The Impact of COVID-19 Pandemic on Country Risk: An Empirical Evidence from Egypt Vs. UK

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Abstract

This paper aims to examine the impact of the COVID-19 pandemic on the country risk in Egypt and the Uk in parallel with control variables; nominal effective exchange rate, and inflation rate. The vector error correction model (VECM) method is used in the study to examine both the short and long-term relationships between the variables over the period stating from February 2020 until June 2021 on a monthly basis. The study employs government bond spread yield as a proxy for country risk measures. For Egypt Model, The empirical findings showed that as the ECT coefficient is negligible, there is no long-run significant relationship between the covid-19, the exchange rate, and the country risk. Moreover, there is no relationship between COVID-19 and country risk, although there is a short-run relationship between the exchange rate and country risk. Whereas for UK model, the ECT coefficient is negative and significant, the investigation discovers a long-run significant relationship between the covid-19, the exchange rate, the inflation rate, and the country risk. In the short term, there is a relationship between inflation rate and country risk, but there is none between covid-19, exchange rate, and country risk.

***Keywords**: Country Risk, Covid-19, Inflation, Exchange Rate, Vector Error Correction Model.*

Introduction

Since COVID-19's first case was identified at the end of 2019, the virus has spread very rapidly all over the world, creating a pandemic. As of September 15, 2021, there were about 4.5 million casualties and about 227 million documented illnesses, according to the Johns Hopkins University Coronavirus Resource Center. In addition to the catastrophic medical and humanitarian problems, the outbreak has severely disrupted global economic activity, causing a significant shock to economic development.

Internationally, high levels of public debt have been observed even before the crisis and are predicted to increase further (IMF, 2020). Real-time increases in public debt and budget deficits are revealed by the evolution of sovereign credit spreads, which have risen almost everywhere in the world in response to the coronavirus announcement. Different countries have different capacities for financing new deficits, whether through the issuing of debt, borrowing, or an increase in taxation.

According to empirical data, high levels of public debt can inhibit economic growth (e.g., Reinhart and Rogoff, 2010; Reinhart, Reinhart, and Rogoff, 2012; Romer and Romer, 2017); additionally,

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higher levels of public debt are associated with greater economic costs following a financial crisis (Jord'a, Schularick & Taylor, 2016; Romer & Romer, 2018, 2019); and vice versa.

Facts demonstrate that rising sovereign credit risk has major economic repercussions, such as higher loan supply risks, investment risks, and company credit risk (Adelino & Ferreira, 2016; Bocola, 2016). (Lee, Naranjo & Sirmans, 2016; Augustin, Boustanifar, Breckenfelder & Schnitzler, 2018).

In essence, the coronavirus pandemic presents researchers with a once-in-a-lifetime chance to get more insight into a nation's response to external shocks. First off, the coronavirus pandemic was an unexpected shock to economic growth that affected every nation in the world, albeit to varying degrees, unlike the Global Financial Crisis (2008) and the European Sovereign Debt Crisis (2010), both of which were brought on by an endogenous build-up of private and public leverage.

Earlier studies that examined the impact of the pandemic on sovereign bond risk include Cevik and Oztürkkal, 2020; Daehler et al., 2020; and Augustin et al., 2021. In contrast to the vast quantity of research that examines the impact of the pandemic on financial markets, there are very few studies that examine the impact of the pandemic on sovereign country risk.

The remainder of the paper is organized as follows: The literature review on the relationship between COVID-19 and country risk, as well as the effects of the reserves ,exchange rate, and inflation rate on country risk, is presented in the second section. The data and methodology are presented in the third part. The empirical findings are presented in the fourth part. The sixth portion comes to an end.

Literature Review

Both Benmelech and Tzur-Ilan (2020) and Balajee, Tomar, and Udupa (2020) indicate concerns that countries with poor credit histories, those with lower credit ratings, and, in particular, lower-income countries, may be unable to effectively deploy fiscal policy tools during economic crises. In the same manner, Arellano, Bai, and Mihalache (2020) look at the connections between sovereign debt and the pandemic, showing that being exposed to financial issues makes the economic and health effects of the epidemic worse. They found that approximately a third of the pandemic's welfare cost is attributable to default risk.

The Effect of the International Reserve Rate on Country Risk

Reserves and borrowing restrictions have been the subject of several recent studies. But their results were very different from the ones mentioned before. According to Caballero and Panageas (2008), a government can reduce the cost of reserve accumulation by entering into contingent contracts that offer protection against sudden capital flow reversals if it can identify features that are connected to unexpected breaks. For a government with limited resources and higher predicted future income, they view reserve building as an expensive choice. However, they are less focused on the endogenous impact of reserve build-up on net value and more focused on portfolio decisions.

