
Does ERP Adoption Affect Stock Price Volatility? Evidence from Egypt

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Abstract

This study explores the association between ERP adoption and stock price volatility (SPV). An ERP software reshapes information collected, processed, and disseminated. We examine whether ERP usage influences the stock price volatility of Egyptian firms. Our investigation is among the first to examine how ERP usage affects SPV, an overall outcome measure of a firm's information environment. The Findings document that ERP has a significant and negative association with SPV. Stock price volatility (SPV) relationships have expanded the literature on ERP facts. ERP is essential for both strategic and operational logistics decisions. This study also gives strong evidence that ERP-adopted firms help to reduce the risk of stock price volatility and build a good relationship with the shareholders. Overall, it showed the financial effect of ERP in the emerging economy context of Egypt.

OLS Regression Analysis 115 organizations in Egypt were edited in 1150 observations registered from 2011 to 2020 on the Egyptian Stock Exchange (ESE). The main results of tests are robust after analysis with a cluster of the standard errors by companies' change of critical variables.

Keywords: Enterprise Resources Planning, Stock Price Volatility, Emerging markets, Egyptian firms.

1. Introduction

Enterprise Resource Planning (ERP) solutions have formed the core of integrated business process management in enterprises for the past 20 years. They are recognized to generate business value by, among other things, shortening process times, enhancing collaboration, centralizing company data, lowering administrative and operational expenses, and increasing on time delivery (Badewi et al., 2018; Gattiker & Goodhue, 2005; McAfee, 2002).

Information technology is now crucial for managing and running all operations, from supply chain management to production scheduling. As a result, the term "Enterprise Resource Planning" refers to an integrated software-based management system that includes both core business functions such as finance, production, and marketing as well as ancillary functions such as purchasing, distribution, cost accounting, cash flows, customer relations, material management, warehouse management, human resources, quality control, and electronic banking.

ERP enables firms to produce commodities and services to use their resources efficiently. The company collects all data in one spot, consolidates it, and uses it to carry out the activity as needed (Akyurt et al., 2020).

It is realistic to expect less ambiguity in management decision-making and a decrease in business risk if IT enhances the quality of managers' information. Moreover, information technology (IT) systems can offer a technological foundation for integrating activities characterized by information sharing and efficient coordination between processes (Barua et al., 2004; Rai et al., 2006). While previous research has established the justification for IT-enabled process integration and demonstrated that it produces performance benefits (Rai et al., 2012), integrated processes should also lower firm risk, improve information quality and visibility for decision-makers, as well as in the coordination of decision making within and across business processes such as Egypt as an emerging market.

The increased flow of information into the market increases the information represented in stock prices. They improve the information content of market prices by providing more financial information, which reduces stock price volatility (Rubin & Smith, 2009). The financial crisis was related to an increased rate of stock price volatility that impacted shareholders (Vlastakis & Markellos, 2012). The main question is whether the ERP system helps reduce stock volatility risks. This topic needs more study, especially in developing countries.

We examine how ERP systems affect reducing firm risk for practical reasons. By responding to this query, a gap in the literature on the business value of ERP will be filled with Systems. According to estimates, companies invest 75% of their corporate IT budgets in enterprise systems, and the need for ERP systems globally is expected to increase. However, there has long been skepticism regarding the commercial viability of ERP systems (Dorantes et al., 2013), and to the best of our knowledge, only a few studies in the literature on ERP systems have looked at how these systems affect firm risk based on large-scale data. A related line of research has looked into the connection between IT investment and business risk. Instead of concentrating on particular systems, such as ERP systems, this research has looked at investments in IT more broadly. So, determining whether ERP systems affect company risk would significantly impact academic research and business practice.

Investment in ERP is expensive and is seen as a strategic choice for a company. ERP can impact all business operations when implemented appropriately (Hitt et al., 2002), changing how businesses operate. Financial and non-financial information is gathered, produced, processed, audited, and disseminated (Brazel & Dang, 2008). In this study, we investigate if ERP usage impacts an Egyptian user's stock price volatility. We specifically inquire whether ERP adoption generally affects Egyptian users' stock price volatility.

