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# Academy of Economics and Finance

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# *Bloomberg Exercises for Derivative Classes*

***R. Stafford Johnson, Xavier University***

## Abstract

For professors whose students have accessed to Bloomberg terminals, one way to include Bloomberg as part of the pedagogy is with exercises related to the subject matter. This paper shares a sample of equity and fixed-income portfolio hedging and market-timing exercises using Bloomberg.

JEL Codes: A20, C88
Keywords: Derivatives, Portfolios, Bloomberg, Pedagogy

## Introduction

Today, Bloomberg terminals are becoming more common in universities where they are used by students and faculty for research, teaching, and managing student investment funds. Given the breadth and depth of information and analytics provided by Bloomberg, finance professors face the challenge of how best to incorporate Bloomberg into their classes. For professors whose students have accessed to Bloomberg terminals, one way to include Bloomberg as part of the pedagogy is with exercises related to the subject matter. The Bloomberg system, in turn, includes an extensive data base on derivatives with analytical functions that can be applied to hedging portfolios, changing the market exposure of bond and equity positions, and pricing derivatives. Many of these applications can be found in Johnson's Derivatives Markets and Analysis (2017). This text provides a comprehensive guide to derivative securities and markets with hundreds of exercises using the Bloomberg terminal. The purpose of this paper is to share a sample of equity and fixed-income portfolio hedging and portfolio enhancing exercises using Bloomberg that have used by the author in his derivative class.

## Changing the Exposure of Equity Portfolio Positions with Derivatives

One of the major uses of stock index derivatives is hedging stock portfolio positions. Several different types of models can be applied to hedging portfolio positions. Depending on the underlying asset to be hedged, the most popular model is the Price Sensitivity Model. This model determines the number of stock index futures contracts that minimizes the variability of the profits from a hedged portfolio consisting of the stock portfolio and stock index futures contracts. In this model, the number of futures contracts or hedge ratio ($n_f$) minimizing the variability is:

$$n_f = \beta \frac{V_0}{f_0}$$

where: $V_0$ = current value of the stock portfolio.
$f_0$ = price on the futures contract.
ß = beta of stock portfolio.

For example, if a June S&P 500 futures contract is available at 2,000, a portfolio manager wanting to hedge a $50 million portfolio with a beta of 1.5 would need 150 short contracts:

$$n_f = \beta \frac{V_0}{f_0} = 1.50 \frac{\$50,000,000}{(2,000)(\$250)} = 150 \text{ contracts}$$

## *Bloomberg Case: Portfolio Hedging*

As a Bloomberg exercise, students in my derivative class were asked to construct an equity portfolios and then form a short hedge with equity index futures using the price sensitivity model.

***Bloomberg Exercise***

Construct your own equity portfolio and then analyze it using Bloomberg's PORT screen and as an index created from in Bloomberg's CIXB screen.

Guidelines:

- In constructing your portfolio make the number of shares for the stocks in your portfolio large enough so that your portfolio's market value is at least $10 million.
- Create historical data for your portfolio.
- Import your portfolio in CIXB and create historical data.
  Examine an ex-post short hedging position for the portfolio you created.

a. Select one futures contract on the S&P 500 (SPA) to hedge your portfolio. Use the expiration date on the futures contract as the date of your hedge value.
b. Use the "Chart" screen (Chart <Enter>) to create multigraphs for the prices on the futures and the portfolio (.Ticker of Portfolio you created in CIXB). On the Chart Menu Screen, select the Standard G chart; once you have loaded your securities, go to "Edit" to put your graphs in separate panels.
c. Select a beginning date that you would have implemented your hedge and a closing date near the futures expiration as the date for closing your hedge. Use the price-sensitivity model to determine the number of futures contracts needed to hedge the portfolio.
d. Calculate the profit or loss on the futures position from opening and closing at the futures prices at the beginning and ending dates, the value of your portfolio on the closing date, and the hedged value (portfolio value plus futures profit). Compare your hedged value to the unhedged value. In retrospect, was the hedge a good strategy?

Exhibit 1 shows the values of one student's portfolio, named the Martin Fund, and the S&P 500 from 5/28/2019 to 5/28/2020. The portfolio was generated using Bloomberg's PRTU screen. The Martin fund holdings consisted of large cap stocks and a beta of 0.94. The student constructed graphs using Bloomberg's CIXB platform that loads portfolios in a basket so that its values and returns can be treated like an index. Bloomberg's Chart Screen was then used to create multigraphs of the portfolio futures, with the data then imported to Excel. On 2/18/2020, just before the market crash, the fund had a market value of $12.124 million. For his ex-post hedging analysis, the student simulated an ex-post hedge by going short in the June S&P 500 futures and then closed the position at a market low on 3/23/20202. Specifically, with a beta of 0.94 and $250 multiplier, the student hedged the portfolio on 3/23/20202 with a short position in 14 June contracts trading on that date at 3,368.80:

$$n_f = \beta \frac{V_0}{f_0} = 0.940 \frac{\$12.124\,\text{million}}{(\$250)(3{,}369.80)} = 14.39 \text{ contracts}$$

Exhibit 1 shows the values of the Martin Fund and the prices of the June contract. From 2/18/2020 to 3/23/2020, the Martin fund decreased 27.36% from $12.124 million to $8.807 million, and the June futures contract decreased 34.11% from 3,369.80 to 2,220.40. As shown in Exhibit 1, the short futures hedged portfolio value was $12.8299 million on 3/23/20/20 instead of $8.807 million—this analysis, of course, was ex post.

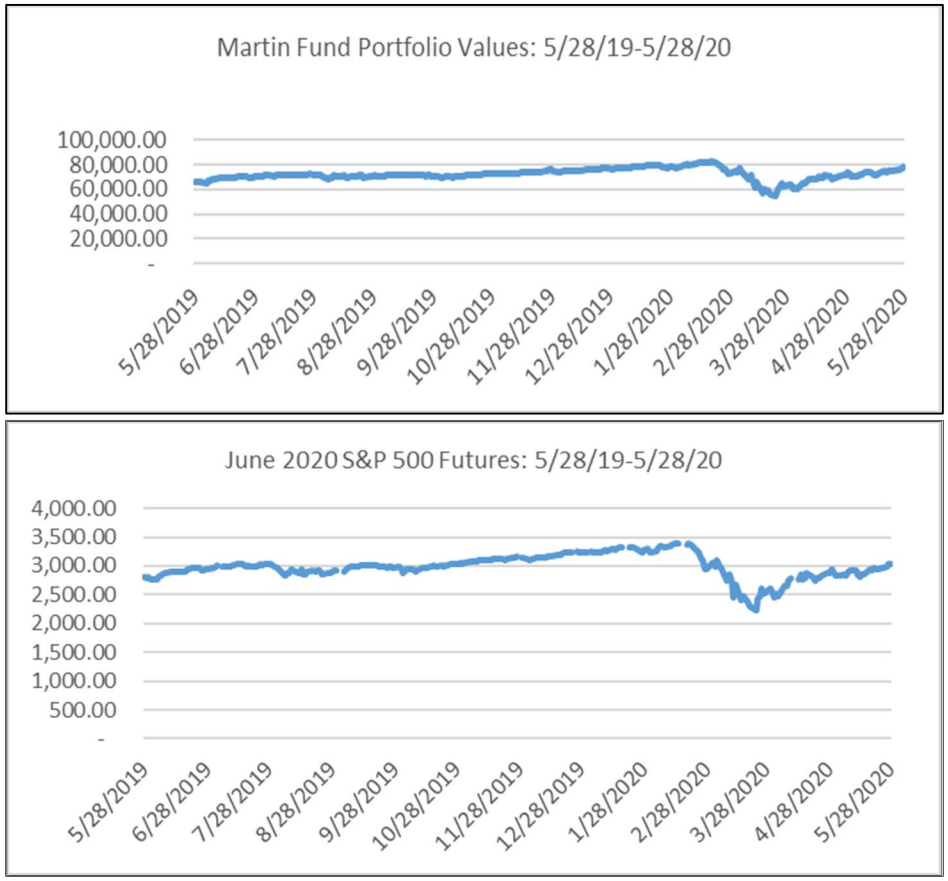
## *Portfolio Exposure—Market Timing*

Instead of hedging a portfolio's value against market or systematic risk, portfolio managers can also change their portfolio's exposure to the market. For example, a stock portfolio manager who is very confident of a bull market may want to give her portfolio more exposure to the market by increasing the portfolio's beta. Changing a portfolio's beta to profit from an expected change in the market is referred to as market timing. Without index futures and derivatives, the beta of a portfolio can be changed only by altering the portfolio's allocation of securities. With index futures, though, a manager can change the portfolio beta, $ß_0$, to a new one, referred to as a target beta, $ß_{TR}$, simply by going long or short in equity index futures contracts. The number of futures contracts needed to move the portfolio beta from $ß_0$ to $ß_{TR}$ can be determined using the price sensitivity model in which:

$$n_f = \frac{V_0}{f_0} (\beta_{TR} - \beta_0)$$

where: if $ß_{TR} > ß_0$, long in futures
if $ß_{TR} < ß_0$, short in futures

**Exhibit 1:** Martin's Fund Values and June S&P 500 Futures Prices from 5/28/2019 to 4/24/2020




## Martin Fund Hedged with June S&P 500 Futures Contracts

| | Fund Values and Opening and Closing Clearinghouse Records for June S&P 500 Futures Contract |
|---|---|
| 2/18/2020 | Martin Fund Value = $12.124 million<br>Futures Opening Position:<br>Martin Fund agrees to sell 14 June S&P 500 Futures Contracts on 2/18/2020 3,369.80 ($250 multiplier) |
| 3/23/2020 | Martin Fund Value = $8.807 million<br>Futures Closing Position:<br>Martin Fund agrees to buy 14 June S&P 500 Futures Contracts on 3/23/2020 for 2,220.40 ($250 multiplier) |
| Settlement | Martin Fund receives $970,500 from clearinghouse<br>$(n_f)$(Multiplier) $(f_0 - f_t)$ = (14)($250)(3,369.80 – 2,220.40 ) = $4,022,900<br>Martin Fund Value on 3/23/2020: $8.807 million<br>Hedged Portfolio Value: $8.807million + 4.0229 million = $12.8299 million<br>Unhedged Portfolio Value: $8.807 million |

## *Bloomberg Case: Market-Timing*

As a Bloomberg exercise, students in my derivative class were asked to take the portfolios they hedged during a market decline and enhance the hedge-value of their portfolios when the market hits its trough by going long in futures.

***Bloomberg Exercise***

Examine an ex-post portfolio beta enhancement or reduction (market-timing) strategy for portfolio you created in Bloomberg.

a. Select one futures contract on the S&P 500 (SPA) to go long or short. Use the expiration date on the futures contract as the date for closing the strategy.
b. Use the "Chart" screen (Chart <Enter>) to create multigraphs for the prices on the futures and the portfolio (.Ticker of portfolio you created in CIXB)
c. Select a beginning date that you would have implemented your futures adjusted portfolio and a closing date near the futures expiration as the date for closing your hedge. Use the price-sensitivity model to determine the number of long or short futures contracts needed to move to your target beta.
d. Calculate the profit or loss on the futures position from opening and closing at the futures prices at the beginning and ending dates, e value of your portfolio on the closing date, and future-adjusted value (portfolio value plus futures profit).
e. Compare your futures-adjusted portfolio value to the unadjusted portfolio value.

