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Banking in the Middle East Revisited Amid Turbulence in Financial Markets: the case of Egypt[1]

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[1] We thank Eric Slear for previous work on this topic in 2004

Recent crisis in international markets have focused attention on the health of the banking system in each and every country. Two thousand eight crisis started in the center with the US mortgage market problems and spread into core and periphery. As structured investment vehicles and mortgage related insurance depreciated in value, it invalidated many behavioral assumptions in risk/reward/hedging models and left the financial sector with unknown and evaporating assets and with larger known liabilities.

There are many ideas now as to what happened and how the crisis spread in both academic and daily studies. Perhaps an amalgam of all is responsible for the failure we are seeing so far. Barber wrote that gambling behavior and principal agent problem broke the banks (Barber, 2008) . Obsfelt and Rogoff (2005) predicted that a crisis in the system was forthcoming due to the trade deficits of the US since 2000, others found lack of information and opaqueness of the credit default swaps and moral hazard were the culprits. With hindsight, it is now accepted that letting Lehman Bank go into bankruptcy was a crucial mistake which dried up the credit markets (Fitzpatrick, 2008). There is also consensus that the reason behind this financial bubble was that the US Federal Reserve had kept the interest rates too low to ease the US out of the 2000 stock market tech bubble, which then resulted in the mortgage bubble.

While this crisis is currently under study, there are many studies which have already studied financial market crisis in the emerging markets. In "Models of Economic and Financial Crises", Mariano, Gultekin, Ozmucur, and Shabbir (2000) reviewed different techniques for measuring crisis and found their methodology of Markov switching models with varying transition probabilities had the best predictions using selected indicators. Chang and Andres (1998) presented a simple model that can account for the main features of recent financial crises in emerging markets. They find that international illiquidity of the domestic financial system is at the center of the problem and that illiquidity in banks of a necessary and sufficient condition for financial crises to occur. They state that the short maturity of capital inflows can contribute to bank fragility, that in the event of a crisis, large real costs may be incurred as a result of early liquidation of investments, and asset prices may consequently fall farther than they would have had this liquidity crunch been avoided. Note that this model also helps explain the current crisis the banking system in the US, Europe is gong through now. Durbin and Ng (1999) investigated the role of "country risk" in determining the default risk of firms in emerging markets. They use firm-level data on bond prices to study the relationship between sovereign risk and firm risk. The results of the investigation indicate that market participants do not strictly apply the "sovereign ceiling", under which no firm is more creditworthy than its government. The

sovereign ceiling rule has significant direct implications for asset markets because of the role that rating agencies play in the pricing of emerging market debt. The correlation of country risk to firm risk is higher for some industries, however banks are bailed out at time of crises and face soft budget constraints. The paper finds evidence that transfer risk is less than 100%.
Creane, et. al. (2004) assessed 20 countries in MENA with respect to their financial sector development using data from IMF surveys as well as data banks. They find major variations in financial development between countries. In MENA, they found good regulations of the banking system and good supervision of the financial markets, yet they noted that while MENA countries have had financial deepening in the last few decades, they were not able to keep up with the progress of Southeast Asia.

Bashir (2002) studied Islamic bank performance for eight countries between 1993 and 1998 for their profitability and efficiency. He finds that given everything else constant, higher profits are due to higher leveraging and higher loan to asset ratios, and those banks that take higher risks are rewarded accordingly. He states "The results also indicate that foreign-owned (Islamic) banks are more profitable than their domestic counterparts. Everything remaining equal, there is evidence that implicit and explicit taxes affect the bank performance measures negatively. Furthermore, favorable macroeconomic conditions impact performance measures positively. Our results also show that stock markets are complementary to bank financing" . Agarwal and Yousef (2000) stated that high degrees of imperfect information and rent-seeking behavior are the main characters of the developing economies where Islamic banks operate. The banks face agency problems due to contractual incompleteness and economies will be biased towards debt financing when characterized by agency problem.