Lastly, by establishing ERP adoption as a new driver to reduce volatility risk, this work contributes to the growing body of research on stock price volatility risk. Prior research has concentrated on the effects of corporate tax avoidance, reporting standards, accounting conservatism, auditor tenure, XBRL adoption, and operating cash flow opacity on stock price crash risk (Kim et al., 2011; DeFond et al., 2015; Kim & Zhang, 2016; Callen & Fang, 2017; Zhang et al., 2019; Cheng et al., 2020). The findings of our study are essential to corporate stakeholders and company management because more businesses are utilizing ERP.

Therefore, the primary goal of this study is to address a research gap by providing insights and answers to the following research question:

RQ1. Does the implementation of ERP affect Stock Price Volatility (SPV) in Egyptian listed companies?

Despite the potential association between ERP usage and SPV, to the best of our knowledge, no prior study has empirically tested such a linkage. Our study aims to fill this gap in the literature. In this context, few studies have explored the relationship between ERP adoption and reducing the risk companies face in emerging markets such as Egypt.

The remainder of this research is organized as follows: Section 2 presents an overview of the Background of ERP adoption in Egypt. Section 3 will review a thorough examination of theoretical analysis and hypothesis development. Section 4 will provide an in-depth description of the research design, such as sample selection, model specification, and variable measurement. Moving forward, Section 5 will review the presentation and discussion of empirical results, including regression analysis and an exploration of the impact of ERP usage. Section 6 will delve into robustness checks, and Section 7 illustrates Cross-sectional analyses. Finally, we conclude in Section 8.

2. Background of ERP adoption in Egypt

There is an orientation in the Egyptian environment to adopt ERP systems in Egyptian listed companies for different purposes. The ERP system aims to unify, improve, and automate work systems to enable the availability of information accurately and quickly and facilitate its flow between different departments. The digital transformation seeks to find the best technical and technical solutions to manage the resources of Egyptian companies, which leads to raising the efficiency of the public sector and automating most of the executive operations of companies (Egyptian Ministry of Public Business Sector, 2021).

ERP witnessed significant development in Egypt during the last period. The following sectors are the largest sector implementations in Egypt: Basic Resources, Financial, and Industrial. The implementation rate of ERP in the study sample during 2011-2020 reached 65%. According to numerous case studies in Egypt, Egyptian businesses frequently employ this method of ERP selection (Haddara & Päivärinta, 2011). Even though there is a ton of research on the ERP selection phase, very few papers offer actual cases. Therefore, choosing the right ERP system is difficult because of the limited resources and knowledge available, the high complexity of ERP systems, and the variety of selection criteria.

On the other hand, implementing an ERP system incorrectly or unsuccessfully is difficult, places a significant strain on a business, and may result in significant losses, project abandonment, or, even worse, bankruptcy. Alarming incidents of ERP systems routinely exceeding budgets and deadlines, seriously disrupting business operations, and even failing have been widely reported (Boersma & Kingma, 2005; Chang et al., 2008; Matende & Ogao, 2013).

In the context of a competitive business environment and an uncertain structure, it becomes inevitable to utilize an effective decision-making tool to face the challenges of making decisions under high uncertainty (Temur & Bolat, 2018). In light of the crises and fluctuations that the Egyptian environment is going through, ERP is considered one of the pillars of shareholders in

decision-making and maintaining the value of the enterprise. This study attempts to verify the feasibility of using ERP in the Egyptian business environment for shareholders.

Therefore, the study sought to determine the impact of ERP on the shareholders of companies in Egypt. There needs to be more post-implementation audits, which would also assist in addressing any problems. The impacts of recent political developments and the fall of the Egyptian economy due to the revolution and COVID19 have also hindered the activities of some companies in their post-implementation ERP.

3 Theoretical analysis and hypothesis development

The recent global financial crisis has dramatically dropped asset prices and increased volatility in many financial markets, possibly due to destabilizing speculation (Engelhardt et al., 2021). Furthermore, according to the financial instability hypothesis, instability in financial markets is endogenous and frequently manifests as higher stock price volatility. Moreover, increased market transparency lessens instability, reducing uncertainty, which is frequently gauged by the volatility of stock prices. Furthermore, according to the financial instability hypothesis, instability in financial markets is endogenous and frequently manifests as higher stock price volatility (Minsky, 1992; Kregel, 2007). Moreover, increased market transparency lessens instability, reducing uncertainty, which is frequently gauged by the volatility of stock prices (Mezhoud et al., 2017).