Exhibit 2 summarizes the beta-enhanced portfolio of the student who formed the Martin Fund. The student forming the Fund observed a hedge portfolio value of $12.8299 million on 3/23/2020 and a price on the S&P June futures of 2,220.40. The student simulated the impact of increasing the funds beta from 0.94 to 1.15 by going long in five June contracts:

$$n_f = \frac{V_{3/23/20}}{f_{3/23/20}} (\beta_{TR} - \beta_0) = \frac{\$12.8299\,\text{million}}{(2,220.40)(\$250)} (1.15 - 0.94) = 4.85 \text{ Contracts}$$

**Exhibit 2:** Enhance Portfolio Value

| | Fund Values and Opening and Closing Clearinghouse Records for June Mini-RIY Index |
|---|---|
| 3/23/2020 | Martin Fund Value = $8.807 million<br>Profit from Closing Short Futures = $4.0299 million<br>Futures Opening Position:<br>Martin Fund agrees to buy 5 June S&P 500 futures at 2,220.40 |
| 4/4/2020 | Martin Fund Value = $11.048 million<br>Futures Closing Position:<br>Martin Fund agrees to sell 5 June S&P 500 Futures Contracts on 4/4/20 for 2,829.50 ($250 multiplier) |
| Settlement | Martin Fund receives $765,375 from clearinghouse<br>$(N_f)$(Multiplier) $(f_t - f_0)$ = (5)($250)(2,829.50 – 2,220.40) = $761,375<br><br>Enhance Portfolio Value:$11.048 million + 0.761375 million = $11.809375 million<br>Portfolio Value without futures: $11.048 million |
| 4/4/20 | Enhance Portfolio Value plus profit on 3/23/20 from Closing Short Futures = $4.0299 million<br>$11.048 million + 0.761375 million + $4.0299 = $15.839275 million |

As shown in Exhibit 2, the futures-enhanced portfolio value would have been worth $11.809375 million on 4/4/20 instead of $11.048 million. This represents a 34% increase compared to 25% without the futures. In addition, the Martin Fund with it portfolio value of $11.048, long futures profit of $0.761 million, and earlier short futures profit of $4.0299 realized on 3/23/20 would have been worth $15.84 million on 4/4/20.

## *Portfolio Insurance and Range-Forward Contracts—Bloomberg's OSA Screen*

An equity portfolio insurance strategy is a hedging position in which an equity portfolio manager protects the future value of her fund by buying spot or futures index put options. The index put options, in turn, provide downside protection against a

stock market decline, while allowing the fund to grow if the market increases. Using the price-sensitivity model, the number of put options needed to hedge is: $n_p = \beta(V_0/X)$.

Using put options to provide a floor entails a cost of buying the underlying options. By limiting some of the upside potential for floors, the cost of buying the options can be defrayed by selling options with a different exercise price. The premium on the short position, in turn, defrays part of the cost of the long position. Sometimes options to sell can be selected such that there is little cost, or even a profit. This position is sometimes referred to as a range forward contract or zero-cost collar. A short-range forward contract consists of a long position in a put with a low exercise price and a short position in a call with a higher exercise price.

## *Bloomberg Case*

On Bloomberg's OSA screen, one can import a portfolio and then add option positions to evaluate a portfolio insurance position for a portfolio created in Bloomberg. As a Bloomberg exercise, students in my derivative class were asked to load their portfolios into Bloomberg's OSA screen and then import S&P 500 spot or futures options to analyze scenarios for the values of the portfolio, a put-insured portfolio, and a range forward position.

***Bloomberg Exercise***

Using the Bloomberg OSA screen, evaluate an insurance and short range forward position applied to a portfolio you constructed in Bloomberg. Use S&P 500 spot or futures options and use the price-sensitivity model to determine the number of options.

The student who created the portfolio named the Martin Fund loaded the portfolio in OSA and then imported a June S&P 500 spot put option with an exercise price of 3,030 and premium of 65.15 and a June S&P 500 spot call option with an exercise price of 3,200 and premium of 8.30. As of 5/28/2020, the Martin Fund had a value of $11.714 million. For the put-insured portfolio, the student added 39 S&P 500 puts with an exercise price of 3030 to the portfolio, and for the range forward position, he combined the 39 long puts contracts with 39 short call contracts with a strike of 3,200. The student analyzed the portfolios at the options' June 19, 2020 expiration date with scenarios in which the portfolio values ranged from -30% to 30% of its $11.714 million value. Exhibit 3 shows the different simulation values of the unhedged portfolio, put-insured portfolio, and range-forward position.

**Exhibit 3:** Bloomberg OSA Scenario for Martin Fund

| Percent Change | Unhedged Portfolio Value | Put-Insured Portfolio Value | Range-Forward Portfolio Value |
|---|---|---|---|
| -30% | 8,199,832 | 11,745,669 | 11,745,669 |
| -24% | 8,902,674 | 11,739,554 | 11,739,554 |
| -18% | 9,605,517 | 11,733,440 | 11,733,440 |
| -12% | 10,308,360 | 11,727,326 | 11,727,326 |
| -6% | 11,011,202 | 11,721,212 | 11,721,212 |
| 0 | 11,714,045 | 11,715,098 | 11,715,098 |
| 6% | 12,416,888 | 12,416,888 | 12,371,984 |
| 12% | 13,119,730 | 13,119,730 | 12,365,870 |
| 18% | 13,822,573 | 13,822,573 | 12,359,756 |
| 24% | 14,525,416 | 14,525,416 | 12,353,642 |
| 30% | 15,228,258 | 15,228,258 | 12,347,527 |

Put: X = 3030, Price = 65.15, T = 6/19/20, Np = 39, total Cost of puts = 39(100)65.15 = $255,085
Call: X = 3200, Price = 8.30, T = 6/19/20, Nc = 39, Revenue from call sale = (39)(100)8.30) = $32,370

## Changing the Exposure of Fixed-Income Portfolio Positions with Derivatives—Bloomberg's MARS Screen

A commonly used models for cross hedging fixed-income positions is the price sensitivity model developed by Kolb and Chiang (1981). This model has been shown to be relatively effective in reducing the variability of debt positions. The model determines the number of futures contracts that will make the value of a portfolio consisting of a fixed income security and an interest rate futures contract invariant to small changes in interest rates. The optimum number of futures contracts that achieves this objective is:

$$n_f = \frac{Dur_S}{Dur_f}\frac{V_0}{f_0}\frac{(1+YTM_f)^T}{(1+YTM_S)^T}$$

where:

- $Dur_S$ = duration of the Bond or Bond Portfolio
- $Dur_f$ = duration of the Bond on the underlying contract (the cheapest-to-deliver bond)
- $V_0$ = value of bond or the bond portfolio
- $f_0$ = futures price
- T = time to expiration on the futures as proportion of year
- $YTM_S$ = yield to maturity on the Bond Fund
- $YTM_f$ = yield to maturity implied on the futures contract

In general, interest rate derivatives are used by financial and non-financial corporations to alter the exposure of their balance sheets to interest rate changes. The change can be done for speculative purposes (increasing the firm's exposure to interest rate changes) or for hedging purposes (reducing exposure). For example, a bond fund expecting interest rates to decrease in the coming year across all maturities could lengthen the duration of its bond fund by swapping some of its shorter-term Treasuries in its portfolio for longer-term one. However, instead of increasing the duration of its bond portfolio by changing the fund's allocation from long-term to short-term Treasuries, the fund alternatively could take a long position in T-bond or T-note futures contracts. If rates, in turn, were to decrease across all maturities as expected, then the fund would realize not only an increase in the value of its bond portfolio, but also a profit from its long futures position; on the other hand, if rates were to increase, then the fund would see not only a decrease in the value of its bond portfolio but also losses on it futures position. Thus, by adding futures to its fund, the fund would be changing its bond portfolio's exposure to interest rates by effectively increasing its duration.

Instead of using futures to change the portfolio's exposure to interest rate, a bond fund can alternatively use futures options. A bond portfolio manager who is very confident of an interest rate decrease (increase) could increase (decrease) her bond portfolio's exposure by increasing (decreasing) the portfolio's duration to a new target duration by going long (short) in a bond futures contracts. The manager also could increase (decrease) her portfolio's exposure by buying futures calls (puts). Changing interest rate exposure with options instead of futures provides an asymmetrical gain and loss exposure—a convex duration. For example, when calls (puts) are purchased to increase (decrease) the target duration, the option-adjusted portfolio has the target beta for interest rate decreases (decreases) and portfolio's duration for interest rate increases (decreases). The cost of obtaining this asymmetrical relation is the cost of the options.

## *Bloomberg Case*

Using Bloomberg MARS screen, one can import a fixed-income portfolios created in Bloomberg and then add options and futures positions to evaluate and simulate the performance of a portfolio insurance or duration-enhanced portfolio position.

***Bloomberg Exercise***

Using the Bloomberg MARS screen, load a bond futures contract and a bond portfolio you have constructed in Bloomberg. Use the price sensitivity model to determine the number of futures contracts you would need to hedge or enhance the value of the portfolio. Using MARS, evaluate and compare the following positions on the futures expiration date for interest rate shifts ranging between –15 bps and +15bps:

a. Unhedged bond portfolio position
b. Bond portfolio position hedged with short futures contract
c. Bond portfolio position enhanced with long futures put contract

Exhibit 4 summarizes the portfolio features and MARS simulation conducted by a student in my derivative class. The student created a bond portfolio in Bloomberg, named the Jorge Fund. On 5/29/2020, the market value of the Fund was $1,249,367 and it had a duration of 6.70. The bond portfolio was then imported into MARS along with a September 5-year T-Note futures. On 5/29/2020, the futures contract was priced at 125-17, and the cheapest-to-deliver T-Note on the future was a Treasury with 1.5% coupon, maturity of 11/30/2024, and duration of 4.364 (information from Bloomberg's DLV screen). Using the price-sensitivity model, the student hedged the portfolio by inputting into MARS a short position of 18 September 5-year T-note futures, and then enhanced the portfolio by inputting a long position of 18 September 5-year T-note futures. The student then ran MARS simulations to calculate the values of the unhedged portfolio, hedged-portfolio, and enhanced portfolio for interest rate shifts ranging between plus and minus 15 basis points.

