Advanced PWERM Example: When the OPM is Inappropriate

The following case study shows another application of the PWERM, illustrating a situation in which the OPM would be less likely to capture key risks and expectations. In this example, the objective is to arrive at the value per share of the common stock of an entity that has a complex capital structure composed of the classes of equity shown in Exhibit A30–11.

Exhibit A30–11

Advanced PWERM Example with Complex Capital Structure

Equity Value	$1,800,000
Equity Volatility	50.0%
Term	5 years
Risk-Free Rate	1.0%

			Economic Rights					
Equity Class	**Shares Outstanding**		**Original Issue Price**	**Exercise Price**	**Liquidation Ratio**	**Conversion Price**	**Conversion Ratio**	**Aggregate Liquidation Preference**
Series A Preferred Stock	1,500,000	57.7%	$1.00		1.00x	$1.00	1.00	$1,500,000
Common Stock	1,000,000	38.5%						–
Option Pool	100,000	3.8%		$0.43				–
Total	**2,600,000**	**100.0%**						**$1,500,000**

Two of the above classes do NOT exist at the December 31, 2019 valuation date:

- The Series C Preferred Stock proceeds of $10 million are anticipated to be needed on or after December 31, 2020, and thus will impact the value of common stock only for exit scenarios that occur in 2021 or thereafter.
- The option pool represents options that are expected to be issued during 2020 and will have a strike price equal to the value per common share derived from this PWERM example. When employing the PWERM, the pool should include all expected future options, so if the company anticipated issuing options beyond 2020, these should also be included in the valuation process.

The PWERM process begins with the identification of expected exit scenarios, which for this case are the following:

- Sale of company in one year (no future Series C round required):
  - Low Sale
  - High Sale
- IPO of company in two years (future Series C round will be required to fund operations to end of year 2):
  - Low IPO
  - High IPO

Even at this initial step, the advantage of the PWERM is clear. The OPM allows for only a single exit date, but in this example, the exit date depends on whether the company is sold or goes public. Also, the OPM requires a *fixed* capital structure, whereas this subject company example has a variable structure (i.e., the Series C preferred only exists in IPO scenarios).

The value of each scenario is then estimated (details are not presented), and probabilities are assigned (note: the assignment of probabilities can be applied either before or after value is allocated to each share class, and the mathematical result is not affected by the order of these two steps):

- Low Sale: 15% probability of $50 million exit value
- High Sale: 30% probability of $100 million exit value
- Low IPO: 15% probability of $175 million exit value
- High IPO: 40% probability of $225 million exit value.

Again, the advantage of the PWERM is evident in situations like this. The probabilities and values above are obviously NOT lognormally distributed. The analyst faces a situation in which the analyst must either try to fit the facts into a single date and lognormal distribution before utilizing the OPM or employ the larger number of assumptions that the PWERM allows.

At this point, the PWERM and accompanying capitalization table can be summarized as shown in Exhibit A30–12.

Exhibit A30–12

Advanced PWERM Example – Complex Capital Structure Approaching Liquidity Event

	Low Sale	High Sale	Low IPO	High IPO	Total
Liquidity Event Scenario					
Probability	*15.0%*	*30.0%*	*15.0%*	*40.0%*	*100.0%*
Liquidity Term	1.00 yrs	1.00 yrs	2.00 yrs	2.00 yrs	1.55 yrs
Future Equity Value	$50,000,000	$100,000,000	$175,000,000	$225,000,000	
Shares Outstanding at Liquidity Event					
Series C Preferred Stock			500,000	500,000	
Series B Preferred Stock	4,000,000	4,000,000	4,000,000	4,000,000	
Series A Preferred Stock	2,000,000	2,000,000	2,000,000	2,000,000	
Common Stock	1,000,000	1,000,000	1,000,000	1,000,000	
Options at $3.00	–	200,000	200,000	200,000	
Option Pool	–	400,000	400,000	400,000	
Total	**7,000,000**	**7,600,000**	**8,100,000**	**8,100,000**	

Selection of Scenarios, Probabilities, and Future Equity Values. Next, the value of each scenario is allocated across the various classes of equity in this complex capital structure. Note that the Series C Preferred only exists and has value in IPO scenarios. Also, Exhibit A30–13 illustrates a frequently observed outcome. In the Low Sale Scenario, the outstanding preferred classes do not receive their full liquidation preferences (B – $50 million and A – $15 million), and the common stock and related options have no value at all as shown in Exhibit A30–13.

Exhibit A30–13

Advanced PWERM Example – Allocation of Future Equity Values Given Possible Liquidity Events

	Low Sale	High Sale	Low IPO	High IPO	Total
Liquidity Event Scenario					
Probability	*15.0%*	*30.0%*	*15.0%*	*40.0%*	*100.0%*
Liquidity Term	1.00 yrs	1.00 yrs	2.00 yrs	2.00 yrs	1.55 yrs
Future Equity Value	$50,000,000	$100,000,000	$175,000,000	$225,000,000	
Allocation of Future Equity Value					
Series C Preferred Stock	$ –	$ –	$11,077,531	$14,163,951	
Series B Preferred Stock	$38,461,538	$54,976,842	$88,620,247	$113,311,605	
Series A Preferred Stock	$11,538,462	$27,488,421	$44,310,123	$56,655,802	
Common Stock	$ –	$13,744,211	$22,155,062	$28,327,901	
Options at $3.00	$ –	$2,148,842	$3,831,012	$5,065,580	
Option Pool	$ –	$1,641,684	$5,006,025	$7,475,160	
Total	$50,000,000	$100,000,000	$175,000,000	$225,000,000	

Allocation of Future Equity Value (Based on Breakpoints). Next, the future value is discounted by class to present value. Note that the discount rate varies by class, from the least risky (Series C, assumed to have superior preferences) to the most risky (common stock and options with no preferences) as shown in Exhibit A30–14.