High and low stock price volatility can be influenced by macro and micro-level causes. Macroeconomic factors include interest rates, currency exchange rates, inflation, and other variables significantly affecting businesses. Micro factors, on the other hand, directly affect the business, such as management changes and elements that can impact a company's profitability, such as funding. It is challenging to identify which factors have the most substantial influence on SPV (Romli et al., 2017). For modern businesses, controlling company risk, also known as firm performance volatility, is a significant challenge. There isn't enough evidence in the literature to support the widespread perception that information technology (IT) is a valuable tool for processing information that helps businesses deal with uncertainty better, potentially reducing firm performance volatility. We hypothesize that ERP systems, a significant class of corporate IT applications, can aid in lowering company risk. In particular, we contend that research on the post implementation stage is required to fully understand the risk lowering impact of ERP systems (Tian & Xu, 2015).

On the other hand, ERP has fitted controls over businesses' operations and reporting, which may help reduce the potential arbitrariness, errors, and inconsistencies inherent in manual checks, leading to more effective internal control. ERP also makes instant and wide-ranging communication possible. Better financial reporting should result from information sharing that speeds up and improves reporting and enhances internal control performance (Cao et al., 2022).

These studies typically discover evidence regarding the effect of ERP usage on firm transparency (Brazel & Dang, 2008) for evidence of deterioration and weakness (Dorantes et al., 2013), for evidence of enhancement in internal control (Wright & Wright, 2002; Brazel & Agoglia, 2007) for decreased effectiveness, and (Morris, 2011 a) for enhanced effect. Despite the more consistent evidence pointing to the positive performance effect of ERP usage, and perhaps most

significantly, we add to the body of knowledge about ERP by demonstrating how the shareholder-manager agency problem has a significant impact on whether a company can realize the advantages of ERP because it affects top management's commitment to the organizational changes needed during the assimilation stage of ERP adoption.

The basis for investors' investment decisions is stock price volatility. The prevalent phenomenon is that the environment is getting more competitive every day. The success of investors depends on the availability of information in the market. The basis for share price volatility must be understood. Investors will only take large risks if there is a potential to gain substantial benefits. This is known as the high-risk, high-return strategy. (Hartono, 2019), Volatility is a security's or commodity's price fluctuation for a predetermined time. Risk and volatility are the same thing. The return's unpredictability increases with increasing volatility. The opportunity to conduct trades or transactions to profit from the difference between the initial price and the end price (margin) at the time of the transaction is there when the daily volatility is very high, but the risk is also relatively high. A low level of volatility in the stock price denotes brief price fluctuations. Investors often cannot make money in this situation, but they must keep the shares for a lengthy time to make money (capital gain). As a result, investors who appreciate trading tactics want high volatility, whereas long-term investors prefer low volatility, even when share values are rising (Chan & Fong, 2000; Khurniaji & Raharja, 2013).

In summary, ERP implies high information quality, good internal control, and less firm risk, so I propose hypothesis 1: Enterprises' adoption of ERP systems has a negative relationship with SPV. According to the above theoretical analysis, the study assumes that:

H-1: ERP adoption negatively correlated with stock price volatility risk.

4. Research design

4.1 Sample and data

Data were obtained from two primary sources. First, I collected financial and operational data from the annual report. Second, enterprise resource planning (ERP), which I collected from the company's annual report and company website, or if I could not get it, then make contact with the company's staff. The main questions focused on the following investigation:

- Is the firm implementing an ERP system or not?
- If the firm adopts ERP, which year begins implementation?
- If the firm adopts ERP, how many modules are there, and what is the name of the ERP system?

One concern is that since companies in Egypt are not required to disclose their use of ERP, an ERP user may decide not to disclose the usage in corporate filings or on the company website. We believe the likelihood of not revealing ERP usage in Egypt is improbable for two reasons, even if our study's methods for obtaining data on ERP usage are similar to those of earlier studies (Brazel & Agoglia, 2007; Morris, 2011 b; Dorantes et al., 2013). First, implementing ERP usage requires a significant financial investment and several years, and there is no legal necessity for ERP usage disclosure. Second, Egyptian listed companies require businesses to promptly disclose information regarding their significant (financially or strategically) investment decisions. Strategic ERP investment is possible.

