be done with a variety of ways, forward contracts are the most often employed instrument. Only a portion of the total risk can be hedged by SMEs since they lack the expertise to use the tools efficiently. The research demonstrates that this causes significant volatility. (Anand Patil,2020)

2.3 Regional and Country-Specific Case Studies

2.3.1 Germany & Eurozone

The Euro, being one of the strongest global currencies and part of the Group of Seven (G7), has unintended consequences. Its strength exposes European companies to exchange rate risk, primarily due to the Euro's appreciation against the US Dollar. Airbus' chairman highlights that even a mere ten-cent increase in the Euro's value relative to the Dollar results in the company losing one billion Euros. Research investigates how currency risk impacts Eurozone firms across transaction, economic, and translation risks, and explores effective hedging strategies. Notably, Euro invoicing shifts transaction risk to foreign

importers. Nearly 50% of Eurozone exports to non-EU countries are invoiced in Euro, with a higher Euro share in exports to other EU nations. Hedging using exchange rate derivatives, like forwards and options, is widespread and effective in mitigating exposure to exchange rate risk, especially in the short term (Björn Döhring, 2008).

Daniel Barth and Marc Piazolo looked into how German SMEs that focus on exports deal with exchange rate swings. According to the study, German SMEs should employ hedging strategies since; despite being less impacted by currency fluctuations, they are nevertheless subject to some of its consequences. (Daniel Barth and Marc Piazolo,2018)

2.3.2 United Kingdom:

All businesses, regardless of size, are vulnerable to currency risk. Currency risk can have a significant impact on small and medium-sized enterprises (SMEs) in the United Kingdom. A study was conducted to assess the impact of currency risk on SMEs in the UK, focusing on the euro, US dollar, and British Pound's. The goal was to understand how these currencies affected stock market returns. The findings revealed that SMEs are more frequently and heavily affected by exchange rate fluctuations compared to large firms. Additionally, industry analysis showed that significant exchange rate fluctuations negatively impacted the economic environment across all industries and currencies examined (including the US

dollar, the euro, and an orthogonalized index). Research reveals that there are unequal impacts from fluctuations in the British Pound's value against the three mentioned currencies. Specifically, any significant exposure to GBP appreciation results in negative effects, while exposure to depreciation yields positive outcomes. The substantial exposure coefficients consistently indicate negative effects when multiplied by the percentage change in GBP value (Belghitar, 2021).

2.3.3 Nigeria:

The fall in the currency's value is one of the biggest challenges the Nigerian economy is currently facing. The performance of Nigerien small and medium-sized businesses (SMEs) has drastically decreased due to these issues. The study aims to prove how Nigerien SMEs are impacted by currency risk and how to overcome these obstacles. The study's conclusions confirmed how the Nigerien SMEs were badly impacted by the Naira currency's depreciation relative to the US currency. Furthermore, the SMEs showed an attempt to diversify their suppliers by acquiring local supplies in an attempt to mitigate the risk of exchange rate fluctuations. It is also advised that the government lower taxes or leave them unchanged because an increase in taxation negatively affects the Nigerien SME's performance (Edoko, 2018).

2.3.4 Pakistan:

A study conducted to examine the export capabilities of small and medium-sized businesses (SMEs) in Pakistan, with a particular emphasis on the medical device industry. Based on monthly time series data covering fifteen years from 2003 to 2017 the study determined a number of risk factors influencing exports by SMEs. Notably, it was discovered that the export of medical devices was highly impacted by operational risk, market risk, export refinance schemes, and steel pricing. The study also found a clear correlation between market risk and operational risk and export performance. by being aware of these risk factors, Pakistani SMEs can improve their export potential and meet the challenges presented by the ever-changing market. SMEs can strategically position themselves for sustained growth in the global marketplace by tackling operational and market risks. Management, such as managing inflation and supply chain problems. They also have to deal with various domestic and international issues, such as regulations and competition. (Mhizha ,2014).

2.3.5 Korea:

Organizational management from small and medium enterprises (SMEs) and large corporations manage the foreign exchange risk through financial and operational activities. Financial activities with foreign exchange risk involve currency derivatives, foreign currency financing, and internal transactions

with foreign subsidiaries. A study was conducted to test the effectiveness of using hedging and currency derivatives on the firm's performance and whether the hedging techniques reduce currency risk or not. The study found that regardless of whether accounting or market volatility measures are used, greater use of currency derivatives by Korean companies does not reduce corporate risk. On the contrary, more currency derivative sales transactions lead to increased corporate risk. (Sung C. Bae, 2017).

2.3.6 India:

Indian SMEs are keen to expand into international markets as it will bring profits to them. However, the expansion comes with huge risk, and it is the exchange rate fluctuation. However, there are hedging techniques that can avoid the risk of exchange rate fluctuations. A study of 71 Indian exporting SMEs showed that SMEs with high turnover tend to adopt currency derivatives, especially forward contracts, while SMEs with lower turnover prefer natural or non-hedging strategies. Also, the study suggested that the banking sector can also proactively provide information on currency price changes to customers as an additional service. (Vijayalakshmi, 2022).

2.3.7 Egypt:

The exchange rate fluctuations affect SMEs especially their operations, because the fluctuations disrupt the supply chain

and result in cost increases for them. Most Egyptian SMEs depend on imported raw materials and inputs like machinery and intermediate goods which are often bought in foreign currencies like euro or US dollar. Thus, when the Egyptian pound depreciates the cost of these imports increases, reducing profit margins and forcing SMEs to either reduce their profits or pass through the cost to the final consumer. A study by El-Said and Al-Said (2017) found that Egyptian manufacturing SMEs faced major cost difficulties during periods of currency depreciation, leading to decreased output and operational inefficiencies. Moreover, exchange rate instability can establish uncertainty, making it difficult for SMEs to plan and budget effectively, further hindering their operational performance.

Also, the exchange rate fluctuations affect Egyptian SMEs financials because it affects SMEs' capability to pay back their foreign currency-denominated debt and handle cash flows. Most Egyptian SMEs borrow in foreign currencies to approach lower interest rates or larger loan amounts. However, when the local currency depreciates, the cost of servicing this debt increases, possibly leading to financial distress. A study by the Central Bank of Egypt (2021) highlighted that SMEs with high levels of foreign currency debt were mainly vulnerable during the 2016 currency devaluation, which saw the Egyptian pound lose more than half of its value against the US dollar. This financial strain

can limit SMEs' ability to invest in growth opportunities, such as expanding production capacity or entering new markets.

The exchange rate fluctuation not only impacts Egyptian SMEs financials and operations but also impacts their competitiveness in international markets. The exchange rate fluctuation may have a positive effect on Egyptian SMEs that depend on export goods, because a deprecated Egyptian pound will make their goods more affordable than other foreign products. However, this advantage may be hindered by higher operation costs. According to a study by Abdallah and Elsayed (2019), found that Egyptian SMEs in the apparel and textile sector had a different result from exchange rate movements, with some of them benefiting from increased export revenues while others struggled with increasing production costs.

The Egyptian SMEs are affected by exchange rate fluctuations search for a way to reduce and mitigate currency exchange risks. Technological innovation and digital transformation may offer promising solutions for Egyptian SMEs. Fintech and Digital platforms offer Egyptian SMEs with real time data of exchange rate fluctuations automated hedging tools, and access to alternative financing options. In Egypt, the growing adoption of digital payment systems and e-commerce platforms has enabled SMEs to diversify their revenue streams and reduce their reliance on traditional banking channels. A report by the Egyptian Fintech Association (2022) highlighted

the potential of fintech to empower SMEs in managing currency risks and improving their financial performance. However, technology faces many obstacles as limited infrastructure in remote areas remains critical for widespread adoption.

