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***ЭМПИРИЧЕСКАЯ ОЦЕНКА ТРАНСГРАНИЧНЫХ БАНКОВ И СВЯЗАННЫХ С  
НИМИ РИСКОВ***

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**Аннотация**

Проблемы, связанные с организацией трансграничных сделок, остаются ключевыми для изучения и решения во всем мире. Поскольку финансовые организации, а также предприятия с целью максимизации прибыли работают в разных юрисдикциях, необходимо критически взглянуть на проблему интернационализации. В предлагаемой статье эмпирически производится оценка портфелей международных банков с использованием простой модели, которая даст возможности для дальнейшего понимания направлений исследования данного предмета.

**Ключевые слова:** банк, портфель, риск

***AN EMPIRICAL ASSESSMENT OF CROSS-BORDER BANKING & ASSOCIATED  
RISKS OF BANKS***

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**Abstract**

The issue regarding cross-border business has been a key issue on the minds of businesses across the globe. As organizations as well as firms seek to maximize their profit through

operating in different jurisdictions, it is quite imperative to take a critical look at the issue regarding internationalization. This paper takes a look at a simple assessment of the international banks portfolio empirically using a simple model, which will open the floodgates for further understanding by way of researching into the subject matter.

**Keywords:** Bank, Portfolio, Risk

## **Introduction**

Researchers, policy think-tanks, regulators as well as economist largely agree for the need for diversification into activities which will yield high returns which are not highly correlated with those of the existing portfolio helps reduce the level of risk regarding an organization. That notwithstanding same opinion is not realizable all the time. In the case where activities are diversified with high risk the likelihood of the overall portfolio risk going up is likely. The 2007-2008 global financial crises however sparked the argument on the benefits associated with financial integration. We realized in the course of the crisis that risk looked to be transmissible across countries and states, thus indicating that the need for diversification across the globe was not worthwhile.

## **Methodology**

We however start off by assessing a bank's portfolio using a very simple model. We first and foremost assume that an international bank will have a simple portfolio comprising two risky assets:

- a foreign asset with expected return  $\mu_F$  and standard deviation  $\sigma_F$  and
- a domestic asset with expected return  $\mu_D$  and standard deviation  $\sigma_D$ .

We then determine the correlation between the two assets and define it as  $\rho_{FD}$  whereas on the other hand we define the bank's ratio of foreign assets to total assets as  $w$ , and we set a range between 0 to 1. Based on that we then deduce the expected return of the portfolio as the equation herein and define it as equation

$$\mu_P = w\mu_F + (1 - w)\mu_D. \quad (1)$$

We further formulate the variance of the portfolio and express it as the equation below and further define it also as equation (2)

$$\sigma_P^2 = w^2\sigma_F^2 + (1 - w)^2\sigma_D^2 + 2w(1 - w)\rho_{FD}\sigma_F\sigma_D. \quad (2)$$

We then introduce an essential parameter standard deviation, we then formulate the standard deviation of the portfolio as  $\sigma_P$  and define same as (3):

$$\sigma_P = \sqrt{w^2\sigma_F^2 + (1 - w)^2\sigma_D^2 + 2w(1 - w)\rho_{FD}\sigma_F\sigma_D}. \quad (3)$$

Since there is need to measure risk, we then compute an inverse measure of risk as the Z-score or Z-test; we further deduce same in respect of our international bank and realize the equation below defining same as equation (4):

$$Z = \frac{\mu_P + \left(\frac{K}{A}\right)}{\mu_P} \quad (4)$$

In the equation  $K/A$  which is the capitalization ratio, which is defined as the ration of total debt to the sum of total debt and shareholders' equity is applied herein. However,  $k/A$  denotes the mean *Capitalization Ratio*.