**Exhibit 4:** Bloomberg MARS Simulation

| Interest Rates Shifts (Basis Points) | Unhedged Portfolio Value | | Portfolio Hedged with Short Position in 18 Futures | | Futures Enhanced Portfolio Value with 18 Long Futures | |
|---|---|---|---|---|---|---|
| | 5/29/2020 | 7/20/2020 | 5/29/2020 | 7/20/2020 | 5/29/2020 | 7/20/2020 |
| -15 | $1,262,215 | $1,132,298 | $1,247,599 | $1,116,668 | $1,276,830 | $1,147,928 |
| -10 | $1,257,893 | $1,128,168 | $1,248,161 | $1,117,425 | $1,267,625 | $1,138,912 |
| -5 | $1,253,617 | $1,124,069 | $1,248,756 | $1,118,200 | $1,258,477 | $1,129,938 |
| 0 | $1,249,367 | $1,119,999 | $1,249,367 | $1,118,993 | $1,249,367 | $1,121,005 |
| 5 | $1,245,142 | $1,115,957 | $1,249,991 | $1,119,802 | $1,240,293 | $1,112,111 |
| 10 | $1,240,942 | $1,111,939 | $1,250,628 | $1,120,626 | $1,231,256 | $1,103,253 |
| 15 | $1,236,777 | $1,107,953 | $1,251,290 | $1,121,468 | $1,222,265 | $1,094,438 |

Jorge Bond Fund on 5/29/2020: V = $1,249,367, Duration = 6.70
September 5-Year T-Note Futures on 5/29/2020: f = 125-17, Expiration = 7/20/2020

## Conclusion

Finance and economics professors frequently require that students explain a theory, strategy, or idea mathematically, graphically, and intuitively. By so doing, students' depth of understanding, as well as retention, of the theory and idea is often enhanced. It has been my experience in using Bloomberg in my derivative classes that it too enhances a student's depth and knowledge of derivatives. Students working the Bloomberg derivative portfolio exercises presented here did come away with a better grasp of how the major models are used today at state-of-the-art trading desks.

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# *Analysis of Financial Fraud Among Hospitals in the United States*

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***Zhenyu Lai, Wuhan Institute of Technology***

## Abstract

This study examines 69 financial fraud cases announced on the U.S. Department of Justice website between 2013 and 2019. Findings are as follows. First, medical professionals are more likely to victimize the public, while administrators are more likely to steal from the organization. Second, the magnitude of loss is larger for cases involving the hospital victimizing the public than those where an insider steals from the hospital itself. Third, the sentence duration is proportional to the amount of loss. Fourth, hospitals are much less likely to survive after the fraud if the fraud involves the hospital victimizing the public.

JEL Codes: I11, I18
Keywords: Fraud, hospital

## Introduction

Financial frauds can negatively affect business organizations (Morris, Egginton, and Fuller, 2019), and it is important to note that these frauds can occur both among for-profit companies and among non-profit organizations (Archambeault, 2015). Better understanding of financial frauds could help inform policies to prevent and reduce frauds.

This paper focuses specifically on financial frauds involving hospitals. Hospitals are not publicly traded companies; therefore, hospitals generally are not the subjects of investigations by the Securities and Exchange Commission. However, hospitals are investigated by other agencies, such as the Department of Justice (DOJ) and the Department of Health and Human Services. The Health Care Fraud and Abuse Control Program acts through the Inspector General for the purpose of identifying and prosecuting health care fraud. In 2007, the Medicare Fraud Strike Force was launched to combat frauds specifically related to Medicare, which is a health insurance coverage for the elderly and the disabled.

However, despite the efforts of these various agencies, healthcare related financial fraud and abuse continue to be a major problem. Health care related financial fraud accounts for an estimated $58 to $84 billion dollars per year in the United States (Shrank, Rogstad, and Parekh, 2019).

In addition to the amount of money involved in these frauds, hospital-related frauds are noteworthy because of the important role that hospitals play in the overall economy. In the United States, healthcare spending is more than 17.8% of gross domestic product (Papanicolas, Woskie, and Jha, 2018). Further, hospitals represent an interesting dataset for studying frauds. The classical fraud triangle theory states that frauds come from pressure, opportunity, and rationalization. In a hospital, physicians and administrators are well compensated and are expected to place patients' welfare first. If the high levels of compensation create at least some lessening of the "pressure" component, and if the stated expectation of placing patients' welfare first acts to lessen to some "rationalization" component, then the "opportunity" factor might take on an outsize role as a driver of hospital-related frauds.

But specifically, what kinds of opportunities do hospitals have for fraud? This paper examines reports, issued by the DOJ, that describe hospital related financial frauds to understand the natures and outcomes of those frauds.

The study compares two types of frauds: internal and external fraud. An internal fraud refers to a fraud where an insider, such as a financial or accounting administrator, steals money from the hospital. For example, an administrator can create fictitious checks to pay for personal purchases. Such internal frauds result in financial loss of the hospital and decreased bottom line. External frauds, on the other hand, refer to a fraud where an employee obtains unlawful payments from external sources. For example, a physician files fraudulent insurance claims to the Medicare. Such external frauds may not result in the direct financial loss of the hospital but result in financial loss of the taxpayers.

The next section of this paper provides a literature review. This is followed by a section in which hypotheses are listed and explained. Afterwards, a detailed explanation of sample selection is provided. Next, the results of hypothesis testing are described. A final section concludes the paper.

## Literature Review

Financial fraud has been an area of much interest in organizations. A classical explanation for fraud was the fraud triangle (Cressey, 1953), which states that three components lead to a financial fraud: financial need, opportunity, and rationalization.

Fraud has continued to be a topic of much interest over the years. High-profile corporate scandals such as Enron led to the Sarbanes-Oxley Act in 2002 (https://pcaobus.org/About/History/Documents/PDFs/Sarbanes_Oxley_Act_of_2002.pdf). Sarbanes-Oxley Act led to the creation of the Public Company Accounting Oversight Board (PCAOB), which was charged with evaluating the quality of the audits conducted by registered firms, and thus increasing the publics' confidence in the audit.

The punishment for white-collar crime increased after the White-Collar Crime Penalty Enhancement Act of 2002 (https://www.congress.gov/bill/107th-congress/senate-bill/2717), which came, along with Sarbanes-Oxley Act, as responses to financial scandals.

Fraud not only occurs in for-profit companies, but also among non-profit organizations (Archambeault, Webber, and Greenlee, 2015). In the Association of Certified Fraud Examiners (ACFE)'s latest report, which contained 2,690 cases of occupational fraud investigated in 2016 and 2017, and 149 cases were health care related. (https://www.acfe.com/resource-library.aspx). Among health care related frauds, the most common scheme was corruption, and the second most common scheme was billing (ACFE, 2018)

The methodology of studying organization fraud by news reports was previously established by Dyck, Morse, and Zingales (2010), who studied the news reports of 216 fraud cases to identify the whistle-blowers. The methodology of studying wrongdoing of non-profit organizations by news reports was established by Fremont-Smith and Kosaras (2003) that studied wrongdoing cases of 152 nonprofit organizations between 1995 and 2002; Fremont-Smith (2004) that studied wrongdoing cases of 32 nonprofit organizations in 2003; and then by Archambeault, Webber, and Greenlee (2015) that examined financial fraud in 115 cases in news reports.

Petrovits, Shakespeare, and Shih (2011) studied the causes and consequences of internal control problems among nonprofit organizations. Krishnan, Yetman, and Yetman (2006) studied expense misreporting in nonprofits. Harris, Tate, and Zimmerman (2019) studied the hiring of auditors by nonprofit organizations.

Morris, Egginton, and Fuller (2019) studied the return and liquidity of public companies following SEC investigation of fraud and showed that frauds can negatively affect a company's stock.

## Hypotheses

### *Perpetrator's Role and Nature of Fraud*

The fraud triangle states that frauds arise from pressure, rationalization, and opportunity. With regard to types of fraud committed, opportunity is likely a main differentiating factor between an administrator and a medical professional. An administrator has access to the hospital's financial assets and accounting records. Thus, for crimes such as the creation of fraudulent checks, an administrator would likely have greater opportunity than would a medical professional. On the other hand, a medical professional has greater access to medical billing. Given the medical professional's job involves entering the medical procedures done into the system, a medical professional could file fraudulent charges to the insurance payer. Therefore, it seems plausible that a medical professional is more likely to victimize the public ("external fraud"), and an administrator is more likely to steal from the hospital ("internal fraud").

### *Nature of Fraud and Magnitude of Fraud*

It seems plausible that the amount of loss can be greater for "external" fraud (in which a hospital or hospital employee steals from the public) than from "internal" fraud (in which the hospital is the victim of fraud committed by an employee). when a hospital steals from the public. The reason is the potential for external frauds to involve repeated frauds spread out across a wide population – for instance, charging Medicare and/or other insurers for procedures that were never performed.

### *Magnitude of Fraud and Sentence Duration*

As prison sentences are intended to provide both punishment and deterrence, it would seem appropriate for sentence duration to be proportional to the amount of fraud. That is, a fraud that involves more financial loss should result in a longer sentence in prison. Thus, we expect to find a statistically significant, positive relationship between the length of the prison sentence imposed and the dollar amount of the fraud.

### *Nature of Fraud and Outcome*

One concern after an instance of fraud is organizational survival (Archambeault and Webber, 2018). "External" frauds, in which the organization and/or its employees defraud the public, are likely to undermine public trust and damage the reputation

of the organization. "Internal" frauds, in which the organization is the victim, can cause financial damage to the organization, but seem less likely to diminish the organization's reputational capital. Thus, it is hypothesized that the organization is less likely to survive an "external" fraud than an "internal" fraud.

## Sample Selection

The DOJ website is searched for all news announcements concerning financial fraud related to hospitals during the period between July 2012 and October 2019. A search is conducted for the keyword "fraud" along with keyword "hospital." The following are then removed: instances that were not financial frauds involving hospitals, instances that were duplicates of the same event, and instances in which a hospital was victimized by an outsider not part of the hospital. The final sample consists of 69 prosecutions for financial fraud.

The news announcements provide the inception dates of the 69 fraud cases. Table 1 lists the year of inception and the number of fraud cases beginning in that year. The earliest year of inception for the frauds in the data set was 2000 and the most recent start year was 2017. The year with the highest number of cases starting was 2009 with 12 cases.

**Table 1:** Year incident began

| Year | Number of Cases | Year | Number of Cases |
|---|---|---|---|
| 2000 | 3 | 2009 | 11 |
| 2001 | 3 | 2010 | 7 |
| 2002 | 1 | 2011 | 8 |
| 2003 | 4 | 2012 | 3 |
| 2005 | 5 | 2013 | 2 |
| 2006 | 6 | 2015 | 1 |
| 2007 | 6 | 2017 | 1 |
| 2008 | 8 | | |
| Total Cases (all years) | 69 | | |

Hospital ownership type was determined by the Hospital Cost Report Public File data from the Centers for Medicare and Medicaid Services: https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Medicare-Provider-Cost-Report/HospitalCostPUF.html

For the outcome analysis, public hospitals (e.g., government-run hospitals) and hospitals affiliated with larger entities (e.g., universities or churches) are excluded, because those hospitals are likely to survive in any event, and therefore might skew the results regarding the relative likelihoods that different types of fraud will damage the hospital to the point that it would not survive.

## Results

### *Descriptive Statistics*

Table 2 lists the nature of the fraud in the sample. There are two categories of fraud: an insider steals from the hospital, e.g., an administrator creates fraudulent checks, and the hospital steals from the public, e.g., the hospital falsely bills an insurance payer.

**Table 2:** Nature of Wrongdoing as Described in News Announcements

| Fraud Category | Number of incidents | Percentage of sample |
|---|---|---|
| Category 1: Insider steals from the hospital | 21 | 30.4% |
| Category 2 Hospital victimizes the public | 48 | 69.6% |
| Total | 69 | 100.0% |

Table 3 shows the perpetrator's role in the sample. There are two categories of perpetrator roles: administrative staff (e.g., CEO, CFO, accountant, administrator) and medical professionals (e.g., physicians, nurses, pharmacists, therapists).

