

**Boston College, MF 820
Professor Strahan
Final Exam, Spring 2008
SOLUTIONS**

Name: _____

Write all answers on the exam. You may use the back of pages if necessary. The exam has 100 points. You are allowed a 1-page, 2-sided cheat sheet. Calculators are permitted, but not computers. You have 2.5 hours. Be brief, but show all relevant calculations (partial credit will be assigned). Your answers must be legible.

True, False, Uncertain. (6 points each)

Explain why the following statements are true, false, or uncertain. You will be graded on the *clarity, completeness* and *coherence* of your answers.

1. Deposit insurance causes banks to hold too little capital and take too much risk, so we should abolish deposit insurance.

F. It is true that deposit insurance encourages banks to hold too little capital and take too much risk. The reason is that the bank does not pay the costs of its risk taking and high leverage in the form of high yields on deposits due to government protection. However, DI is beneficial in preventing bank runs and in enhancing the liquidity of deposits. Bank runs are costly because they can make an otherwise solvent bank fail and harm its customers.

2. Leverage ratios at financial institutions have become less useful as a measure of insolvency risk over time.

T. This is one lesson from LTCM. With off balance sheet positions, leverage becomes an almost meaningless measure of risk.

3. Banks have become unimportant in large-firm finance due to the growth of the commercial paper & junk bond markets.

F. First, banks support the CP market with lines of credit and letters of credit. Second, banks are now competitive with the bond market in large-firm corporate finance thru the expansion of the syndicated lending market.

4. The original Basel I Accord was revised so that banks' off balance sheet positions could be taken into account in computing required capital.

F. Basel I did account for off balance sheet positions crudely, although there were some major loopholes such as the fact that commitments under 1 year came with no capital requirement.

5. Banks are exposed to liquidity risk mainly through demand deposits.

F. Traditionally this was true but in the modern financial system deposits are a source of stability, while liquidity risk comes more from the asset side where banks support the markets via lines of credit and loan commitments

Longer Questions

1. You are running a hedge fund with a long position of 1000 shares of IBM, and a short position of 5000 shares of Intel. IBM is currently trading at \$120 per share, and Intel is trading at \$22 per share. Over the past year, the volatility of IBM's stock was 2% per day, the volatility of Intel's stock was 3% per day, and the correlation between the two company stocks was 0.9.

A) Compute the delta-normal VAR with a 1-day holding period and 99% confidence for your portfolio. (10 points)

$$\text{VaR of IBM} = 2.33 * 1000 * 120 * 0.02 = 5592$$

$$\text{VaR of Intel} = 2.33 * 5000 * 22 * 0.03 = 7689$$

$$\text{Portfolio VaR} = (5592^2 + 7689^2 - 2 * 0.9 * 5592 * 7689)^{1/2} = 3605$$

Many people forgot the negative sign in the portfolio VAR.

B) Your hedge fund's capital equals the value of its current positions (e.g. it has no other assets). Based on the calculation in A, does your hedge fund hold enough capital? (5 points)

The fund's capital = $1000 * 120 - 5000 * 22 = 10,000$. Given A, this is plenty of capital. (That is, assuming the assumptions are correct...)

C) During the past year, there was one day in which IBM's shares fell 4%. On that same day, Intel's shares rose by 6%. How does this change your answer from part B? (5 points)

This shows that the portfolio risk is actually very high. Just one day where the prices move in opposite direction buries the hedge!! We lose all of our capital : the loss = 11,400. The point here is that the hedge relies on the very high positive correlation in the risk factors. Correlations are notoriously unstable!

2. Your bank has the following balances sheet:

Assets	
Loans	1500
Cash	500

Liabilities	
Deposits	1800
Equity	200

You have decided to securitize a package of \$500 million in loans. After working with your investment bank and the credit rating agencies, you have decided to sell the loans to an SPV, which will pay for the loans by issuing three classes of securities. The first class are AAA rated and will fund \$400 million of the SPV; the second class are BBB rated and will fund \$50 million of the SPV; the third class is unrated and will fund the remaining \$50 million. The unrated tranche will suffer all of the losses on the pool of loans until that tranche is exhausted; if losses exceed \$50 million, then the BBB rated tranche will begin to experience losses. The AAA rated tranche will only experience losses if both of the other two are completely exhausted. Your bank plans to retain the third (unrated) tranche.

The average yield on the loans in the pool is 12%, and the expected loss on the pool of loans is 5%. AAA rated bonds yield 5% and BBB rated bonds yield 7%.

A) Write down the balance sheet of your bank after selling the loans to the SPV. Assume that the bank has used the proceeds of the loan to reduce its deposits. (5 points)

Assets	
Loans	1000
Equity Tranche	50
Cash	500

Liabilities	
Deposits	1350
Equity	200

(Some people had deposits drop to 1300 and lowered cash by 50 on the asset side. That was fine.)

B) Write down the balance sheet of the SPV. (5 points)

Assets	
Loans	500
Liabilities	
AAA Securities	400
Baa Securities	50
Unrated tranche	50

C) What is the yield on the unrated tranche of the pool of loans? (8 points)

$$\text{Total yield} = 500 * 0.12 = 60$$

$$\text{Payment to AAA} = 400 * 0.05 = 20$$

$$\text{Total payment Baa} = 50 * 0.07 = 3.5$$

$$\text{'Excess Spread'} = 60 - 20 - 3.5 = 36.5$$

$$\text{Yield} = 36.5 / 50 = 73\%$$

(The high yield reflects the very high risk in the unrated tranche.)

