



## Case Study – Precise Debt Modeling

Question Appeared in: ModelOff 2014 Round 1

Time Allocated: 40 minutes

### INTRODUCTION

You work at a bank and have been asked to prepare a spreadsheet that can generate loan schedules for personal loans taken out by the bank's customers. The loan details are as follows:

- The loan duration can be for any number of months up to 72 months.
- Drawdowns occur as a single drawdown for the full balance at the beginning of the loan.
- The drawdown can occur on any Business Day. A Business Day is defined as a weekday (Monday to Friday) that is not a Holiday. The list of Holidays has been provided to you.
- The Actual Payment Date shall be based on the Regular Payment Date, but adjusted to be a Business Day as described below.
- Loan payments are made monthly in arrears, on the Actual Payment Date each month, with the first payment one month after drawdown.
- The Regular Payment Date each month will be the same DAY of the month as the loan drawdown (for example, if the drawdown was the 8<sup>th</sup> of October, then the Regular Payment Date will be the 8<sup>th</sup> of each month).
- The Actual Payment Date will equal the Regular Payment Date, subject to the following three conditions:

**HINT: For Questions 1-4, you can ignore conditions 2 and 3, as they will not be relevant.**

**Condition 1:** If the Regular Payment Date is **not** a Business Day, then the Actual Payment Date will be made on the first Business Day after the regular payment date, **except** where that Business Day would be in a new calendar month.

**HINT: For Questions 5-8, your model will need to also incorporate conditions 2 and 3.**

**Condition 2:** If Condition 1 results in a new calendar month, the Actual Payment Date shall be the last Business Day of the calendar month (which, by definition, will be before the Regular Payment Date)

**Condition 3:** If the Regular Payment Date is the 29th, 30th or 31st of the month then, where a month has fewer days (e.g. February), the Actual Payment Date will be the last Business Day of the calendar month.

- The Monthly Payment Amount shall be the same for each period, and include both an interest portion and a principal portion. Therefore, the split between interest and principal will change from period to period.
- Interest due shall be calculated on an *Actual / 365* basis based on the number of days between successive Actual Payment Dates.
- Do not round any of your calculations.



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Your manager has also given you the following advice for preparing your model:

- It is expected you will need to use Excel's Goal Seek tool or equivalent functionality in order to find the Monthly Payment Amount. Due to the interest periods having a different number of days from month to month, you will not be able to solve this problem with the PMT, PPMT or IPMT functions.

### HOLIDAY SCHEDULE

Your model should accommodate the following fixed schedule of holidays.

A list of these Holidays is included in the provided workbook.

3 April 2015  
6 April 2015  
25 October 2015  
25 March 2016  
28 March 2016  
24 October 2016  
14 April 2017  
17 April 2017  
30 October 2017  
30 March 2018  
2 April 2018  
19 October 2018  
19 April 2019  
22 April 2019  
14 October 2019  
10 April 2020  
13 April 2020  
19 October 2020

**HINT: It may be convenient to construct a static list next to the Holiday List, either through formulas or manual entry, of the Actual Payment Date that corresponds to each Holiday.**

**Questions 1-4 relate to Loan 1 with the following terms:**

Loan amount: \$250,000  
Loan duration: 72 months  
Drawdown date: 19 January 2015  
Interest Rate: 5.20% per annum

**Questions 5-8 relate to Loan 2 with the following terms:**

Loan amount: \$100,000  
Loan duration: 48 months  
Drawdown date: 30 June 2015  
Interest Rate: 7.00% per annum



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**QUESTIONS**

**Question 1**

**For Loan 1, how many of the 72 Regular Payment Dates are not Business Days?**

- a. 18
- b. 21
- c. 24
- d. 27

**Question 2**

**For Loan 1, the total interest paid over the life of the loan is closest to:**

- a. \$41,560
- b. \$41,570
- c. \$41,580
- d. \$41,590

**Question 3**

**For Loan 1, the Monthly Payment Amount ends in what number of cents (rounded to the nearest cent)?**

- a. 85
- b. 47
- c. 32
- d. 11

**Question 4**

**For Loan 1, after how many payments does the outstanding loan balance first drop below 40% of the original drawdown value?**

- a. 44
- b. 45
- c. 46
- d. 47



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**Question 5**

**For Loan 2, how many interest periods have exactly 31 days?**

- a. 12
- b. 13
- c. 14
- d. 15

**Question 6**

**For Loan 2, the Monthly Payment Amount is:**

- a. \$2,394.62
- b. \$2,394.98
- c. \$2,395.14
- d. \$2,395.40

**Question 7**

**For Loan 2, the loan balance immediately after the 12<sup>th</sup> payment on 30 June 2016 is:**

- a. \$77,566.02
- b. \$77,566.34
- c. \$77,566.87
- d. \$77,567.31

**Question 8**

**For Loan 2, what proportion of total payments made over the life of the loan are interest payments, rounded to the nearest percent? [5 marks]**

- a. 13%
- b. 14%
- c. 15%
- d. 16%

## Answers

1	C
2	D
3	A
4	C
5	B
6	B
7	B
8	A