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A. ARTICLES /CASES

1.CAN FINANCIAL ENGINEERING CURE CANCER?*

Dr. Prasanna Chandra

Remarkable scientific breakthroughs in recent years have deepened our understanding of the molecular biology of disease, but biopharma returns have been meager and investors are withdrawing from this sector. For example, in 2010 the outlays on translational research were barely $ 6 to $ 7 billion, while the outlays on basic research and clinical developments were $ 48 billion and $ 125 billion respectively. This is because translational research (concerned with drug developments) which lies between basic research human clinical trials is becoming more expensive, time consuming complex, and risky.

The increasing complexity and risk of drug development means that private and public equity, the traditional financing vehicles for biopharama, are becoming less effective. The needs and expectations of limited partners and shareholders are not congruent with the realities of biomedical innovation. Likewise, the quarterly earnings cycle, continuous pricing, and diffused ownership of public equities entail constant scrutiny of corporate performance, all dissuading management away from speculative but potentially transformative research.

Is there a way out? According to David E. Fagnan et. al. financing biomedical innovation calls for a new approach that uses portfolio theory and securitization to diminish the risk of translational medicine. Essentially their proposal calls for setting up a "mega fund" that combines a large number of drug development projects within a single portfolio. Doing so reduces investment risk to such an extent that it becomes feasible to issue bonds backed by such a highly diversified portfolio of projects. As David A. Fagnan et. al put it, "If these bonds are structured to have different priorities, the most senior class or 'tranche' may be rated by credit rating agencies, opening up a much larger pool of institutional investors who can purchase such instruments, e.g., pension funds, sovereign wealth funds, endowments, and foundations."

A Stylized Example They present a stylized example in support of their argument. Consider a hypothetical drug development program that has the following characteristics:

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* Adapted from David E. Fagnan, Jose Maria Fernandez, Andrew W. Lo, and Roger M.Stein, "Can Financial Engineering Cure Cancer," *American Economic Review: Papers and Proceedings* 2013, 103(3): 406-411

- It requires $ 200 million (in present value) in out- of- pocket development costs, over a ten- year development period, during which it generates no revenues.
- There is a 5 percent chance that it will be successful, resulting in an approved drug at the end of ten years.
- If successful, the drug will produce $ 2 billion in net cash flows over the following ten- year period (years 11 to 20), the typical length of patent protection remaining at the time of approval. The value of these cash flows, evaluated as at the end of year 10, using a discount rate of 10 percent works out to $12.3 billion.

If a cost of capital of 10 percent is applied to these cash flows, the expected compound annual rate of return for this project works out to 11.9 percent, but the standard deviation of return is very high, 423 percent, thanks to the extremely skewed distribution of success and failure.

What happens if a portfolio of 150 such projects is created? Assuming that these projects are independently and identically distributed (IID), the expected return of the portfolio remains 11.9 percent, but the standard deviation falls substantially to 423/ √150=35 percent, making the investment much more attractive.

Of course, this risk reduction requires $ 30 billion of capital. However, such risk reduction allows a significant portion of this capital to be raised by way of debt. In particular, since the probability of at least two successes in 150 IID trials is 99.6 percent, this mega fund can issue up to $ 24.6 (2 x $ 12.3) billion of ten- year zero coupon bonds which have a default probability of just 0.4 percent (100-99.6). As of February 2012, the average yield of Aaa corporate bonds with an approximate maturity of 30 years was 3.85 percent. Using this as a proxy for the yield of a ten- year bond of high credit quality, zero- coupon bond, promising to pay $ 24.6 billion in year 10 would fetch $ 16.8 billion when issued un year 0. If the balance $13.2 billion were to be financed by equity, the expected rate of return would be 17.8 percent with a standard deviation of 78.9 percent. If must be emphasized that these values critically depend on the assumption that the 150 projects are independent. If they are positively correlated, risk reduction will be lower, if they are negatively correlated, risk reduction will be higher.

This example highlights the possibility of dramatically increasing the potential funding for the mega fund by issuing debt. It is possible to further widen the investor base, As David E. Fagman et. al. put it, “Using securitization techniques, credit derivatives, and third party guarantees can further increase the mega fund’s investor

base. Guarantees are especially effective, not only on their impact on credit rating, but also because of their efficient use of capital."

