

## CHRIS LEE'S INVESTMENT PLAN

*Lana Rao wrote this case under the supervision of Professor Hubert Pun solely to provide material for class discussion. The authors do not intend to illustrate either effective or ineffective handling of a managerial situation. The authors may have disguised certain names and other identifying information to protect confidentiality.*

*This publication may not be transmitted, photocopied, digitized or otherwise reproduced in any form or by any means without the permission of the copyright holder. Reproduction of this material is not covered under authorization by any reproduction rights organization. To order copies or request permission to reproduce materials, contact Ivey Publishing, Ivey Business School, Western University, London, Ontario, Canada, N6G 0N1; (t) 519.661.3208; (e) cases@ivey.ca; www.iveycases.com.*

Copyright © 2015, Richard Ivey School of Business Foundation

Version: 2015-04-10

This is a Monday in mid-November; Chris Lee had just finished work in downtown Toronto and was looking at his cash balance, trying to select an investment portfolio that would give him the largest return and the lowest risk.

### PERSONAL SITUATION

Lee was a hardworking and thrifty person. After working for a few years, he had accumulated \$50,000 in his savings account. Currently, the annual interest rate for this savings account was hovering at 1 per cent. He did not expect to use this money in the foreseeable future and could afford some risk in his portfolio.

### THE MARKET

Lee knew that the U.S. equity market had rebounded from the collapse in 2008, and several of his friends were making great returns. He wanted to invest his money in the fast-growing equity market to enjoy some of these returns himself. He believed that a selection of some Fortune 500 stocks could help him achieve this goal.

Lee narrowed down the list of candidate stocks to a short list of U.S.-based multinational companies he believed had a good record and good future potential.

1. Wal-Mart was a retail company that operated a chain of discount department stores and warehouse stores globally; it was the world's largest company by revenue.<sup>1</sup>
2. International Business Machines (IBM) provided information technology products and services worldwide. IBM enjoyed wide economic moats and ranked as the fourth largest firm in terms of market capitalization.<sup>2</sup>

<sup>1</sup> "Walmart Corporate: Our Business," Walmart, <http://corporate.walmart.com/our-story/our-business/>, accessed February 27, 2015.

<sup>2</sup> "Fortune 500 2012," *Fortune*, May 9, 2014, <http://fortune.com/fortune500/2012/>, accessed February 27, 2015.

3. Apple designed and sold consumer electronics, personal computers and online services. Apple topped the list of the world's most powerful brands.<sup>3</sup>
4. Chevron was the second largest energy company in the United States and one of the six major oil companies in the world, operating in 180 countries.<sup>4</sup>
5. Amazon was an e-commerce company that sold a wide range of products, services and digital content through its various owned and affiliated websites. Amazon was the largest Internet-based retailer in the United States, with 65 million customers per month, and had a growing presence internationally.<sup>5</sup>

There were competitive and cooperative relationships between these large firms. Not surprisingly, their stock prices were highly correlated. For example, Walmart and Amazon were competitors; therefore, if one's stock rose, the other's stock might fall. IBM and Intel were partners, so their stocks were likely to move in the same direction. To further understand these relationships, it would be helpful for Lee to estimate the risk of a portfolio's historical returns to represent a future year and then, based on these 12 months of returns, to identify as many as possible one-year returns. Finally, Lee remembered learning about efficient frontiers (see Exhibit 1). He definitely wanted to invest in a portfolio that maximized his return for the level of risk he was assuming.

## FINDING THE PORTFOLIO

Lee collected the monthly stock price for these companies from May 2007 to December 2012 from Yahoo Finance (see Exhibit 2).

With ideas racing through his mind and a coffee in hand, he began a long night of challenging but enjoyable analysis.