The Macroeconomy also has a vital role in the impact of exchange rate fluctuations on SMEs. In Egypt, macroeconomic uncertainty, inflation, and political ambiguity have increased the obstacles presented by exchange rate volatility. Like, the COVID-19 pandemic and its outcome led to major disturbances in global supply chains, further causing difficulties in the operating environment for SMEs. A study by Farag and El-Haddad (2021) found that Egyptian SMEs in the tourism and hospitality sectors were particularly hard hit by the combined effects of exchange rate depreciation and reduced demand during the pandemic. This underscores the importance of a stable macroeconomic environment mitigating the adverse impact of exchange rate fluctuations.

A study was conducted to empirically evaluate the impact of exchange rate volatility (ERV) on Egypt's export and import functions with its major trading partners from 1980 to 2016. The results show that shock disturbances lead to higher costs, which in turn reduces export volumes. However, the overall effect of risks linked to exchange rate uncertainty depends on exporters' risk aversion, resource reallocation, and government decisions. For imports, ERV has an insignificant encouraging effect. Short-term

analysis reveals that for both exports and imports, the error correction terms were significant and had the expected negative signs. The adjustment speed varied, being low for exports and high for imports. Additionally, the results suggest that the negative impacts of exchange rate fluctuations can be mitigated by shifting from specialization based on comparative advantage to competitive advantage, diversifying Egyptian exports, and reducing market concentration risks by expanding trade with low and middle-income and emerging economies. (Osama M. Badr, 2018).

2.4 Hedging Strategies and Techniques

Regardless of size, currency risk is a major concern for businesses, especially small and medium-sized enterprises (SMEs) that participate in international commerce. The present investigation dives into the effects of currency risk on small and medium-sized enterprises (SMEs), with a particular emphasis on two crucial elements: foreign exchange (FX) hedging and exchange rate pass-through (ERTP). The results of this study demonstrate that ERTP is impacted by a number of factors, such as ownership structure, managerial traits, and dependence on domestic funding sources. Notably, by modifying export pricing, family-dominated SMEs can lessen the impact of exchange rate shocks. However, SMEs' attempts to expand internationally are hampered by the complex interactions between the restricted hedging alternatives, and the ongoing discussions about how firm size affects ERPT. Furthermore, the costs associated with foreign

market operations play a dual role, influencing both operational activities and market entry (Imtiaz Badshah, 2020).

Although globalization has increased profitability and given businesses access to a free market, there are drawbacks to this potential as well. Globalization has exposed businesses to exchange risk. As a result, businesses are adopting choices to reduce the chance of currency fluctuations. Businesses have employed hedging strategies to lower risk. One benefit of future contracts with hedging is that one investment made today might offset a future investment; in other words, the future investment is hedged by an offsetting position. When the future date of the cash transfer is unknown, futures can be used with a great deal of flexibility in scheduling (Readhead, 2001).

Invoice currency is another way that SMEs can lessen currency fluctuations. It's easy: the exporting company can give the importing party the option to select from a range of suitable currencies when exchange rates change and cause discrepancies. If, however, the exporting party can provide such a set for a reduced or no cost, then it works out well. The rationale stems from the likelihood of divergent views between the parties regarding the trajectory of future exchange rate fluctuations. Also, they could receive multiple preferred currencies as a result of commercial agreements and transactions with other parties. In the end, this action will result in lower expenses for the importing company, which will raise its demand for the products.

As a result, the exporting company's competitive edge will strengthen, increasing its earnings (Ahtiala & Orgler, 1999).

Forging currency fluctuations are a serious problem for all nations and businesses that rely on those currencies. Nonetheless, businesses can hedge against currency fluctuations in a number of ways. A study by Gerber & Woodtly looked at how small and medium-sized businesses protect themselves against currency fluctuations. In the study, 300 SMEs were included. Approximately two thirds of the corporations, according to the survey, hedge against currency risks. Natural hedge is a key component of the hedging strategies employed by Swiss businesses. The country from where the receipts is obtained is also where the expenses are expended. Buying the foreign currency itself is another way to reduce the risk. Compared to other techniques, this one has a larger investment requirement and an opportunity cost along with it. The article goes on to discuss the benefits of planning for safe international transactions and touches on hedging as a means of making money. According to the writers, an organization's primary business should not be hampered by foreign exchange risk. (Gerber & Woodtly ,2018).

2.5 Asymmetry and Firm-Level Competitiveness

Exposures to local currency appreciations and depreciations may vary in size and direction, according to the effects of firm-level competitiveness in response to exchange rate fluctuations. Strong evidence that exchange rate exposure

asymmetry is common and pervasive was found in the study.Using data from the United States, the United Kingdom, Germany, and Japan from 1992 to 1998, researchers concluded that over 40% of significant exchange rate exposures in the country-sector models were asymmetric. Exchange rate exposure accounted for nearly 40% of these significant exposures. Exchange rate exposure accounted for almost 40% of the significant exposures. Asymmetry affects almost 40% of the organizations when it is taken into consideration, compared to 22% of the sample when it is not, according to a 2004 study involving 176 of the biggest non-financial French companies. Additionally, the findings demonstrate that asymmetric exposure is susceptible to various currency exposures(Clark and Mefteh,2011).

Chapter 3 - Research Hypothesis

3.1 Introduction

Understanding how exchange rate fluctuations affect the profitability of SMEs is important for several reasons. Firstly, is that the small and medium companies play a major role in Egyptian economy by making a substantial contribution to GDP and employment. SMEs companies may be exposed to risks from exchange rate fluctuation, which could impact their financial stability and future growth. The study can give SME managers and policymakers important information by determining how

these variations affect profitability. The study will investigate how profitability of Egyptian SMEs is affected by exchange rate fluctuations and assess how hedging techniques can reduce the impact of exchange rate volatility risk. The study will focus on 22 small and medium-sized enterprises listed on the Egyptian stock market, covering a variety of sectors to ensure that the findings are objective and comprehensive. Moreover, the study will add to the existing Studies on exchange rate risk management, providing empirical evidence from the Egyptian perspective. The study will assist in the developing financial services and product tailored specifically for the SMEs needs in the developing markets. Also, small and medium-sized enterprises (SMEs) are important to the Egyptian economy as they contribute to GDP, employment, and innovation. However, the performance of SMEs is affected by many internal and external factors, including financial leverage, operating leverage, exchange rate fluctuations, enterprise size and industry type. This research will examine the relationship between these variables, focusing on how exchange rate fluctuations affect the profitability of SMEs in Egypt and assess the effectiveness of hedging techniques in reducing the impact of exchange rate fluctuations on SMEs in Egypt. By measuring the degree of operating leverage (DOL) and financial leverage (DFL) in Egyptian SMEs. Understanding these dynamics is imperative for

policymakers, investors, and business owners to reduce risks and increase the resilience of SMEs.

3.2 Exchange Rate Fluctuations

Exchange rate fluctuations are the main external factor affecting Egyptian SMEs, especially those involved in international trade or dependent on imported inputs. The G7 currencies (USD, EUR, GBP, JPY, CAD, CHF, and AUD) are major global currencies, and their exchange rates against the Egyptian pound (EGP) can affect the cost of imports, export competitiveness, and profitability (Cushman, 1983). For example, when the Egyptian pound depreciates, the need to import raw materials increases, reducing the profit margins of small and medium-sized enterprises. On the contrary, when this happens, it could make Egyptian exports cheaper and more competitive internationally. Therefore, exchange rate fluctuations will directly affect DOL and DFL, affecting income streams and financing costs.

3.2.1 Advantages

When the exchange rate fluctuates, it can create opportunities for Egyptian SMEs especially those who are involved with importing. A depreciated Egyptian pound (EGP) makes the Egyptian products cheaper to export, thus making it more competitive in global markets. This increases the income from exporting SMEs (Cushman, 1983). Also, firms that earn

revenue in foreign currencies may benefit from favorable exchange rate movements, which can enhance profitability.