A sovereign spread index was created more recently by Ramos-Francia and Rangel (2012) and is based on the difference between the yields on long-term government bonds and those on 10-year US Treasury bonds. They examine the relationship between this index and macroeconomic factors such as nominal exchange rate swings, GDP, fiscal and current account deficits, and inflation. These results demonstrate a relationship between increasing global reserves and currency rates and a reduction in developing market default risk

In a two-country model presented by Aizenman et al. (2005), credit ceilings are placed on the second country as a result of the risk of an output shock. The agent chooses the level of debt and reserves to optimize consumption. After experiencing shock, the nation determines whether or not to declare bankruptcy.

They demonstrate that when reserves are used to lower the risk of a crisis and raise the nation's credit ceiling, reserve demand increases.

Mendoza (2006) also emphasized the negative effects of an abrupt stop, including significant current account reversals, sharp drops in total output and consumption, and asset price corrections. A comparable paradigm is used by Durdu et al. (2009) to examine the impact of output unpredictability, unexpected stops, and financial globalization on reserve demand under two different preference criteria. Their results suggest that, in addition to preventing unexpected halt in reserve demand, financial globalization has a positive impact on reserve demand, but the relationship between output variability and reserves is not statistically significant.

Additionally, Caballero and Panageas (2008) suggest building up reserves is expensive for developing nations that are already struggling financially. To safeguard them against abrupt capital reversals, they encourage governments to implement contingent hedging measures. According to Mendoza et al. (2007) and Durdu et al. (2010), the main predictor of the increase in reserve holdings is financial globalization, not the need to balance consumption against economic instability (2009).

The Effect of Exchange Rate on Country Risk

There is minimal research on the relationship between exchange rates and sovereign risk, despite the fact that this area of the literature is expanding significantly, with the exception of a few specific empirical findings.

The solvency and value of a nation's currency are impacted by both domestic and external factors. Wealth in both developing and developed countries is susceptible to valuation effects as a result of fluctuations in foreign exchange rates due to the rise of globalization, which encourages financial market integration and deregulation.

It is questionable, though, how the change in foreign exchange rates affects sovereign risk. That question's response is still unclear. According to the classical Mundell-Fleming model, a local currency depreciation increases net exports and raises a nation's competitiveness (Net Export Channel). As a result, total output rises and pressures on sovereign risk are reduced.

Quanto spreads are used by Augustin, Chernov, and Song (2020) to provide an asset-pricing approach to the connection between government defaults and currency depreciation in the Eurozone. The researchers found that despite its low devaluation risk conditional on failure, the risk premium for the euro devaluation was higher than either the credit risk premium or the equity market component.

A nation is said to have an unhedged negative net foreign asset status if it has more foreign currency obligations than foreign currency assets. Therefore, currency depreciation has a harmful effect on wealth. Especially in developing market economies, the balance sheets of local borrowers suffer when the value of a foreign currency declines. This causes the credit situation to worsen, which causes credit to contract and borrowing costs to rise. Investors' perceptions of the danger of bankruptcy increase as a result of this deterioration in domestic financial circumstances, which reduces economic activity.

From the previous discussion, we can draw the conclusion that a depreciation of the local currency may increase or decrease sovereign risk depending on whether the financial channel or net export channel predominates. Based on the domestic balance sheet's sensitivity to changes in foreign exchange rates, this dominance exists.

The Effect of Inflation on Country Risk

The body of literature regarding the causes of global inflation variations has improved by taking institutional and economic issues into account. The seminal research on this topic took into account variables like central bank independence (Rogoff 1985; Grili et al. 1991; Cukierman et al 1992); inflation targeting (Svensson 1997; Bernanke et al. 1999; Von Neumann & Hagen, 2002; Truman, 2003); the degree of economic openness (Romer 1993; Lane 1997; Ball, 2006; Cox, 2007; Binici et al., 2012); Public debt and financial sector inflation aversion (Cato & Terrones 2005; Lin & Chu 2013).

The literature also focuses on how non-economic variables affect inflation. The literature specifically considers the impact that political turmoil has on inflation. According to Cukierman et al. (1992), political polarization and taxation income are related. Paldam (1987) analyzes data from eight Latin American countries to provide empirical support for this relationship. According to Aisen and Veiga (2008), countries with social and political instabilities are more likely to experience volatile inflation. These findings are generally related to the idea of government accountability. These authors evaluated the effect of political and institutional factors, by considering that unstable political and socially fragmented nations with weak institutions are commonly prone to political shocks that result in erratic monetary and fiscal policies and rising inflation volatility.

The political, economic, and financial elements that are reported by the ICRG database include the country risk as a key component. According to Campillo and Miron (1997), the economy invests in technology as a result of the high past inflation to prevent the negative impacts of inflation, which ultimately lowers the costs of inflation. The coefficient should be greater than zero. The relationship between public debt and inflation is positive and statistically significant at this time. This outcome is consistent with Cato and Terrones' (2005) findings as well as Lin and Chu (2013).

