MIDTERM EXAM

The exam lasts 50 minutes. Answer all three questions. The questions will receive equal weight in grading, though they may not be of equal difficulty. You should be sure not to spend disproportionate time on any one question unless you have already answered the others.

(1) (Moral hazard)

(a) For homeowners' insurance against fire, flood, storm damage, etc., a high deductible mitigates moral hazard and may reduce monitoring costs. Why? [A "deductible" is the dollar amount for damages below which the insured homeowner pays all the costs herself. The insurance company pays only for damages in excess of the deductible.]

Moral hazard is the problem that after being insured, a person may take more risks because of the insurance, increasing the expected costs to the insurer. A high deductible means that the financial consequences of damage to the house from fire, flood etc. are borne by the insured person, unless they become very large. This gives the insured person a strong incentive to take safety precautions, and relieves the insurer of the need to check often to be sure that good safety practices are being followed.

(b) How is a standard loan constract like insurance with a high deductible? Which party is like the insurance company, the borrower or the lender?

A standard loan makes the return to the borrower from whatever investment he makes with the loan accrue to the borrower himself, so long as the returns are not very low (i.e., low enough to cause bankruptcy). This gives the borrower a strong incentive to take actions that maximize return, and relieves the lender of the need to check to be sure that the borrower is not made lazy or careless by having "insurance" from the lender. The lender provides insurance, in that the borrower is protected from the full consequences of a very poor outcome on the project, because the lender must leave the borrower with the exemption level of wealth.

Many students made this question harder to answer by not using the definition of the "standard loan contract" that we had used in class. That definition was not written down in the notes or on the board as a formal definition, but the term was used extensively in discussing Zha's framework. A standard loan contract in economic theory is a contract in which a lender provides money in return for a promise of a fixed repayment at a later date, with the proviso that if the repayment is impossible, the lender can take all of the borrower's wealth up to some "exemption" level, after paying a monitoring cost for verifying the

amount of the borrower's wealth. If you took the "standard loan contract" to be a mortgage, or other collateralized lending contract, analysis of the incentives and the insurance could be more complicated. If the risk in a mortgage contract were only that the value of the house could fall below the mortgage value, then the mortgage functions much like a standard loan contract, with the bank providing insurance and the borrower having an incentive to maintain the house value. But if the risk is that the borrower might lose her job and thus not be able to make payments on the mortgage, the lender is not providing insurance; in fact if having to sell a house under duress to pay off a mortgage is costly, it is providing the opposite of insurance, an extra cost that is incurred on top of another adverse shock. Students who discussed mortgages or collateralized loans tended to write imprecise answers that did not clearly identify the analogy to insurance with a deductible.

(2) A central bank like the US Federal Reserve can "print money". That is, if it wants to buy something, it can simply open or add to a deposit account in itself, in the amount of the purchase price, for the seller. But a private bank can do the same thing. Does that mean that a private bank can also "print money"? What is the key difference, or set of differences, that explain why we usually don't think of private banks as able to print money? Would these differences between the central bank and private banks disappear if there were no reserve requirements?

A private bank can indeed in a sense "create money" by creating a bank account with positive balance for someone. It can do this with a "stroke of the pen". In this it is like the Fed. However, both the private bank and the Fed promise that the amount in the account can be redeemed on demand for currency. The private bank cannot "print" currency, so in expanding demand deposits, it must consider whether it has sufficient reserves, in the form of vault cash and deposits at the Fed that can be immediately converted to cash, to meet likely levels of demands for currency by its depositors. Reserve requirements mean that every addition to demand deposits requires a proportional increase in reserves. But even without a formal reserve requirement, a prudent private bank must increase reserves as its demand deposits rise. The Fed does not need reserves, because it can print currency.

A really good answer might go beyond what we've discussed in lecture, to note that capital plays a different role for the Fed and for private banks. For private banks, low or negative levels of capital imply insolvency, or a risk of insolvency. That is, the possibility that if depositors all withdrew their holdings, the banks assets, when sold, would not suffice to pay off the depositors. So a private bank that creates an additional deposit account as part of purchasing, say, employee wages or cleaning supplies, would find its liabilities expanding with no corresponding increase in assets, so its capital would shrink. Doing too

much of this could set off a run. The Fed, on the other hand, cannot have a "run" of this kind, even if its assets are lower in value than its deposits. The depositors can demand only currency, which the Fed can supply at zero cost, whether or not its assets formally match its liabilities in value. If the Fed increases its deposits without increasing its assets, it is increasing the stock of money. This can produce inflationary pressure, but not a solvency problem for the Fed.

(3) Suppose that in the world of Zha's static model, we change the assumption that verifying the return on an individual's investment is always costly. Instead we assume that while such verification is generally costly, individuals can form two-person partnerships, and that each member of the partnership can see the returns on the other's investment without cost. They can therefore cooperate in funding each others' investments without paying monitoring costs or needing to use standard loan contracts. Would this change make the bank that Zha introduces redundant, so that no one would want to use it? Why or why not?

In Zha's model there is inefficiency when every individual is autarkic, because the marginal product of capital will differ across individuals, according to their levels of wealth, with marginal product high for low-wealth people and low for high-wealth people. If people can pair up and invest jointly, they will want to make the marginal product of capital the same for both of them, and their doing this will result in an improvement over autarky. However, there will still be inefficiency, because in general different pairs of people will have different levels of total wealth. In fact, one could think of each pair as one of Zha's firms or agents, where the production function of the pair is $(A_1 + A_2) f(.5(K_1 + K_2))$, because the efficient pairs will put half their total investment in each partner's production process, so as to make the marginal products match. Then Zha's loan market improves allocations for the economy of pairs just as it would for the economy of isolated producers.

There is a case in which the pairing up could shut down the loan market. If monitoring costs are high enough relative to the efficiency gains from capital reallocation, it may be impossible for the bank to lend without losing money. Since the efficiency gains from allowing lending are greater in the purely autarkic case, it is possible that lending could be helpful in that case, yet unnecessary in the partnership economy.

Another exotic special case someone might have thought of: The question does not say how the pairs are formed. If the distribution of W across the population is symmetric, it may be possible to pair up each person with wealth W with another whose wealth is $2\bar{W} - W$, where $\bar{W}$ is the mean of the distribution of wealth, so that the sum of their wealths is $2\bar{W}$. It is even somewhat plausible that people would pair up in this way, as the total gain from pairing up, summed over the population, is maximized with this pattern of pairing. But then wealth would

be constant across the pairs, and there would be no benefit from introducing borrowing and lending.