

# Dynamic Risk Management

September 2021

Agenda Paper 4B: Illustration  
of potential refinements to the  
DRM Model—Risk Limits

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# Introduction

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- Agenda paper 4A of this Board meeting sets out the potential refinements to the DRM model by incorporating the concept of risk limits into the target profile. The purpose of this paper is to illustrate through examples how these potential refinements to the DRM model could work.
- These slides are for illustration purposes only and illustrate one possible way in which the refinements to the DRM model could be applied
- Slide 4 provides a diagram summarising the interaction of the key elements of the DRM model (including the potential refinements)
- Slide 5 illustrate the six steps in the DRM cycle covering both prospective and retrospective actions required, as well as the DRM boundaries
- Slide 6 to 13 demonstrate the application and mechanics of the DRM model with an example, in each of the six steps over two periods
- Slide 14 demonstrates the DRM model performance when the risk managers decide to trade positions outside of the DRM boundaries

# Elements of the DRM model (including refinements)

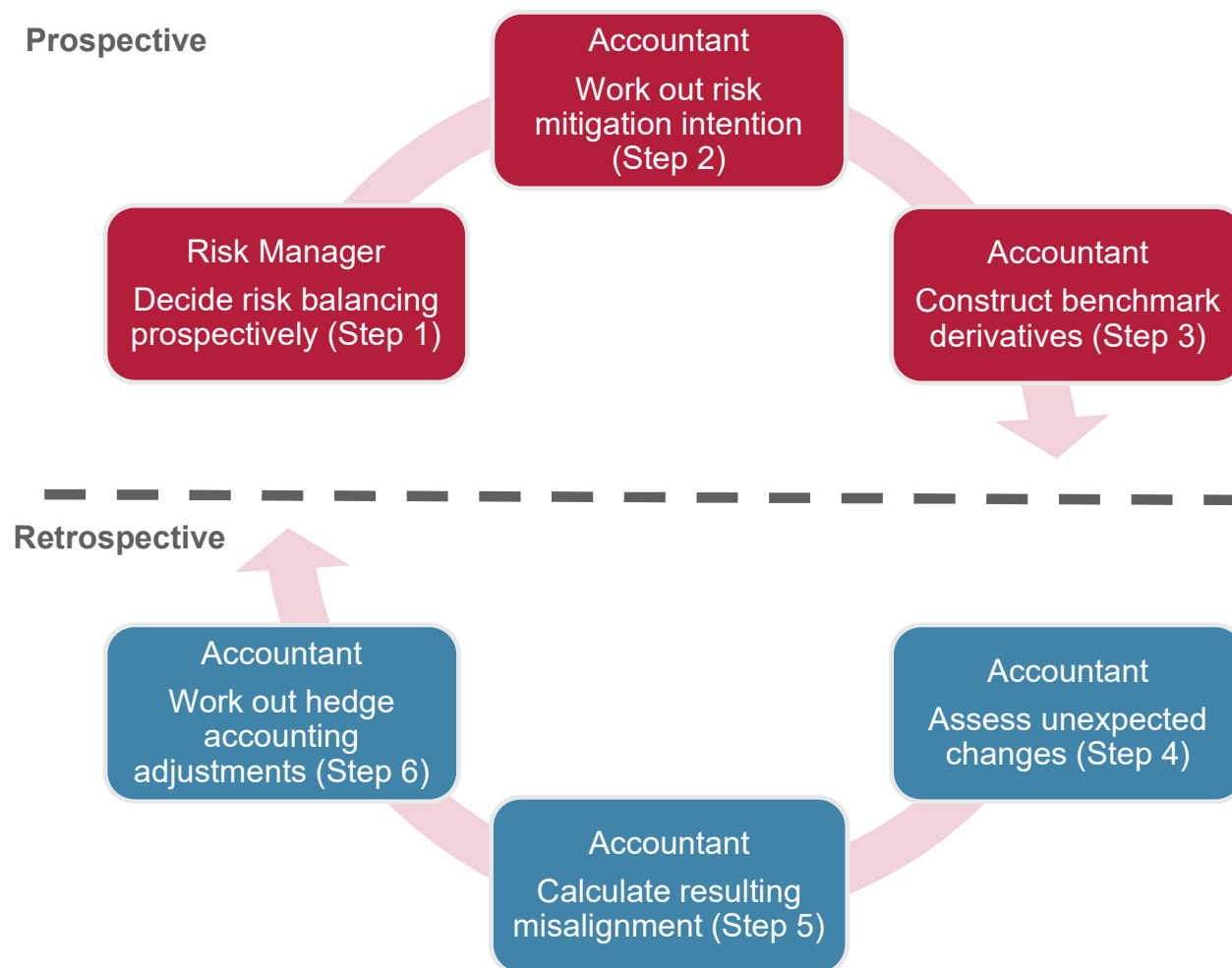
This diagram summarises the relationships of the key elements of the DRM model, as described in the agenda paper 4A of this Board meeting.