Dar et. al (2001) stated the importance of the Gulf Region with regards to Islamic financial activities. The Gulf Corporation Council (GCC) is considered the third largest region, which account for about 13% of total assets of Islamic Banks worldwide. Currently, Islamic banks do not need financial cushion since depositors share profit and losses. There are a sufficient numbers of borrowers and investors in Islamic and non-Islamic countries to warrant the attention of traditional banks (Poulous, et. al., 2003). Almost all forms of western commercial banking have the counterparts in Islamic banking. There are Islamic versions of Repos, Leasing, Hire Purchase, Equity investment, Venture capital, non-recourse project finance and even Islamic Derivatives, financial instruments derived from another financial instrument or a combination of instruments.

DIVERSIFICATION OF MIDDLE EAST BANK PORTFOLIOS

ME banks are not any different than other banks when it comes to quality of management and the diversification of the portfolios. While the regulatory agencies may monitor for the CAL ratios (capital adequacy, assets, liquidity), performances of individual banks depend on their portfolio mix and risk adjusted returns. Using modern portfolio theory, we discuss its implications for ME banks using mean-variance efficient portfolio approach.

If a bank has N risky asset choices with random returns , we can denote the returns vector R as

$$R = [\, R_1 \ . \ . \ . \ R_N \,] \qquad [1]$$

And the expected returns as

$$E(R) = \mu = [\, \mu_1 \ . \ . \ . \ \mu_N \,] \qquad [2]$$

Defining covariance matrix of returns as

$$\Omega = COV(R), \qquad [3]$$

And the portfolio weight vector of each asset as

$$\omega = [\, \omega_1 \ . \ . \ . \ \omega_N \,] \qquad [4]$$

Then the expected return in the portfolio is

$$\sum_{i=1}^{N} \omega_i \mu_I = \omega^T \mu. \qquad [5]$$

where superscript T denotes the transpose.

By definition, the variance of returns of the bank portfolio will be

$$\omega^T \Omega \omega. \qquad [6]$$

Since banks want to maximize expected returns while minimizing risks (i.e., the standard deviation of returns), we set the Langrangian function with multipliers δ_1 , δ_2 such that

$$L(\omega, \delta_1, \delta_2) = \omega^T \Omega \omega + \delta_1 (\mu_P - \omega^T \mu_P{}^{\mu}) + \delta_2 (1 - \omega^T 1) \qquad [7]$$

Here, the first constraint shows the weights in the mean-variance efficient portfolio that will give a desired return of μ_P and the second constraint (1 is a vector of ones) states that all weights to sum up to 100%.

To solve, set the first derivatives of the function L to zero

$$0 = \frac{\partial}{\partial \omega} L(\omega, \delta_1, \delta_2) = 2\Omega\omega\mu_P - \delta_1 \mu - \delta_2 1 \qquad [8]$$

The solution of (8) for ω gives the optimal weights of the portfolio.

For a bank that faces two risky asset choices, the solution for the variance of the portfolios will be

$$\sigma_R^2 = w^2\sigma_1^2 + (1- w)^2\sigma_2^2 + 2w(1-w)\rho_{12}\sigma_1\sigma_2 \qquad [9]$$

and the expected return is

$$E(R) = w\mu_1 + (1-w)\mu_2 \qquad [10]$$

An important aspect of the solution lies in the correlation (or lack of) between the two risky assets. If the two risky assets are uncorrelated (i.e., $\rho_{12} = 0$), we can easily achieve the locus of points that describe the risk-reward path of the portfolio choice by assigning various weights to two assets, once the returns and standard deviations are known. For example, for two risky assets with expected returns of 10 and 20 percent, respectively, and with standard deviations of 0.2 and 0.4, the equations reduce to an expected return of

