Solutions to Questions - Chapter 19
The Secondary Mortgage Market: Pass-Through Securities

Question 19-1

What is the secondary mortgage market? List three reasons why it is important.

The secondary mortgage market is the "after" market in which mortgages are sold and resold. The secondary mortgage market is important for the following reasons: (1) it enables mortgage lending companies to sell existing mortgages and thereby replenish funds with funds from which new loans can be originated, (2) it facilitates the geographic flow of funds, and (3) it increases the investing options available to individuals and institutions.

Question 19-2

What were the three principal activities of FNMA under its 1954 charter? What is its principal function now?

In 1954, Congress rechartered FNMA, assigning it three separate and distinct activities: (1) enhancement of secondary market operations in federally insured and guaranteed mortgages, (2) management of direct loans previously made and, where necessary, liquidation of properties and mortgages acquired by default, and (3) management of special assistance programs, including support for subsidized mortgage loan programs. Eventually, the investment by life insurance companies in common stocks and bonds grew at the expense of mortgages. Mortgage companies and other originators became concerned because their traditional source of funds from secondary mortgage sales diminished. Industry related associations advocated that FNMA's secondary market operations be expanded to include its principal function today: namely, holding mortgages.

Question 19-3

Name two ways that FNMA currently finances its secondary mortgage operations.

To provide a financial base to operate FNMA, the Charter Act also authorized issuance of nonvoting preferred and common stock for the financing of secondary market operations. Additional funding came from FNMA's issuance of notes and debt instruments.

Question 19-4

When did GNMA come into existence? What was its original function? What is its main function now?

The Government National Mortgage Association was created by the Housing and Urban Development Act of 1968. Originally, it was organized to perform three principal functions: (1) management and liquidation of mortgages previously acquired by FNMA; the liquidation of the portfolio acquired from FNMA at the time of its partition comes through regular principal repayments and sales; (2) special assistance lending in support of certain federal subsidized housing programs; GNMA, also known as "Ginnie Mae," is authorized to purchase mortgages, which are originated under various housing programs designed by FHA, to provide housing in areas where it cannot be provided by conventional market lending; and (3) provision of a guarantee for FHA-VA mortgage pools, which would provide a guarantee for mortgage-backed securities. By providing the buyer with a guarantee of timely payment of interest and principal, GNMA was, in essence, guaranteeing monthly payments of interest and principal from amortization. This guarantee enabled originators of FHA and VA mortgages to pool or package mortgages and to issue securities, called pass-through securities, which were collateralized by the mortgages, and were based on the notion of investors buying an undivided security interest in a pool of mortgages with interest and principal passed through to investors as received from borrowers.

Question 19-5

Why was the formation of FHLMC so important?

A period of intermittent rate volatility, particularly during the mid- and late 1960s, was also causing liquidity problems that plagued thrifts. The Federal Home Loan Mortgage Corporation (FHLMC) was established to provide a secondary market and, hence, liquidity for conventional mortgage originators.

Question 19-6

What is a mortgage-related security? What are the similarities and differences between mortgage securities and corporate bonds?

Many originators are no longer willing to take the interest rate risk associated with originating loans with funds obtained from deposits and have found a way, through securitization, to raise funds and shift interest rate risk to various classes of investors. Large mortgage originators place mortgages in pools and sell securities of various types, using the mortgages in these pools as collateral. With the aid of investment bankers, large originators can issue securities in small denominations that are purchased by numerous investors. Like corporate bonds, mortgage securities are: underwritten by investment banks, rated by independent bond rating agencies, sold through an underwriting syndicate, and issued with fixed-coupon rates and specific maturities. However, unlike corporate bonds, mortgage securities are "overcollateralized."

Question 19-7

Name the principal types of mortgage-related securities. What are the difference between them?

The major types of mortgage-backed securities currently in use are: mortgage-backed bonds (MBBs), mortgage pass-through securities (MPTs), mortgage pay-through bonds (MPTBs), collateralized mortgage obligations (CMOs). The major difference between them is whether they are more like bonds where the issuer owns the mortgage pool and pays interest to investors, versus principal and interest flowing directly to the investors.