The data were collected year by year and firm by firm. To approach relevant data, the sample is the 115 listed companies of the Egyptian Exchange (EGX) for ten years of 1150 observations. According to the timescale of the data action, the timescale was reduced to 10 years from 2011 to 2020—this study emphasizes finances. Moreover, non-financial, it has 17 sectors. Table 1 provides industry-specific statistics.

Table 1 Industry distribution of the sample

Name of the Industry	Number	percentage
Industrial Goods and Services and Automobiles	11	10%
Banks	10	9%
Basic Resources	7	6%
Chemicals	4	3%
Construction and Materials	20	17%
Financial Services, excluding Banks	6	5%
Food and Beverage	17	14%
Healthcare and Pharmaceuticals	10	8%
Hotels & Entertainment Services	2	2%
Insurance	2	2%
Personal and Household Products	3	3%
Real Estate	13	11%
Retail	1	1%
Textiles and durable goods	2	2%
Travel & Leisure	3	3%
Utilities	1	1%
Media and Telecommunications	3	3%
Total	115	100%

4.2 Model and variables

A suitable model was created to analyze the hypothesis, which included all dependent, independent, and control variables. The final regression model (1) is as follows:

$$SPV = \beta_0 + \beta_1 ERP + \beta_2 ISHR + \beta_3 TAT + \beta_4 \text{Tobin's Q} + \beta_5 OCF + \beta_6 ROI + \beta_7 DUAL + \beta_8 \text{Cash} + \beta_9 BIND + \beta_{10} \text{covid19} + \beta_{11} \text{year-effect} + \beta_{12} \text{Industry-effect} + \epsilon \tag{1}$$

Where, stock price volatility (SPV)= The range of the highest and lowest stock price prices of each stock firm, dividing it by the average prices $\frac{HP - LP}{(HP + LP)/2}$, ERP= Levels implemented Enterprise recourse planning measured, 2 for adopted ERP totally implementation, 1 for adopted ERP partly implementation, 0 no implementation; ISHR= the aggregate percentages of banks, insurance companies, in investment enterprises; Total assets Turnover (TAT)= The net sales revenue to total assets ratio; Tobin's Q= Market value of equity + net debts)/ending total assets, OCF= cash flows from operating activities divided by average total assets, ROI= income before extraordinary items (available for common stockholders), divided by the sum of total long-term debt, preferred stock, minority interest, and total common equity,

Dual=1 if the chairman and CEO are the same persons, otherwise 0, Cash =Cash and cash equivalent/total assets, Ind =A dummy variable of industry equal 1 if industry firm,0 otherwise, BIND=The number independent of board directors, Covid19=dummy variable 1 from (2019-2020) 0 otherwise.

Equation (1) is a regression model for estimating the association between ERP implementation and stock price volatility (SPV) if ERP adoption is negatively correlated with stock price volatility (SPV).

4.3 variable measurement

4.3.1 Dependent variable

The dependent variable is stock price volatility, which was used to determine how widely stock prices fluctuated around their average value during a certain period. Volatility also refers to the degree of uncertainty or risk associated with the magnitude of movements in the value of a security. A higher level of volatility indicates that an investment's value can be spread out over a wider range of values. This means that the security's price can vary drastically in either way in a short period. A reduced level of volatility indicates that the value of an investment does not fluctuate dramatically (Kurniasari & Reyes, 2020).

The Egyptian stock exchange's historical data is used to calculate stock prices. We calculate stock price volatility (SPV) by dividing the yearly difference between each stock firm's maximum and minimum stock prices in the stock market by the average prices.

The stock price volatility range during the investigation window. Following (Huang et al., 2011), the stock price volatility range is defined as follows:

$$SPV = \frac{HP - LP}{(HP + LP)/2}$$

Where HP reflects the maximum closing price, and LP reflects the minimum closing price during the investigation window. A larger VOLD indicates greater stock price volatility.

4.3.2 Independent variable

Enterprise resource planning (ERP) adoption is the independent variable in this model. It is a measure of the effectiveness of investors' investments. It is an indicator that measures the levels of ERP implementation in the organization to measure ERP adoption. It measures 2 in the case of total implementation, 1 in the case of partial implementation, and 0 in the case of non-implementation.