According to Nguyen (2015), monetary policy becomes passive and can only manage the rate of inflation while fiscal policy turns active with budget surpluses serving as a nominal anchor. Therefore, higher government spending and fiscal deficits may result in greater inflation rates.

Wealthy countries are less afraid of inflation since they can adapt to it more easily, according to Campillo and Miron (1997) In the majority of the estimations, the dummy variable for the inflation targeting regime has a statistically significant negative coefficient. The inflation targeting regime is a key tool for bringing down inflation levels, as demonstrated by Svensson (1997), Bernanke and Mishkin (1997), Bernanke et al. (1999), Neumann and Hagen (2002), and Truman (2003). This negative association is consistent with their findings. The findings show a tradeoff between trade openness and inflation. Additionally, these findings were obtained by Lane (1997), Bowdler and Nunziata (2007), Sachsida, Carneiro, and Loureiro (2003).

Greater openness serves as an implicit mechanism, that discourages policymakers from acting in the event of a surprise monetary expansion, which lowers inflation (Romer,1993). The findings indicate a positive relationship between political risk factors and inflation in all estimates when it refers to risk variables.

The results of the Governance Failure study indicate that this political risk factor may influence inflation through the government's inability to implement fiscal and monetary policies (lower bureaucracy quality) and ineffectiveness in combating corruption (excessive patronage, nepotism, and job reservations) caused by routinely violating a law, which in turn increases social unhappiness and deteriorates socioeconomic conditions (such as growth in unemployment and poverty).

According to Baldacci et al. (2011), inflation has a considerable impact on sovereign risks. According to Martinez et al. (2013), the necessity for higher interest rates and the monetization of the budget deficit may both contribute to a high inflation rate. Min et al (2003) .'s research suggests that the sovereign risk premium will rise as a result of an increase in the inflation rate signifying macroeconomic instability. However, if the government does not increase the short-term interest rate through the central bank to combat inflationary tendencies, the default risk will be significant in an economy that targets inflation. The expected sign of inflation on the risk premium is positive.

Methodology

The study employs the vector error correction model (VECM) method, to examine the short-run and long-run relationship between the variables. To provide precision in the estimate of the relationship, it is thus necessary to first determine the presence of unit root and cointegration between the time series. This helps in implementing VECM method which supposes that all variables are endogenous. **Co-integration test** is the only method to study a relation in the long term between non stationary variables and integrated of degree (n) is to associate these variables with a co-integration relationship. (Moawad R.R.,2021)

Augmented Dickey-Fuller Stationary Test

The study applies the Augmented Dickey-Fuller (ADF) test to examine the unit root in each series. If the null hypothesis is rejected at level, then the order of the stationary series is labeled as I(0) whereas if the null hypothesis is rejected at first difference then the order of the stationary series is labeled as I(1). Similarly, for the second difference the order of the stationary series is labeled as I(2).

Johansen Cointegration Test

The regression of a non-stationary time series on another non-stationary time series may produce a spurious regression. Economically speaking, two variables will be cointegrated if they have a long-term, or equilibrium, relationship between them. (gujarati, 2020)

If the time series are non-stationary at level and when the variables are integrated of same order, the Johansen test of cointegration can be applied to obtain the number of cointegrating vector(s). But if variables in a long run relationship are of a different order of integration and the order of integration of the dependent variable is lower than the highest order of integration of the explanatory variables, there must be at least two explanatory variables integrated of this highest order if the necessary condition for the stationarity of the error term is to be met (Charemza et al., 1997). Johansen test technique uses two likelihood ratio test statistics to obtain the number of cointegrating vectors namely, the Trace test and the Maximum Eigenvalue test.

So, if the variables are found to be cointegrated after applying Johansen test then it can be concluded that there exists a long-run equilibrium relationship between the variables. Further, the long-run equilibrium relationship can be examined by applying VECM method.

Vector Error Correction Model (VECM)

It can be understood that cointegration indicates the presence of causality among two-time series but it does not detect the direction of the causal relationship. The cointegration variables can be specified by an Error Correction Mechanism that can be estimated by applying standard methods and diagnostic tests. The VECM representation allows us to distinguish between the long-run and short-run dynamic relationships.

Empirical Study

The model specified in the study is applied to two different countries which are Egypt and the United Kingdom in order to check the effect of the covid-19 on the country's risk in two different situations and levels of development.

Empirical Study: The Case of Egypt

1- **Analysis of Augmented Dickey-Fuller: Stationary Test**

It is evident from Table 1 that 2 variables are stationary in the first difference with no unit root and have the same order of integration I (1) and 2 variables are stationary at level I(0).