Question 19-8

There are several ways that mortgages can be sold in the secondary market. Choose two and compare and contrast their length of distribution channel, relative ease of transaction, and efficiency as it relates to maximizing funds flow from sale.

Essentially, mortgages are originated by lenders and are pooled by them or sold to FNMA or FHLMC. If pooled by the originator, the originator will work with a securities underwriter to issue the securities. These securities are then sold through security dealers to individuals and institutional investors. In the early 1980s both FNMA and FHLMC instituted swap programs in which originators pool mortgages, then swap them for pass-through securities simultaneously issued by Fannie Mae or Freddie Mac. Depending on market interest rates, the originator may then choose to sell part or all of the mortgage securities at a premium or a discount. These securities could be sold directly by the originator to institutional investors, to security dealers, or through the trading department operated by FHLMC. By swapping securities for mortgages, the originator has more flexibility when deciding whether to own securities or how and when such securities will be sold to raise cash.

Question 19-9

What is the function of the optional delivery commitment?

Under the optional delivery, originators pay Fannie Mae a fee for the "right but not the obligation" to sell (deliver) their mortgages to Fannie Mae. Hence, if interest rates increase, originators can sell mortgages to Fannie Mae, but if interest rates fall, they can retain the option to sell mortgages to another party for a better price (or even to renegotiate a price with Fannie Mae).

Question 19-10

What is a mortgage swap certificate?

In a mortgage swap, an originator pools mortgages, then swaps them for pass-through mortgage securities issued simultaneously by Fannie Mae or Freddie Mac. Mortgage swap certificates are the securities guaranteed by FNMA and FHLMC.

Question 19-11

Name five important characteristics of mortgage pools. Tell why each is important.

(1) Guarantee against default on mortgages by both private mortgage insurers and government agencies reduces the inherent risk of such securities.

(2) Mortgages are grouped according to payment patterns, maturity and security which helps investors predict with some confidence the cash flow pattern that they can expect to receive.

(3) A mixture of interest rates enables a faster accumulation of larger pools for securitization. The coupon rate promised to investors purchasing securities is generally based on the lowest interest rate on any mortgage in the pool, less servicing and guarantee fees. This means that for two security issues bearing the same coupon rate,

expected cash flows to investors in the pool containing mortgages with different rates will be less variable than cash flows from the pool with the same interest rates.
(4) The risk of default is usually greatest in the early years of the life of a mortgage. Inclusion of seasoned mortgages in pools tends to reduce the possibility of prepayment because of default.
(5) Geographic diversity of the mortgages in the pool is important because it may affect the likelihood of prepayment and default. Certain regions of the country may be affected more by economic downturns and resulting unemployment than others and, hence, may have higher default rates. A mortgage pool with more geographic diversity tends to insulate investors from cash flow irregularities.

Question 19-12

In general, would a falling rate of market interest cause the price of an MPT security to increase or decrease? Would the increase or decrease be greater if the security was issued at a discount? Would an increase in prepayment be likely or unlikely? Describe with an example.

The market value of an MPT security will increase as the market interest rate fells. An increase or decrease will affect MPTs in the same manner whether they are issued at a discount, a premium or par. As interest rates decrease below the rates of individual mortgages in a pool, borrowers will begin to refinance their loans assuming they are able to secure lower rates. Conversely, as interest rates rise above those of individual mortgages in a pool, borrowers will be less apt to prepay as their ability to secure rates below that of the market diminishes.