Second, to our knowledge, this study is the first to investigate the association between ERP usage and firm stock price volatility, which is a broad indicator of a firm's information environment. Previous research on the use of ERP has concentrated on its effects on firm performance (Poston & Grabski, 2001; Hitt et al., 2002; Nicolaou, 2004), management control (Chapman & Kihn, 2009; Morris a, 2011), earnings management (Brazel & Dang, 2008), internal control weakness (Morris b, 2011), management earnings forecast (Dorantes et al., 2013), auditor effectiveness (Pincus et al., 2017), and capital market (Jia et al., 2020).

4.3.3 Control variables

The volatility of stock prices is impacted by both internal and external variables. This study calculated stock price volatility by examining the impact of several factors, including Total assets Turnover (TAT), Return on Investment (ROI), Dual, and COVID-19.

The literature has shown that ROA has an impact on stock price volatility. For instance, ROA was adversely correlated with stock volatility during the financial crisis in 2008 and the European debt crisis in 2012 (Aloui & Jarboui, 2018).

The findings show a significant positive association between the five largest shareholders and share price volatility. However, the analysis was unable to establish a meaningful association between individual and institutional holdings on the one hand and share price volatility on the other. These findings are consistent with previous empirical research. This dissertation provides managers and investors with insight into the nature of ownership structures and how ownership structures can influence business risk and stock returns (Alzeaiden & Al-Rawash, 2014).

The board structure reduces volatility. We find a statistically significant inverse association between board independence, CEO duality, board size, and share price volatility. As a result, the board structure is not predicted to produce significant fluctuations in stock prices, which is consistent with the findings of this study (Mezhoud et al., 2017)—board dimensions. Businesses with larger boards have lower performance variability because it takes longer for a larger board to decide (Cheng, 2008). Larger groups tend to make fewer extreme decisions, which results in less volatile performance (Kogan & Wallach, 1966; Moscovici & Zavalloni, 1969). This suggests that BS is adversely correlated with stock price volatility.

Tan and Liu (2016) show that the market-to-book ratio is negatively connected with firm-specific volatility in the Australian stock market, consistent with findings from more recent studies (Ferreira & Lax, 2007; Serfling, 2014).

Numerous studies have been conducted to investigate the impact of COVID19 on price volatility in the context of the continuing COVID19 pandemic. For example, (Sahoo, 2021; Uddin et al., 2021) found that COVID19 influences market price dynamics; Neog (2021) showed that emerging stock markets became more volatile during the COVID19 pandemic than they were during the GFC period; and Gurrib (2021) revealed that shocks to COVID19 cases have a short-term price impact. Despite the scarcity of research on stock price overreaction during crises, it has been reported that short-run price overreaction typically occurs in a volatile environment and that it is more sensitive to increases in volatility under stressful conditions than under less stressful conditions (Piccoli et al., 2017). A greater discount rate and lower stock prices will result from increased money supply. Stock prices will decline due to more challenging economic regulations from increased inflation. Hugida (2011) demonstrates how inflation influences the volatility of stock prices. The adverse effect will tempt investors to sell their holdings, exacerbating stock price volatility.

The Egyptian business environment has witnessed many financial and political crises, including the Corona crisis, which greatly affected stock fluctuations. The following are the dependent variables, independent variables, and control variables:

Table 2 Variable definitions

Variables	Acronym	Measurement
stock price volatility	SPV	The range of the highest and lowest prices for each stock firm is divided by the average prices. $VOLD = \frac{HP - LP}{(HP + LP)/2}$
Enterprise resource planning	ERP	Levels of implemented ERP measured: 2 for adopted ERP total implementation, 1 for adopted ERP partially implementation, and 0 for no implementation.
Institutional Shareholders	ISHR	The sum of the percentages of the firm's total capital shares held by banks, insurance companies, investment firms, pension funds, and other large financial institutions.
Total assets Turnover	TAT	The net sales revenue to total assets ratio.
Tobin's Q	Tobin's Q	The market value of equity + net debts)/ending total assets
Operating Cash Flow	OCF	cash flows from operating activities divided by average total assets
Return on Investment	ROI	income before extraordinary items (available for common stockholders), divided by the sum of total long-term debt, preferred stock, minority interest, and total common equity
Duality	Dual	1 if the chairman and CEO are the same person, otherwise 0
Cash holding	Cash	Cash and cash equivalent/total assets
Independent board size	BIND	The number independent of board directors
Coronavirus	Covid19	Dummy variable 1 from (2019-2020) 0 otherwise.