2. VALUATION OF eBAY

Dr. Prasanna Chandra

In the spring of 2003, eBay was followed by more than twenty analysts, the most well known of them being Mary Meeker of Morgan Stanley. Mary Meeker used a series of techniques for valuing eBay. Her April 2003 report offers good insights into how analysts apply various valuation techniques.

When Mary Meeker released her April 2003 report, eBay was quoting at $89.22 per share. Her task was to develop a price target for the subsequent 12 months. For doing this, she used the discounted cash flow (DCF) computation and three valuation heuristics (P/E, PEG, and Price- to –sales).

Exhibit 1 displays the DCF valuation table drawn from her April 2003 report (written along with Brian Pitz). The heart of her DCF analysis consists of the forecast for revenues (not shown) and EBITDA (earnings before interest, taxes, depreciation and amortization).

Exhibit 1 Free Cash Flow Computation Mary Meeker's Target Price Analysis of eBay

Note: Values given are in $ thousands.

Source : Mary Meeker and Brian Pitz, "CQI

	2000	2001	2002	2003E	2004E	2005E	2006E	2007E	2008E	2009E	2010E	2011Eon
EBITDA	84,072	229,438	444,614	723,735	1,005,276	1,401,682	1,853,230	2,426,297	3,110,990	3,985,085	4,982,032	
Taxes	—	—	—	—	—	140,168	370,646	849,204	1,088,846	1,394,780	1,743,711	
Change in working capital	(47,582)	(41,091)	39,232	(26,792)	6,849	(58,695)	9,709	(52,096)	7,375	(53,278)	4,105	
Capital expenditures	49,753	57,420	138,670	188,908	190,000	190,000	190,000	190,000	190,000	190,000	190,000	
Free cash flow	(13,263)	130,927	345,176	508,035	822,125	1,012,819	1,302,292	1,334,997	1,839,519	2,347,027	3,052,426	65,321,907

Target Price – Dec 31, 2003

Present value eBay free cash flows	$36,478,759
Less debt	$79,592
Plus cash	$2, 280, 857
eBay's full value	$ 38,680,023

Share outstanding ('000)	330,259
Discount rate	12%
Future growth rate	7%
DCF per share value	$117

In Exhibit 1, the terminal value figure of $65.3 billion was calculated by assuming that free cash flows would grow at the rate of 7 percent from 2011 and the discount rate would be 12 percent. More specifically, the free cash flow forecast for 2011 would is: $3,266,096 = 1.07 x $3,052, 426. Applying the constant- growth – rate perpetuity formula, the terminal value was estimate as follows:

$$\text{Terminal value} = \frac{\$3{,}266{,}096}{0.12 - 0.07} = \$65{,}321{,}907$$

Exhibit 2 describes the assumptions and computations supporting Mary Meerker's heuristic- based target prices.

Exhibit 2Valuation Methodologies in Mary Meeker's Target Price Analysis of eBay

Source: Mary Meeker and Brian Pitz. "CQI results: Tales of a Growth Machine," Morgan stanley Analyst Report on eBay, April 23, 2003.

	Year			
	2002	**2003E**	**2004E**	**2005E**
EPS at 32% growth	**$0.86**	**$1.14**	**$1.50**	**$1.98**
EPS at 38% growth	**$0.86**	**$1.19**	**$1.64**	**$2.26**
GMS/share at 38% growth	**$39.53**	**$54.55**	**$75.27**	**$103.88**
P/E	**103**	**63**	**47**	**33**

Method	**P/E Ratio**	**PEG Ratio**	**Price-to-Sales Ratio**	**EPS**	**Growth**	**GMS Sales per Share**	**Target Price Dec 2004**	**Target Price (Discounted)**
P/E	**40**			**$2.26**			**$90**	**$84**
PEG		**1.5**		**1.50**	**32**		**72**	**68**

Price – to - sales	**1.5**	**2.26**	**$103.88**	**156**	**147**

Exhibit 3 presents the summary of Mary Meeker's target price analysis of eBay.

Exhibit 3 Summary Components in Mary Meeker's Target Price Analysis of eBay

Source: Mary Meeker and Brian Pitz, "CQI Results: Tales of a Growth Machine," Morgan Stanley Analyst Report on eBay. April 23,2003.