And we know that if variables in a long-run relationship are of a different order of integration and the order of integration of the dependent variable is lower than the highest order of integration of the explanatory variables, there must be at least two explanatory variables integrated of this highest order if the necessary condition for the stationarity of the error term is to be met (Charemza et al., 1997).

Table (1): Augmented Dickey Fuller Test

Variable	Augmented Dickey-Fuller (test statistic)	Test critical value at 5%	P-value	Order of integration
Ye	-3.469527	-2.976263	0.0170	I(0)
X1e	-4.202517	-2.981038	0.0031	I(0)
X2e	-4.766087	-2.981038	0.0008	I(1)
X3e	-3.712503	-2.981038	0.0100	I(1)

Source: done by researchers using the E-views software.
Where:
- ye: country risk in Egypt measured by Bond Yield Spread between US & Egypt
- X1e: covid-19 monthly new cases in Egypt.
- X2e: exchange rate of the Egyptian pound vs. US dollar.
X3e: monthly inflation rate of Egypt.

2- Lag Length Selection

A critical element in the specification of VAR models is the determination of the lag length of the VAR. selecting a higher order lag length than the true lag length causes an increase in the mean-square forecast errors of the VAR and that under-fitting the lag length often generates autocorrelated errors. Most VAR models are estimated using symmetric lags, i.e. the same lag length is used for all variables in all equations of the model. This lag length is frequently selected using an explicit statistical criterion such as the AIC or SIC. (Ozcicek & McMillin, 1999).

Table (2): VAR Lag Order Selection Criteria

VAR Lag Order Selection Criteria
Endogenous variables: YE X1E X2E X3E
Exogenous variables: C
Date: 06/27/22 Time: 23:01
Sample: 2020M02 2022M05
Included observations: 24

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-342.1465	NA	39595422	28.84554	29.04188	28.89763
1	-292.6057	78.43950	2479903.	26.05048	27.03219*	26.31093
2	-267.7516	31.06769*	1349106.	25.31263	27.07971	25.78144
3	-251.1510	15.21718	1848405.	25.26258	27.81503	25.93975
4	-218.5395	19.02337	1122161.*	23.87829*	27.21611	24.76382*

Source: done by researchers using the E-views software.

The study used 2 lags based on the LR criteria as the previous table shows. The sample is limited so we can't use 4 lags but in order to avoid complications if the lag length is under-fitted which often generates auto-correlated errors, a diagnostic test of the residual is performed.

3- Johansen Cointegration Test

As the ADF test shows that variables are of a different order of integration, the order of integration of the dependent variable is lower than the highest order of integration of the explanatory variables and two explanatory variables are integrated of this highest order, then the necessary condition for the stationarity of the error term is to be met and we can have cointegration equations.

Finally, from the cointegration test, it can be concluded that there are one cointegrating vector between the variables at 5% level and thus, VECM is now applied to examine the short-run and/or long-run equilibrium relationships among these variables.

Table (3): Johansen Cointegration Test

Date: 06/28/22 Time: 00:42
Sample (adjusted): 2020M05 2022M05
Included observations: 25 after adjustments
Trend assumption: Linear deterministic trend
Series: YE X1E X2E X3E
Lags interval (in first differences): 1 to 2
Unrestricted Cointegration Rank Test (Trace)

Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.809872	68.60253	47.85613	0.0002
At most 1	0.482049	27.10104	29.79707	0.0992
At most 2	0.311257	10.65416	15.49471	0.2337
At most 3	0.051884	1.331973	3.841466	0.2485

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.809872	41.50149	27.58434	0.0005
At most 1	0.482049	16.44688	21.13162	0.1998
At most 2	0.311257	9.322184	14.26460	0.2603
At most 3	0.051884	1.331973	3.841466	0.2485

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level

Source: done by researchers using the E-views software.

4- Vector error Correction Model VECM

The existence of cointegration vectors between variables recommends a short-term and long-term equilibrium relationship between the variables under consideration

To make it more obvious, the study got the model with p-values as follows in order to decide the significance of coefficients and to test the existence of long run relation.

The ECT coefficient value (c1) is negative but statistically insignificant at 1% level. This concludes the acceptance of null hypothesis of 'no-cointegration' and confirms the non-existence of long-run equilibrium relationship between the variables.

The p-values of all the coefficients are insignificant so there might be a multicollinearity problem so the study tested the correlation between the independent variables and the results are as in table (6).

It is clear that x2e and x3e are highly correlated so we have multicollinearity problem and a solution is to drop one variable and rerun the cointegration. The variable to be dropped is the one having the highest insignificance (highest p-value), which is x3e.

The study will test the residuals diagnostics also as in table (7).

Table 7 shows that there is neither serial correlation between residuals nor heteroskedasticity as the p-values are greater than 5%.