Exhibit A30–14

Advanced PWERM Example – Allocation of Current Equity Values Given Probability Weighted Liquidity Events

		Low Sale	High Sale	Low IPO	High IPO	Total
Liquidity Event Scenario						
Probability	*15.0%*	*30.0%*	*15.0%*	*40.0%*	*100.0%*	
Liquidity Term	1.00 Yrs	1.00 Yrs	2.00 Yrs	2.00 Yrs	1.55 Yrs	
Future Equity Value	$50,000,000	$100,000,000	$175,000,000	$225,000,000		
Present Equity Value						
Series C Preferred Stock	*15.0%*	$ –	$ –	$8,376,205	$10,709,982	$5,540,423
Series B Preferred Stock	*17.5%*	$32,733,224	$46,788,802	$64,188,499	$82,072,688	$61,403,974
Series A Preferred Stock	*20.0%*	$9,615,385	$22,907,018	$30,770,919	$39,344,307	$28,667,774
Common Stock	*30.0%*	$ –	$10,572,470	$13,109,504	$16,762,072	$11,842,995
Options at $3.00	*30.0%*	$ –	$1,652,955	$2,266,871	$2,997,385	$2,034,871
Option Pool	*30.0%*	$ –	$1,262,834	$2,962,145	$4,423,172	$2,592,441
Total		$42,348,609	$83,184,078	$121,674,143	$156,309,605	$112,082,478

Present Value of Equity per Share. The next step is mechanical, as the present value per class is converted into values per share. The security of interest in this example is the common stock, which is valued at $11.85 per share before any relevant valuation discounts. This is shown in Exhibit A30–15.

Exhibit A30–15

Advanced PWERM Example – Concluded Current Value of Common Stock Per Share Given Probability Weighted Liquidity Events

	Low Sale	High Sale	Low IPO	High IPO	Total
Liquidity Event Scenario					
Probability	*15.0%*	*30.0%*	*15.0%*	*40.0%*	*100.0%*
Liquidity Term	1.00 yrs	1.00 yrs	2.00 yrs	2.00 yrs	1.55 yrs
Future Equity Value	$50,000,000	$100,000,000	$175,000,000	$225,000,000	
Present Value per Share					
Series C Preferred Stock	$ –	$ –	$ 16.75	$ 21.42	$11.08
Series B Preferred Stock	$8.18	$11.70	$16.05	$20.52	$15.35
Series A Preferred Stock	$4.81	$11.45	$15.39	$19.67	$14.33
Common Stock	$ –	$10.57	$13.11	$16.76	$11.84
Options at $3.00	$ –	$8.26	$11.33	$14.99	$10.17
Option Pool	$ –	$3.16	$7.41	$11.06	$6.48

Concluded Value per Share. The final step in this PWERM case example is to apply a discount for lack of marketability (DLOM). Since DLOMs are assumed to be correlated with both volatility and time, the discounts for the one-year scenarios are lower than the discounts for the two-year IPO scenarios, resulting in a final value per common share of $9.64, which is also iteratively used as the strike price of the 400,000 yet-to-be-issued options in the option pool. The results are shown in Exhibit A30–16.

Exhibit A30–16

Advanced PWERM Example – Concluded Fair Market Value of Common Stock Per Share Given Probability Weighted Liquidity Events

	Low Sale	High Sale	Low IPO	High IPO	Total
Liquidity Event Scenario					
Probability	*15.0%*	*30.0%*	*15.0%*	*40.0%*	*100.0%*
Liquidity Term	1.00 yrs	1.00 yrs	2.00 yrs	2.00 yrs	1.55 yrs
Future Equity Value	$50,000,000	$100,000,000	$175,000,000	$225,000,000	
Conclusion of Fair Market Value of Common Stock					
Allocated Value Per Share	$ –	$10.57	$13.11	$16.76	$11.84
Discount for Lack of Marketability	*15.0%*	*15.0%*	*20.0%*	*20.0%*	
Fair Market Value of Common Stock	$ –	$ 8.99	$ 10.49	$ 13.41	$ 9.63

The above case example explicitly illustrates a potentially thorny issue—expected changes in the capital structure prior to the expected exit date, which might include:

- Future financing needs before the exit date (see the Series C Preferred treatment)
- Expected future stock option issuances before the exit date

The analyst should carefully consider other *interim* issues, such as expected changes in non-operational asset or liability values (e.g., changes in excess cash balances) that may vary from scenario to scenario.

As the case example and discussion above illustrates, the PWERM is a technique that requires many additional assumptions in comparison with the OPM, many of which may be difficult to support. When the choice is not clear, the analyst must choose between the simpler OPM that may not fully capture the nuances of the valuation, and the complexity and increased subjectivity of the PWERM. This leads to the final technique of this chapter, one that combines the advantages of both procedures—the hybrid methodology.

The discussion of this case study continues in the text of the chapter.