**Table 3:** Perpetrator's Role as Described in News Announcements

| Perpetrator's Role | Number of incidents | Percentage of sample |
|---|---|---|
| Administrative | 39 | 56.5% |
| Medical Professional | 30 | 43.5% |
| Total | 69 | 100.0% |

Table 4 shows the summary statistics of the fraud durations.

**Table 4:** Fraud Duration Summary Statistics

| Statistic | Years |
|---|---|
| Mean | 5.10 |
| Median | 5.00 |
| Maximum | 15.00 |
| Minimum | 1.00 |
| Standard Deviation | 3.12 |

Table 5 shows the summary statistics of the fraud magnitude of loss, i.e., amounts, in U.S. Dollars. The mean is $21.26 million, the median is $1.46 million, the maximum is $400 million, the minimum is $20,500, and the standard deviation is $57.42 million.

**Table 5:** Fraud Magnitude Summary Statistics

| Statistic | U.S. Dollars |
|---|---|
| Mean | $21.26 million |
| Median | $1.46 million |
| Maximum | $400 million |
| Minimum | $20,500 |
| Standard Deviation | $57.42 million |

## *Hypothesis Testing*

Hypothesis 1 predicts that in comparison to frauds committed by administrators, frauds committed by medical professionals are relatively more likely to be external frauds (i.e., frauds against outside parties), and relatively less likely to be internal frauds (i.e., frauds against the hospital). Table 6 confirms the hypothesized relationship between the perpetrator's role and the nature of the fraud, with a p-value of less than 0.01. Thus, the findings support Hypothesis 1.

**Table 6:** Relationship between perpetrator's role and nature of fraud

| Perpetrator's Role | Hospital victimizes public | Insider victimizes hospital | Total |
|---|---|---|---|
| Administrative (n = 39) | 53.8% | 46.2% | 100% |
| Medical (n = 30) | 90.0% | 10.0% | 100% |

Fisher's exact test p-value < 0.01

Hypothesis 2 predicts that on average, external frauds will involve greater dollar amounts than will internal frauds. As shown in Table 7, the findings confirm this prediction, with a two-sample t-test p-value of less than 0.01. Indeed, the mean dollar amount of external frauds is over 6 times as great as the mean dollar amount of internal frauds, a discrepancy that is not only statistically significant, but economically significant as well.

**Table 7:** Relationship between nature of fraud and magnitude of loss

| | Insider steals from hospital | Hospital victimizes public |
|---|---|---|
| Mean | $1.06 million | $30.1 million |
| Median | $391,600 | $4.7 million |

Two sample t-test p-value < 0.01

Hypothesis 3 predicts that there should be a significantly positive relationship between the dollar size of a fraud and the length of the prison sentence imposed. Table 8 shows the results of a regression of length of sentence (in years) on the amount

of the fraud (in millions of dollars). The sample has 42 cases where both the amount and sentence information were available. Results show that at the margin, an additional $1 million in the size of the theft is associated with a sentence that is longer by 0.158 years (i.e., slightly under two months). This result is statistically significant at the 1% level, although the size of the relationship (i.e., the increment in sentence per million-dollar increment in the size of the fraud) was somewhat less than we might have expected.

**Table 8:** Regression of years in sentence on fraud size in millions

| | |
|---|---|
| Intercept | 4.456 * |
| Regression coefficient | 0.158 * |
| $R^2$ | 0.345 |

* indicates p-value < 0.01

Hypothesis 4 predicts that due to loss of reputational capital, hospitals involved in external fraud are less likely to survive than are hospitals that are victims of internal fraud. After excluding the hospitals that are public or are affiliated with larger entities, the sample has 18 cases that have survival information. 5 of these 18 cases involve internal fraud, and the remaining 13 cases involve external fraud. Among those cases involving an insider stealing from the hospital, 80% of the hospitals survived after the fraud. However, in those cases involving external fraud, only 7.7% of the hospitals survived under their previous ownership. 30.8% of the hospitals had a change of ownership after fraud, and 61.5% of the hospitals did not survive. This difference in survival rates was sufficiently large that, despite the small sample size, the Fisher's exact test p-value was less than 0.01. Thus – although again with the caveat that the sample size is quite small – the results support the hypothesis cases involving external fraud are associated with a lower survival rate than are cases involving internal fraud.

**Table 9:** Relationship between nature of fraud and hospital survival after fraud

| | **Insider steals from hospital** | **Hospital victimizes public** |
|---|---|---|
| Changed ownership after fraud | 0.0% | 30.8% |
| Did not survive after fraud | 20.0% | 61.5% |
| Survived after fraud | 80.0% | 7.7% |

Fisher's exact test p-value < 0.01

## Conclusions

One limitation of the data is that DOJ news announcements rarely identified the whistle-blower (Dyck, Morse, and Zingales, 2010) or how the fraud was uncovered. It would be interesting to know who discovered the frauds and how the frauds were discovered.

Another limitation of relying on DOJ news announcements is that the data sample size may therefore be relatively small. It would be interesting to study cases outside of the DOJ website.

Yet another limitation was that this study was limited to the United States. It would be interesting to study if churches around the world have similar patterns of frauds.

Despite the relatively small sample size, statistically significant results were found. Hypotheses 1, 2, 3, and 4 are supported. First, medical professionals are more likely to victimize the public, while administrators are more likely to steal from the organization. This likely has to do with the availability of opportunities. Next, the magnitude of loss was larger for cases involving the hospital victimizing the public than those where an insider steals from the public. Then, the sentence duration is proportional to the amount of loss. Last, but not least, hospitals are much less likely to survive after the fraud if the fraud involves the hospital victimizing the public.

Altogether, the results would suggest that the punishment to perpetrator is adequate, and yet hospitals need to minimize opportunities where the hospital employees can victimize the public. This not only helps the public but also the hospital itself. The results suggest a need for fraud control against victimizing insurance providers and external agencies. In other words, in addition to internal controls that prevent an employee from stealing the asset of the organization, there should be measures to prevent an employee from stealing from outside organizations, e.g., Medicare or other insurance providers. Schemes against outside insurance companies can have an even more significant impact on the mission and survival of the hospital than misappropriation of internal assets.

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# *Affordit Raises Capital: Private Placement Memorandum or Venture Capital*

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## Abstract

Affordit, a fintech startup, required a private equity investment to accelerate their growth. Affordit shopped around several venture capital firms who provided the terms for their investments. The founder was concerned with the terms offered and decided to raise capital through a private placement memorandum. Raising equity through a private placement required building a network of accredited investors aligned with founder's vision for growth. The case offers students an opportunity to value an early stage high growth fintech company and compare the terms of a private placement memorandum to a venture capital term sheet.

JEL Codes: G24, M13
Keywords: Private Placement Memorandum, Term Sheets, Valuation, Fintech

### Introduction

In late 2017, Kevin O'Brien and his wife were in the process of applying for their first mortgage loan through a credit union they banked with for many years. Unfortunately, the credit union denied them the loan. This was not due to their credit score, employment history, or income, but because they did not fit into the "standard" debt-to-income (DTI) ratio range that is generally required for financial institutions to sell the mortgage loan on the secondary derivative market after the applicant has closed on the loan. With no other justification, the credit union simply said, "Go pay something off on your credit report and come back when you have less debt." Kevin and his wife did not understand this explanation since each had a reasonable car payment, minimal credit card debt and student loan payments that were paid each month on time. Kevin wanted to understand how the entire loan process worked so he shadowed several underwriters and discovered a major gap in the lending process. Initial market research indicated that many mortgages and consumer loans were getting denied each year because the applicants did not fit into the standard DTI range. Kevin recognized the opportunity to create a fintech company that could help applicants get approved for loans and assist lenders in providing guidance for those who are denied. Kevin decided to leave his corporate job in global finance for one of the largest companies in the world and start a company called Affordit. Kevin invested his life savings to bootstrap the launch of the company in 2018. The growth of the company consumed Kevin's initial investment and he knew that he would need to raise equity capital to continue the growth of Affordit. Kevin had to make a choice between an investment from a venture capital firm or raising capital through a private placement memorandum.

Kevin O'Brien decided to self-fund the growth of Affordit for as long as he could. He invested his entire savings and 401(k), sacrificing his family's living accommodations to get through the first 18 months. Once his capital contributions were exhausted, he realized it was time to raise capital. Fundraising while running a high-growth company is one of the toughest endeavor entrepreneurs endure. Early-stage companies face significant execution risk as the founders focus on executing the plan for their new ventures. Fundraising often is difficult and time consuming for entrepreneurs who simultaneously operate their business. Discussions about fundraising with entrepreneurs focus on their success or failure in raising capital. Equally important are the terms of the investment and alignment of interests between the founder and investors. There have been countless situations witnessed that did not end well for the founder due to fundraising mistakes. Most entrepreneurs believe they must get capital from a Private Equity (PE) or a Venture Capital (VC) firm, who tend to dictate the terms of agreement and take a substantial portion of ownership. Kevin knew he did not want to give up a large share of equity in his startup right away. Kevin shopped the company around to a variety venture capital firms to gauge their interests on investing in Affordit. Several venture capital firms were interested and Kevin received a term sheet from one of the venture capital firms outlining the terms of the investment offer. Kevin evaluated the terms and discussed the offer with trusted advisors. If Kevin accepted the venture capitalist's terms he could quickly receive the equity investment needed and focus on executing on his vision for Affordit.

Another alternative was to raise the money through a private placement memorandum where Kevin could provide the terms to accredited investors. The process was much more time intensive as Kevin would have to identify accredited investors that believed in him and his vision of creating transparency and visibility into the loan process while improving the financial wellness of consumers. Kevin did not have access to a large number of accredited investors so he would have built out a network of potential investors and pitch his company to them to raise the needed capital. The private placement memorandum

would be much more time consuming and Kevin was not sure if he would be able to build the appropriate network of investors to raise the needed capital. Kevin would have to determine what legal documents are required to conduct the private placement and the appropriate terms to best align his interests with the investors' interests.

The case provides an opportunity to contrast raising private equity from a venture capital firm to raising private equity through a private placement memorandum and to value an early stage high growth fintech company. The terms offered by the venture capital firm are significantly different than the terms in the private placement memorandum. By comparing the terms and quantifying their impact on cash flows to the stakeholders in the firm students gain a deep understanding of private equity investments into high-growth high-tech companies.

## Valuation

Kevin he needed to determine the value of Affordit before he could determine best alternative for raising capital. Affordit had successfully executed a contract integrating its technology, Wallet Genie, into a Loan Origination Software (LOS) company product enabling Affordit to scale national wide and accelerate the rate of onboarding financial institutions. Kevin set out estimate the future cash flows for Affordit based on the number of financial institutions that Affordit had direct access to through the LOS Company. Affordit's product would be part of an integrated software system already at numerous financial institutions. Once a financial institution decided to use Affordit's service they could simply turn on the feature instead of having to integrate a new software into their existing software systems. This integration decreases the sales cycle since the institution does not have to replace any of their existing products or software. Kevin identified which institutions were likely to be early adopters of technology and ranked them in order of which were most likely to adopt the technology. This framework was used to build out the forecast of financial institutions adopting the software over the next five years starting in 2020. The financial institutions varied in size and loan activity. The initial research indicated that a lender would typically use Affordit's product 2.5 times per loan origination. Affordit developed a "performance-based" pricing model, meaning Affordit does not charge exorbitant monthly rates if the technology is not utilized. Affordit processes a Solution Based Outcome (SBO) report on customers for that financial institution in real-time that provides recommendations to increase the customer's financial health and opportunities for the financial institution to sell additional products. Affordit charges the institution a flat rate $4.50 per Solution Based Outcome report. The report increases the cross-sell opportunities for the institution and saves the customer money on monthly interest payments or decreases the duration of their existing loans on their credit report. Affordit's pricing model is truly a win-win-win scenario for everyone involved.