<sup>1</sup> Target profile may be a range of acceptable outcomes based on the risk limits specified in the entity's risk management strategy.

<sup>2</sup> Risk mitigation intention is a single-outcome element representing the extent of risk to be mitigated, subject to DRM boundaries (see slide 5 for details). This is usually evidenced by the designated derivatives.

# Proposed DRM cycle



## DRM Boundaries

- ***Risk mitigation intention*** cannot create new risks (ie it must reduce the interest rate risk in the current net open risk position by time bucket and cannot exceed the total amount of risk by time bucket).
- ***Risk mitigation intention*** shall transform the current net open risk position to a residual risk position that is within the ***target profile***.

# Example of DRM hedge accounting

## Background Information

Bank ABC manages interest rate risk dynamically, covering the net interest rate risk positions from assets and liabilities. For prepayable assets, it manages the expected interest rate risk positions based on the latest expectation.

When Bank ABC begins to apply DRM hedging, it holds the following position:

	bucket (yrs)	1	2	3	4	5
Prepayable Assets (PV01)					100	1,000
Term Liabilities (PV01)					-100	-500
<b>Current Net Open Risk Position</b>					<b>0</b>	<b>500</b>

Bank ABC's risk management strategy is to manage the net open risk position within the range of -50 and +50 PV01 in each time bucket, which is the target profile.

# Example of DRM hedge accounting

Period 0

Not applicable – No retrospective steps required for the first period.

Step 1

Risk managers calculate the current net open risk per bucket and decide to what extent the current net open risk position shall be mitigated prospectively through the use of derivatives.

Risk managers decided to mitigate the current net open risk from +500 to +10, by trading an interest rate swap that has PV01 of -490 in the 5-year bucket.

	bucket (yrs)	1	2	3	4	5
Prepayable Assets (PV01)					100	1,000
Term Liabilities (PV01)					-100	-500
<b>Current Net Open Risk Position</b>					0	500
<b>Designated Derivatives</b>					0	-490
<b>Residual open risk position</b>					0	10

# Example of DRM hedge accounting

Period 0

## Step 2

Accountants determine the risk mitigation intention based on the designated derivatives and the current net open risk position, subject to DRM boundaries.

	bucket (yrs)	1	2	3	4	5	
<b>A Current Net Open Risk Position</b>					0	500	
Designated Derivatives					0	-490	
<b>B Risk Mitigation Intention</b>					<b>0</b>	<b>-490</b>	To work out risk mitigation intention that meets the DRM boundaries prospectively
<b>C Total of A and B</b>					0	10	
<b>D Target Profile</b>		50	50	50	50	50	
Check for risk mitigation (A vs B)		OK	OK	OK	OK	OK	
Check within target profile (C vs D)		OK	OK	OK	OK	OK	

## Step 3

Accountants construct and designate the new benchmark derivatives based on the risk mitigation intention and any existing benchmark derivatives.

	bucket (yrs)	1	2	3	4	5	
Risk Mitigation Intention		0	0	0	0	-490	
<b>Benchmark Derivatives</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>-490</b>	@ T0 Rates



# Example of DRM hedge accounting

Period 1

Step 4

Accountants consider the unexpected changes to the current net open risk position based on latest ALM information, and compare that against the risk mitigation intention.