The previous tables show that there is no long-run significant relation between the variables as the ECT coefficient is insignificant.

The only significant relation is between the lagged value of the exchange rate of the Egyptian pound and the country risk in Egypt measured by Bond Yield Spread between US and Egypt.

Table (4): vector error correction estimates

Vector Error Correction Estimates
Date: 06/27/22 Time: 23:11
Sample (adjusted): 2020M05 2022M05
Included observations: 25 after adjustments
Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1			
YE(-1)	1.000000			
X1E(-1)	2.64E-05			
	(2.6E-06)			
	[9.97868]			
X2E(-1)	-0.651923			
	(0.23993)			
	[-2.71713]			
X3E(-1)	0.024190			
	(0.02030)			
	[1.19133]			
C	-3.827611			
Error Correction:	D(YE)	D(X1E)	D(X2E)	D(X3E)
CointEq1	-0.391189	-37362.27	-0.614509	0.080547
	(0.49797)	(16770.1)	(0.83243)	(1.80555)
	[-0.78556]	[-2.22791]	[-0.73821]	[0.04461]
R-squared	0.720989	0.659679	0.363087	0.372516

Source: done by researchers using the E-views software.

Table (5): system equation model

Dependent Variable: D(YE)
Method: Least Squares (Gauss-Newton / Marquardt steps)
Date: 06/27/22 Time: 23:58
Sample (adjusted): 2020M05 2022M05
Included observations: 25 after adjustments
D(YE) = C(1)*(YE(-1) + 2.63532070244E-05*X1E(-1) - 0.651922932176*X2E(-1) + 0.0241895037433*X3E(-1) - 3.82761091632) + C(2) *D(YE(-1)) + C(3)*D(YE(-2)) + C(4)*D(X1E(-1)) + C(5)*D(X1E(-2)) + C(6)*D(X2E(-1)) + C(7)*D(X2E(-2)) + C(8)*D(X3E(-1)) + C(9)*D(X3E(-2)) + C(10)

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.391189	0.497972	-0.785564	0.4444
C(2)	0.364781	0.504238	0.723431	0.4805
C(3)	0.237521	0.237462	1.000247	0.3331
C(4)	9.31E-06	8.19E-06	1.136795	0.2735
C(5)	9.27E-06	7.13E-06	1.300841	0.2129
C(6)	-0.540743	0.497106	-1.087782	0.2939
C(7)	0.459559	0.526049	0.873605	0.3961
C(8)	0.031352	0.085178	0.368071	0.7180
C(9)	-0.043284	0.086555	-0.500068	0.6243
C(10)	0.064929	0.141766	0.458001	0.6535
R-squared	0.720989	Mean dependent var		0.033312
F-statistic	4.306807	Durbin-Watson stat		2.158572
Prob(F-statistic)	0.006365			

Source: done by researchers using the E-views software.

5- **Wald Test: Testing Short-run Relation**

The adjusted Wald test coefficient p-values - which determine the short-run relationship between the variables - report insignificant value for x1e and significant value for x2e.

So there is a short run relation between the exchange rate and the country risk and there is no relation between the covid-19 and the country risk in Egypt.

Table (6): correlation test

	X1E	X2E	X3E
X1E	1	-0.1347169259107101	0.02627913255567843
X2E	-0.1347169259107101	1	0.8653942616261531
X3E	0.02627913255567843	0.8653942616261531	1

Source: done by researchers using the E-views software.

Table (7): Breusch-Godfrey Tests for Serial Correlation and Heteroskedasticity

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	0.484835	Prob. F(2,13)	0.6265
Obs*R-squared	1.735312	Prob. Chi-Square(2)	0.4199
Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	0.455061	Prob. F(12,12)	0.9065
Obs*R-squared	7.818588	Prob. Chi-Square(12)	0.7991
Scaled explained SS	6.802454	Prob. Chi-Square(12)	0.8704

Source: done by researchers using the E-views software.

Table (9): Estimated Model after Dropping the Variable x3e

Dependent Variable: D(YE)
Method: Least Squares (Gauss-Newton / Marquardt steps)
Date: 06/28/22 Time: 00:55
Sample (adjusted): 2020M05 2022M05
Included observations: 25 after adjustments
D(YE)=C(1)*(YE(-1)+2.89542076865E-05*X1E(-1)-0.267119923544*X2E(-1)-9.88104159088)+C(2)*D(YE(-1))+C(3)*D(YE(-2))+C(4)*D(X1E(-1))+C(5)*D(X1E(-2))+C(6)*D(X2E(-1))+C(7)*D(X2E(-2))+C(8)

