Group 5
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MoGen Case

1. ***How important is it for MoGen to get $5 billion of external funding in 2006? Could the company cut back on its share repurchase program, for example, to reduce the funds needed?***

External funding is needed to cover the deficit MoGen estimates in 2006, given the amount of investment it needs to do that year to maintain its product line compared to the cash it expects to generate. MoGen has a potential $5B deficit between the $5B of expected funds to cover investment (Net income + depreciation), and the $10B of expected investments it needed to make for its operations. There are four primary outflows for investment in 2006 including manufacturing needs (~$1B), product R&D (~$3B), acquisitions and licensing (~2B), and stock repurchasing (~4B). Based on this current operating plan, the deficit needed to be covered by an external source, unless for example there were other pricing or internal activities the company could take to generate a higher net income. With net income only at $3.6B in 2005, its unlikely growing net income to $10B in one year (277% growth rate YoY for net income is likely unattainable). Therefore, to cover the deficit external funding would be needed.

Manufacturing, R&D, and acquisition are incredibly important for a high R&D industry like biotech, where quality of products, trials, and patents are important elements of gaining competitive edges and ensuring your solution can meet FDA standards, so those should not be eliminated as it would reduce the amount of reinvestment .

The stock repurchasing strategy is distinct and not necessarily needed, and if eliminated would reduce the need of such a large amount of external funding. However, if MoGen eliminated the stock repurchase option, it would likely have to reward stockholders in other ways to ensure stock sell offs don't occur, such as dividend payments, which would require additional cash anyways, or MoGen would risk having the stock price falling and hurting market value of equity.

2. ***In your view, what are the pros and cons of issuing convertible debt relative to straight debt or equity?***

The pros of issuing convertible debt relative to straight debt or equity is the optionality it provides investors, plus the unlimited upside based on the ability to convert the bond into common stock after the transaction. This means that those purchasing the bond have the ability to net an additional gain on the transaction if the stock price is higher, with unlimited upside based on how high the stock price goes, with at the same time a clear floor of the bond price. Further, there are pros to the issuing company in that it can use these convertible debt and equity as a source of cash, without having to issue dividends to shareholders, especially if future profitability is uncertain. Once a firm issues dividends, there becomes an expectation in the marketplace that the dividend payments will be consistent, so if a company has a poor

performing year they are not beholden to make a dividend payment if they used convertibles instead of straight stock issuance.

The overall risk of convertible debt is the introduction of additional uncertainty into your debt and equity sources that tied to future performance of the stock price. Companies and purchases alike are essentially betting on future performance, versus being able to make a transaction based on today's stock performance. Second, if all the convertible debt issued is converted to common stock, this could eventually dilute or further dilute the earnings per share (as the number of shares increases, but the earnings are not increasing at the same rate).

3. ***The case states that a convertible bond can be valued as the sum of a straight bond plus a call option. Starting with the current stock price of $77.98 per share, how can you use the Black-Scholes model to estimate the value of the conversion option with a 25% conversion premium for one share of MoGen stock? Explain your choice for the stock price, exercise price, risk-free rate, time to maturity, and volatility. How should you convert this option value per share into the option value for a bond with a $1,000 face value?***

With a 25% conversion premium (current share price = $77.98) for one share of MoGen stock (representing a $97.48 conversion price, or "strike" price), we estimate the value of the conversion option at $18.64/share using the Black-Scholes equation. The risk-free rate is provided by the average of the 5-yr and 20-yr treasury notes (Exhibit 3 from the case) and came out to 4.56%. The Time to Maturity is assumed to be 5 years since the bond's conversion option extends out 5 years and investors don't often convert prior to the maturity date. The annualized volatility of 27% is provided in Exhibit 4 from the case.

The option value per share of $18.64 can be converted into option value of a $1000 face-value bond by multiplying the per-share option value with the number of shares which could be converted upon exercise of the option rights. In this case, with a 25% conversion premium representing a strike price of $97.48, we can divide the conversion price into the $1000 face value to determine the amount of shares convertible. In this case, it is 10.26 shares convertible per $1000 face-value bond (assuming fractional shares are possible).

4. ***What is the value of the straight bond component? What coupon rate should Manaavi propose in order for the convert to sell at exactly $1,000 per bond? What discount rate did you use to value the straight bond component? Conceptually, what should happen to the coupon rate if Manaavi were to propose a 15% conversion premium? A 40% conversion premium?***

In this case, **the value of a straight bond component is $861.14**. MoGen's "standard" bond offering of 5.75% on a 5-yr $1000 bond carries a market value of $1,052 since the rate offered is a premium to the prevailing risk-free rate of 4.56%. After subtracting the value of the conversion option ($191.28) from the $1052 market value of a straight bond, the resulting convertible bond component value is $861.14. From there, we can calculate what convertible bond coupon rate

would provide a bond market value of $861.14 with prevailing risk-free rate of 4.56% and a face value of $1000. What we found was that **a coupon rate of 1.39%** achieves that bond value discount. The value of the bond is so much lower since the “straight” bond value *without* a convertible component provides investors with a 5.75% yield, so the 1.39% yield necessitates that the bond component as a standalone entity sells as a significant discount on the open market. For the sake of comparison, the 5.75% rate was used as the discount rate for both the straight bond and convertible bond calculations.