This step covers the effect from unexpected changes to the underlying assets and liabilities considered in the previous period (ie Period 0). Other changes (such as additional new businesses) are only considered in prospective steps (Step 4). One possible way to reflect the impact of unexpected changes is by amending the benchmark derivatives if one of the DRM boundaries is breached.

In this example, we assume there was a change in the expected repayment date for the prepayable assets, and thus part of the PV01 in year 5 bucket had moved to year 4 bucket unexpectedly.

	bucket (yrs)	1	2	3	4	5	
Prepayable Assets (PV01)					160	940	+60 of PV01 moved from Y5 to Y4
Term Liabilities (PV01)					-100	-500	
<b>A Current Net Open Risk Position (updated)</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>60</b>	<b>440</b>	Excluding new business
<b>B Risk Mitigation Intention (for Period 0)</b>					<b>0</b>	<b>-490</b>	
<b>C Total of A and B</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>60</b>	<b>-50</b>	
<b>D Target profile</b>		50	50	50	50	50	
Check for risk mitigation (A vs B)		OK	OK	OK	OK	Over	
Check within target profile (C vs D)		OK	OK	OK	Over	OK	
Amendment Required?		No	No	No	Yes	Yes	

Amendments are needed as the residual open risk position falls outside of the risk limits in Year 4 bucket and does not satisfy the risk mitigation requirement in Year 5 bucket.

# Example of DRM hedge accounting

Period 1

Step 5

Accountants calculate the resulting misalignment due to unexpected changes.

One possible way to do this is to amend the benchmark derivatives by the minimum amount to satisfy the DRM boundaries (as per slide 5). The misalignment could be represented by designating additional benchmark derivatives using the prevailing benchmark interest rates at previous period end when the performance of DRM hedge was last assessed.

	bucket (yrs)	1	2	3	4	5	
Prepayable Assets (PV01)					160	940	+60 of PV01 moved from Y5 to Y4
Term Liabilities (PV01)					-100	-500	
<b>A Current Net Open Risk Position (updated)</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>60</b>	<b>440</b>	Excluding new business
Previous Benchmark Derivatives		0	0	0	0	-490	@T0 Rates
Additional Benchmark Derivatives					-10	50	@T0 Rates
<b>B Total revised Benchmark</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>-10</b>	<b>-440</b>	
<b>C Total of A and B</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>50</b>	<b>0</b>	
<b>D Target profile</b>		50	50	50	50	50	
Check for risk mitigation (A vs B)		OK	OK	OK	OK	OK	
Check within target profile (C vs D)		OK	OK	OK	OK	OK	

At Y4 bucket, an additional benchmark derivative of -10 PV01 is needed to bring the residual risk within risk limits.

At Y5 bucket, additional benchmark derivative of +50 PV01 is needed to ensure the benchmark derivatives reflect the unexpected change.

# Example of DRM hedge accounting

Period 1

Step 6

Accountants work out the hedge accounting adjustments (using the 'lower-of test').

Accountants calculate the present value movements of the designated derivatives and the benchmark derivatives, and recognise the lower of the two in OCI.

	bucket (yrs)	1	2	3	4	5
<b>Designated Derivatives</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>-490</b>
Previous Benchmark Derivatives		0	0	0	0	-490 @T0 Rates
Additional Benchmark Derivatives		0	0	0	-10	50 @T0 Rates
<b>Total Benchmark Derivatives</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>-10</b>	<b>-440</b>

In this example, between period 0 and period 1, the present value movements in designated derivatives are driven by the -490 PV01 in Y5 bucket, while the present value movements in the benchmark derivatives are driven by -440 PV01 in Y5 bucket, and -10 PV01 in Y4 bucket, which lead to misalignment.

# Example of DRM hedge accounting

Period 1

Once the retrospective steps (ie step 4 to 6) are performed, the cycle moves on to the prospective steps again (ie steps 1 to 3).