The rate of onboarding new financial institutions was estimated based on similar FinTech companies' growth using similar channel sale processes that Affordit had in place with the LOS. Affordit created a workflow process that allows the company's sales team to onboard three to five institutions per quarter for the first two years, then increase each quarter, up to approximately 15 institutions per quarter. Affordit recognized that a variety of factors affect the timing and the number of institutions that can be onboarded. Kevin contacted industry experts and trusted advisors as he continuously adjusted his projections to account for this uncertainty. Kevin ultimately came up with a forecast that incorporated all the research and insights from industry experts and trusted advisors. Affordit would not have any revenue in 2019 as they developed the software and integrated it into the LOS. Affordit would enroll 2 financial institutions per quarter in 2020, 3 financial institutions per quarter in 2021, 5 financial institutions per quarter in 2022, 10 financial institutions per quarter in 2023 and 15 financial institutions per quarter in 2024. Each of the institutions varied in size and quantity of loans processed each year. The projected cash flows are provided in the Table 1 below. Kevin believed the company would be an attractive target for acquisition by the end 2024.

**Table 1:** Financial Forecasts

| | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|---|---|---|---|---|---|---|
| Operating Income | $ (1,640,575) | $1,996,871 | $8,257,417 | $13,782,997 | $20,720,170 | $27,285,293 |
| Tax Expense | $ - | $133,102 | $3,509,402 | $5,857,774 | $8,806,072 | $11,596,250 |
| Net Income | $(1,640,575) | $1,863,769 | $4,748,015 | $7,925,223 | $11,914,098 | $15,689,044 |
| Depreciation | $47,950 | $78,375 | $89,650 | $103,175 | $113,000 | $123,600 |
| CAPEX | $13,500 | $16,500 | $16,500 | $27,000 | $4,500 | $19,500 |
| Change in NWC | $22,500 | $482,459 | $436,453 | $382,201 | $455,427 | $382,841 |
| Cash Flow | $ (1,628,625) | $1,443,185 | $4,384,712 | $7,619,197 | 11,567,270 | $15,410,303 |

Kevin needed to estimate what the firm would be worth if a liquidity event occurred at the end of 2024. Kevin believed using comparable companies who experienced liquidity events would be the best approach to determine the appropriate multiple to value Affordit. Kevin contacted an investment banker to identify comparable companies that had recently sold to determine the appropriate multiple to apply to trailing twelve-month earnings in determining the terminal value of Affordit. The investment banker identified seven recent transactions for similar companies in the banking sector. The companies and

their information are provided in Table 2. Based on the comparable deal information Kevin felt that a PE multiple of 14.5x was reasonable for Affordit at a liquidity event at the end of 2024.

**Table 2:** Bank Technology Company Trading Analysis

| Company Name | Equity Value (millions) | Enterprise Value (millions) | Enterprise Value/ Revenue | Enterprise Value/ EBITDA | Price Earnings | Revenue Growth | EBITDA Margin |
|---|---|---|---|---|---|---|---|
| Fiserv, Inc. | $57,398.3 | $78,702.3 | 4.9x | 12.7x | 24.5x | 5.5% | 38.7% |
| Fidelity National Information Services, Inc. | $35,603.6 | $45,090.6 | 5.2x | 13.0x | 14.5x | 3.8% | 39.9% |
| Temenos, AG | $10,413.8 | $10,852.6 | 9.9x | 25.5x | 42.1x | 11.0% | 38.8% |
| Jack Henry & Associates | $10,235.9 | $10,204.5 | 5.9x | 16.6x | 36.4x | 7.2% | 35.4% |
| Black Night, Inc. | $ 7,838.1 | $ 9,159.0 | 7.1x | 14.1x | 26.8x | 7.8% | 50.6% |
| ACI Worldwide, Inc. | $ 3,795.7 | $ 4,382.4 | 3.9x | 13.2x | 31.6x | 3.6% | 29.3% |
| Q2 Holdings, Inc. | $ 3,188.3 | $ 3,070.4 | 8.1x | NA | NA | 22.5% | 10.4% |
| Bank Technology Median | | | 5.9x | 13.6x | 29.2x | 7.2% | 38.7% |

Now that Kevin had estimated the cash flows and terminal value of Affordit he needed to determine the appropriate discount rate to compute the net present value of the company. The discount rate used is the rate investors require for investing in companies of similar risk. Kevin discussed the issue with his trusted advisors who provided a range of values between 25% and 30% as reasonable discount rates for an early stage high growth fintech company like Affordit. Kevin wanted to keep his valuation conservative in his discussions with investors so he decided to use 30% as the discount rate for his projected cash flows.

## Venture Capital Term Sheet

Kevin began reviewing the terms sheet offered by the venture capital firm and listed a variety issues to be discussed with his trusted advisors and counsel. The term sheet is provided in Appendix 1 for analysis. The venture capital firm wanted to invest $1,500,000 in Series A Convertible Preferred Stock (Series A) with a pre-money valuation of Affordit set at $3,000,000. This would result in the venture capital firm owning one-third of Affordit following the investment. Kevin would also create an employee stock ownership pool equaling ten percent of the fully diluted, post-closing capitalization that was vested 25% after one year, with the remaining vested quarterly over the next 36 months. The stock ownership pool and vesting are important in attracting key employees to Affordit. The Series A would accrue 8% annual dividends that would be paid upon a liquidity event. If the liquidity event occurred in five years, the Series A stockholders would receive the first $600,000 to cover the accrued dividends. The Series A also has a 2x liquidation preference meaning that Series A receives two times their initial investment or $3,000,000 prior to converting to common stock. Once converted the venture capital firm would then be entitled to one-third of the remaining proceeds from the liquidity event.

The term sheet allowed for redemption of Series A shares at the greater of the original issue price plus all accrued but unpaid dividends or the fair market value of the shares. Determining the fair market value of Affordit is complicated and could lead to complications if the redemption feature was exercised. The term sheet also requires representations, warranties and personal indemnification from the founders along with Affordit for certain key matters. This would put Kevin's personal wealth, homes and family assets at risk. Another term of interest to Kevin were the anti-dilution provision that would adjust the conversion price using a narrow-based weighted average price if shares in the future were sold for less than the original purchase per share paid by the venture capital firm. This provision would further dilute Kevin's ownership in the event of future down rounds of financing. Kevin felt that these terms made the founders hold a disproportionate amount of the risk relative to the Series A investors.

Several terms on control of the firm favored the Series A investors. The term sheet gave the Series A investors two seats on the Board of Directors and special veto rights on an extensive list of protective provisions. The Board would consist of two members elected by the founders, two members elected by the Series A investors and one member that was mutually agreed upon by the Series A investors and the founders. Essentially, the founder gives up control of the company from an operational perspective. This could allow the Series A investors to change the direction of the company or remove the founder from control. The terms call for the Series A Directors to comprise two of the three members of the Compensation Committee giving the Series A investors control over the compensation of Kevin and other key employees. Another concern in the term sheet was the Founders Restricted Stock Agreement which could force Kevin to forfeit all of his shares if he is terminated with "cause" or if he resigns without "good reason" with the buyback rights lapsing on 25% of his shares after 12 months and rest lapsing monthly in equal increments over the next 24 months. The term sheet also made Affordit responsible for up to $50,000 in legal

fees of the Series A investors at the time of closing. The final concern of Kevin was an 8 week no shop/confidentiality agreement that would not allow Kevin to look for any other investors while the Series A investors did their due diligence prior to closing. Kevin knew that the terms offered were subject to negotiation and he would seek advice from trusted advisors and counsel as to what terms he could expect following the negotiations.

## Private Placement

Another option was a private placement of equity which would give Kevin more favorable terms. Kevin sought legal counsel who specialized in security law to determine what documents would be required to raise a large amount of capital. His counsel informed Kevin that he would need to create a Private Placement Memorandum (PPM), Operating Agreement, and a Subscription Agreement. The costs associated with creating the documents would be $30,000 and would provide all the necessary documents to accredited investors analyzing the investment opportunity. O'Brien knew he needed the proper legal documentation to raise the necessary capital from accredited investors. Once the proper documentation was in place Mr. O'Brien would be able to begin the process of building a network of accredited investors interested in learning more about Affordit. Raising capital through a PPM would require Kevin to build out a network of accredited investors who shared his vision and wanted to invest in Affordit. Kevin realized that the amount of time it takes to raise capital with multiple accredited investors would be tedious and exhaustive.

The advantages of a PPM are more favorable terms of the deal and maintaining control over the firm. Kevin envisioned a straightforward common stock structure for the investors with no liquidation preferences or dividends which allowed all investors, including the founder, to get distributions pro rata on their ownership percentage. This provides everyone with equal incentive to maximize shareholder wealth and grow the company together. Kevin wanted to raise a smaller amount of capital than the VC firm wanted to invest. Kevin wanted to raise $500,000 in the initial round and raise an additional $1,000,000 later as Affordit valuation increased. This would enable Kevin to give up a smaller amount of equity in the offering. Kevin also envisioned separate classes of shares for investors, founders and advisors. Class A Shares would belong to the founder and have all voting rights. This way Kevin could maintain complete control of operations. Class B shares would belong to the investors and would have no voting rights over the company's financial and operating decisions. Class C shares are "profit interests" that would be assigned to certain members of the advisory board as compensation for their service to Affordit. A PPM gives control of the fund-raising process to the founder by enabling the founder to select which individuals they want to buy shares in their company.

Another major factor Kevin needed to consider is the amount of time fundraising takes. If Kevin takes the investment from the VC it is one transactional deal. Kevin would be able to focus on running his company and transaction would clear quickly. The drawback from the VC option is the amount of equity and control Kevin would yield to the VC investors. If O'Brien raises capital through the PPM he would need to arrange to meet with many qualified and pre-vetted investors which would take about three times longer taking money from a VC firm. The slow pace of raising capital would allow O'Brien to give less equity away and create an ecosystem that would provide Affordit critical support to continue its growth.

## Case Questions

1) Estimate the value of Affordit given the financial projections provided in Appendix 1 and comparable deals in Appendix 2.
2) Review the terms offered by the VC in Appendix 3 and identify any concerns for Kevin.
3) Provide a counter set of terms for the VC in rebuttal along with likely compromise positions on those key terms.
4) Should Affordit raise capital through the VC or PPM? Justify your answer.

## Appendix 1 – Term Sheet

This Term Sheet (Table A1) summarizes the principal terms of the Series A Preferred Stock Financing of Affordit, Inc., a Delaware corporation (the "Company"). In consideration of the time and expense devoted and to be devoted by the Investors with respect to this investment, the No Shop/Confidentiality provisions of this Term Sheet shall be binding obligations of the Company whether or not the financing is consummated. No other legally binding obligations will be created until definitive agreements are executed and delivered by all parties.