5. Empirical results

5.1 Summary statistics

Table 3 shows the descriptive statistics of our study. The dependent variable is stock price volatility (SPV). The mean value of SPV is 0.179. The mean was 0.179, with a standard deviation of 0.11. Due to the highly positive skewness of 0.806. On the other hand, a higher level of volatility means that the price of securities can move drastically in a short period, causing shareholders and banks to lose confidence in making loans, resulting in several difficulties.

The level of ERP implementation has a mean of 1.123. Where the mean values of institutional

shareholding a 0.14 and TAT is 0.343. The analysis of this table shows that the mean values of Tobin’s Q and OCF are 1.336 and 0.047, respectively. Moreover, the mean values of DUAL and ROI are 0.675 and 0.103, respectively.

Also, the analysis of this table shows that the mean values of cash holding and Bind are 0.079 and 0.822, respectively.

Table 3 Descriptive statistics analysis

Variable	Obs	Mean	Std. Dev.	Min	Max
STV	1150	0.179	0.11	0	0.806
ERP	1150	1.123	0.904	0	2
ISHR	1150	0.14	0.223	0	0.97
TAT	1150	0.343	0.289	0.00004	0.949
Tobin’s Q	1150	1.337	0.595	0.524	5.764
OCF	1150	0.047	0.139	-1.454	0.687
ROI	1150	0.103	0.203	-0.63	0.629
DUAL	1150	0.675	0.469	0	1
Cash	1150	0.079	0.179	0.0013	0.886
BIND	1150	0.822	1.277	0	7
covid19	1150	0.2	0.4	0	1

SPV=stock price volatility, ERP=Enterprise Resources Planning, ISHR= institutional shareholders, TAT= Total assets Turnover; Tobin’s Q =firm value, OCF= cash flows from operating activities, ROI= Return on Investment, Dual=1 if the chairman and CEO are the same persons, otherwise 0, Cash =Cash and cash equivalent, BIND=independent board number, Covid19=coronavirus.

5.2 Correlation analysis

The correlation matrix showed vital evidence of the relationship between stock price volatility (SPV) and ERP adoption. The correlation matrix identifies the direction and strength of the association between all under this study variables. The findings show a negative association between ERP and stock price volatility (SPV), implying that companies implementing ERP decrease stock price volatility. This test is helpful to examine whether a multicollinearity problem exists in this study. This implies that there is no multicollinearity in this model. Table 4 shows that considering the values of pairwise correlations, there is a negative association between ERP and stock price volatility ($r = -0.098$) since ($p < 0.01$). ERP has a negative impact of -0.098 on stock price volatility. The result indicates ISHR also has a negative influence on variable stock price volatility since ($r = -0.053$) and a significant level of ($P < 0.05$).

There is a negative association between TAT and SPV ($r = -0.063$) and a highly significant relationship level of ($p < 0.05$). There is a negative correlation between financial Tobin’s Q and SPV since ($r = -0.082$) ($p < 0.01$). There is a negative association between ROI and SPV ($r = -0.192$) and a highly significant relationship level of ($p < 0.01$). There is a negative association between OCF and SPV ($r = -0.118$) and a highly significant relationship level of ($p < 0.01$). There is a negative correlation between DUAL and stock price volatility since ($r = -0.066$) ($p < 0.05$). There is a negative association between cash holding and SPV ($r = -0.057$) and a significant

relationship level of ($p < 0.1$).

There is a positive correlation between BIND and SPV since ($r=0.108$) and a highly significant relationship level of ($p < 0.01$). Finally, there is no association between COVID-19 and SPV. The economic effects of the Corona crisis did not appear until the end of 2020.