Step 1

Risk managers calculate the current net open risk per bucket and decide to what extent the current net open risk position shall be mitigated prospectively through the use of derivatives.

Risk managers reassess the net open risk position from assets and liabilities (including new business), and decide the required derivatives for risk management purpose. This decision is not directly limited by the DRM boundaries.

In this example, we assume there two new items — a new 2-year term asset with PV01 of +200; and a new 1-year term liability with PV01 of -200. Risk managers decide to reduce the residual open risk position to +20 PV01 in Y5 bucket, and hedge all other risks using derivatives.

	bucket (yrs)	1	2	3	4	5
Prepayable Assets (PV01)		0	0	0	160	940
New Term Assets (PV01)		0	200	0	0	0
Term Liabilities (PV01)		0	0	0	-100	-500
New Term Liabilities (PV01)		-200	0	0	0	0
<b>Current Net Open Risk Position</b>		<b>-200</b>	<b>200</b>	<b>0</b>	<b>60</b>	<b>440</b>
Existing Designated Derivatives		0	0	0	0	-490
Additional Designated Derivatives		200	-200		-60	70
<b>Total Designated Derivatives</b>		<b>200</b>	<b>-200</b>	<b>0</b>	<b>-60</b>	<b>-420</b>
<b>Residual open risk position</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>20</b>

# Example of DRM hedge accounting

Period 1

Step 2

Accountants determine the risk mitigation intention based on the designated derivatives and the current net open risk position, subject to DRM boundaries.

	bucket (yrs)	1	2	3	4	5
<b>A Current Net Open Risk Position</b>		-200	200	0	60	440
Total Designated Derivatives		200	-200	0	-60	-420
<b>B Risk Mitigation Intention</b>		<b>200</b>	<b>-200</b>	<b>0</b>	<b>-60</b>	<b>-420</b>
<b>C Total of A and B</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>20</b>
<b>D Target Profile</b>		50	50	50	50	50
Check for risk mitigation (A vs B)		OK	OK	OK	OK	OK
Check within target profile (C vs D)		OK	OK	OK	OK	OK

Step 3

Accountants construct and designate the new benchmark derivatives based on the risk mitigation intention and any existing benchmark derivatives.

Previous Benchmark Derivatives						-490	T0 @ T0 Rates
Additional Benchmark Derivatives		0	0	0	-10	50	T1 @ T0 Rates
<b>New Benchmark Derivatives</b>		<b>200</b>	<b>-200</b>	<b>0</b>	<b>-50</b>	<b>20</b>	T1 @ T1 Rates
Total Benchmark Derivatives		200	-200	0	-60	-420	

The DRM cycle will continue in Period 2 onwards in the same way as illustrated in this example.

# Example of over-hedging

Risk managers trade derivatives outside of the DRM boundaries

- Trading decisions are not directly limited by the DRM boundaries, and in some cases entities may decide to over-hedge the current net open risk position.
- In such case, the risk mitigation intention has to be limited to the maximum position allowed for risk mitigation purposes.
- In this example, the current net open risk position is a PV01 of +500 at Y5 bucket, but the risk managers traded derivatives with PV01 of -510 at Y5 bucket. The risk mitigation intention has to be limited to the PV01 of +500, as anything above +500 would not be used for risk mitigation.
- As a result, the difference in designated derivatives and benchmark derivatives will lead to misalignment.

	bucket (yrs)	1	2	3	4	5
	Prepayable Assets (PV01)				100	1,000
	Term Liabilities (PV01)				-100	-500
	<b>A Current Net Open Risk Position</b>				<b>0</b>	<b>500</b>
Step 1	Designated Derivatives	0	0	0	0	-510
Step 2	<b>B Risk Mitigation Intention</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>-500</b>
	<b>C Total of A and B</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
	<b>D Target Profile</b>	50	50	50	50	50
	Check for risk mitigation (A vs B)	OK	OK	OK	OK	OK
	Check within target profile (C vs D)	OK	OK	OK	OK	OK
Step 3	<b>Benchmark Derivatives</b>				<b>0</b>	<b>-500</b>

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