

PACs, TACs, Floaters, and Inverse Floaters

Download the spreadsheet that accompanies this assignment and use the appropriate worksheet in the workbook to answer the following questions.

1. **Planned Amortization Class¹ (PAC)** (35 points). A PAC tranche² and a companion/support bond are created out of a mortgage pass-through (MPT) that has collateral of \$425 million with a coupon rate of 5.08%, a WAC of 5.7%, a WAM of 357 months, and a contract term of 360 months. Of the \$425 million in collateral, the PAC has a par value of \$170 million and the par value of the support class is \$255 million. The coupon rate on the PAC and Support bonds is 4.6% and 5.4% respectively. The PAC bands used for the PAC sinking fund schedule of principal are 100% PSA and 350% PSA. The PAC has a three year lockout (there is no principal payments to the PAC bond class in the first year). If the actual prepayment speed is 215% PSA,



- a. What are the monthly cash flows to the PAC and support bond? For your convenience, I have provided a template labeled **1ab. PAC-Lockout** to do your calculations. Please fill in the areas highlighted in **yellow**. (Hint: You should make copies of your MPT spreadsheet to make it easier on yourself with respect to calculating the payments associated with the upper and lower PAC bands. To make a copy of your spreadsheet, position the cursor over a worksheet tab and right click on the mouse. Select **Move or Copy** then select the worksheet in the workbook that you wish to copy. In the lower left hand corner, click on the **Create a copy** box and then click the **OK** button. Double click on the tab of the copied worksheet and type in **1.1 PAC Lower Band** and **1.2 PAC Upper Band** for the sheet containing the lower and upper bands respectively)
- b. What is the WAL for the PAC and for the support bond?
- c. What must the PAC and support bonds be priced at have an annual yield (IRR) of 4.85% and 6.1% respectively? Hint: To solve this problem, first enter the par values for the PAC and support bonds in MPT Month 0 as *negative* numbers (because these are the investors' initial investment outlays). Solve for the monthly IRR of the PAC and support bonds

¹This problem was constructed to reflect conditions in the market at the time that this case was written.

Information was obtained lexis-nexus, investext, and from the following websites

<http://www.commercebank.com/business/commercial/investments/commentary.asp> ,

<http://www.bondmarkets.com> , <http://www.bloomberg.com> , and <http://www.freddiemac.com/mbs/> among other sources of data.

²A planned amortization class (PAC) bond (tranche) was created to give some CMO tranches a structure similar to corporate bonds under certain conditions. PAC structures cause the principal component of the monthly payments to be "locked out" for a period of time, going instead to other tranches in the REMIC. The payment schedule and average life do not change as long as prepayments remain *inside* a specified band of prepayment rates. Speeds faster than the band could cause the PAC to shorten from its expected average life, while slower speeds could cause it to extend.

respectively using the **IRR** function (**=IRR(values,guess)**) Note: you should use .001 as the guess otherwise Excel will give you a #NUM! as your answer). Next, multiply the monthly IRRs by 12 to obtain the annual IRRs. To derive the price that the PAC and support classes should be sold at to yield 4.85% and 6.1% respectively use the Solver option which can be accessed by selecting **T**ools → **S**olver... at the top of the Excel toolbar. If the **Solver...** option is not present, you can add it to your **T**ools submenu by selecting **T**ools → **A**ddIns... → click on the box labeled **Solver Add-in** → click **OK**. You should now see the **Solver...** option in your **T**ools submenu. To obtain the price for the PAC to yield 4.85%, **S**et **T**arget **C**ell: equal to cell B7 and in the **E**qual **T**o: row, select the **V**alue **o**f: option and type in .0485 (the yield the PAC investors demand). In the next row, **B**y **C**hanging **C**ells: enter cell B12 as the cell you want to solve for and click the **S**olve button. Use a similar logic process to obtain the price for the support class.

2. Target Amortization Class (TAC) (35 points). Suppose that we wish to create a TAC tranche and a companion tranche out of the support bond in question 1 so that our mortgage pass-through (MPT) is being used to create a PAC, a TAC, and a companion tranche. As in question 1, our MPT has collateral of \$425 million with a coupon rate of 5.08%, a WAC of 5.7%, a WAM of 357 months, and a contract term of 360 months. Of the \$425 million in collateral, the PAC has a par value of \$170 million, with the par value of the TAC and companion bonds equal to \$63.75 million and \$191.25 million respectively. The coupon rates on the PAC, TAC, and companion bonds are 4.6%, 5.4%, and 5.4% respectively. The PAC bands used for the PAC sinking fund schedule of principal are 100% PSA and 350% PSA. The PAC has a three year lockout (there is no principal payments to the PAC bond class in the first year). The TAC band used for the TAC sinking fund schedule of principal is 200% PSA. If the actual prepayment speed is 215% PSA,



- a. What are the monthly cash flows to the TAC and support bond? Hint: You should first calculate the TAC sinking fund schedule using the **2.1 TAC@200% PSA** worksheet provided. The initial beginning balance is \$255 million (par value of TAC + par value of companion tranche = par value of the support tranche). Next, use the worksheet labeled **2.2 PAC+TAC+Support** to calculate the monthly cash flows as well as the WAL and IRR.
- b. What is the WAL for the TAC and for the support bond?
- c. What is the IRR for the PAC, TAC, and the support bond if the PAC is priced using your answer in question 1c, the TAC is priced at 98% of its par value, and the support bond is priced at 96% of its par value?

3. **Floater and Inverse Floater** (30 points). In lieu of creating a PAC, TAC, and support bond, suppose that you wish to create a CMO consisting of an A Tranche and a B tranche out of the mortgage pass-through (MPT) that has a collateral of \$425 million with a coupon rate of 5%, a WAC of 5.5%, a WAM of 357 months, and a contract term of 360 months. Of the \$425 million in collateral, the Class A bond has a par value of \$170 million and the par value of Tranche B is \$255 million. Both bond classes have a coupon rate of 5%. A floater and inverse floater is created out of Tranche B such that:



- par value of the floater + par value of the inverse floater = par value of Tranche B,
- coupon leverage (also known as the leverage factor) is 4
- the floor on the coupon rate associated with the inverse floater is set at 0% (this sets the maximum coupon rate for the floater)
- Margin on the Floater = 1.5%

Assume that the path for mortgage rates, Treasury bill rates, and PSA are as follows:

<u>Interest Rate Path</u>									
Year	Y1	Y2	Y3	Y4	Y5-Y7	Y8	Y9-Y14	Y15-End	
MtgRates	0.064	0.0591	0.0575	0.0571	0.0562	0.0563	0.0562	0.0566	
Tbill	0.0280	0.0279	0.0293	0.0289	0.0297	0.030	0.0314	0.0322	
PSA	208	229	255	280	343	280	329	265	

- a. What are the monthly cash flows to Tranche A, the floater, and the inverse floater bond classes? To help you with your calculations, there are 3 templates provided. The first worksheet **3.1 SMM Vector** provided is to aid in your calculation of the SMM vector which will be used in the **3. Floater & Inverse Fltr** worksheet (see the column labeled “SMM(t)”). The **3.2 Coupon(Fltr & InvFltr)** worksheet is to help you calculate the interest rate over time on the floater and inverse floater tranches which you will use to calculate the net interest payments in the **3. Floater & Inverse Fltr** worksheet.
- b. What are the IRRs for Tranche A, the floater, and the inverse floater bond classes assuming that each was purchased at par?
- c. What are the WALs for Tranche A, the floater, and the inverse floater bond classes?

Please turn in a hard copy of your assignment. Remember: this is an **individual** assignment.