Solutions to Problems - Chapter 19
The Secondary Mortgage Market: Pass-Through Securities

Problem 19-1
(REFER TO TEMPLATE 19_1.XLS)

ASSUMPTIONS:

Principal	$10,000	
Coupon rates:		
(Bond 1) Annual	10.50%	
(Bond 2) Zero	0.00%	
Term in years		
Initial	25	years
Years into future	5	
Investors interest rate	12.00%	
Market interest rate	9.50%	
Number of compounding periods	50	

(a) Initial price of each bond (compounded annually):

Annual compounding on both MBBs	Bond 1	Bond 2
Principal	$10,000.00	$10,000.00
Coupon rate	10.50%	0.00%
Term	25	25
Investors interest rate	12.00%	12.00%
The present value of the coupon payments	$8,235.30	$0.00
The present value of the principal	$588.23	$588.23
Initial price of each bond	**$8,823.53**	**$588.23**

The price of the annual coupon bond is the present value of 25 payments at 10.5% times the initial principal discounted at the investor's required rate of return plus the present value of the initial principal discounted for 25 periods at the same rate of return.

The price of the zero-coupon bond is the present value of the initial principal discounted for 25 periods at the investor's required rate of return.

(b) Initial price of each bond (compounded semi-annually):

Semi-annual compounding on both MBBs		
Principal	$10,000.00	$10,000.00
Coupon rate	10.50%	0.00%
Term	25	25
Investors interest rate	12.00%	12.00%
Number of compounding periods	50	50
The present value of the coupon payments	$8,274.98	$0.00
The present value of the principal	$542.88	$542.88
Initial price of each bond	**$8,817.86**	**$542.88**

(c) Value each bond at the end of the fifth year. Market interest rates fall to 9.50% and the bonds are compounded annually:

Future Value		
Principal	$10,000.00	$10,000.00
Coupon rate	10.50%	0.00%
Term	20	20
Market interest rate	9.50%	9.50%
The present value of the coupon payments	$9,253.00	$0.00
The present value of the principal	$1,628.24	$1,628.24
Value of bond in dollars	**$10,881.24**	**$1,628.24**
Value of the bond in % of par	**108.81%**	**16.28%**

Problem 19-2
(REFER TO TEMPLATE 19_2AB.XLS)

ASSUMPTIONS:

Number of mortgages in initial pool	75
Average mortgage balance	$100,000
Initial mortgage pool balance	$7,500,000
Prepayment rate	10.00%
Coupon rate	12.00%

(a) Price MBS's under different market interest rates.

	(a)	(b)	(c)	(d)	(e)
Year	Pool Balance	Principal due to Prepayment	Principal and Interest Pmts	Total Principal and Interest	Pool Factor
0	$7,500,000				1.0000
1	6,322,619	$750,000	$1,327,381	$2,077,381	0.8430
2	5,262,449	632,262	1,186,622	1,818,884	0.7017
3	4,308,352	526,245	1,059,346	1,585,591	0.5744
4	3,450,483	430,835	944,036	1,374,872	0.4601
5	2,680,246	345,048	839,246	1,184,294	0.3574
6	1,990,325	268,025	743,526	1,011,551	0.2654
7	1,374,848	199,032	655,283	854,316	0.1833
8	829,928	137,485	572,416	709,901	0.1107
9	355,460	82,993	491,067	574,060	0.0474
10	0	0	398,115	398,115	0.0000

The price that Green could obtain is determined by discounting the total principal and interest payments including any prepayment (column d) by the market interest rate.

Market Interest Rate	Price of the Pool
11.00%	$7,740,598
12.00%	$7,500,000
9.00%	$8,264,095

(b) The pool factor at any given time is the outstanding principal balance divided by the initial principal of the pool.

At the end of year 5:	
Outstanding pool balance	$2,680,246
Initial pool balance	7,500,000
Pool factor	0.3574

If the market interest rate is 12.00%, the price that Green could obtain is the PV of the remaining cash flows discounted at the current market interest rate. (Take the PV of column d for years 6-10.)

Market Interest Rate	Price of the pool after 5 years
12.00%	$2,680,246

(REFER TO TEMPLATE 19_2CD.XLS)

(c) Issuance of 100 Mortgage Pass Through Securities: (10.00% prepayment rate and 9.50% market interest rate are the original variables contained in the template. It must be changed for any other answer.)

Assuming that Green does not service or guarantee the mortgages, the price obtained will be the PV of the total cash flows less servicing and guarantee fees (column f) discounted by the market rate of interest.