Some people subtracted the expected loss of 25. This gives an expected return (not yield) on the unrated piece of $11.5 / 50 = 23\%$. I gave full credit for both answers.

D) Using the balance sheet from part A, is this bank's risk of insolvency higher or lower as a consequence of the securitization? Explain. (7 points)

Risk is lower. The bank has the same amount of capital as before, but it has removed some of the credit risk, albeit most of the risk remains because the bank holds the first loss piece.

E) How would your answer to D change if the bank used the proceeds of the securitization to make new loans? Explain. (5 points)

If instead of paying down its deposits, the bank takes the \$450 in cash raised thru the securitization and makes new loans, then its risk will rise because it will hold almost all of the credit risk from the first \$500 in loans that were originally securitized, PLUS the credit risk on the new \$450 in loans made with the proceeds from the securitization. Note that the bank's buffer of capital has not been affected; hence its risk of insolvency must be higher. The bank's balance sheet would look like this:

Assets	
Loans	1450
Equity Tranche	50
Cash	500
Liabilities	
Deposits	1800
Equity	200

I am implicitly assuming that the 1450 in loans has approx. the same credit risk as the original portfolio of 1500 in loans prior to the securitization.

3. Briefly compare the Fed's actions during the LTCM collapse versus its actions last month regarding the failure of Bear Stearns. Why did the Fed do what it did? What are the costs and benefits of the Fed's moves? Do you agree or disagree with their decisions in each instance? (20 points)

Actions taken:

LTCM: The Fed brokered a private-sector bailout whereby the major banks refinanced the hedge fund to avoid liquidation.

BSC: The Fed subsidized JPM's purchase of BSC by guaranteeing its large portfolio of mortgage-backed securities that market participants had found hard to value. Note that a similar private sector bailout is not feasible in the case of BSC because there are too many diverse and diffuse creditors.

Why did the Fed Act?

In the case of LTCM, the Fed was concerned that the forced liquidation of LTCM's positions would drive down prices of illiquid assets. At the time, the prices of all risky assets worldwide were depressed, and LTCM had a portfolio that was basically long on many classes of these risky and illiquid assets. Given their tremendous size, the Fed was concerned that the liquidation

would depress prices so much as to potentially bring down other financial institutions.

In the case of BSC, the Fed faced a classic bank run. BSC's counterparties, customers and short-term creditors were all pulling back due to concerns about the true values of BSC's positions. The market knew that BSC has a large exposure to the sub-prime market, but not how much or how big the losses might be. Given this uncertainty, it was individually rational for each creditor to pull away from BSC. In aggregate, however, this 'run' made it impossible for BSC to avoid bankruptcy absent a buyer. The Fed was concerned that if BSC went to Chapter 11, this would further scare the market (i.e the run could be contagious), and thus the Fed worried that borrowing and lending between financial institutions would cease, and that other banks (e.g. Lehman) would face runs. The drying up of the interbank and 'repo' markets could have had major ramifications for the overall economy because financial institutions would react by trying to build up cash on their balance sheets and thus stop lending (note that this was already going on to some degree). The Fed also expanded access to the discount window beyond regulated commercial banks, and has been supporting the MBS market by taking these securities as collateral. These have been truly radical steps by the Fed!

Benefits:

In both cases the Fed seemed to succeed in bringing liquidity back to the market. Thus, financial crisis was avoided, as were the potentially large (but unknowable) costs to the economy as a whole.

Costs:

These policies create the moral hazard cost of encouraging future risk taking because creditors were effectively bailed out. The Fed tried hard to impose losses on equity holders in both cases, but certainly the creditors of BSC were bailed out. The moral hazard issue is much worse in the case of BSC; in the case of LTCM the Fed can credibly argue that no public funds were placed at risk (because the private sector restructuring was in no way guaranteed by the Fed or by taxpayers).

Both actions also worsen the 'too-big-to-let-fail' problem. The issue is that the Fed is encouraging financial institutions to get very large in order to increase the likelihood of bailouts or at least some form of special treatment, even if there is no economic rational for getting large. It is ironic that too big to fail is usually discussed in the context of commercial banks, but in both of these instances it was unregulated financial institutions that were involved.

Did the Fed do the right thing?

This is very hard to know because we never observe the counterfactual world in which the Fed either let's LTCM get liquidated or let's BSC go to Chapter 11. My view is that the Fed probably acted correctly in the LTCM restructuring. I have a harder time with the BSC bailout because the Fed, in my view, could have let BSC go down and then announced the expansion of

access to the discount window. Or, perhaps wait to see how the market would react to the BSC bankruptcy before opening up the window. For reasons that I don't understand, the Fed chose to make both moves simultaneously, thereby removing a degree of flexibility (option value) from their policy arsenal. Opening up the discount window would still create substantial moral hazard, but at least the Fed could have gained some credibility on the too big to fail issue by letting BSC go down.

Having said that, clearly reasonable people can differ on these very difficult policy decisions!