Adjustable rate mortgages

Real-Estate Investments - Tutorial 4

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Adjustable rate mortgages (ARM)

Recall, mortgage pricing follows : $i = r + f + p$

- Real rate of interest (r).
- Inflation (f)
- Risk premium (p)

Adjustable rate mortgages (ARM)

$$i = r + f + p$$

- f is adjustable: **Price level adjusted mortgage (PLAM)**
- Problems:
  - Payment is computed again every period given changes in CPI.
  - CPI may not be appropriate to determine mortgage pricing.
  - Borrower's income might not follow the rate inflation.
  - Past changes in CPI affect future mortgage interest rate.

Adjustable rate mortgages (ARM)

$i = r + f + p$

- r, f, p are adjustable: rate is linked to **interest rate index**.
  - Let market expectations of r, p, f determine i.
  - Mortgage interest rates reflects future expectations and not past outcomes.

Important observations: - Risk depends on the adjustment intervals.
- Compared with FRM, lender faces less risk.

Adjustable rate mortgages (ARM)

$i = r + f + p$

- **Hybrid ARM**
  - ARM rates adjust in relatively long intervals (i.e, every few years).
  - Interest rate risk is divided between borrower and lender.

ARM main characteristics and terms

- **Index**: The index to which the interest rate is linked.
- **Margin**: A premium in addition to the index chosen.
- **Cap/Floor**: Limitations on the changes in payments or interest rates.
  - Due to caps, payments may be lower than the interest on the outstanding loan $\rightarrow$ negative amortization.
- **Reset**: The point in time when mortgage payments will be adjusted.
- **Discount points**:"points or fees added to increase the lender's yield (also in FRM).

Exercises (from the book)

Problem 2 (P.164)

A basic ARM is made for $200,000 at an initial interest rate of 6 percent for 30 years with an annual reset date. The borrower believes that the interest rate at the beginning of year 2 will increase to 7 percent.

1. Assuming that a fully amortizing loan is made, what will monthly payments be during year 1?
2. Based on (a) what will the loan balance be at the end of year 1?
3. Given that the interest rate is expected to be 7 percent at the beginning of year 2, what will monthly payments be during year 2?
4. What will be the loan balance at the end of year 2?
5. What would be the monthly payments in year 1 if they are to be interest only?
6. Assuming terms in (e), what would monthly interest only payments be in year 2?

Problem 2 answer

```
See Excel

# 1
=PMT(0.06/12, 30*12, -200,000, 0) = 1,199.1

# 2
=FV(0.06/12, 12, -1,199.1, 200,000) = 197,543

# 3
=PMT(0.07/12, 29*12, -197,543, 0) = 1,327.7
```

Problem 2 answer (continued)

```
# 4
=FV(0.07/12, 12, -1,327.7, 197,543) = 195,370

# 5
=PMT(0.06/12, 30*12, -200,000, 200,000) = 1,000

# 6
=PMT(0.07/12, 29*12, -200,000, 200,000) = 1,167
```

Problem 3 (P.165)

A 3/1 ARM (reset after 3 years) is made for $150,000 at 7 percent with a 30-year maturity.

1. Assuming that fixed payments are to be made monthly for three years and that the loan is fully amortizing, what will be the monthly payments? What will be the loan balance after three years?
2. What would new payments be beginning in year 4 if the interest rate fell to 6 percent and the loan continued to be fully amortizing?
3. In (a) what would monthly payments be during year 1 if they were interest only? What would payments be beginning in year 4 if interest rates fell to 6 percent and the loan became fully amortizing?

Problem 3 answer

```
See Excel

# 1
=PMT(0.07/12, 30*12, -150000, 0) = 997.9537
=FV(0.07/12, 12*3, -997.9537, 150000) = -145,090.4

# 2
=PMT(0.06/12, 27*12, -145090.4, 0) = 905.34

# 3
=PMT(0.07/12, 30*12, -150000, 150000) = 875
=FV(0.07/12, 12*3, 875, 150000) = -150,000
=PMT(0.06/12, 27*12, -150000, 0) = 935.978
```