We then try and introduce Z and rewrite Z from equation (4) as:

$$Z = \frac{w\mu_F + (1-w)\mu_D + \left(\frac{K}{A}\right)}{\sqrt{w^2\sigma_F^2 + (1-w)^2\sigma_D^2 + 2w(1-w)\rho_{FD}\sigma_F\sigma_D}}. \quad (5)$$

This notwithstanding we then attempt to assess the impact internationalization has on risk component, i.e. we assess the effect of the foreign assets ratio,  $w$ , on the Z-score as and define same as equation (6):

$$\frac{\partial Z}{\partial w} = \frac{\partial \left[ \frac{\mu_P + \left(\frac{K}{A}\right)}{\sigma_P} \right]}{\partial w} \quad (6)$$

We then assess the correlation of risk  $\partial Z/\partial w$  by employing of the simple parameters as:

$$\frac{\partial Z}{\partial w} = \left[ \frac{[(1-w)\sigma_D^2 + w\rho_{FD}\sigma_F\sigma_D]}{[w^2\sigma_F^2 + (1-w)^2\sigma_D^2 + 2w(1-w)\rho_{FD}\sigma_F\sigma_D]^{\wedge 3/2}} \right] \mu_F - \left[ \frac{[w\sigma_D^2 + (1-w)\rho_{FD}\sigma_F\sigma_D]}{[w^2\sigma_F^2 + (1-w)^2\sigma_D^2 + 2w(1-w)\rho_{FD}\sigma_F\sigma_D]^{\wedge 3/2}} \right] \mu_D - \left[ \frac{[w\sigma_F^2 - (1-w)\sigma_D^2 + (1-2w)\rho_{FD}\sigma_F\sigma_D]}{[w^2\sigma_F^2 + (1-w)^2\sigma_D^2 + 2w(1-w)\rho_{FD}\sigma_F\sigma_D]^{\wedge 3/2}} \right] \left( \frac{K}{A} \right) \quad (7)$$

We then compute equation (7) by imputing the f parameters as well as the conditions below and define same as equation (8):

$$w \in [0,1], \sigma_F \in (0,1), \sigma_D \in (0,1), \rho_{FD} \in [-1,1], \mu_F \in (0, 0.5), \mu_D \in (0,0.5), K/A \in (0,0.5). \quad (8)$$

We start off by imputing values of 0 for  $w$ , 0.1 for  $\sigma_F$ ,  $\sigma_D$ ,  $\mu_F$ ,  $\mu_D$ , and  $K/A$ , and -1 for  $\rho_{FD}$ , and the incremental of 0.1 for all.

In doing so we can realize the effect of holding higher  $w$  on  $Z$  and can realize that it is dependent significantly on both  $\rho_{FD}$  and the relative risk of the foreign asset (i.e., degree of  $F$  in comparison to  $\sigma_D$  and  $\mu_F$  also compared to  $\mu_D$ ). It is worthy to note that we will have two clear-cut cases in which the correlation as well as the relative risks automatically points to reduce or increase the level of risk from more investment in the foreign asset.

Using the two scenarios

Scenario 1 thus implies that a negative correlation with relatively low foreign asset risk will result in the relation:  $\rho_{FD} \leq 0; F < \sigma_D; \mu_F > \mu_D$ .

Whereas scenario 2 with a positive correlation and relatively high foreign asset risk will lead us to deduce the relation:  $\rho_{FD} > 0; F > \sigma_D; \mu_F < \mu_D$ .

## Conclusion

Using the simple model, we realized the following findings in the two scenarios. In scenarios 1, we realized that  $\partial Z/\partial w$  is mostly positive showing positive yields of 75,876 positive solutions, 28,667 negative solutions, and 1 zero solution. This is however intuitive and as such recommends that for majority of the values, more of the foreign asset thus reduces the overall risk portfolio in the event the correlations of returns are negative and the foreign asset will be relatively safe.

In the second scenario 2, we realized that  $\partial Z/\partial w$  was mostly negative i.e.: 90,194 negative solutions, 4,832 positive solutions, and 14 zero solutions. This is on the other hand is quite intuitive and suggests that for the majority of the values, more of the foreign asset increases overall portfolio risk when the correlations of returns are positive and the foreign asset is relatively risky.

We also consider other possible scenarios in where the correlation is either positive with relatively low foreign asset risk ( $\rho_{FD} \leq 0$ ;  $\sigma_F < \sigma_D$ ;  $\mu_F > \mu_D$ .) or where the correlation is negative with relatively high foreign asset risk ( $\rho_{FD} > 0$ ;  $\sigma_F > \sigma_D$ ;  $\mu_F < \mu_D$ .) as well as cases in where the mean and standard deviation relations both move in the opposite directions.

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