**Table A1**. Term Sheet

| | |
|---|---|
| Offering Terms | |
| Investors | Venture Capital Fund, L.P., as the lead investor (the "Lead Investor" and one or more "accredited investors' mutually acceptable to the Company and to the Lead Investor (collectively the "Investors"). |
| Security to be Purchased | Series A Convertible Preferred Stock (the "Series A Preferred"). Up to a total of $1,500,000 |
| Aggregate Amount of Financing | with approximately $1,000,000 to be invested by the Lead Investor. |
| Post-Money Valuation of company | $4,500,000 |
| Price Per Share: | $3.00 per share (based on the pre-money valuation set above and the capitalization of the Company contemplated below) (the "Original Issue Price"). |
| Capitalization; Option Pool: | The company's capital structure before and after the Closing is set forth at the end of the document. The employee option pool shall be established prior to the closing of the transactions contemplated hereby (the "Closing"), and shall represent 10% of the Company's fully diluted, post-Closing capitalization. All employee options shall vest no faster than: 25% after one year, with the remaining vesting quarterly over the next 36 months. |
| Terms of the Series A Preferred | |
| Dividends | The Series A Preferred will accrue dividends at the rate of 8% per annum, payable only, if and when declared by the Company's Board of Directors (the "Board") or upon a liquidation or redemption. These dividends shall accumulate and accrue regardless of whether declared by the Board, and shall be paid and in preference to any dividends on the Common Stock. For any other dividends or distributions, participation with Common Stock on an as-converted basis. Series A Preferred dividends to be paid in connection with a liquidation event and paid in-kind upon any optional or mandatory conversion. |
| Liquidation Preference | In the event of any liquidation, dissolution or winding up of the Company, the holders of Series A Preferred shall be entitled to receive, prior and in preference to the holders of Common Stock, an amount per share equal to 2x the Original Issue Price, plus accrued but unpaid dividends, on each share of the Series A Preferred (collectively, the "Liquidation Preference"). Any proceeds remaining after the payment of the Liquidation Preference shall be distributed to the holders of Series A Preferred and Common Stock on a pro rata, as-converted basis. A merger or consolidation (other than one in which stockholders of the Company own a majority by voting power of the outstanding shares of the surviving or acquiring corporation) and a sale, lease, transfer, exclusive license or other disposition of all or substantially all of the assets of the Company will be treated as a liquidation event (a "Deemed Liquidation Event"), thereby triggering payment of the Liquidation Preference described above. |
| Optional Redemption | The Company shall redeem all or any portion of the Series A Preferred at the option and upon the request of holders of at least 60% of the outstanding Series A Preferred, at any time on or after the 5$^{th}$ anniversary of the Closing. Such redemption shall be made solely from funds legally available for distribution at a price equal to the greater of (i) The Original Issue Price plus all accrued but unpaid dividends, and (ii) the fair market value thereof. Redemption shall occur in three equal annual installments. |
| Optional Conversion | The Series A Preferred may be converted into Common Stock at any time or from time to time, at the option of the holder. The number of shares of Common Stock into which Series A Preferred shall be determined by dividing the Original Issuance Price by the conversion price, as adjusted and then in effect. The initial conversion price shall be the Original Issue Price, reflecting a conversion ratio of 1:1. Such conversion price shall be subject to anti-dilution adjustments described below. |
| Mandatory Conversion | Each share of Series A Preferred will automatically be converted into Common Stock at the applicable conversion (i) in the event of a closing of a firmly underwritten initial public offering of the Company's Common Stock at a price to the public of 5x the Original Issue Price (subject to adjustments for stock dividends, splits, combinations and similar events) that is registered under the Securities Act of 1933 and results in net, cash proceeds to the Company of not less than $15,000,000 (a "QPO"), or (ii) upon written consent of the holders of 60% of the Series A Preferred. |

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| Anti-dilution Protection | In the event that the Company issues or is deemed to issue equity (other than Excluded Securities (as defined below)) at a purchase price less than the Original Issuance Price (or the then current conversion price), the conversion price of the Series A Preferred will be subject to full to narrow-based, weighted-average anti-dilution protection. For purposes of this Term Sheet, the phrase "Excluded Securities" shall mean (i) securities issuable upon conversion of any of the Series A Preferred, or as a dividend or distribution on the Series A Preferred; (ii) securities issued upon the conversion of any debenture, warrant, option, or other convertible security outstanding as of the Closing; (iii) Common Stock issuable upon a stock split, stock dividend, or any subdivision of shares of Common Stock; and (iv) shares reflected on Exhibit A hereto as being reserved or anticipated to be reserved for issuance under the stock employee stock option plans or programs. The conversion price shall also be subject to proportionate adjustments for stock splits, dividends, combinations and similar events. |
| Voting Rights | Each share of Series A Preferred shall vote together with the Common Stock on an as-converted basis as a single class, and not as a separate class, on all matters on which the Common Stock is entitled to vote; provided that the Series A Preferred shall vote as a separate class with respect to: (i) the election of two members of the Board (the "Series A Directors"), (ii) the protective provisions set forth below, and (iii) matters required by law. The Company's Certificate of Incorporation will provide that the number of authorized shares of Common Stock may be increased or decreased with the approval of a majority of the preferred stock and Common Stock, voting together as a single class, and without a separate class vote by the Common Stock, irrespective of the provisions of Section 242(b)(2) of the Delaware General Corporation Law. |
| Protective Provisions | In addition to any other vote or approval required under the Company's Charter or By-laws, the Company will not, without the written consent of the holders of at least 60% of the Company's Series A Preferred, either directly or indirectly by amendment, merger, consolidation, or otherwise: (i) liquidate, dissolve or wind-up the business and affairs of the Company, or effect any Deemed Liquidation Event or consent to any of the foregoing; (ii) amend, alter, or repeal any provision of the Certificate of Incorporation or Bylaws; (iii) create or authorize the creation of, or issue or obligate itself to issue shares of, any other security convertible into or exercisable for any equity security, having rights, preferences or privileges senior to or on parity with the Series A Preferred, or increase the authorized number of shares of Series A Preferred or any additional class or series stock; (iv) reclassify, alter or amend an existing security that is junior to or in parity with Series A Preferred, if such a reclassification, alteration or amendment would render such other security senior to or in parity with Series A Preferred; (v) purchase or redeem or pay any dividend on any capital stock prior to the Series A Preferred; (vi) create or authorize the creation of any debt; (vii) create or hold capital stock in any subsidiary that is not a wholly-owned subsidiary or dispose of any subsidiary stock or all or substantially all of any subsidiary assets; or (viii) increase or decrease the size of the Board. |
| Stock Purchase Agreement; Ancillary Agreements | |
| Stock Purchase Agreement | The purchase of Series A Preferred shall be made pursuant to a Stock Purchase Agreement, which shall provide for, among other things, the terms reflected hereby; customary representations and warranties of the Company (and related indemnification provisions); representations and warranties by the Company's founders regarding technology ownership, conflicting agreements, conflicts of interest, certain transactions, litigations and similar matters (and related indemnification provisions); investment representations of the Investors; customary affirmative and negative covenants; customary conditions to closing; and such other customary terms are mutually agreeable to the Company and the Investors. Conditions to closing shall include (i) the completion of the Investor's business and legal due diligence review to its satisfaction; (ii) the non-occurrence of any material adverse change in the business or prospects of the company; (iii) the obtaining requisite consents, approvals and waivers; (iv) compliance with all applicable federal and state laws; (v) completion of all appropriate state and local filings, including the filing of a Certificate of Designation to establish Series A Preferred; (iv) the election to the Board of Directors of the Company a Lead Investor and a designee of holders of a majority of the Series A Preferred held by other Investors; and (vii) a favorable opinion of counsel to the Company. Notwithstanding the foregoing, the Investors may in their discretion waive satisfaction of any one or more of the foregoing conditions. |

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| Ancillary Agreements | Ancillary agreements and documents Shall include a Registration Rights Agreement, a Stockholders' Agreement, a Voting Agreement, a Right of First Refusal and Co-Sale Agreement and a Certificate of Designation of Rights, Preference and Privileges of the Series A Preferred. |
| Additional Rights of Investors Under Ancillary Agreements | |
| Preemptive Rights | All Investors shall have a pro rata right, based on their percentage equity ownership in the Company (calculated assuming the conversion of all Series A Preferred to Common Stock), to participate in subsequent issuances of equity securities of the Company (excluding issuances of Excluded Securities). |
| Right of First Offer; Right of Co-Sale | The Company first and the Investors second will have a right of first refusal with respect to any shares of capital stock of the Company proposed to be sold by the founder and current and future employees or consultants holding greater than 1% of Company's Common Stock (assuming conversion of Series A Preferred Stock), with a right of oversubscription for Investors of shares unsubscribed by the other Investors. Before any such person may sell Common Stock, he will give the Investors an opportunity to participate in such sale on a basis proportionate to the amount of securities held by the seller and those held by the participating Investors. Transfers to spouses, lineal descendants or trusts therefor, or partners or affiliates, as applicable who or which agree to be bound by the same restrictions shall be exempt from these provisions. |
| Drag Along | Holders of Series A Preferred Stock, and the founders and all future holders of greater than 1% of Common Stock shall be required to enter into an agreement with the Investors that provides that such stockholders will vote their shares in favor of a Deemed Liquidation Event or transaction in which 50% or more of the voting power of the Company is transferred and which is approved by the Board of Directors and the holders of 60% of the outstanding shares of Series A Preferred Stock. |
| Board of Directors | At the initial Closing, the Board shall consist of five members consisting of two Series A Directors, two directors designated by the founders (one of whom shall be the person serving as the Company's Chief Executive Officer), and an independent Director (the "Independent Director") designated by mutual agreement of the founders and the Series A Directors. The Independent Director shall be a person who is not employed by the Company and is otherwise independent of the Investors and founders. |
| Matters Requiring Series A Director Approval | So long as the holders of Series A Preferred are entitled to elect at least one Series A Director, the Company will not, without Board approval, which approval must include the affirmative vote of both of the Series A Directors: (i) make any loan or advance to, or own any stock or other securities of, any subsidiary or other corporation, partnership, or other entity unless it is wholly owned by the Company; (ii) make any loan or advance to any person, including, any employee or director, except advances and similar expenditures in the ordinary course of business or under the terms of an employee stock or option plan approved by the Board; (iii) guarantee~~,~~ any indebtedness except for trade accounts of the Company or any subsidiary arising in the ordinary course of business; (iv) make any investment inconsistent with any investment policy approved by the Board; (v) incur any aggregate indebtedness in excess of $50,000 that is not already included in a Board-approved budget, other than trade credit incurred in the ordinary course of business; (vi) enter into or be a party to any transaction with any director, officer or employee of the Company or any "associate" (as defined in Rule 12b-2 promulgated under the Exchange Act) of any such person; (vii) hire, fire, or change the compensation of the executive officers, including approving any option grants; (viii) change the principal business of the Company, enter new lines of business, or exit the current line of business; (ix) sell, assign, license, pledge or encumber material technology or intellectual property, other than licenses granted in the ordinary course of business; or (x) enter into any corporate strategic relationship involving the payment contribution or assignment by the Company or to the Company of assets greater than $50,000.00. |
| Board Matters | The Board shall form an Audit Committee and Compensation Committee, each of which shall have a charter approved by at least one Series A Director. Both Series A Directors shall be entitled to be members of the Compensation Committee, which shall have no more than three members. At least one Series A Director shall have the right to be a member of the Audit Committee. The Board shall meet at least quarterly, unless otherwise agreed by a vote of the majority of directors. All non-employee directors shall be entitled to reimbursement of expenses incurred in attending meetings of the Board. |