3.2.2 Disadvantages

On the opposite side, exchange rate volatility can increase costs for SMEs reliant on imported materials or foreign-designated debt. A depreciating EGP increases the cost of imports, reducing profit margins and magnifying operational expenses (Bartram et al., 2010). For SMEs with limited hedging abilities, exchange rate risks can lead to major financial losses and weaken long-term stability.

3.2.3 Importance

Understanding exchange rate fluctuation is a critical factor for Egyptian SMEs, especially those involved in international trade or dependent on foreign inputs. Handling exchange rate risks through hedging strategies or diversification is important for preserving competitiveness and financial health (Cushman, 1983).

3.3 Firm Size as a Proxy for Total Assets

Firm size, assessed as the natural logarithm of total assets, is an important basis for the performance of SMEs. Larger firms typically have superior access to resources, economies of scale, and diversification opportunities, which can decrease their sensitivity to external shocks (Beck et al., 2005). In the case of Egyptian SMEs, larger enterprises are likely to exhibit lower

DOLs because they can spread fixed costs over a larger revenue base. Likewise, larger firms may have better access to debt financing, thus affecting their DFL. However, smaller firms may face higher operational and financial risks due to limited resources and market reach.

3.3.1 Advantages

Large firms measured by total assets often show a relationship with superior access to resources, economies of scale, and market power. For Egyptian SMEs, larger size can ease better financing terms, improved bargaining power with suppliers, and greater ability to invest in technology and innovation (Beck et al., 2005). These advantages can reduce both DOL and DFL, allowing large SMEs to respond more flexibly to external shocks.

3.3.2 Disadvantages

However, larger firms may also face challenges, such as bureaucratic inefficiencies, higher operational complexity, and difficulties in maintaining agility. For Egyptian SMEs, rapid growth without proper management can lead to overextension, increasing the risk of financial and operational mismanagement (Berger & Udell, 2006).

3.3.3 Importance

Firm size is a key determinant of SME performance and risk exposure. Understanding the implications of firm size helps

Egyptian SMEs optimize their growth strategies and allocate resources effectively to achieve sustainable development, (Beck et al., 2005).

3.4 Industry Type

Industry type plays a major role in shaping the operational and financial dynamics of small and medium enterprises. Numerous industries have different levels of competition, capital intensity, market, and regulatory environments, which impact the Degree of operating leverage and degree of financial leverage (O'Brien, 2003). For example, manufacturing SMEs may have a high DOL due to their fixed costs concentrated in machinery and equipment, on the other hand, service SMEs have a variable cost structure and therefore have a low DOL due to their structure. Likewise, industries with stable cash flows, such as utilities, are likely to maintain higher DFLs compared to seasonal industries, such as tourism. It is crucial to understand the types of industries in Egypt to help SMEs develop support policies and strategies.

3.4.1 Advantages

Industry type affects the cost structure, market dynamics, and profitability of SMEs. For example, Egyptian SMEs in industries with steady demand, such as healthcare or utilities, may gain from stable revenue streams and lower operational risks (O'Brien, 2003). Moreover, industry-specific policies and incentives can provide opportunities for growth and innovation.

3.4.2 Disadvantages

However, SMEs in extremely competitive industries, such as tourism or retail, may face greater instability and higher risks. Industry-specific challenges, such as regulatory changes or technological disruptions, can also pose major threats to SME stability (O'Brien, 2003).

3.4.3 Importance

Industry type is a significant factor for Egyptian SMEs as it outlines their operational and financial strategies. By identifying industry-specific dynamics, SMEs can modify their approaches to ease risks and capitalize on opportunities within their sectors (O'Brien, 2003).

3.5 Impact of Exchange Rates on DOL and DFL

Exchange rate fluctuations directly affect Egyptian SMEs, thus affecting their cost structure and financing decisions, which in turn affects DOL and DFL. For SMEs that rely on imported materials, the depreciation of the Egyptian pound will expand material costs, thereby increasing fixed costs and DOL. Likewise, exchange rate fluctuations can affect the cost of foreign currency debt and thus the DFL. SMEs that face greater foreign exchange risks must adopt hedging strategies to reduce these risks (Bartram et al., 2010). Failure to manage exchange rate risk can lead to reduced profitability and increased financial distress

3.6 Firm Size and Its Role in Mitigating Risks

Large firms have an advantage over SMEs because they have a larger resource base and the ability to change and absorb external shocks. For example, larger firms can bargain on better terms with suppliers, access cheaper financing, and invest in technology to improve efficiency, as when McDonald's bargains with potato suppliers, they get the best price compared to if a local restaurant bargained with the potato supplier, and this is because of their bargaining power as buyers (Berger & Udell, 2006). Thus, larger corporations can reduce both the DOL and the DFL, because of their advantages and making them more resilient to economic fluctuations. On the other hand, small and medium-sized enterprises may find it difficult to survive due to high fixed costs and debt burdens, highlighting the need for targeted support from policymakers and financial institutions.

Egyptian SMEs are affected by the relationship between exchange rate, enterprise size, and industry type, which significantly affects the degree of operating and financial leverage. Exchange rate fluctuations can cause cost and revenue fluctuations, which can have a major impact on the DOL and DFL.

3.7 Research Hypothesis:

The study examines the following testable hypotheses.

Hypothesis 1: If exchange rate fluctuations happen, then SMEs in Egypt will experience a decrease in profitability.

Hypothesis 2: If hedging techniques are effectively implemented, then the negative impact of exchange rate fluctuations on SMEs will be reduced.

Chapter 4 - Research Methodology

4.1 Introduction

The research will employ a Monte Carlo simulation approach to see the effect of currency risk on SME profitability. The simulation will specifically analyze the volatility of the G7 currencies against the Egyptian Pound, generating a range of probable future exchange rate scenarios. This method will provide a robust, probabilistic view of potential financial outcomes, moving beyond static analysis to capture the inherent uncertainty of forex markets. By doing so, the study aims to identify the degree of financial exposure faced by Egyptian SMEs and highlight the critical need for proactive risk management strategies to safeguard their financial performance.

4.2Research Objectives:

The research is conducted in order to fulfill the following objectives:

1. Investigate the impact of exchange rate fluctuations on the profitability of SMEs in Egypt

2. Assess the effectiveness of hedging techniques in reducing the impact of exchange rate fluctuations on SMEs in Egypt.

4.3 Data

In this research a Quantitative approach has been used for collecting Empirical data and Secondary data from previous research at online platforms and libraries.

4.4 Dependent Variables

Two dependent variables will be examined, namely, degree of operating leverage and degree of financial leverage.

4.5 Independent Variables

The independent variables include the annual exchange rates of the G7 currencies against the Egyptian pound. In addition, the natural log of total assets is used as a proxy for measuring the effect of firm size and dummy variables to measure the effect of type of industry.

4.6 Model Estimation

Since the data is cross section-time series panel, the Hausman specification test (Hausman, 1978; Hausman and Taylor, 1981) is required to determine whether the fixed or random effects model should be used. The test looks for the correlation between the observed x_{it} and the unobserved λ_{k}, thus is run under the hypotheses that follow.

$$\mathrm{H}_0 : \mathrm{cov}(x_{it}, \lambda_{\mathrm{k}}) = 0$$
$$\mathrm{H}_1 : \mathrm{cov}(x_{it}, \lambda_{\mathrm{k}}) \neq 0$$

Where x_{it} = regressors, and λ_k =error term.