$$E(R) = (0.10)w + (0.20)(1-w) = 0.20 - 0.10w$$

And a variance of returns of

$$\sigma^2 = w^2(0.2)^2 + (1- w)(0.4)^2$$

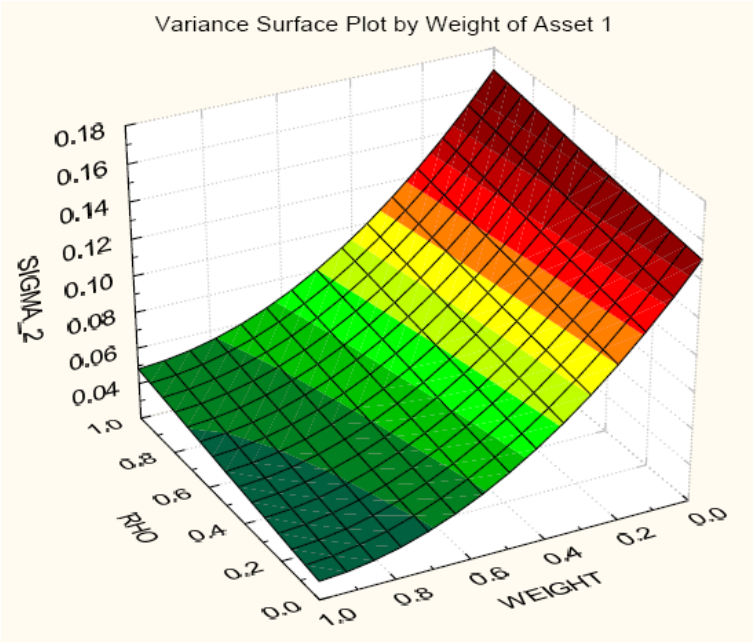
which reduces to

$\sigma^2 = 0.16 - 0.32w + 0.20\ w^2$

Minimizing the variance gives us the optimal weight of the first asset at 80 % weight and the second asset at 20 % weight. The expected return on the portfolio then comes out to be 12 % and the standard deviation is 0.1789. Finance literature shows these relationships with the sideways parabolic functions. If there is some correlation between the assets, the parabolic function of returns to risk plot changes. The return adjusted by the risk ratio[2] is lower, the higher the correlation between risky assets.

Figure 1 below shows a 3-D graph with varying portfolio weights for Asset 1, its variance (sigma squared) on the vertical axis, and correlation coefficient (rho) ρ_{12} between two assets versus weight on the horizontal ones . Note that the lower the correlation between assets, the lower is the variance.

FIGURE 1



[2] The return to risk ratio is not the Sharpe ratio, which examines the deviation of return from a riskless rate. Even though Sharpe ratio is a better measure of investment performance, we do not have any estimates of 'riskless rates' for the MENA financial markets.

In Figure 2, the weight of Asset 1, the correlation between assets and the risk (sigma) ratio is plotted. Again, the higher the correlation coefficient between assets, the higher the weight of the risky asset, the higher is the risk of the portfolio.

