

## Econ 252 - Financial Markets

Spring 2011

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### Problem Set 4

#### Question 1

Suppose a bank has to make a decision about two residential mortgage applications.

- Applicant A wants to borrow \$525,000 to purchase a property for \$600,000.
- Applicant B wants to borrow \$385,000 to purchase a property for \$400,000.

(a) What is the LTV (loan-to-value ratio) for the two applications?

(b) Consider a situation, in which the bank grants both applicants a 30-year interest-only loan with a lockout period of two years and a note rate of 9% for the full amount that the applicants desire to borrow. Suppose that within the first two years house prices have depreciated by 10 percent (that is, after two years a house previously worth \$100,000 is now worth \$90,000). Assume that both applicants default on their mortgages after two years and that the bank will repossess the properties and sell it for the current market value. What percentage can the bank recover from each of the two loans?

(c) Taking into account your answers to (a) and (b), which application should the bank rather have denied in the first place?

**QUESTION 1 CONTINUES ON THE NEXT PAGE.**

## CONTINUATION OF QUESTION 1.

(d) How does your answer to part (b) change if both applicants are granted a standard 30-year mortgage with a note rate of 9% for the full amount that they desire to borrow?

("Standard" refers to a fixed-rate mortgage contract with level payments.)

(e) Does the change in the terms of the mortgage contract from part (b) to part (d) affect the bank's decision which application it should have denied in the first place?

## Question 2

Consider a hypothetical, fully amortizing 5-month mortgage with an original balance of \$20,000 and a note rate of 12%. This is a fixed-rate mortgage contract with level payments.

- (a) Write down the full amortization schedule of the mortgage under the assumption that the borrower neither prepays nor defaults.
- (b) Maintaining the assumption that the borrower does not default, suppose that the borrower prepays \$5,000 in month 3. Specify the changed amortization schedule starting at month 3.

Instead of the previous 5-month mortgage, consider a fully amortizing 30-year mortgage with an original balance of \$200,000 and a note rate of 12%. As previously, this is a fixed-rate mortgage contract with level payments.

- (c) Write down part of the amortization schedule starting with month 100 and ending with month 102 (including month 102).

## Question 3

Consider 30-year mortgages (fixed-rate mortgage contracts with level payments) and assume 350 PSA.

Compute the CPR and SMM for the following months:

(a) Month 6.

(b) Month 28.

(c) Month 248.

## Question 4

Consider a hypothetical pass-through security given a PSA assumption of 150 PSA. The underlying mortgages for this security are fixed-rate, level-payment 30-year mortgages and the pass-through rate is 7%. The WAM is 345 months and the WAC is 8%.

Restrict attention to month 180 of this security. Suppose the outstanding balance in the beginning of month 180 is \$120,000,000 and the mortgage payment is \$1,900,000.

Compute the following quantities:

- (a) Net interest and scheduled principal for month 180.
- (b) SMM and prepayment for month 180.
- (c) Total principal and total cash flow for month 180.
- (d) Outstanding balance in the beginning of month 181.

**Question 5**

Consider a hypothetical non-agency CMO, whose collateral has a par value of \$410,000,000:

<b>Tranche</b>	<b>Principal Amount</b>	<b>Credit Rating</b>
1	\$250,000,000	AAA
2	\$22,000,000	AA-
3	\$47,000,000	A+
4	\$5,000,000	A
5	\$17,000,000	BBB
6	\$9,000,000	BB+
7	\$14,000,000	B
8	\$40,000,000	not rated

- (a) Is this CMO overcollateralized? If yes, by how much?
- (b) What is the credit enhancement (provided by the senior-subordinate structure) of tranche 4?
- (c) By how much does the value of the collateral have to drop in order for tranche 2 to lose half of its value?