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.242031	0.398937	-0.606690	0.5521
C(2)	0.265623	0.430920	0.616411	0.5458
C(3)	0.239710	0.204883	1.169985	0.2581
C(4)	8.84E-06	7.55E-06	1.171051	0.2577
C(5)	7.03E-06	6.16E-06	1.140734	0.2698
C(6)	-0.321816	0.248062	-1.297317	0.2119
C(7)	0.652716	0.281006	2.322782	0.0329
C(8)	0.011927	0.102641	0.116199	0.9089
R-squared	0.703988	Mean dependent var	0.033312	
Adjusted R-squared	0.582101	S.D. dependent var	0.470717	
S.E. of regression	0.304296	Akaike info criterion	0.712704	
Sum squared resid	1.574131	Schwarz criterion	1.102745	
Log likelihood	-0.908804	Hannan-Quinn criter.	0.820885	
F-statistic	5.775738	Durbin-Watson stat	2.152355	
Prob(F-statistic)	0.001500			

Source: done by researchers using the E-views software.

Table (8): Cointegration Test after Dropping the Variable x3e

Date: 06/28/22 Time: 00:53				
Unrestricted Cointegration Rank Test (Trace)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.715425	40.87922	29.79707	0.0018
At most 1	0.314417	9.460218	15.49471	0.3245
At most 2	0.000923	0.023077	3.841466	0.8792
Trace test indicates 1 cointegrating eqn(s) at the 0.05 level				
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.715425	31.41900	21.13162	0.0013
At most 1	0.314417	9.437140	14.26460	0.2516
At most 2	0.000923	0.023077	3.841466	0.8792
Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level				

Source: done by researchers using the E-views software.

Table (10): Wald Test

Wald Test:
Equation: Untitled

Test Statistic	Value	df	Probability
F-statistic	1.266843	(2, 17)	0.3070
Chi-square	2.533685	2	0.2817

Null Hypothesis: C(4)=C(5)=0
Wald Test:
Equation: Untitled

Test Statistic	Value	df	Probability
F-statistic	10.63418	(2, 17)	0.0010
Chi-square	21.26835	2	0.0000

Null Hypothesis: C(6)=C(7)=0

Source: done by researchers using the E-views software.

Table (11): Augmented Dickey Fuller Test

Variable	Augmented Dickey-Fuller (test statistic)	Test critical value at 5%	P-value	Order of integration
Y	-6.281216	-3.711457	0.0000	I(1)
X1	-4.260447	-3.752946	0.0032	I(1)
X2	-4.441811	-3.711457	0.0018	I(1)
X3	-4.441088	-3.711457	0.0018	I(1)

Source: done by researchers using the E-views software.
Where:
- y: country risk in the United Kingdom measured by Bond Yield Spread between US and the United Kingdom.
- X1: covid-19 monthly new cases in the United Kingdom.
- X2: the exchange rate of the sterling pound vs. US dollar.
- X3: monthly inflation rate of the United Kingdom.

6- Egypt Model Results

- The study finds there is no long-run significant relation between the covid-19, the exchange rate and the country risk in Egypt as the ECT coefficient is insignificant.
- There is a short-run relation between the exchange rate and the country risk and there is no relation between the covid-19 and the country risk in Egypt.

Empirical Study: Case of United Kingdom

1- Analysis of Augmented Dickey-Fuller: Stationary Test

It is evident from Table 11 that all variables are stationary in the first difference with no unit root and have the same order of integration I (1) at 1% significance level. So a cointegration test is to be performed.

2- **Lag Length Selection**

This lag length is frequently selected using an explicit statistical criterion such as the AIC or SIC. (Omer Ozcicek and W. Douglas McMillin, 1999)

Using 1 lag is suggested by the Schwarz information criterion and the sequential modified LR test statistic as the previous table shows. But when applying the model on 2 lags, it gave better results and due to the sample size, it is hard to use more than 2 lags so the study uses 2 lags. The best practical advice is to start with sufficiently large lags and then reduce them by some statistical criterion, such as the Akaike or Schwarz information criterion. (Gujarati, 2020). A diagnostic test is performed to check the quality of the model.

Table (12): VAR Lag Order Selection Criteria

VAR Lag Order Selection Criteria
Endogenous variables: Y X1 X2 X3
Exogenous variables: C
Date: 06/28/22 Time: 22:16
Sample: 2020M02 2022M05
Included observations: 24

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-347.5939	NA	62343864	29.29949	29.49583	29.35158
1	-267.8150	126.3165*	314216.6	23.98459	24.96630*	24.24503
2	-252.2630	19.44008	371102.9	24.02191	25.78899	24.49072
3	-228.9119	21.40514	289692.1	23.40932	25.96177	24.08649
4	-197.9282	18.07383	201421.6*	22.16068*	25.49850	23.04621*

* indicates lag order selected by the criterion

Source: done by researchers using the E-views software.

3- **Johansen Cointegration Test**

As the ADF test shows that variables are of the same order of integration, we can have cointegration equations.