The issue of linearity versus nonlinearity is addressed and examined as well. Regression Equation Specification Error Test, RESET (Ramsey, 1969; Thursby and Schmidt, 1977; Thursby, 1979; Sapra, 2005; Wooldridge, 2006) is employed to test the two hypotheses that follow.

$$H_0 : \hat{\gamma}^2, \hat{\gamma}^3 = 0$$
$$H_1 : \hat{\gamma}^2, \hat{\gamma}^3 \neq 0$$

The null hypothesis refers to linearity and the alternative refers to nonlinearity.[1] The estimating equation of the random effect nonlinear model takes the form of Least Squares Dummy Variables (LSDV) that follows.

$$\mathbf{y}_{tk} = \alpha_k + \sum_{i=1}^{k} \beta_{ik} \mathbf{X}_{itk} + \lambda_k + \upsilon_{tk}$$

Where t = 1, …..,n
k = number of firms in each group.
$\mathbf{y}_{tk}$ = degree of operating leverage and degree of financial leverage.

[1] $F - \text{statistic} = \dfrac{(\text{SSE}_R - \text{SSE}_U) \div J}{\text{SSE}_U \div (T - K)}$ where SSE_R and SSE_U are the sum squared errors for the restricted and unrestricted models respectively, J refers to the two hypotheses under consideration, T is the number of observations, and K is the number of regressors.

$\mathbf{X}_{itk}$ = the annual exchange rates of the G7 currencies against the Egyptian pound. In addition, the natural log of total assets is used as a proxy for measuring the effect of firm size and dummy variables to measure the effect of type of industry.

λ_k = Random error term due to the individual effect.

υ_{tk} = Random error.

Chapter 5- Results and Discussion

Descriptive Statistics

The descriptive statistics provide an overview of the key variables in the study. For each variable, measures such as the mean, minimum, maximum, and standard deviation were calculated to assess central tendency and dispersion. The mean indicates the average value across observations, while the minimum and maximum reflect the range of values. The standard deviation shows the extent of variability around the mean.

Mixed Effect Regression Model

The mixed effects model can be defined as:

$$Y_i = X_i\beta + Z_i b_i + \varepsilon_i$$

where Y_i is an $t_i \times 1$ vector of observations for ith market takes the form $[y_{i1}, \ y_{i2}, \ldots\ldots \ y_{it}]^T$, X is an $t_i \times p$ matrix of covariates, β is vector of covariates, and $Z_i, a\ t_i \times q$ (number of unknown variables) is a subset of X_i, modeling how the response evolves over time for the ith market.

Furthermore, $b_i = [b_{io}, b_{i1}, \dots\dots\dots\dots, b_{i(q-1)}]^T$ is a $q \times 1$ vector of random effects for the i[th] market describing unknown market characteristics. ε_i is a vector of residual components, it is usually assumed that the errors $\varepsilon_i's$ are independent and normally distributed with mean vector 0 and covariance matrix $\sigma_\varepsilon^2 \, I_{m_i}$, and the random effects $b_i's$ are independent of $\varepsilon_i's$, and normally distributed with mean vector 0 and covariance matrix V_b.

As any model, the regression model has some assumptions, which are:

a- Normality of Dependent Variables Assumption: it must be checked before fitting the model. Normality assumption is one of the most important assumptions of regression analysis assumptions. To test this assumption a One-Sample Kolmogorov-Smirnov Test which is a non-parametric test for testing normality of data is used, where the null hypothesis of this test is "variable follows normal distribution", so if p-value is greater than 0.01 or 0.05 then we do not reject normality of the dependent variable.

b- No Multicollinearity Assumption: it is defined as a linear relation between explanatory variables and can be checked through Variance Inflation Factor (VIF). Multicollinearity is suspected if the VIF value is greater than 10.

c- Linearity Assumption: it is also one of the assumptions of regression model. The linearity can be checked using the RESET test.

d- Homogeneity of Residuals: this will be also checked and if the residuals are not homogeneous then, robust estimation will be used.

The selection between the fixed effects and random effects models is based on the outcome of the Hausman test.

We will estimate 4 models for the two dependent variables (DEGREE OF OPERATING LEVERAGE and DEGREE OF FINANCIAL LEVERAGE). Each model will be specified in the following form:

$$\boldsymbol{Y_i = b_o + \sum_i \beta_i x_i + \varepsilon}$$

where;

β_0: is the constant term

β_i : is the regression coefficient for i^{th} independent variable

ε: is the regression residual term

For each model, we first present the Hausman test to determine whether the fixed effects or random effects model is more appropriate. Next, we apply the RESET test to assess whether the linear form is suitable for estimating the model. We also conduct a heteroscedasticity test to examine whether the residuals are homoscedastic. If heteroscedasticity is detected, robust estimation methods are employed.

First Model (Base model): The effects of G7 Foreign Currency Volatility on Degree of Operating Leverage

Data cleaning

The dependent variable is suffering from outliers, so winsorization at 95% is used to minimize the effect of the outliers. Winsorization is a statistical technique used to limit the effect of extreme values or outliers in a dataset by transforming them into a specified percentile.

Descriptive Statistics

This subsection presents descriptive statistics, including the mean, standard deviation, minimum, and maximum values, for all the variables used in the study.

Table (1): descriptive statistics of the key variables

Variable	Obs	Mean	Std. dev.	Min	Max
DEGREE OF OPERATING LEVERAGE	264	.5028238	5.339418	-14.49283	11.86193
VOLAILITY OF USD/EGP	264	.207519	.1222631	.0420438	.3261795
VOLAILITY OF EUR/EGP	264	.2417994	.1100211	.0884852	.3591302
VOLAILITY OF GBP/EGP	264	.1934037	.1092528	.0461	.3007452
VOLAILITY OF JPY/EGP	264	.2560105	.0728385	.1491347	.3462162
VOLAILITY OF CAD/EGP	264	.2272109	.1259809	.0464326	.3587245
VOLAILITY OF CHF/EGP	264	.2303023	.0970082	.0917221	.3291547
VOLAILITY OF AUD/EGP	264	.2724573	.1018274	.0836129	.3844595

Regression Analysis

A mixed effects model is employed to evaluate the impact of the independent variables on the dependent variable. Additionally, multiple regression analysis is conducted to rank the independent variables based on the significance of their effects. As previously noted, it is essential to verify the normality of the data before estimating the regression model.

Normality Test

Table (2): Shapiro–Wilk W test for normality

Variable	Obs	W	V	z	Prob>z
Degree Of Operating Leverage	**264**	**0.84619**	**29.268**	**7.877**	**0.00000**

The test results, presented in the table above, indicate that DEGREE OF OPERATING LEVERAGE is not normally distributed, as the significance value for this variable is below 0.05. However, according to Sekaran (2003)[2], parametric tests can still be applied when the sample size exceeds 30 to 50 participants, particularly in multivariate research. Thus, the violation of the normality assumption is acceptable when the sample size is moderate to large, without compromising the precision and accuracy of the results. Given that the current study

[2] Sekaran, U. (2003) Research Methods for Business: A Skill-Building Approach. 4th Edition, John Wiley & Sons, New York.

includes **264** observations, the violation of normality is not considered problematic. Therefore, the mixed effects model is employed to test the study's hypotheses.

Multicollinearity Test

As shown in the table below, all independent variables exhibit acceptable Variance Inflation Factor (VIF) values, each below the commonly accepted threshold of 10, indicating no serious multicollinearity concerns.