Data Input Box:

Number of mortgages in initial pool	**75**
Average mortgage balance	**$100,000**
Initial mortgage pool balance	$7,500,000
Prepayment rate	**10.00%**
Coupon rate	**11.50%**
Servicing and Guarantee Fee	**0.5%**
Total rate for P&I on Pass Through	**12.0%**
Market interest rate	**9.50%**

Issuance of 100 Mortgage Pass Through Securities (MPT)

	(a)	(b)	(c)	(d)	(e)	(f)	(g)
Year	Pool Balance	Principal due to Prepayment	Principal and Interest Pmts to Issuer	Total Principal and Interest Pmts to Issuer (b)+(c)	Guarantee and Service Fees (a)x(0.5%)	Total Payments to Investors (d)-(e)	Pmt to Individual Investor (f)/100
0	$7,500,000						($75,000)
1	6,285,119	750,000	1,327,381	2,077,381	37,500	2,039,881	20,399
2	5,199,811	628,512	1,179,584	1,808,096	31,426	1,776,670	17,767
3	4,231,072	519,981	1,046,737	1,566,718	25,999	1,540,719	15,407
4	3,367,435	423,107	927,103	1,350,210	21,155	1,329,055	13,291
5	2,598,900	336,744	819,047	1,155,790	16,837	1,138,953	11,390
6	1,916,923	259,890	720,960	980,850	12,994	967,856	9,679
7	1,314,560	191,692	631,117	822,809	9,585	813,225	8,132
8	786,963	131,456	547,316	678,772	6,573	672,199	6,722
9	333,123	78,696	465,644	544,341	3,935	540,406	5,404
10	0	0	373,097	373,097	1,666	371,432	3,714
							11.00%

Price to Green	Value of MPT
$7,872,299	$78,723

(d) Issuance of 100 Mortgage Pass Through Securities: (Change 10.00% prepayment rate to 20.00% and 9.50% market interest rate to 8.00%. All other variables are constant.)

ASSUMPTIONS:

Data Input Box:

Number of mortgages in initial pool	**75**
Average mortgage balance	**$100,000**
Initial mortgage pool balance	$7,500,000
Prepayment rate	**20.00%**
Coupon rate	**11.50%**
Servicing and Guarantee Fee	**0.5%**
Total rate for P&I on Pass Through	**12.0%**
Market interest rate	**8.00%**

Issuance of 100 Mortgage Pass Through Securities (MPT)

	(a)	(b)	(c)	(d)	(e)	(f)	(g)
Year	Pool Balance	Principal due to Prepayment	Principal and Interest Pmts to Issuer	Total Principal and Interest Pmts to Issuer (b)+(c)	Guarantee and Service Fees (a)x(0.5%)	Total Payments to Investors (d)-(e)	Pmt to Individual Investor (f)/100
0	$7,500,000						($75,000)
1	5,535,119	1,500,000	1,327,381	2,827,381	37,500	2,789,881	27,899
2	4,025,809	1,107,024	1,038,825	2,145,849	27,676	2,118,173	21,182
3	2,873,208	805,162	810,407	1,615,568	20,129	1,595,439	15,954
4	1,999,415	574,642	629,571	1,204,213	14,366	1,189,846	11,898
5	1,343,155	399,883	486,309	886,192	9,997	876,195	8,762
6	856,383	268,631	372,604	641,235	6,716	634,520	6,345
7	501,640	171,277	281,951	453,227	4,282	448,945	4,489
8	250,143	100,328	208,857	309,185	2,508	306,677	3,067
9	80,872	50,029	148,009	198,038	1,251	196,787	1,968
10	0	0	90,576	90,576	404	90,172	902
							11.00%

Price to Green	Value of MPT
$8,104,331	$81,043

Problem 19-3

(a) See result for 7.5% in the table below.

Discount rate	Price to Green	Value of MPT
7.50%	$1,069,843	$26,746
9.50%	$1,000,000	$25,000
8.50%	$1,033,908	$25,848
10.50%	$967,969	$24,199
11.50%	$937,679	$23,442

(b) See result for 11.5% in the table above.