From the co-integration test, it can be concluded that there are cointegrating vectors between the variables at 5% level and thus, VECM is now applied to examine the short-run and/or long-run equilibrium relationships among these variables.

4- **Vector Error Correction Model VECM**

The existence of cointegration vectors between variables recommends a short-term and long-term equilibrium relationship between the variables under consideration

Table (13): Johansen co-integration test

Date: 06/28/22 Time: 22:19
Sample (adjusted): 2020M05 2022M05
Included observations: 25 after adjustments
Trend assumption: Linear deterministic trend
Series: Y X1 X2 X3
Lags interval (in first differences): 1 to 2
Unrestricted Cointegration Rank Test (Trace)

Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.777521	79.83948	47.85613	0.0000
At most 1 *	0.553137	42.26647	29.79707	0.0011
At most 2 *	0.484622	22.12887	15.49471	0.0043
At most 3 *	0.199325	5.557505	3.841466	0.0184

Trace test indicates 4 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.777521	37.57302	27.58434	0.0019
At most 1	0.553137	20.13760	21.13162	0.0684
At most 2 *	0.484622	16.57137	14.26460	0.0212
At most 3 *	0.199325	5.557505	3.841466	0.0184

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Source: done by researchers using the E-views software.

To make it more obvious, the study got the model with p-values as follows in order to decide the significance of coefficients and to test the existence of long-run relation.

The ECT coefficient value (c1) is negative and statistically significant at 1% level. This concludes the reject of null hypothesis of 'no-cointegration' and confirms the existence of a long-run equilibrium relationship between the variables.

The p-values of all the coefficients are insignificant except the inflation rate coefficients c(8) and c(9) are significant. The only significant relationship is between the value and the lagged value of the inflation rate and the country risk in the United Kingdom measured the by Bond Yield Spread between US and the U.K

Table (14): Vector Error Correction Estimates

Vector Error Correction Estimates
Date: 06/28/22 Time: 22:24
Sample (adjusted): 2020M05 2022M05
Included observations: 25 after adjustments
Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1			
Y(-1)	1.000000			
X1(-1)	-3.12E-07			
	(2.1E-07)			
	[-1.47689]			
X2(-1)	-10.93930			
	(3.63275)			
	[-3.01130]			
X3(-1)	0.564781			
	(0.11498)			
	[4.91211]			
C	7.484177			
Error Correction:	**D(Y)**	**D(X1)**	**D(X2)**	**D(X3)**
CointEq1	-0.166662	-304509.7	0.014838	0.721692
	(0.04601)	(358235.)	(0.00387)	(0.19438)
	[-3.62212]	[-0.85003]	[3.83341]	[3.71286]
R-squared	0.537643	0.193356	0.638574	0.598037
Adj. R-squared	0.260228	-0.290630	0.421718	0.356859
Sum sq. resids	0.198987	1.21E+13	0.001408	3.551101
S.E. equation	0.115177	896726.9	0.009689	0.486559
F-statistic	1.938049	0.399508	2.944695	2.479653
Log likelihood	24.94395	-371.7508	86.83127	-11.07824
Akaike AIC	-1.195516	30.54006	-6.146501	1.686259
Schwarz SC	-0.707966	31.02762	-5.658951	2.173809
Mean dependent	-0.034048	4453.040	-0.000400	0.332000
S.D. dependent	0.133911	789331.3	0.012741	0.606712

Source: done by researchers using the E-views software.

5- Wald Test: Testing Short-run Relation

The adjusted Wald test coefficient p-values - which determine the short-run relationship between the variables - report insignificant value for x1,x2 but significant value for x3.

So there is a short run relation between the inflation rate and the country risk and there is no relation between the covid-19, the exchange rate and the country risk in the United Kingdom.

Table (15): System Equation Model

Method: Least Squares (Gauss-Newton / Marquardt steps)
Date: 06/28/22 Time: 22:26
Sample (adjusted): 2020M05 2022M05
Included observations: 25 after adjustments
D(Y)=C(1)*(Y(-1)-3.12220376489E-07*X1(-1)-10.9393007884*X2(-1)+0.564781141606*X3(-1)+7.48417722927)+C(2)*D(Y(-1))+C(3)*D(Y(-2))+C(4)*D(X1(-1))+C(5)*D(X1(-2))+C(6)*D(X2(-1))+C(7)*D(X2(-2))+C(8)*D(X3(-1))+C(9)*D(X3(-2))+C(10)

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.166662	0.046012	-3.622119	0.0025
C(2)	-0.177873	0.263740	-0.674425	0.5103
C(3)	-0.039529	0.187213	-0.211146	0.8356
C(4)	4.80E-08	3.51E-08	1.365080	0.1924
C(5)	6.21E-08	4.22E-08	1.471259	0.1619
C(6)	2.468828	2.515877	0.981299	0.3420
C(7)	1.860942	2.006883	0.927280	0.3685
C(8)	0.191369	0.064476	2.968078	0.0096
C(9)	0.155323	0.070699	2.196965	0.0442
C(10)	-0.135747	0.038786	-3.499884	0.0032
R-squared	0.537643	Mean dependent var		-0.034048
F-statistic	1.938049	Durbin-Watson stat		1.843054
Prob(F-statistic)	0.123617			

Source: done by researchers using the E-views software.