---

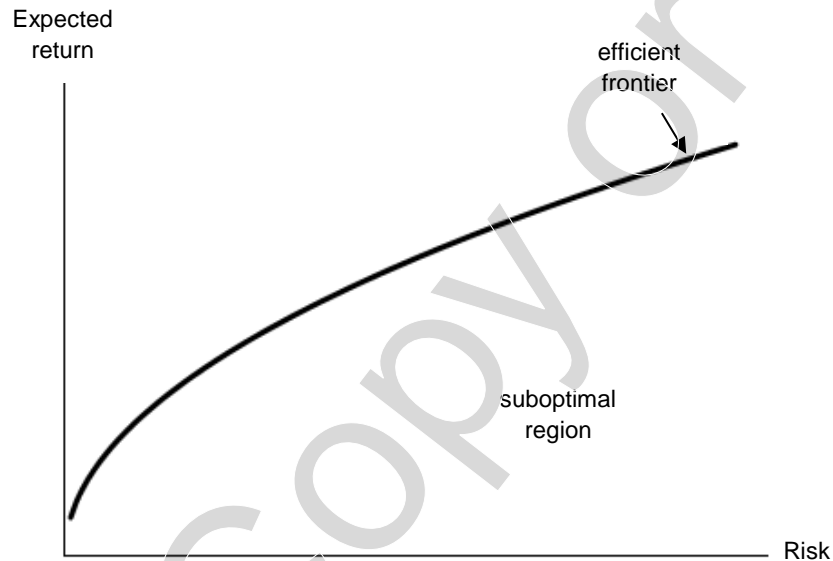
<sup>3</sup> Kurt Badenhausen, "Apple Tops List of the World's Most Powerful Brands," *Forbes*, October 22, 2012, [www.forbes.com/sites/kurtbadenhausen/2012/10/02/apple-tops-list-of-the-worlds-most-powerful-brands/](http://www.forbes.com/sites/kurtbadenhausen/2012/10/02/apple-tops-list-of-the-worlds-most-powerful-brands/), accessed February 27, 2015.

<sup>4</sup> "The Power of Human Energy," Chevron Corporation, [www.chevron.com/](http://www.chevron.com/), accessed February 27, 2015.

<sup>5</sup> "World's Largest Bookseller Opens on the Web," [www.urlwire.com/news/100495.html](http://www.urlwire.com/news/100495.html), accessed February 27, 2015.

**EXHIBIT 1: EFFICIENT FRONTIER**

An efficient frontier is comprised of a set of optimal portfolios that offer the minimum level of risk for a given expected return or the maximum level of expected return for a given level of risk. Portfolios that lie below the efficient frontier are dominated by those on the frontier, because for the same level of risk a portfolio on the frontier would provide a greater expected return, or for the same level of expected return a portfolio on the frontier would require the investor to take on less risk. There are many different measurements of risk an investor might consider, such as portfolio variance, standard deviation, the probability of losing money or the portfolio's semi-absolute deviation.<sup>6</sup>



<sup>6</sup> William Sharpe, "Portfolio Choice," Stanford.edu. [http://web.stanford.edu/~wsharp/mia/rr/mia\\_rr2.htm](http://web.stanford.edu/~wsharp/mia/rr/mia_rr2.htm), accessed February 27, 2015.

**EXHIBIT-2: MONTHLY STOCK PRICES**

Date	Wal-Mart (WMT)	IBM (IBM)	Apple (AAPL)	Chevron (CVX)	Amazon (AMZN)
1-Jun-07	\$48.11	\$105.25	\$122.04	\$84.24	\$68.41
2-Jul-07	\$45.95	\$110.65	\$131.76	\$85.26	\$78.54
1-Aug-07	\$43.63	\$116.69	\$138.48	\$87.76	\$79.91
.	.	.	.	.	.
.	.	.	.	.	.
.	.	.	.	.	.
4-Sep-12	\$73.80	\$207.45	\$667.10	\$116.56	\$254.32
1-Oct-12	\$75.02	\$194.53	\$595.32	\$110.24	\$232.89
1-Nov-12	\$72.02	\$190.07	\$585.28	\$105.69	\$252.05

Source: "Yahoo Finance - Business Finance, Stock Market, Quotes, News," Yahoo Finance, <http://finance.yahoo.com/>, accessed February 27, 2015.