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| Registration Rights | The investors shall be entitled to customary registration rights (including two demand rights (exercisable no earlier than the first to occur six months after the Company's initial public offering and five years after the closing), unlimited piggyback rights and unlimited Form S-3 registration rights (but no more than two of such Form S-3 registration rights shall be exercised in any 12 month period).The registration expenses (exclusive of stock transfer taxes, underwriting discounts and commissions) will be borne by the Company. The Company will also pay reasonable fees and expenses of one special counsel to represent all the participating Investors. |
| Information Rights | Each Investor will be granted access to Company facilities and personnel during normal business hours and with reasonable advance notification. The Company will deliver to each Investor (i) annual, quarterly, and monthly financial statements, and other information as determined by the Board; (ii) thirty days prior to the end of each fiscal year, a comprehensive operating budget forecasting the Company's revenues, expenses, and cash position on a month-to-month basis for the upcoming fiscal year; and (iii) promptly following the end of each quarter an up-to-date capitalization table. |
| Certain Additional Conditions to Closing; Related Matters | |
| Founders' Stock | The Company and the founders shall have entered into Founder Restricted Stock Agreements pursuant to which all Common Stock owned by the founders will be subject to a Company right to buy such shares back cost upon termination of such founder's employment by the Company for "cause" or the founder without "good reason" (each such term to be defined in the Founder Restricted Stock Agreement). The buyback right shall lapse with respect to 25% of the founders' stock 12 months after the Closing, and thereafter the buyback right shall lapse in equal monthly increments over the following 24 months. |
| Non-Competition, Non-Solicitation, Non-Disclosure and Invention Assignment Agreements | Each Founder and key employee will enter into a two-year non-competition and non-solicitation agreement in a form reasonably acceptable to the Investors. Each current and former founder, employee and consultant will enter into a non-disclosure and proprietary rights assignment agreement in a form reasonably acceptable to the Investors. All of the foregoing agreements will name the Lead Investor as an intended-third party beneficiary with rights to enforce the agreement. |
| Key-Man Life Insurance; D&O Insurance | Effective upon the Closing, the Company shall have obtained (i) key-man life insurance on the lives of the founders in a face amount to be mutually determined by the Investors and the Company, and (ii) D&O insurance in an amount and on such terms as are reasonably satisfactory to the Lead Investor. The key-man and D&O insurance policies shall be with carriers reasonably satisfactory to the Lead Investor. |
| Expenses | Each party shall be responsible for the payment of its, his or her own costs and expenses, including attorneys' fees and expenses, in connection with the transactions contemplated hereby; provided however, that the Company shall be responsible for and at the Closing shall pay reasonable fees (up to $50,000) and expenses of counsel to the Lead Investor, incurred in connection with the transactions contemplated hereby. |
| No Shop/Confidentiality | The Company agrees to work in good faith expeditiously towards a closing. The Company and the founders agree that they will not, for a period of eight weeks from the date these terms are accepted, take any action to solicit, initiate, encourage or assist the submission of any proposal, negotiation or offer from any person or entity other than the Investors relating to the sale or issuance, of any of the capital stock of the Company or the acquisition, sale, lease, license or other disposition of the Company or any material part of the stock or assets of the Company and shall notify the Investors promptly of any inquiries by any third parties in regards to the foregoing. |

**Table A2**. Pre- and Post-Financing Capitalization

| | Pre-Financing | | Post-Financing | |
|---|---|---|---|---|
| Security | # of Shares | % | # of Shares | % |
| Common – Founders | 900,000 | 90.0 | 850,000 | 56.7 |
| Common – Employee Stock Pool | 100,000 | 10.0 | 150,000 | 10.0 |
| Issued | 5,000 | 0.5 | 5,000 | 0.3 |
| Unissued | 95,000 | 9.5 | 145,000 | 9.7 |
| Series A Preferred | 0 | 0.0 | 500,000 | 33.3 |
| Total | 1,000,000 | 100.0 | 1,500,000 | 100.0 |

# The Impact of New Housing on Local Economic Development

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JEL Codes: R11, R15
Keywords: economic impact, housing

## Abstract

Industrial Development Agencies (IDA) in New York were originally envisioned as a tool to attract new industrial firms and businesses that would generate employment opportunities in manufacturing and similar other areas. The primary tools used by the IDA are tax-saving incentives and fast-track permit processing to attract businesses to promote sustainable economic growth. IDA incentives on Long Island have been used to attract and retain firms in fields such as pharmaceutical manufacturing, computer software development, and wholesale distribution. More recently, IDAs on LI have actively supported the construction of medium density housing to redevelop local village and town central business districts, create walkable transit-oriented communities, and to support the region's workforce by increasing the supply of rental housing. Using a computable general equilibrium model (CGE) this study evaluates the effectiveness of recently completed IDA supported medium density housing projects in Babylon, NY towards fulfilling their core mission to create employment opportunities and economic resiliency. The results of the analysis indicate that these projects have a positive and significant impact on regional output and employment in both the construction phase and the operations phase. It should be noted that the greatest economic impact arises during the construction phase of these projects.

## Introduction

Since 1990, manufacturing employment on Long Island, New York has fallen from 13 percent to 5.13 (December 2018) percent of regional employment. Sectors such as education and health services have increased from 12 percent to 20.24 percent of total employment. Through much of the mid-twentieth century, the region was home to a strong defense oriented manufacturing industry that fell into decline with end of the Cold War and the deindustrialization of the region as firms moved to other parts of the country to take advantage of lower costs and different regulatory environments. In response to declines to its manufacturing base, the New York State Industrial Development Agency Act of 1969 allowed for the creation of public benefit corporations (IDAs) to promote, encourage and assist in developing facilities that would create employment opportunities.

The original impetus was to support industrial development especially in areas such as manufacturing. However, over the past fifteen to twenty years IDAs on Long Island have actively supported a diverse range of projects including corporate headquarters for firms such as Canon, manufacturing and distribution facilities, automobile dealerships and other retail outlets (shopping mall), as well as a number of medium density residential and mixed-use developments. A key issue and part of a growing controversy locally is whether IDA supported investments in certain sectors particularly housing and retail is an effective vehicle to support regional economic growth and development.

Typically, IDA supported projects receive tax abatements for a limited period of years depending on the nature of the project and the recipients guarantee that they will employ a negotiated minimum number of workers annually. A recent study of 80 IDA supported projects conducted for the Town of Babylon, NY between 2011 and 2015 (Mussa, Li, Sepulveda and Vogel, 2017) found that once fully operational, these projects generated direct employment of 4,123 workers. On examination, of these projects, the projected number of direct jobs created by residential developments was generally very low (sometimes as low as 3 to 5 workers annually), while other projects (manufacturing, operations centers, etc.) may employ 100 workers or more.

More recently, IDAs on LI have been actively supporting place-making in the form of the construction of medium density housing to redevelop local village and town central business districts, create walkable transit-oriented communities, and to support the region's workforce by increasing the supply of rental housing. This study evaluates the effectiveness of recently completed IDA supported medium density housing projects in several LI towns towards fulfilling their core mission to create employment opportunities and economic resiliency, not just in terms of the creation of direct employment, but also in terms of indirect and induced employment as well as income and tax revenues. The rest of this paper is organized as follows. The section provides an overview of current issues on Long Island and the related literature on regional growth and development. Following that, we present the data and projects used for the analysis. We utilize a CGE model of Long Island's economy to analyze the impact of these projects in the next section. The conclusions of the study are then presented.

## Long Island, Housing and Economic Growth

The New York metropolitan area is one of the highest cost housing markets in the country and housing has long been a pressing issue in the region. Housing costs in suburban LI though lower than New York City are still quite high in comparison to the rest of the country and the rental housing market is not as well developed as NYC's. Many communities on LI have restrictive zoning that limits housing density consequently leading to a dearth of multifamily medium or high-density apartment complexes. Unlike NYC with a wide range of mass-transit options, mass-transit on LI is primarily of two types: The Long Island Railroad (LIRR), the oldest commuter rail line in the country geared towards transporting suburban commuters into NYC, and inefficient and limited bus service.

The mix of housing and transportation concerns has been cited by local community planners as a critical issue in fostering growth in the region. A recent report from the Nassau County Comptroller's office (Schnirman 2019) cites factors such as the high cost of living in the region, student debt, and limited housing options or walkable communities as impediments to LI's growth. The report points out that the critical working age population in Nassau County between age groups 20 to 44 has fallen over the past seven years by 9.3 percent. The drop is most pronounced in 35-44 range with a decrease of 26.9 percent. While the report does indicate that manufacturing in the county grew by 2.3% (1600 jobs) between 2018 and 2019, manufacturing has declined precipitously in the region over the past thirty years.

Regional planners on LI have been arguing that high housing costs are limiting the choices that workers in the community have, with lower-wage workers priced out of some markets. A recent report from the Long Island Index (2018, p. 9) suggests that wages have grown slowly over the last decade primarily as a result of growth in low wage sectors such as recreation. The report also found that 30 percent of Nassau County's workforce and 11 percent of Suffolk's are commuters to NYC, and their wages contribute 34 percent in Nassau and 14 percent in Suffolk of total income. From 2010 to 2017, LI's population grew by 0.7 percent, the lowest growth rate in the metropolitan area. The report also asserts (p. 41) that LI's post World War II growth was supported by affordable suburban single-family housing, growth that is now constrained by matured housing markets and limited development options. As of 2016, housing costs represented 50 percent or more of household income for 19 percent of the region's population, and 35-49 percent of 13 percent of the population's income. Annual median household income in 2016 stood at just under $99,000 and median rent on LI was just under $1700 a month.

Research such as Plantanga et al (2013) reinforce the view of Long Island's regional planners, high housing costs reduce the inflow of new residents, thus constraining regional growth. Their study found that housing costs affected the decision of college educated individuals to migrate into more costly areas, even when greater amenities and higher wages are accounted for. This result is in direct contrast to the view that housing costs are a reflection of a region's wage and amenity structure.

Studies such as those by Atkinson-Palumbo (2010) document the changing patterns of sprawl and urban-suburban growth in terms of higher density multi-family development, amenities and densification. Buryadi (2018, p.4) identifies the following priorities for small-towns and cities seeking to redevelop their downtowns: the need for long-term vision, public-private partnerships, prioritizing of mixed-use development, and building upon their individual assets. He points out that there is a growing interest in downtown housing and walkable communities and amenities to support these communities. Harris and Arku's (2006) study found that investment in housing supports economic development through both economic and social channels; e.g. employment and multiplier effects during the construction phase, the provision of housing for the regional workforce which further supports and reinforces regional growth, and for social well-being. Other recent research such as Guthrie and Fan (2016) and Noland, Weiner, DiPetrillo and Kay (2017) focus upon developers and residents growing acceptance of the need for transit-oriented development.