FIGURE 2

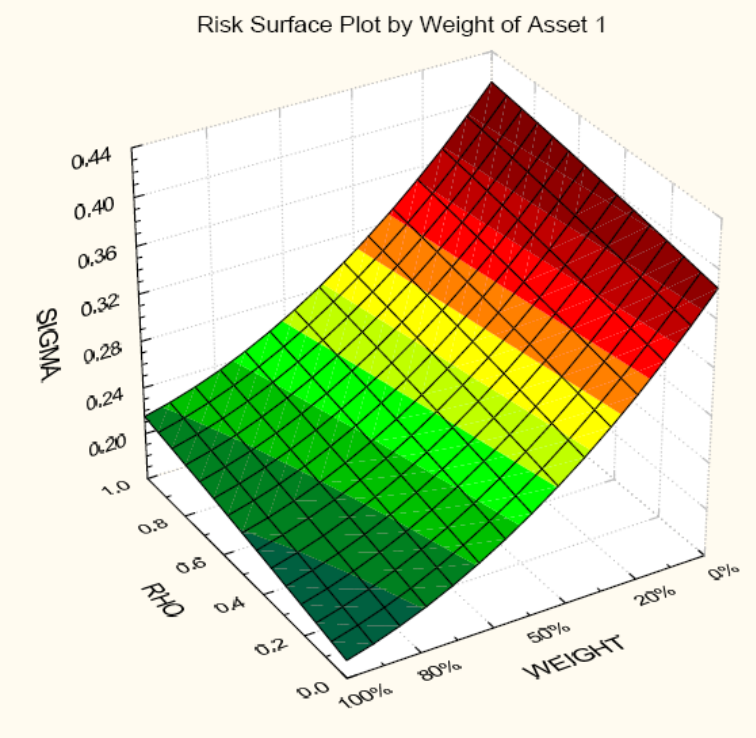
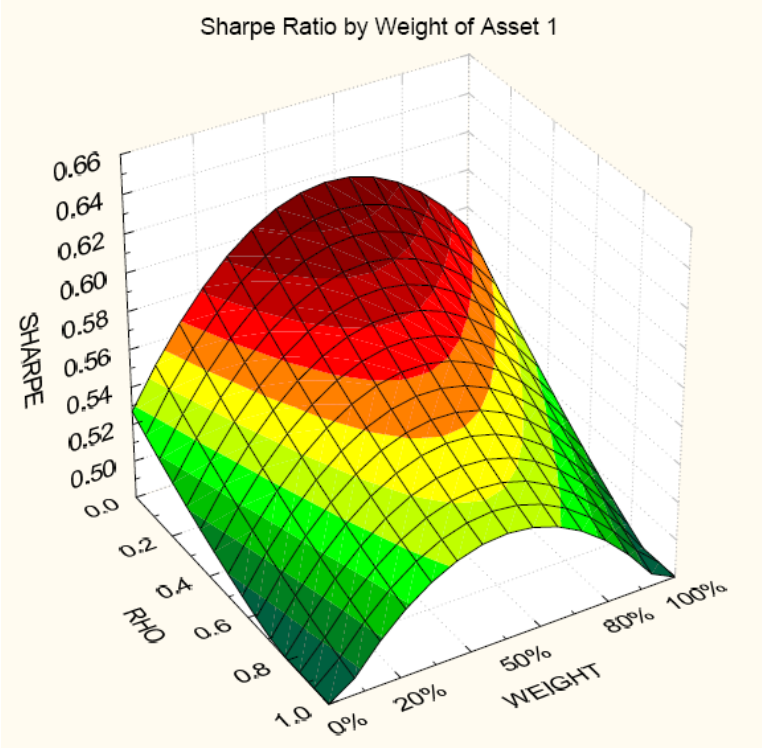


FIGURE 3 plots the return to risk ratio of the portfolio (Sharpe) in the vertical axis with the correlation coefficient between assets and the weight of asset 1. In this example, the maximum return/risk ratio is around 0.62 when correlation between assets is zero.

FIGURE 3



EVIDENCE FROM EGYPT:

We examine general conditions of Egyptian Banks by examining central bank summary statements. All banks face constraints of capital adequacy, asset and management quality issues, efficiency problems and liquidity risks. Some risks are easier to isolate and quantify than others. One major risk that developing country banks face is inflation risks and related currency risks. To hedge for domestic currency depreciation and to protect loan portfolio quality, some banks hedge by loaning (or 'investing') in foreign currency loans and assets. In the 2005 study, we noted " For banks in Saudi Arabia, where the value of the currency has been stable over some time, we find currency risks to be minimal compared to the other two countries. For Egypt and Jordan, the degradation of the domestic loan portfolio may be a major problem. " (Cinar, 2005). However, since then, increasing foreign exchange exposure to hedge the portfolio may have been a very risky strategy if the monies went into hedge funds in financial markets, given the banking crisis in dollar and euro markets. Hedge funds, including private funds from Saudi Arabia who backed Citicorp and other financial institutions have taken billions of dollars of losses since summer of 2008. How has Egypt fared during this time?