Table 4 Pairwise correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) STV	1.000										
(2) ERP	-0.098***	1.000									
(3) ISHR	-0.053*	0.172***	1.000								
(4) TAT	-0.063**	0.060**	-0.280***	1.000							
(5) Tobin'sQ	-0.082***	0.208***	-0.086***	0.215***	1.000						
(6) OCF	-0.118***	0.114***	0.0327	0.097***	0.306***	1.000					
(7) ROI	-0.192***	0.090***	0.092***	0.0326	0.276***	0.309***	1.000				
(8) DUAL	-0.066**	0.0012	-0.101***	-0.0261	-0.0588	-0.058**	-0.089**	1.000			
(9) cash	-0.057*	-0.075**	-0.067**	0.070**	-0.0381	-0.059**	-0.0152	0.125***	1.000		
(10) BIND	0.108***	0.164***	-0.0502*	-0.058**	-0.0070	-0.0030	-0.055*	-0.0385	-0.0440	1.000	
(11) covid19	-0.0441	0.081***	0.0115	0.0064	-0.058**	-0.116***	-0.083***	-0.0099	0.0368	0.194***	1.000

5.3 Regression results of ERP adoption and stock price volatility

Table 5 demonstrates the baseline findings of the regression analysis. This study concluded that stock price volatility (SPV) negatively affects ERP adoption. This study presented a consistent result by including the control variables shown in Model 1. It shows a negative association between stock price volatility (SPV) and ERP adoption with a coefficient of -0.009. The results support hypothesis 1, which states that ERP adoption negatively correlates with stock price volatility (SPV). The value of the coefficient of determination R-square is 0.115 with control. The value indicates a relation between the adopted ERP system and stock price volatility (SPV). Adopting ERP software is one of the factors that helps, supports, and protects shareholders from risky stock fluctuations.

Table 5 The regression results between the stock price volatility (SPV) effect of ERP

Dependent variable: stock price volatility	(1) Model 1
ERP	-0.009** (-2.31)
ISHR	-0.024 (-1.49)
TAT	-0.0006 (-0.47)
Tobin's Q	0.0002 (0.03)
OCF	-0.062** (-2.56)
ROI	-0.085*** (-5.03)
DUAL	-0.017** (-2.56)
Cash	-0.03* (-1.66)
BIND	0.011*** (4.42)
covid19	-0.01 (-0.69)
year- effect	Y
Industry-effect	Y
Constant	0.225*** (16.13)
Observations	1150
R-squared	0.115
Adj. R-squared	0.100
F-statistics	7.725***

*** p<0.01, ** p<0.05, * p<0.1

SPV=stock price volatility, ERP=Enterprise Resources Planning, ISHR= institutional shareholders; TAT= Total assets Turnover; Tobin's Q =firm value, OCF= cash flows from operating activities, ROI= Return on Investment, Dual=1 if the chairman and CEO are the same persons, otherwise 0, Cash =Cash and cash equivalent, BIND=independent board number, Covid19=coronavirus.

6. Robustness tests

6.1 Alternative measure

Table 6 provides a robust analysis to check the sensitivity and robustness of the results obtained for the effect of ERP on stock price volatility, and we employ an alternative measure of independent variable ERP adoption. We use the year of implementation ERP measured by the number of years after implementation ERP; first, the analysis with an alternative measure. The results again display a negative and significant association between ERP adoption and stock price volatility in model 1. Second, the analysis with an alternative of the dependent variable stock price volatility is measured by the standard deviation of stock prices. The results display a negative and significant association between ERP adoption and stock price volatility. Third, we found a negative and significant relationship between ERP adoption and stock price volatility by replacing ROI with ROA, as shown in model 2.

Table 6 Robustness tests stock price volatility (SPV)and ERP adoption

VARIABLES	(1) SPV	(2) Replace ROI with ROA	(3) SD
ERP year	-0.003*** (-4.53)		
ERP		-0.011*** (-2.83)	-0.174* (-1.73)
ISHR	-0.021 (-1.34)	-0.033** (-2.06)	0.515 (1.21)
TAT	-0.006 (-0.44)	-0.015 (-1.18)	-0.0291 (-0.09)
Tobin's Q	-0.001 (-0.11)	-0.009* (-1.74)	0.591*** (3.49)
OCF	-0.061** (-2.54)	-0.094*** (-3.97)	2.148*** (3.19)
ROI	-0.086*** (-5.11)		2.347*** (5.00)
DUAL	-0.021*** (-3.08)	-0.016** (-2.37)	0.428** (2.35)
Cash	-0.017 (-0.92)	-0.035* (-1.92)	-0.934* (-1.88)
BIND	0.011*** (4.41)	0.011*** (4.18)	0.0527 (0.73)
covid19	0.006 (0.41)	-0.007 (-0.52)	1.061*** (2.76)
ROA		0.131*** (3.89)	
year- effect	Y	Y	Y
Industry-effect	Y	Y	Y
Constant	0.226*** (16.33)	0.236*** (16.62)	-0.206 (-0.53)
Observations	1,150	1,150	1150
R-squared	0.127	0.107	0.135
Adj. R-squared	0.112	0.092	0.1194
F-statistics	8.62***	7.14***	8.83***