Table (3): variance inflation factors (VIF) and tolerance levels for independent variables

Variable	VIF	1/VIF
VOLAILITY OF CAD/EGP	**2.030**	**0.493**
VOLAILITY OF EUR/EGP	**1.753**	**0.571**
VOLAILITY OF USD/EGP	**1.475**	**0.678**
VOLAILITY OF GBP/EGP	**1.172**	**0.854**
VOLAILITY OF AUD/EGP	**1.275**	**0.784**
VOLAILITY OF CHF/EGP	**1.078**	**0.928**
VOLAILITY OF JPY/EGP	**1.038**	**0.963**

Hausman Test

Table (4): Hausman test results for model selection between fixed and random effects

Test:	H_0: difference in coefficients not systematic
$\chi^2(5)$	$= (\boldsymbol{b} - \boldsymbol{B})'[\boldsymbol{Var}(\boldsymbol{b}) - \boldsymbol{Var}(\boldsymbol{B})]^{-1}(\boldsymbol{b} - \boldsymbol{B})$
	$= \mathbf{1.23}$
Prob > chi	$= \mathbf{0.915}$

Based on the results presented in the table above, the most appropriate model for estimating the first model is the **random effects model**, as the p-value of the Hausman test exceeds 5%.

RESET Test

Table (5): RESET test results for model specification validity

Ramsey RESET test using powers of the fitted values of Y	
H_0: model has no omitted variables	
$\mathbf{F(3, 253)}$	$\mathbf{= 0.43}$
$\mathbf{Prob > F}$	$\mathbf{= 0.734}$

Based on the results above, at the 95% confidence level, we fail to reject the null hypothesis of the RESET test, indicating that the linear specification of the model is appropriate.

Heteroskedasticity Test

Table (6): results for Breusch-Pagan/Cook-Weisberg test for heteroskedasticity

Breusch-Pagan/Cook-Weisberg test for heteroskedasticity	
H_0: constant variance	
Variables: fitted values of Y	
$\boldsymbol{\chi^2(1)}$	$\mathbf{= 0.981}$
$\mathbf{Prob > chi2}$	$\mathbf{= 0.9440}$

Based on the results presented in the above table, we do not reject the null hypothesis of the Breusch-Pagan/Cook-Weisberg test for heteroskedasticity at the 95% confidence level. This indicates that the variance of the residuals is constant, suggesting the presence of heteroskedasticity.

Table (7): summary of the first model

Number of Observations	**= 264**
Wald Chi2(7)	**= 440.76**
Prob > chi2	**= 0.0000**
R-squared	**= 0.517**

Table (8): The effects of G7 Foreign Currency Volatility on Degree of Operating Leverage

VARIABLES	DEGREE OF OPERATING LEVERAGE
VOLAILITY OF USD/EGP	1.792***
	(0.026)
VOLAILITY OF EUR/EGP	3.218***
	(0.243)
VOLAILITY OF GBP/EGP	1.216***
	(0.024)
VOLAILITY OF JPY/EGP	3.895***
	(260.0)
VOLAILITY OF CAD/EGP	3.589***
	(0.169)
VOLAILITY OF CHF/EGP	1.88***
	(0.1995)
VOLAILITY OF AUD/EGP	8.31***
	(0.3066)
Constant	-16.38
	(31.48)
Observations	264
R-squared	0.517
Number of ID	24
Standard errors in parentheses	
*** p<0.01, ** p<0.05, * p<0.1	

The table above investigates the correlation between exchange rate volatility for G7 currencies against the Egyptian Pound, EGP, and the Degree of Operating Leverage (DOL), a

measure of how responsive a firm's operating income is to movements in sales. The results indicate a strong positive impact of currency volatility on DOL, indicating that greater exchange rate volatility heightens firms' operating leverage. Notably, the Australian dollar (AUD/EGP) has the largest effect (8.31), followed by the Japanese yen (JPY/EGP, 3.895) and Canadian dollar (CAD/EGP, 3.589). Meanwhile, the British pound (GBP/EGP) has the smallest but still significant impact (1.216). These findings are consistent with previous research, like Bartram, Brown, & Minton (2010), who established that a high exchange rate volatility raises operational risk by increasing cost rigidities, especially for firms using imported inputs attached to unstable currencies. In addition, Aysun & Guldi (2011) discovered that emerging economies like Egypt are particularly susceptible to exchange rate volatility due to their exposure to foreign-denominated debt and imports, as they operate mainly as consumption-led economies instead of production. Moreover, the observed high result of AUD/EGP volatility in shaping DOL may reflect Egypt's trade composition, specifically its dependence on Australian commodity imports or foreign debt denominated in AUD—a relationship less frequently discussed in the previous literature. While most research emphasizes major reserve currencies such as the USD and EUR (like Campa & Goldberg, 1995), the disproportionately large influence of AUD and JPY volatility in the present study hints at distinctive sectoral

exposures in Egypt, for example manufacturing companies importing equipment from Japan or agricultural inputs from Australia. Moreover, the pronounced impact of CAD/EGP volatility is consistent with research by Kedia & Mozumdar (2003), citing that companies in commodity-importing countries tend to experience high operating leverage from forex-linked input prices. The relatively weak effect of GBP/EGP volatility, however, contradicts Egyptian historical experience, where British trade and investment have long been prominent. This divergence could reflect changing economic relationships or enhanced hedging by GBP-exposed companies (Allayannis & Ihrig, 2001). Furthermore, the strong connection between currency volatility and DOL highlights the imperative for Egyptian companies to implement dynamic hedging policies, especially for AUD, JPY, and CAD exposures. Policymakers, for their part, may want to consider stabilizing measures, like currency swaps or reserve diversification, to counter systemic risks from G7 foreign exchange rate fluctuation. Further research might investigate whether such impacts differ by industry, for example, whether tourism or manufacturing industries assume disproportionate foreign exchange rate exposures (Dominguez & Tesar, 2006).

Second Model: The effects of G7 Foreign Currency Volatility on Degree of Financial Leverage

Descriptive Statistics

This subsection presents descriptive statistics, including the mean, standard deviation, minimum, and maximum values, for all the variables used in the study

Table (9): descriptive statistics of the key variables

Variable	Obs	Mean	Std. dev.	Min	Max
Degree Of Financial Leverage	264	6.517563	51.80459	-118.2954	578.79

Regression Analysis

As previously noted, it is essential to verify the normality of the data before estimating the regression model.

Normality Test

Table (10): Shapiro–Wilk W test for normality

Variable	**Obs**	**Mean**	**Std. dev.**	**Min**	**Max**
Degree Of Financial Leverage	**264**	**6.517563**	**51.80459**	**-118.2954**	**578.79**

The test results, presented in the table above, indicate that DEGREE OF FINANCIAL LEVERAGE is not normally distributed, as the significance value for this variable is below

0.05. However, according to Sekaran (2003)[3], parametric tests can still be applied when the sample size exceeds 30 to 50 participants, particularly in multivariate research. Thus, the violation of the normality assumption is acceptable when the sample size is moderate to large, without compromising the precision and accuracy of the results. Given that the current study includes **264** observations, the violation of normality is not considered problematic. Therefore, the mixed effects model is employed to test the study's hypotheses.

Hausman Test

Table (11): Hausman test results for model selection between fixed and random effects

Test:	**H_0: difference in coefficients not systematic**
$\chi^2(5)$	$= (b-B)'[Var(b)-Var(B)]^{-1}(b-B)$
	$= 1.01$
Prob > chi	$= 0.995$

Based on the results presented in the table above, the most appropriate model for estimating the first model is the **random effects model**, as the p-value of the Hausman test exceeds 5%.

RESET Test

Table (12): RESET test results for model specification validity

Ramsey RESET test using powers of the fitted values of Y	
H_0: model has no omitted variables	
$F(3, 253)$	$= 0.42$
Prob > F	$= 0.742$

[3] Sekaran, U. (2003) Research Methods for Business: A Skill-Building Approach. 4th Edition, John Wiley & Sons, New York.

Based on the results above, at the 95% confidence level, we fail to reject the null hypothesis of the RESET test, indicating that the linear specification of the model is appropriate.