Egyptian Central Bank. summary reports are given in the Appendix. Table 1A reflects the trends in lending extended by the banking system in Egypt. The table shows that the banks have

increased their foreign exchange lending by of 10 % (from 20% to 30% weight) in the last seven years, which is in line with the hedging their portfolios, as analyzed in the above section. In 2000, average domestic currency lending was about 80 % and it decreased to 70 % by 2007. Most of this decrease came from decreased domestic currency lending in trade. Of the 10% increased lending in foreign currencies, while agriculture, trade, services stayed relatively same, it was the remarkable growth in industrial lending in foreign currency. Had this been services, there was room for worry, but Egypt, by increasing efficiency yet keeping it for the industrial sector, has avoided a head on collision with the current crisis by doing the best possible.

REFER TO TABLE 1A IN THE APPENDIX

The next table shows the balance sheet of banks in Egypt. Between 2006 to 2007, balances with banks abroad almost doubled, where as liabilities remained steady since 2000.

REFER TO TABLE 1B IN THE APPENDIX

What has saved Egypt from exposure to the crisis is that the banking system still loan a large portion of the portfolios to domestic borrowers in domestic currency.

If we consider domestic versus foreign lending as two different assets, we can then construct some portfolio characteristics for the banking system of Egypt and some neighbors. Table 2 presents the Pearson correlation coefficients of the prices of gold and currencies in USD for gold, USD/EURO, USD/Jordanian Dinar, USD/Saudi Arabian Riyal, USD/Egyptian Pound and USD/Bahrainian Dinar. The correlations are calculated from daily spot closing prices for the time period 12/28/2000 to 10/13/2004.

TABLE 2: PEARSON CORRELATION COEFFICIENTS USING DAILY DATA 12/28//2000 TO 10/13//2004 FOR EGYPT, NEIGHBORS AND CURRENCIES

	GOLD	USD/EUR	USD/JOD	USD/SA	USD/EGYPT	USD/BAHRAIN
GOLD	1	0.941**	-0.253**	0.087**	-0.910**	0.046
USD/EUR	0.941**	1	-0.270**	0.078*	-0.919**	-0.035
USD/JOD	-0.253**	-0.270**	1	0.044	0.291**	0.042
USD/SA	0.087**	0.78*	0.044	1	-0.108**	0.016
USD/EGYPT	-0.910**	-0.919**	0.291**	-0.108**	1	0.060
USD/BAHRAIN	0.046	-0.035	0.042	0.016	0.060	1

N=939
** correlation is significant at the 0.01 level (2-tailed).
* correlation is significant at the 0.05 level (2-tailed).
Sources: Gold prices are from **http://www.amark.com/archives/data.asp**. Currencies are from http://fx.sauder.ubc.ca/.

The Bahraini Dinar exchange rates are not statistically correlated with any other currency or species listed above. The Pearson correlation coefficients for the other currencies are statistically significant. For Egypt for this time period, the exchange rate is strongly negatively related to the closing daily prices of gold and the USD/Euro rate and is also slightly negatively correlated with the Saudi Arabian currency.

We see that the SA currency is the only one which has a positive correlation between its exchange rate and the USD/Euro rate. The largest negative correlation in the table is between the USD Euro rate and the Egyptian pound
(-0.916), due to the depreciation of the Egyptian pound. The largest currency risk is within the Egyptian banking system.

To reinforce these findings and to alleviate the problems due to the declining value of the dollar vis a vis the Euro in recent years, and to smooth daily fluctuations, the same correlations were estimated using monthly data between the four countries exchange rates between themselves. The following table reports these correlations for the monthly data.

TABLE 3 : PEARSON CORRELATION COEFFICIENTS USING MONTHLY DATA 1/1/2000 TO 12/1/2004

		Bahrain	Saudi	Egypt	Jordan
Bahrain	Pearson Correlation	1.000	-0.049	0.136	0.122
	Sig. (2-tailed)		0.712	0.301	0.353
Saudi	Pearson Correlation	-0.049	1.000	-.397**	-0.146
	Sig. (2-tailed)	0.712		0.002	0.265
Egypt	Pearson Correlation	0.136	-.397**	1.000	.529**
	Sig. (2-tailed)	0.301	0.002		0.000
Jordan	Pearson Correlation	0.122	-0.146	.529**	1.000
	Sig. (2-tailed)	0.353	0.265	0.000	

** Correlations significant at the 0.01 level (two tailed)
N=60

Data Source: http://fx.sauder.ubc.ca

Again, Egypt has a significantly negative correlation between the Egyptian pound and the Saudi Dinar and a positive one with Jordanian Dinar. Jordan has a negative but non-significant correlation with the Saudi Dinar. Based on these data, we can say the risks each country's commercial banking system takes with respect to domestic loans are very different from each other and are affected by the macro policies of their environment.