7. Further analyses

7.1 Moderating effects of the size firm (large size & small size)

Table 7 presents the results by size (large size, small size) for additional analysis. The size firm showed that the stock price volatility (SPV) has a significant and negative association with ERP only in the case of companies with large size with a coefficient value of -0.013, as shown in model 1. The stock price is more erratic because the shares of large companies are more traded than small corporations.

According to (Sutrisno, 2020; Mehmood et al., 2019), the corporation's size positively impacts stock volatility. The higher the diversification of activities. This application can reduce the level of volatility in large companies.

Table 7 Moderating effects of SIZE

Dependent variable: stock price volatility	(1)	(2)
	Large -size	Small-size
ERP	-0.013** (-2.05)	-0.006 (-1.22)
ISHR	-0.015 (-0.80)	0.011 (0.29)
TAT	0.042** (2.11)	-0.035** (-2.14)
Tobin's Q	-0.01 (-1.14)	0.013 (1.54)
OCF	-0.02 (-0.43)	-0.079*** (-2.80)
ROI	-0.08*** (-3.00)	-0.103*** (-4.57)
DUAL	-0.008 (-0.81)	-0.026*** (-2.70)
Cash	-0.041 (-1.06)	-0.035* (-1.66)
BIND	0.016*** (4.40)	0.007* (1.83)
covid19	-0.02 (-0.97)	0.007 (0.37)
year- effect	Y	Y
Industry-effect	Y	Y
Constant	0.224*** (11.14)	0.212 (10.31)
Observations	556	594
R-squared	0.146	0.135
Adj. R-squared	0.1158	0.1059
F-statistics	4.826***	4.685***

7.2 Moderating effects of corporate governance (good CG and bad CG)

For additional analysis, Table 8 presents the results of good and bad corporate governance. The result demonstrates that the ERP has a significant and negative association with SPV only in companies with corporate governance with a coefficient value of -0.014, as shown in model 1 of Table 8. The findings also demonstrate that the board structure components reduce volatility. We find a statistically significant inverse association between board independence, CEO duality, board size, and share price volatility. As a result, the board structure is not predicted to produce significant fluctuations in stock prices, which is consistent with the findings of this study (Mezoud & Boubaker, 2017).

Table 8 Moderating effects of corporate governance

Dependent variable: stock price volatility	(1)	(2)
	Good govern	Bad govern
ERP	-0.014** (-2.33)	-0.007 (-1.41)
ISHR	-0.013 (-0.67)	-0.041 (-1.32)
TAT	0.034* (1.65)	-0.03* (-1.84)
Tobin's Q	0.016* (1.77)	-0.009 (-1.14)
OCF	-0.066 (-1.54)	-0.053* (-1.76)
ROI	-0.12*** (-4.23)	-0.066*** (-3.05)
DUAL	-0.0005 (-0.05)	-0.028** (-2.39)
Cash	-0.045 (-1.54)	-0.023 (-0.94)
BIND	0.009*** (2.81)	0.009* (1.90)
covid19	-0.012 (-0.58)	-0.008 (-0.39)
year- effect	Y	Y
Industry-effect	Y	Y
Constant	0.212*** (10.65)	0.24*** (11.90)
Observations	531	619
R-squared	0.143	0.120
Adj. R-squared	0.110	0.0923
F-statistics	4.456***	4.306***

8. Conclusion

We investigate whether ERP usage reduces the stock price volatility of Egyptian firms and whether the effect differs between large and small sizes. We find that ERP usage is negatively associated with SPV. We also find that this association is more pronounced in large-size and

good-governance corporations. It will help to reduce the Stock Price Volatility in Emerging markets such as Egypt. Our study is among the first to examine how ERP usage affects SPV.

Our results confirm the role of ERP system in supporting companies, especially in light of the volatility witnessed by the developing country, in reducing the risks of stock volatility.

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