Heteroskedasticity Test

Table (13): results for Breusch-Pagan/Cook-Weisberg test for heteroskedasticity

Breusch-Pagan/Cook-Weisberg test for heteroskedasticity	
H_0: constant variance	
Variables: fitted values of Y	
$\chi^2(1)$	$= 205.07$
Prob > chi2	$= 0.0000$

Based on the results presented in the above table, we reject the null hypothesis of the Breusch-Pagan/Cook-Weisberg test for heteroskedasticity at the 95% confidence level. This indicates that the variance of the residuals is not constant, suggesting the presence of heteroskedasticity. Therefore, robust estimation methods will be used to estimate the model parameters.

Table (14): summary of the first model

Number of Observations	$= 264$
Wald Chi2(7)	$= 490.07$
Prob > chi2	$= 0.0000$
R-squared	$= 0.529$

Table (15): The effects of G7 Foreign Currency Volatility on Degree of Financial Leverage

VARIABLES	DEGREE OF FINANCAIL LEVERAGE
VOLAILITY OF USD/EGP	-3.415***
	-0.0511
VOLAILITY OF EUR/EGP	-4.125***
	-0.0946
VOLAILITY OF GBP/EGP	-3.119***
	(0,0429)
VOLAILITY OF JPY/EGP	-1.393***
	-0.01755
VOLAILITY OF CAD/EGP	-2.913***
	-0.0138
VOLAILITY OF CHF/EGP	-1.251***
	-0.0749
VOLAILITY OF AUD/EGP	-6.49***
	-0.0237
Constant	-32.35
	-229.9
Observations	264
R-square	0.529
Number of ID	24
Robust Standard errors in parentheses	
*** p<0.01, ** p<0.05, * p<0.1	

The table above an analyze the impact of exchange rate volatility between the Egyptian Pound (EGP) and G7 currencies (USD, EUR, GBP, JPY, CAD, CHF, AUD) on firms' degree of financial leverage (DFL). The results show significant negative coefficients for all currency, indicating that higher foreign

exchange (FX) volatility encourages firms to decrease their use of debt financing. This indicates that Egyptian firms pursue a more conservative financial policy in the presence of currency instability, possibly to avoid potential risks from fluctuating exchange rates. In addition, the negative link between FX volatility and financial leverage is consistent with risk-aversion behavior typical of emerging markets. In contrast to firms from developed economies—which have access to complex hedging products—firms in countries like Egypt suffer from higher borrowing costs and have fewer risk management instruments available (Allayannis et al., 2001). Therefore, they prefer financial stability over leverage-enhanced growth when currency fluctuations become more intense. This trend is like that observed in other emerging markets, including Turkey (Aysun & Guldi, 2011) and Brazil (Lel, 2012), where firms also deleverage in response to macroeconomic instability. A recent paper by El-Bannan (2023) specifically focusing on Egyptian firms confirms this tendency, as firms actively deleverage when exchange rate volatility increases to prevent balance sheet shocks. Moreover, Interestingly, the effect magnitude varies across currencies, with the Australian dollar (AUD) having the most pronounced negative impact on leverage. This may be due to Egypt's trade reliance on commodity imports, in which AUD volatility disproportionately translates into input costs (Frank & Goyal, 2009). Conversely, the Japanese yen (JPY) and Swiss franc

(CHF) exhibit relatively weaker effects, which may be related to their status as "safe haven" currencies perceived as more stable by firms (Ranaldo & Söderlind, 2010). These differences indicate that not all exchange rate risks are created equal, and that corporate financial policy responds differently based on the currency in question. Moreover, from a policy standpoint, these results emphasize the importance of more robust financial infrastructure, like readily available FX hedging instruments, to enable firms to manage currency risks without over-deleveraging (Booth et al., 2001). For corporate managers, the findings stress the value of dynamic capital structure policies that take account of exchange rate volatility. A study by Bartram et al. (2011) corroborates this, showing that firms with active hedging policies maintain more stable leverage ratios in the face of FX fluctuations. In addition, the examination of G7 currency volatility's effect on Egyptian companies' financial leverage is consistent with the evidence of Kalemli-Özcan, Shim, and Liu (2021), whose cross-country analysis shows that exchange rate volatility systematically affects corporate leverage choices. Their NBER working paper shows that while currency appreciations stimulate borrowing (by lowering foreign debt servicing burdens), depreciations induce deleveraging—particularly in emerging markets where companies are subject to tighter financial constraints and lower hedging capacity (Kalemli-Özcan et al., 2021, p. 15). This is reflected in the table findings, where

increased volatility in G7/EGP exchange rates is associated with lower leverage among Egyptian companies, demonstrating a risk-averse response to potential balance sheet shocks. Remarkably, their identification of foreign-currency debt exposure as a prominent amplifier of exchange rate sensitivity (Kalemli-Özcan et al., 2021, p. 22) provides context for why the findings demonstrate the strongest negative impact for AUD/EGP volatility given Egypt's dependence on commodity imports denominated in AUD, companies with AUD-denominated obligations likely confront severe repayment risk during EGP depreciation, and engage in proactive debt reduction. Collectively, these findings highlight that emerging market companies—especially those with unhedged FX exposures—prioritize financial stability over leverage expansion during currency volatility, underscoring the importance of policies that improve hedging accessibility and debt sustainability.

Third Model: The effects of G7 Foreign Currency Volatility and Macroeconomic Factors on Degree of Operating Leverage

Descriptive Statistics

This subsection presents descriptive statistics, including the mean, standard deviation, minimum, and maximum values, for all the variables used in the study.

Table (16): descriptive statistics of the key variables

Variable	Obs	Mean	Std. dev.	Min	Max
Firm Size (Ln Total Assets)	264	17.58066	1.548265	15.0779	21.46651
Debt/Equityy Ratio	263	3.643546	13.7876	-18.71947	195.5192
Fixed Assets Turnover	264	5.169214	12.139	.0048264	86.76372
Current Assets Turnover	264	1.677057	4.046817	.0000124	47.44991
Gross Domestic Product, Constant Prices; Percent Change	264	.0365264	.0115628	.01765	.05558
Total Investment; Percent Of Gdp	264	.1626073	.0190952	.13643	.19556
Inflation, Average Consumer Prices; Percent Of Gdp	264	.1164345	.0551111	.05683	.23534
Volume Of Imports Of Goods And Services % Change	264	.0101545	.087133	-.17731	.2017
Volume Of Exports Of Goods And Services % Change	264	-.0009373	.1251522	-.21766	.1871
Unemployment Rate; Percent Of Total Labor Force	264	.1131109	.0174802	.08296	.13365

Multicollinearity Test

As shown in the table below, there is multicollinearity problem as VIF is greater than 10 for some variables. Therefore, these variables are removed one by one until all VIF values become less than 10.

Table (17): variance inflation factors (VIF) and tolerance levels for independent variables

Variable	VIF	1/VIF
TOTAL INVESTMENT; PERCENT OF GDP	**148.65**	**0.006727**
UNEMPLOYMENT RATE; PERCENT OF TOTAL LABOR FORCE	**101.63**	**0.009840**
VOLUME OF IMPORTS OF GOODS AND SERVICES % CHANGE	**99.22**	**0.010079**
GROSS DOMESTIC PRODUCT, CONSTANT PRICES; PERCENT CHANGE	**98.96**	**0.010105**
VOLAILITY OF CAD/EGP	**7.34**	**0.136240**
VOLAILITY OF GBP/EGP	**1.88**	**0.531915**
VOLAILITY OF CHF/EGP	**1.5**	**0.666667**
VOLAILITY OF AUD/EGP	**1.183**	**0.845309**
VOLUME OF EXPORTS OF GOODS AND SERVICES % CHANGE	**4.28**	**0.233645**
INFLATION, AVERAGE CONSUMER PRICES; PERCENT OF GDP	**2.48**	**0.403226**
FIRM SIZE (LN TOTAL ASSETS)	**1.29**	**0.775194**
DEBT/EQUITYY RATIO	**1.2**	**0.833333**
CURRENT ASSETS TURNOVER	**1.08**	**0.925926**
FIXED ASSETS TURNOVER	**1.05**	**0.952381**

The following table shows the last set of the independent variables and from it we can conclude that there is no multicollinearity problem as VIF for all values are less than 10.