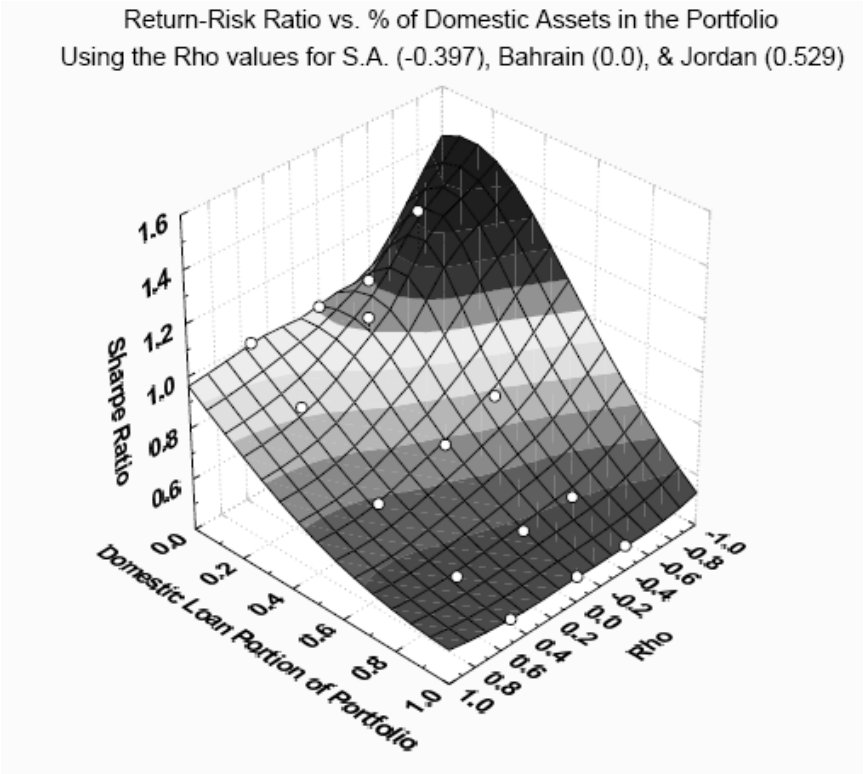
Among the four countries, Egypt has the largest depreciation of its currency in the time period under study. One can find 'hedging' strategies and instruments in ME by examining how the portfolio returns would change by investing in 'neighbors'. The following table gives three hypothetical cases of Egyptian banks loaning out a portion of their funds to each of the other three countries. The surface plot for the return/risk ratio using monthly data correlations is given below. The correlation coefficient used come from monthly data reported in Table 3. Table 4 is calculated on the assumption of 10 rate of return for Egyptian loans, with a standard deviation of 0.20. These estimates are realistic, based on the Central Bank of Egypt's quotes on the banking industry in Egypt, where the lending rate is, on average, about 13 % (CBE, 2004).

TABLE 4: RETURN/RISK RATIOS FOR HYPOTHETICAL EGYPTIAN BANK PORTFOLIOS USING MONTHLY DATA CORRELATIONS; U(1)=0.10, SD(1)=0.2 AND U(2)= 0.05, SD(2)=0.05

	BAHRAIN	**SAUDI ARABIA**	**JORDAN**	
ρ_{12}	**0**	**-0.397**	**0.529**	
WEIGHT OF ASSET 1= 0	1	1	1	
0.2	1.0607	1.3659	0.8578	BEST RATIO
0.5	0.7276	0.8069	0.6511	
0.8	0.5614	0.5758	0.5438	Actual lending in 2000
1	0.5	0.5	0.5	

The visual portfolio surface for Egyptian banks is given in Figure 4: The frontal horizontal axis plots the ρ_{12}. The highest return/risk ratios for the time period are with Saudi Arabian assets.