If a 15% conversion premium were offered - that is, investors could convert their bond principle into *more* shares than currently offered - the coupon rate would decline even further. The value of the option component of the convertible bond offering would increase, and to balance that out, the straight bond component would decrease. The face value of the bond is still $1000, so the yield would have to further decrease in this case.

If the conversion premium were increased to 40%, the opposite would happen - the value of the option component would decrease, the value of the straight bond component would increase, and the yield on the bond would be higher than the 25% conversion rate case.

In each case, the coupon rate should reflect the value of the straight bond component relative to the conversion option component, and together, the sum of their values *should* equal the market value of an equivalent straight bond funding (otherwise, the market is inefficient).

5. ***As MoGen’s CEO, what do you like and dislike about the proposal from Merrill Lynch? Do you like the 25% conversion premium? The coupon rate?***

As Mogen’s CEO, the advantage of the convertible offering is that it shifts some risk onto the capital providers while capping Mogen’s upside in the case of value creation. This offering ultimately has a lower cost and would allow us to cover the required capital needed, in addition to allowing MoGen to just retire the debt in the instance where we fall short in the stock price appreciation. Conversely, the drawback of this type of financing is that even if we create substantial value for our current shareholders, a significant portion of it above the conversion price would be captured by the convertible debtholders.

MoGen shareholders should like this tradeoff at the 25% conversion rate and the 1.39% coupon rate, because the prevailing risk free rate alone is almost 4.5% risky bonds would be even higher. In this way, MoGen is able to finance this strategy much more cheaply, in the short term, than would be otherwise possible. What we should dislike about the Merrill Lynch offer is that in the case of significant value creation over the life of the convertible bond, existing shareholders would still be diluted with approximately 30 million additional shares created net of the share repurchase program than this is financing. MoGen in this case may consider a special dividend in lieu of a repurchase program so that existing shareholders may choose to increase their ownership via a DRIP or cash return to invest as they see fit.

APPENDIX:

Exhibit 1: Black-Sholes Option Pricing (Q3)

Black Scholes Option prices for European Calls and Puts on Non-dividend paying stock			
Current price	S	$77.98	<- current stock price
Exercise price	K	$97.48	<- 25% conversion premium
Standard deviation (annual)	σ	0.27	<- annual volatility provided from Exhibit 4
Risk-free rate	r	4.56%	<- Average of 5 and 20 yr T-bills
Time to expiration (years)	T	5	<- Case given, we can assume investors wait til maturity to convert
	PV(K)	$77.62	calc
	d_1	0.31	calc
	d_2	-0.29	calc
European Call price	C	$18.64	calc
European Put price	P	$18.28	calc
Put-call parity check for put	$18.28	calc	
Convertible Bond Face Value			
$1,000			
# of Shares per Bond			
10.25904078			
Value of Options Component			
$191.21			

Exhibit 2: Convertible Bond Yield Calculations and Pricing (Q4)

	Yield	Price	Risk-Free Rate
MoGen's 5-yr Straight Bond	5.75%	$1,000	4.56%

	Given in case	Given in case			
Straight Bond Case					
Time Period	**1**	**2**	**3**	**4**	**5**
Yield	$57.50	$57.50	$57.50	$57.50	$57.50
Face Value PMT	$0.00	$0.00	$0.00	$0.00	$1,000.00
PV of Bond Cashflows	$252.04				
PV of Bond Face Value	$800.34				
Market Value of Straight Bond	**$1,052.38**				

# of Shares per $1000 Conversion	10.26	<-- 25% premium stock price ($97.48) divided into $1000
Value of Call Option Component	$191.21	<--- Calc : # of convertible shares * value of option per share

Yield of Convertible Bond	**1.39%**	***<-- Yield to maintain $1000 face value on a 25% conversion premium***
Price	$1,000	<-- Given in the case
RFR	4.56%	<-- This is the 'guaranteed' return from the bond when not converted

Convertible Bond Case					
Time Period	**1**	**2**	**3**	**4**	**5**
Par Value	$13.87	$13.87	$13.87	$13.87	$13.87
Face Value PMT	$0.00	$0.00	$0.00	$0.00	$1,000.00
PV of Bond Cashflows	$60.80				
PV of Bond Face Value	$800.34				
PV of Convertible Bond	**$861.14**				
Value of Call Option Component	$191.21				
MV of Convertible Bond Pkg	**$1,052.34**	<--- Convertible Bond Pkg (Bond component + Option Component) must be equal to the equivalent straight bond component			