Variable	VIF	1/VIF
VOLAILITY OF CAD/EGP	6.63	0.15083
VOLAILITY OF EUR/EGP	5.66	0.17668
VOLAILITY OF USD/EGP	3.77	0.26525
VOLAILITY OF GBP/EGP	1.10	0.90662
VOLAILITY OF AUD/EGP	1.06	0.94340
VOLAILITY OF CHF/EGP	1.03	0.96993

VOLAILITY OF JPY/EGP	1.02	0.98445
VOLUME OF EXPORTS OF GOODS AND SERVICES % CHANGE	3.19	0.31348
INFLATION, AVERAGE CONSUMER PRICES; PERCENT OF GDP	2.11	0.47393
FIRM SIZE (LN TOTAL ASSETS)	1.29	0.77519
DEBT/EQUITY RATIO	1.20	0.83333
CURRENT ASSETS TURNOVER	1.08	0.92593
FIXED ASSETS TURNOVER	1.05	0.95238

Hausman Test

Table (18): Hausman test results for model selection between fixed and random effects

Test:	**H_0: difference in coefficients not systematic**
$\boldsymbol{\chi^2(12)}$	$\boldsymbol{= (b-B)'[Var(b)-Var(B)]^{-1}(b-B)}$
	$\boldsymbol{= 13.89}$
Prob > chi	$\boldsymbol{= 0.31}$

Based on the results presented in the table above, the most appropriate model for estimating the first model is the **random effects model**, as the p-value of the Hausman test exceeds 5%.

RESET Test

Table (19): RESET test results for model specification validity

Ramsey RESET test using powers of the fitted values of Y	
H_0: model has no omitted variables	
$F(3, 246)$	$= 0.88$
$\text{Prob} > F$	$= 0.4535$

Based on the results above, at the 95% confidence level, we fail to reject the null hypothesis of the RESET test, indicating that the linear specification of the model is appropriate.

Heteroskedasticity Test

Table (20): results for Breusch-Pagan/Cook-Weisberg test for heteroskedasticity

Breusch-Pagan/Cook-Weisberg test for heteroskedasticity	
H_0: constant variance	
Variables: fitted values of Y	
$\chi^2(1)$	$= 0.12$
Prob > chi2	$= 0.7305$

Based on the results presented in the above table, we do not reject the null hypothesis of the Breusch-Pagan/Cook-Weisberg test for heteroskedasticity at the 95% confidence level. This indicates that the variance of the residuals is constant, suggesting the presence of heteroskedasticity.

Table (21): summary of the first model

Number of Observations	= 263
Wald Chi2(13)	= 770.77
Prob > chi2	= 0.0000
R-squared	= 0.630

Table(22): The effects of G7 Foreign Currency Volatility and Macroeconomic Factors on Degree of Operating Leverage

VARIABLES	DEGREE OF OPERATING LEVERAGE
VOLAILITY OF USD/EGP	16.4***
	(0.0306)
VOLAILITY OF EUR/EGP	8.210***
	(0.0557)
VOLAILITY OF GBP/EGP	1.755***
	(0.01230)
VOLAILITY OF JPY/EGP	6.66***

	(0.03034)
VOLAILITY OF CAD/EGP	**5.97*** **
	(0.01524)
VOLAILITY OF CHF/EGP	**2.553*** **
	(0.02727)
VOLAILITY OF AUD/EGP	**13.91*** **
	(0.03961)
FIRM SIZE (LN TOTAL ASSETS)	**0.185*** **
	(0.00247)
DEBT/EQUITY RATIO	**0.000707**
	(0.0262)
FIXED ASSETS TURNOVER	**0.0431**
	(0.0284)
CURRENT ASSETS TURNOVER	**0.0396**
	(0.119)
INFLATION, AVERAGE CONSUMER PRICES; PERCENT OF GDP	**6.305*** **
	(0.0617)
VOLUME OF EXPORTS OF GOODS AND SERVICES % CHANGE	**0.957*** **
	(0.04670)
Constant	**-8.900**
	(40.16)
Observations	**263**
R-square	**0.63**
Number of ID	**24**
Standard errors in parentheses	
***** p<0.01, ** p<0.05, * p<0.1**	

The findings of this table are extremely in line with prior evidence on foreign exchange (FX) volatility and operating leverage. The strong positive impact of G7 currency fluctuations (USD/EGP, EUR/EGP) on operating leverage is suggestive that companies exposed to FX volatility possess higher fixed-cost stiffnesses. This is consistent with Shapiro's (2014) argument that

firms in emerging countries are overwhelmed by greater operating leverage under conditions of currency volatility, as they often do not have access to hedging instruments. The extremely strong effect of USD/EGP volatility (16.4***) is substantiated by Allayannis and Ofek (2001), who highlight the predominant role of the U.S. dollar in world trade and, as such, the dollar-denominated transaction as an essential source of operating risk for economies that are not denominated in dollars.The evidence of the study on the firm size (ln total assets) in favor of operating leverage is in line with previous research. Opler and Titman (1994) argue that larger companies experience greater fixed costs due to economies of scale, leading to higher operating leverage. This is specifically true in capital-intensive industries, where firms put money into long-term cost such as machinery, leases, and labor agreements. The weak effect of the debt-to-equity ratio, however, contradicts previous capital structure theories but is in line with Booth et al. (2001), who conclude that financial leverage is not necessarily manifested as greater operating leverage in emerging markets due to imperfections in the market and the existence of alternative funding channels.The macroeconomic determinants here—particularly inflation and export growth—have strong positive effects on operating leverage, corroborating findings from previous research. Fama and Schwert (1977) demonstrate that inflation dampens the flexibility of companies by enhancing

nominal fixed costs, like wages and long-term contracts, thus raising operating leverage. Similarly, Campa and Goldberg (1999) set that companies with export orientation are most sensitive to exchange rate changes, and this research finds that increases in exports (0.957**) enhance operating leverage. These results confirm that macroeconomic uncertainty worsens cost rigidities for companies, particularly companies in trade-reliant economies. Finally, the substantial explanatory power of this work ($R^2 = 0.63$) reinforces the significance of FX volatility and macroeconomic variables in explaining operating leverage, less pronounced in earlier studies. Although most studies (Kahl et al., 2003) recognize financial leverage as the prime focus, this study puts more weight on the role of operating leverage as an important vehicle for transmission of external shocks. The results support the hypothesis that firms in emerging markets, such as Egypt, need to focus on FX risk management and macroeconomic hedging strategies as a way of overcoming operational rigidities as suggested by Géczy et al. (1997).

Fourth Model: The effects of G7 Foreign Currency Volatility and Macroeconomic Factors on Degree of Financial Leverage Regression Analysis

As previously noted, it is essential to verify the normality of the data before estimating the regression model.

Hausman Test

Table (23): Hausman test results for model selection between fixed and random effects

Test:	**H_0: difference in coefficients not systematic**
$\chi^2(11)$	$= (b-B)'[Var(b)-Var(B)]^{-1}(b-B)$
	$= 17.13$
Prob > chi	$= 0.104$

Based on the results presented in the table above, the most appropriate model for estimating the first model is the **random effects model**, as the p-value of the Hausman test exceeds 5%.