FIGURE 4



Best return/risk ratios above are for portfolios with weight of 20 % of domestic currency (Asset 1) for Egypt and therefore with weight of 80 % of foreign loans (Asset 2). The actual ratios in Egyptian commercial banking system are opposite. Actual domestic lending in Egypt is 70 % (down from 80% earlier) (see Table 1A in Appendix). Egyptian banking system's performance can improve its return/risk by moving more to its optimal portfolio weights.

How robust are the estimates of return/risk ratios to rates of returns and expected returns? The rates on the assets in Table 4 were nominal, there were no corrections made for depreciation of the currency. The devaluations as well as differential default rates among assets would also change the actual return/risk ratios and alter allocations. Table 5 gives the return/risk ratios for the case for the foreign asset when the returns are increased by 10 % due to depreciation of local currency.

TABLE 5: RETURN/RISK RATIOS FOR HYPOTHETICAL EGYPTIAN BANK PORTFOLIOS USING MONTHLY DATA CORRELATIONS; U(1)=0.10, SD(1)=0.2 AND U(2)= 0.15, SD(2)=0.15

	BAHRAIN	**SAUDI ARABIA**	**JORDAN**	
ρ_{12}	**0**	**-0.397**	**0.529**	
WEIGHT OF ASSET 1= 0	1	1	1	
0.2	1.07	1.268	0.964	**BEST RATIO**
0.5	1	1.271	0.814	
0.8	0.676	0.73	0.619	**Actual lending**
1	0.5	0.5	0.5	

In this case again, the optimal weights of assets do not change. Under what conditions would a portfolio of 80% in domestic assets would be preferable? Some alternative scenarios on return and risk give us clues. The results are summarized in Table 6.

TABLE 6: SUMMARY OF HIGHEST RETURN/RISK RATIO AND WEIGHT OF ASSET 1

	U(1)	Sd(1)	U(2)	Sd(2)	**Optimal weight of Asset 1**
All 3 countries	0.1	0.2	0.1	0.4	80%
	0.1	0.2	0.2	0.4	50% to 80 %
	0.1	0.2	0.2	0.2	20%for Bahrain and Jordan, 50 % for S.A.
	0.1	0.2	0.1	0.2	50%

We see that if the return to risk ratio in Egypt is higher that the corresponding foreign assets, than a 80% domestic loan allocation is justifiable. However, we do not observe such return/risk ratios during this time period to justify this portfolio allocation.

CONCLUSIONS

Egyptian banking system is subject to poorer macro environment than those of its neighbors. Egypt has the poorest macro environment and an application of portfolio analysis using currency risk showed that the commercial banking system should pay more attention to loaning funds outside of Egypt than it currently does. Whether this is done with credit card expansions into other countries, or whether these are investments into foreign public bonds will depend on very specific circumstances. Egyptian banks had a vested interest in expanding to countries like Saudi Arabia because Saudi Dinar, for the time period under study, made a good hedge for the Egyptian pound and it still continues to do so. While large domestic currency lending has insulated Egyptian banking system from the financial crisis of 2008 as of now, one can not say that Egyptian economy will remain unaffected. Ripple effects of this crisis will enter the economy and the banking system through changes in exports, especially of industrial products. Therefore, hedging by diversification is still an important issue for the Egyptian banking system.