Table (16): Wald Test

Wald Test:
Equation: EQ01

Test Statistic	Value	df	Probability
F-statistic	1.545254	(2, 15)	0.2454
Chi-square	3.090507	2	0.2133
Null Hypothesis: C(4)=C(5)=0			
Wald Test:			
Equation: EQ01			
Test Statistic	Value	df	Probability
F-statistic	0.912320	(2, 15)	0.4228
Chi-square	1.824640	2	0.4016
Null Hypothesis: C(6)=C(7)=0			
Wald Test:			
Equation: EQ01			
Test Statistic	Value	df	Probability
F-statistic	5.100567	(2, 15)	0.0204
Chi-square	10.20113	2	0.0061
Null Hypothesis: C(8)=C(9)=0			

Source: done by researchers using the E-views software.

6- Diagnostic Tests

It is clear that the variables are not correlated so we don't have multicollinearity problem.

Table 18 shows that there is neither serial correlation between residuals nor heteroskedasticity as the p-values are greater than 5%.

7- The United Kingdom Model Results

- The study finds there is long-run significant re-

Table (17): Correlation Test

	X1	X2	X3
X1	1	-0.3363602068721633	0.5220560645191653
X2	-0.3363602068721633	1	-0.02931898823789911
X3	0.5220560645191653	-0.02931898823789911	1

Source: done by researchers using the E-views software.

lation between the covid-19, the exchange rate, the inflation rate and the country risk in the United Kingdom as the ECT coefficient is negative and significant.

- There is a short run relation between the inflation rate and the country risk but there is no relation between the covid-19, the exchange rate and the country risk in the United Kingdom.

Table (18): Breusch-Godfrey tests for Serial Correlation and Heteroskedasticity

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	0.548734	Prob. F(2,13)	0.5905
Obs*R-squared	1.946216	Prob. Chi-Square(2)	0.3779
Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	1.410766	Prob. F(12,12)	0.2802
Obs*R-squared	14.62985	Prob. Chi-Square(12)	0.2623
Scaled explained SS	3.339072	Prob. Chi-Square(12)	0.9926

Source: done by researchers using the E-views software.

Conclusion & Policy Recommendations

This paper examines the impact of the COVID-19 pandemic on the country's risk over the period February 2020 – June 2022. In order to determine how the covid-19 affects a country's risk in two distinct contexts and stages of development, the study's model is applied to Egypt and the United Kingdom, two distinct countries.

By using, the Vector error correction model VECM, The only significant relationship is between the lagged value of the exchange rate of the Egyptian pound and the country risk in Egypt measured by Bond Yield Spread between US and Egypt. Despite being negative, the ECT coefficient value (c1) is statistically negligible at the 1% level. As a result, it is confirmed that there is no long-run equilibrium link between the variables. The short-run link between the variables is revealed by the adjusted Wald test coefficient p-values, which indicated, that there is no relations between the COVID-19 and the country risk in Egypt, but there is a short-term relationship between the exchange rate and the country risk.

At the 1% level, the ECT coefficient value is negative and statistically significant. As a result, this points to the presence of a long-term equilibrium relationship between the variables is confirmed. As regards to UK ,all of the coefficients' p-values are non-significant. The value and lagged value of the inflation rate and the country risk in the United Kingdom, as determined by the bond yield spread between the United States and the United Kingdom, are the only variables that significantly correlate. The Wald test coefficient reported there is no relationship between the covid-19, the exchange rate, and the country risk in the United Kingdom. However, there is a short-term relationship between the inflation rate and the country's risk.

The empirical findings have policy ramifications since they show that the COVID-19 pandemic's progression is hurting the sovereign credit rating and, as a result, raising the country's risk in many ways, which unquestionably has a negative impact on international capital flows. Therefore, the main piece of advice for decision-makers is to quickly contain the virus in order to save human lives and maintain the sovereign rating. Additionally, media efforts should increase urging locals to receive the COVID-19 vaccine. Moreover in order to reduce risk and maintain the credibility of the financial markets, macro-prudential policies must be adopted in conjunction with monetary and fiscal policies. However, social initiatives must be added to macroeconomic policies in order to reform the health system and reduce ambiguity and uncertainty on both an economic and social level.

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