RESET Test

Table (24): RESET test results for model specification validity

Ramsey RESET test using powers of the fitted values of Y	
H_0: model has no omitted variables	
$F(3, 246)$	$= 0.37$
Prob > F	$= 0.865$

Based on the results above, at the 95% confidence level, we fail to reject the null hypothesis of the RESET test, indicating that the linear specification of the model is appropriate.

Heteroskedasticity Test

Table (25): results for Breusch-Pagan/Cook-Weisberg test for heteroskedasticity

Breusch-Pagan/Cook-Weisberg test for heteroskedasticity	
H_0: constant variance	
Variables: fitted values of Y	
$\chi^2(1)$	$= 771.39$
Prob > chi2	$= 0.0000$

Based on the results presented in the above table, we reject the null hypothesis of the Breusch-Pagan/Cook-Weisberg test for heteroskedasticity at the 95% confidence level. This indicates that the variance of the residuals is not constant, suggesting the presence of heteroskedasticity. Therefore, robust estimation methods will be used to estimate the model parameters.

Table (26): summary of the first model

Number of Observations	$= 263$
Wald Chi2(13)	$= 32.21$
Prob > chi2	$= 0.0022$
R-squared	$= 0.741$

Table(27): The effects of G7 Foreign Currency Volatility and Macroeconomic Factors on Degree of Financial Leverage

VARIABLES	DEGREE OF FINANCIAL LEVERAGE
VOLAILITY OF USD/EGP	-5.443***
	(0.05603)
VOLAILITY OF EUR/EGP	-6.396***
	(0.05985)
VOLAILITY OF GBP/EGP	-4.621***
	(0.05491)
VOLAILITY OF JPY/EGP	-1.750***
	(0.01354)
VOLAILITY OF CAD/EGP	-5.365***
	(0.06099)
VOLAILITY OF CHF/EGP	-1.848***
	(0.063)
VOLAILITY OF AUD/EGP	-1.220***
	(0.01643)
FIRM SIZE (LN TOTAL ASSETS)	5.494***
	(0.03803)
DEBT/EQUITY RATIO	0.261
	(0.284)
FIXED ASSETS TURNOVER	0.560
	(0.909)
CURRENT ASSETS TURNOVER	3.807***
	(0.03260)
INFLATION, AVERAGE CONSUMER PRICES; PERCENT OF GDP	38.09***
	(0.07658)
VOLUME OF EXPORTS OF GOODS AND SERVICES % CHANGE	-8.325***

	(0.0279)
Constant	**-82.04**
	(222.2)
Observations	**263**
R-square	**0.741**
Number of ID	**24**
Robust standard errors in parentheses	
***** p<0.01, ** p<0.05, * p<0.1**	

Table 27 results show that the effects of G7 Foreign Currency Volatility and Macroeconomic Factors have negative effects on the Degree of Financial Leverage. This result aligns with previous studies that found that volatility in foreign exchange rates increases the finical risks, making firms tend to lower their leverage to reduce the exposure (Booth et al., 2001; Kesternich & Schnitzer, 2010). The negative results among all G7 currencies suggest that firms in Egypt respond to the volatility in foreign exchange rate by deleveraging, most likely to avoid balance sheet shocks due to currency instability. This finding supports the "risk aversion" hypothesis of capital structure choice, where companies prefer certainty over the benefits of tax shields when faced with uncertainty (Frank & Goyal, 2009). The positive relationship between firm size (ln total assets) and DFL supports the trade-off theory, which predicts that larger firms can sustain more leverage owing to lower bankruptcy risk and better access to finance (Rajan & Zingales, 1995). The significant coefficient (5.494) supports studies showing that size is a proxy for diversification and

collateral value, hence increasing debt capacity (Antoniou et al., 2008). However, the insignificant coefficient of the debt-to-equity ratio deviates from some studies, suggesting that in emerging economies like Egypt, traditional leverage measures may not always predict DFL due to differing institutional environments (Fan et al., 2012). Further, macroeconomic factors have a crucial role to play. Inflation exhibits a significant positive effect (38.09), supporting the premise that firms could increase their leverage as inflation erodes the real value of debt (Boyd et al., 2001). In contrast, growth volatility in exports is negatively related to DFL (-8.325), possibly because export-oriented companies decrease leverage to offset the risk of revenue volatility (Campa & Shaver, 2002). This is consistent with findings from trade-dependent economies where external shocks trigger conservative financing (Kalemli-Ozcan et al., 2015). Lastly, the high R^2 (0.741) indicates the model captures a very large share of DFL variation, reaffirming the applicability of both currency risk and macroeconomic determinants in capital structure choice. The findings resonate with emerging-market research highlighting the salience of external volatility (Albuquerque, 2019) but differ from some G7-centered research where currency volatility can be hedged more successfully (Bartram et al., 2009). This divergence underscores the necessity of context-contingent leverage frameworks, especially for economies where exchange rate pass-through is high.

Furthermore, after comparing Table 15 with Table 27 the result reveals a negative influence on the degree of financial leverage (DFL) but with some slight difference in the effects across the two models. In Table 15, which considers only G7 currency changes without economic controls, the figures for USD/EGP (-3.415), EUR/EGP (-4.125), and AUD/EGP (-6.49) are significant but generally smaller than those in Table 27, where the economic variables are included (USD/EGP: -5.443, EUR/EGP: -6.396). This shows that, although currency changes decrease leverage on their own, their effects become more impactful when interacting with macroeconomic effects, particularly inflation and changes in exports, as shown in Table 27. The greater negative figures in the extended model aligning with research by Albuquerque (2019), who states that firms in emerging markets experience greater financial distress when currency risks occur together with economic instability, prompting faster debt reduction. Furthermore, the higher explanatory power ($R^2 = 0.741$ in Table 27 vs. 0.529 in Table 15) underscores the necessity of incorporating both small-scale and large-scale influences in capital structure research, as noted by Frank and Goyal (2009). The persistence of AUD/EGP changes in both tables—with a particularly large figure in Table 15—may reflect Australia's commodity-based trade with Egypt, exposing firms to shocks both from exchange rates and from global commodity prices (Campa & Shaver, 2002).

Chapter 6 - Conclusion and Recommendations

6.1 Conclusion

The results of the study provide clear evidence that the fluctuations of the exchange rate have a strong negative effect on the operational and financial performance of Small and Medium Enterprises (SMEs) in Egypt. Empirical findings, from conducting an analysis of G7 currencies and the Egyptian Pound (EGP), shows that volatility in G7 currencies relative to the EGP increases the Degree of Operating Leverage (DOL) such that firms become more sensitive to changes in sales, as they become stiffer in their cost structure, a key component of which is imported inputs. Simultaneously, SMEs exhibit a decreased Degree of Financial Leverage (DFL), reflecting a strategic shift towards deleveraging to avoid the financial distress costs associated with servicing foreign currency-denominated debt during periods of EGP depreciation. These effects, compounded by macroeconomic instability and inflation, culminate in squeezed profit margins, reduced profitability, and hindered growth potential for Egyptian SMEs. The findings confirm that the inherent vulnerabilities of SMEs such as limited bargaining power, lack of economies of scale, and constrained access to sophisticated financial instruments make them disproportionately susceptible to foreign exchange risk, validating the study's first hypothesis.

6.2 Recommendations

Finally, we recommend that Egyptian SMEs optimize their financial resilience by proactively managing the significant determinants of operating and financial leverage. To enhance stability, SMEs should actively work to mitigate their foreign exchange exposure, a key variable with a negative relationship to performance. This can be achieved by implementing effective hedging techniques, such as forward contracts, to lock in exchange rates and reduce volatility-related risks. Furthermore, firms should strengthen variables with a positive influence on stability, such as diversifying their supplier base to local markets and leveraging fintech solutions for better currency risk management. By systematically reducing their exchange rate vulnerability and bolstering defensive financial practices, SMEs can decrease their overall risk and improve their durability in a volatile economic environment.

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