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TABLE 1A

Egyptian Banks : Lending and Discount Balances by Economic Activity

(LE.mn)

End of June	1999	2000	2001	2002	2003	2004	2005	2006	2007
Total	**204132**	**226776**	**241470**	**266100**	**284721**	**296199**	**308195**	**324041**	**353746**
In Local Currency	**156287**	**180673**	**193981**	**213008**	**218695**	**228159**	**233141**	**238926**	**248544**
% local currency	76.56	79.67	80.33	80.05	76.81	77.03	75.65	73.73	70.26
Agriculture	5515	4828.00	4749.00	5166.00	4521.00	5015.00	5822.00	4902.00	6985.85
% agriculture	2.70	2.13	1.97	1.94	1.59	1.69	1.89	1.51	1.97
Industry	47698	58410.00	64950.00	73178.00	74269.00	77722.00	81844.00	77734.00	80497.13
% industry	23.37	25.76	26.90	27.50	26.08	26.24	26.56	23.99	22.76
Trade	37997	42919.00	42797.00	47251.00	47530.00	48479.00	45648.00	43564.00	37476.00
% trade	18.61	18.93	17.72	17.76	16.69	16.37	14.81	13.44	10.59
Services	38278	45706.00	50260.00	54325.00	58546.00	60505.00	59870.00	61679.00	67034.69
Other	26799	28810.00	31225.00	33088.00	33829.00	36438.00	39957.00	51047.00	56549.98
In Foreign Currencies	**47845**	**46103.00**	**47489.00**	**53092.00**	**66026.00**	**68040.00**	**75054.00**	**85115.00**	**105201.73**
% foreign currency	23.44	20.33	19.67	19.95	23.19	22.97	24.35	26.27	29.74
Agriculture	499	526.00	554.00	550.00	447.00	550.00	619.00	829.00	928.84
% agriculture	0.24	0.23	0.23	0.21	0.16	0.19	0.20	0.26	0.26
Industry	19277	18817.00	19772.00	20561.00	26782.00	28569.00	34957.00	38517.00	51398.83
% industry	9.44	8.30	8.19	7.73	9.41	9.65	11.34	11.89	14.53
Trade	10197	8790.00	7983.00	9175.00	11557.00	12552.00	11893.00	13930.00	11837.00
% trade	5.00	3.88	3.31	3.45	4.06	4.24	3.86	4.30	3.35
Services	14855	14800.00	16124.00	20097.00	24341.00	23941.00	24188.00	26983.00	33842.37
% services	7.28	6.53	6.68	7.55	8.55	8.08	7.85	8.33	9.57
Unclassified sectors	3017	3170.00	3056.00	2709.00	2899.00	2428.00	3397.00	4856.00	7194.69

source: Central Bank of Egypt (CBE)

TABLE 1B

Egyptian Banks : Aggregate Balance Sheet

(LE.mn)

End of June	1999	2000	2001	2002	2003	2004	2005	2006	2007
Assets									
Cash	3220	3431	3485	4453	5557	5412	6594	6813	7705
Securities&investments in TBs of which :	60114	60818	71142	87726	111337	137431	170659	193965	176098
Treasury bills	21342	20601	28442	39740	53651	58633	91496	71181	60539
Other gov securities	19187	19888	20899	24423	33666	35104	43456	59614	50429
CBE notes				_	_	_	_	21563	17617
Balances with banks in Egypt	45098	49400	67047	83244	110874	116290	124986	121695	217363
Balances with banks abroad	16106	17776	16252	20002	29798	43290	51204	72554	124366
Loans and discounts	204132	226776	241470	266100	284722	296199	308195	324041	353746
Other assets	22956	24137	28966	33939	35650	34814	41990	42494	58645
Assets =Liabilities	**351626**	**382338**	**428362**	**495464**	**577938**	**633436**	**703628**	**761562**	**937923**
Liabilities									
Capital	11373	11764	12038	12531	18155	20346	22949	27112	33037
Reserves	8132	9226	10156	11238	11805	11454	12419	13418	12552
Provisions	25984	27554	31200	35869	40099	44584	49541	54950	53469
Long term loans&Bonds	9147	10579	11922	14057	14866	15012	14254	17526	26351
Obligations to banks in Egypt	21413	24210	28158	35094	35578	29933	22671	21488	82619
Obligations to banks abroad	11306	9970	11486	11830	16246	10332	12262	8770	10006
Total deposits	237343	260429	291225	340868	403144	461697	519649	568841	649953
Other liabilities	26928	28606	32177	33977	38043	40078	49883	49457	69936

Source: CBE