Technique	**Downside**	**Upside**	**Base**
P/E	$74	$111	$84
PEG	45	91	68
Price-to-sales	97	210	147
Discounted cash flow			117
Average			$104
Upside adjusted average			$106

B.SNIPPETS

1. **Occupy Wall Street**

Capitalism or market- oriented economic system presupposes fair and perfect competition. In practice, it often degenerates into crony capitalism, an alleged capitalism in which success in business hinges on close relationships between business people and government officials. In its worst form, crony capitalism consists of collusion among market players. While market players may compete lightly against each other, they will present a unified front to the government.

'Occupy Wall Street' is a call to reform capitalism, the dominant mode of market economy, as it is currently practiced. In their book, *Saving Capitalism from the Capitalism* Raghuram Rajan and Luigi Zingales made a powerful case against regulatory capture by capitalists. In his book, *The Price of Civilization,* Jeffry Sachs has critiqued the current state of capitalism. Joseph Stiglitz's influential essay, "Of the 1%, by the 1%, for the 1%," inspired many protesters to participate in the 'Occupy Wall Street' movement. Stiglitz argued that the socialization of losses and privatization of gains is a clear distortion of capitalism or market economy that needs to be corrected.

2. The Myth of Global Risk Reduction

Of the many fairy tales told over the last few years, one of the most seductive–and thus dangerous–was the one about global risk reduction. It went this way:

- The risk of economic cycles has been eased by adroit central bank management.
- Because of globalization, risk has been spread worldwide rather than concentrated geographically.
- Securitization and syndication have distributed risk to many market participants rather than leaving it concentrated with just a few.
- Risk has been "trenched out" to the investors best able to bear it.
- Leverage has become less risky because interest rates and debt terms are so much more borrower-friendly.

- Leveraged buyouts are safer because the companies being bought are fundamentally stronger.
- Risk can be hedged through long/short and absolute return investing or the use of derivatives designed for that purpose.
- Improvements in computers, mathematics, and modeling have made the markets better understood and thus less risky.

3. The Emerging Equity Gap

In the coming decade, the financial assets of investors in emerging markets will rise to nearly 36 percent of the global total, from the current level of 21 percent. But, as compared to developed countries, the financial assets of private investors in emerging markets are concentrated in bank deposits, fixed income instruments, and gold with meager exposure to publicly listed equities. Even in developed countries, investor appetite for equities will diminish on account of aging populations, growth of alternative investments such as private equity, shifts to defined-contribution plans, and changes in regulation applicable to financial institutions.

These trends will shift the balance between debt and equity. This would have several implications :(i) equity will become more costly and less available,(ii)investors with lower allocations to equities in their portfolio will have greater difficulty in achieving their financial goals, and (iii) greater leverage in the economy will cause more financial distress and bankruptcy.

Given the potential "equity gap" it behooves on governments and policy makers to promote greater equity culture because well-functioning public equity markets provide significant benefits across an economy. As the Mckinsey Global Institute report on "The Emerging Equity Gap: Growth and Stability in the New Investor Landscape," put it: "They are an important source of long-term financing for high-growth companies, they allocate capital efficiently, and they disperse risk and reduce vulnerability to bankruptcy. These advantages outweigh shortcomings, we believe, and make public equity ownership an important element of a balanced global financial system."

Based on Mckinsey Global Institute, "The Emerging Equity Gap: Growth and Stability in the New Investor Landscape," December 2011.

PART C: WIT AND WIDSOM

1.HUMOUR

- An African chieftain went to London. When a reporter asked a question, he replied, "Honk, dink, screech, whistle, z-z-z and then added in perfect English." Baffled, the reporter asked, "Sir, where did you learn to speak such flawless English." He promptly said, "Short Wave Radio."
- Root of all evil: Money
  If a man runs after money, he is money mad; if he keeps it, he's a capitalist; if he spends it, he is a playboy; if he doesn't get it, he is a never do- well; if he doesn't try to get it, he lacks ambition; if he gets it without working for it, he is a parasite; and if he accumulates it after a lifetime of hard work, people call him a fool who never got anything out of life. Yic Oliver

2. Wise Saws

- Don't let what you cannot do interfere with what you can do. John Wooden.
- Great minds discuss ideas; average minds discuss events; small minds discuss people.