There is an extensive literature on the effects of housing regulations (see Gyourko and Molloy, 2015). One recent study by Glaeser and Gyourko (2018) found that restrictive zoning and housing markets in New York, San Francisco and San Jose may reduce national economic growth by between 2 percent and 9 percent. While housing prices are reflective of a region's characteristics including local amenities and wage rates, they also impact local labor markets. Similarly, Herkenhoff, Ohanian and Prescott (2018) found that land-use restrictions reduced national growth and productivity. Their analysis suggests that relaxing land-use regulations and restrictions in the states of California and New York would result in a reallocation of labor and capital nationally and increase overall productivity and output.

Over the past ten to fifteen years, IDAs on Long Island have provided greater and greater support for the development of multi-family and mixed use medium and high-density residential housing. IDA approved projects of all types are facing greater public scrutiny than in the past (see Madore, 2019). Recent newspaper reports have highlighted the actions of IDAs in the Towns of Babylon, Riverhead, Hempstead, as well as Nassau County, and Suffolk County in approving tax abatements to subsidize and support residential developments. Approved projects include a $28.6 million 30 year tax abatement for a 260 unit apartment complex across the street from the train station in Lindenhurst (O'Brien, 2018), a 14 building apartment complex in Selden (Genn, 2017), a 172 unit apartment complex in Island Park (Winzelberg, 2019), and a 420 unit complex with close proximity to the train station in Copaigue (Spangler, 2015).

This is just a short sampling of projects in the region. As a general precondition for IDA support, the developers have to pledge a minimum level of the new units constructed will be offered as "affordable housing", the number ranging anywhere from 10 to 25 percent of all of the units. Aside from the "affordable housing" units, very often, these new complexes are offering 1, 2, and 3 bedroom apartments for monthly rents of $2500 and above. Project construction creates significant impacts in terms of employment and income. Once the construction phase has ended and the developments come online, they generally offer limited direct employment of between 2 to 8 full-time equivalent employees.

In the next section of this paper, we analyze the economic impact of a subset of these projects in Suffolk County. The analysis is conducted using a computable general equilibrium model that we developed for Long Island. The model which was originally developed to analyze and evaluate the recreational fishing industry for the region has been adapted to evaluate the impact of new housing development on Long Island.

## CGE Model Overview - Model formulation and calibration

Computable general equilibrium (CGE) models have been widely used to analyze the impacts of regional changes and policies in recent years (Lukas et al. 2009; Bröcker and Korzhenevych 2013; Von Lampe et al. 2014; Li and Jia 2016). Therefore, in analyzing the impacts of constructing housing by IDA, a CGE approach is generally considered an appropriate tool. In this study, the structural model is based on traditional Keynesian economic theory, closely following a regional CGE model developed by Washington State University (Waters et al. 1997; Julia-Wise et al. 2002). We assume all economic agents (consumers, producers, and institutions) are optimizing their behavior in the economy and trace the impact of shocks through effects on output, prices, sales, employment, income, and revenues. The model includes the local market, exports including the rest of the U.S (RUS) and the rest of the world (ROW).

The production function is specified as a Leontief-CES function. Primary factors (labor, capital, and other inputs) are assumed to substitute through the function (Winchester 2011). We allow for imperfect substitution between locally produced goods and imported goods. Domestic supply is derived from an Armington CES function, which is used to distribute state-produced goods and imported goods for both firms and households.

The model simulates the economy in which quantities and prices adjust and feedback to clear product and factor markets in response to planned and exogenous shocks. The export supply function is derived from a constant elasticity of transformation (CET) function. The value of exports is specified as a function of the ratio of local level and international export prices (Holland et al. 2006).

Final demand and intermediate demand are comprised of mixed commodities from both locally produced and imported goods. The optimal locally produced commodities and imported commodities are derived from a CES function to form composite commodities. The demand for input factors is derived from the first-order conditions of profit maximization, taking into account the net price. Capital is assumed to be fixed within any given period and could be moved across the industries in response to different rates of return in the economy (Alavalapati et al. 1998).

Households in this model are disaggregated into nine categories and are assumed to maximize utility subject to a budget constraint. Households demand is derived using a linear expenditure function (Stone-Geary utility function) (Zhang et al. 2005). Households receive income by supplying factors of production; import tariff revenues transferred to them by their domestic governments, and transfers of other property and labor revenue from outside of the local economy (Decaluwé et al. 2010).

The government account was divided into two categories: federal, and state and local combined. State and local government expenditures are treated as endogenous and are assumed to be driven by state and local tax revenues. State and local tax revenues include payroll taxes, household direct taxes, and indirect business taxes.

The Keynesian closure is applied in this model and we assume that labor supply was mobile across sectors, while capital was assumed fixed in the region, but mobile between sectors. Factor Prices are institutionally fixed, thus the labor market clears through adjusting the level of employment in the regions. Investment is fixed and exogenous, and the model balances saving-investment accounts through endogenous saving flows. The regional supply of labor is assumed to be perfectly elastic, but it might vary in the long run. The local supply of capital is assumed to be perfectly inelastic in the short term.

The model is calibrated by using the 2014 symmetric Social Accounting Matrix (SAM) tables of the town of Babylon produced by IMPLAN (Impact Analysis for Planning). The 536 IMPLAN industry sectors were aggregated into nine production sectors, including construction, real estate, wholesale and retail trade & services, utilities, manufacturing, miscellaneous, processed food, agriculture, and mining and quarrying. The Babylon SAM includes a total of 9 aggregated production sectors producing 9 commodities; 3 value-added sectors (labor, capital, and indirect business taxes); 2 government sectors (combined state and local government and federal government); 9 household categories (classified by income level); a savings-investment account; and two accounts for imports and exports to the RUS and ROW. The parameters, such as elasticities of substitution, transformation, and some demand elasticities are specified based on previous research (Bilgic et al. 2002). Additional parameters, such as the share and shift parameters are determined by solving the given equations by substituting the value of the SAM with the base-year data and the exogenous parameters.

## Results: Housing Projects of the Babylon IDA and Simulation Design

The residential projects supported by Babylon IDA and used in the analysis are shown in Table 1. Five projects accounted for $234 million in investment from 2011 to 2015. These projects proposed to establish new rental housing units and create retail employment opportunities for residents. A total of 1217 residential dwelling units comprised of one and two-bedroom apartments (including units designated as affordable housing) were constructed. Included as part of these developments were parking, amenities, walkable spaces and gathering areas, and transit stops to fully support residential and retail uses.

**Table 1:** Basic information Residential/Residential Mixed projects, 2011-2015

| | City | Total Project Amount | No of Apartment Units | Benefited Project Amount | Year Approved |
|---|---|---|---|---|---|
| New Frontier II LLC | Amityville | 121,805,000 | 500 | 106,805,000 | 2015 |
| WR Communities - A | Wyandanch | 37,919,858 | 287 | 28,732,577 | 2013 |
| WR Communities – B | Wyandanch | 38,960,138 | 288 | 27,334,286 | 2013 |
| Copiague Commons | Copiague | 33,563,857 | 91 | 25,786,823 | 2015 |
| Andpress Plaza | Amityville | 1,750,000 | 51 | 1,502,750 | 2015 |
| Sum: | | 233,998,853 | 1,217 | 190,161,436 | |

Data source: Town of Babylon IDA and Town of Babylon Purchasing Department

The economic impacts from the projects arise in two phases, 1) the impact on construction, and 2) the benefits of operations. Construction impacts are the result of acquisition, construction, expansion, renovation, and equipping of the new residential facilities. The direct impacts of construction are equal to the total amount of investment ($234 million) for each project. Operational impacts are the result of ongoing activities, which include further round-by-round operations after the construction phase. These are created by the economic activities generated from the operational revenue, taxes paid, spending on salaries of employees, spending on utilities, and the cost of facility maintenance. In this study, the operational impacts mainly come from new residential consumption, including food, housing, apparel and services, transportation, healthcare, entertainment, education, and personal insurance. According to consumer spending data by BEA, the major expenditures include food, housing, apparel and services, transportation, healthcare, entertainment, education, and personal insurance. The average annual consumer expenditure is $49,396. Under the assumption of 100% and 75% occupancy in the study area, the total spending generated from the new apartment is estimated as $116 million and $58 million per year (Table 2).

**Table 2:** Basic information Residential/Residential Mixed projects, 2011-2015

| IMPLAN Sector ID | Sectors | Average Consumer Expenditure [1] | Total Consumption ($Million) [2] | |
|---|---|---|---|---|
| | | | Full | 75% Use |
| 400 | Food | 6,759 | 16.45 | 12.34 |
| 440 | Housing | 17,798 | 43.32 | 32.49 |
| 403 | Apparel and services | 1,786 | 4.35 | 3.26 |
| 412 | Transportation | 9,073 | 22.08 | 16.56 |
| 484 | Healthcare | 4,290 | 10.44 | 7.83 |
| 496 | Entertainment | 2,728 | 6.64 | 4.98 |
| 474 | Education | 1,236 | 3.01 | 2.26 |
| 438 | Personal insurance | 5,726 | 9.38 | 7.04 |
| | Total: | 49,396 | 116 | 87.00 |

Note: 1. The average consumer expenditures were calculated according to the data published in the Bureau of Labor Statistics. 2. We assume a two-person family in each apartment unit, the total consumption was calculated by the total no of consumers units (1,217*2=2,434) multiplying by average consumer expenditure.

## *Simulation Results*

The model is calibrated for the Town of Babylon using 2014 as the benchmark year and solved by GAMS. The estimated baseline values of related sectors across the study areas are shown in Table 3. Wholesale and retail trade and service is the largest sector contributing $8.7 billion in output and 59 thousand jobs. Manufacturing and miscellaneous are the second and third largest sectors generating over $5.5 billion in output and employment of 25 thousand. Construction and Real Estate are also important for the town producing over $2 billion in output and 12,749 jobs annually. Total GDP for Babylon is

approximately $9.5 billion. Gross household income is approximately $4.2 billion. Federal and state government revenue is nearly $2.5 billion and $3.9 billion, and collected indirect taxes are about $81 million and $727 million, respectively.

**Table 3:** Estimated Baseline Values in the sectors, Town of Babylon.

| Sectors | Jobs | Output ($Million) |
|---|---|---|
| Construction | 9,497 | 1,731.88 |
| Real Estate | 3,252 | 473.86 |
| Wholesale and retail trade & services | 59,505 | 8,656.05 |
| Utilities | 102 | 115.29 |
| Manufacturing | 10,404 | 3,703.71 |
| Miscellaneous | 14,614 | 1,883.29 |
| Processed food | 675 | 154.04 |
| Agriculture | 28 | 6.34 |
| Mining and quarrying | 15 | 5.78 |
| Total | 98,093 | 16,730.23 |
| Labor Income | | 4,771.30 |
| Gross household income | | 4,212.68 |
| Federal government revenue | | 2,495.79 |
| State government revenue | | 3,879.37 |
| Federal indirect taxes | | 81.01 |
| State indirect taxes | | 726.68 |
| GDP | | 9,509.31 |

Data source: Estimated according to the IMPLAN's dataset.

**Table 4:** Change of economic impacts from Baseline Values under the construction phase.

| Sectors | Price | Job | | Value of output | |
|---|---|---|---|---|---|
| | % | Value | % | Value($Million) | % |
| Construction | 7.79 | 2,614 | 27.53 | 360.15 | 20.80 |
| Real Estate | 0.58 | 14 | 0.44 | 4.49 | 0.95 |
| Wholesale and retail trade & services | 0.37 | 521 | 0.87 | 79.41 | 0.92 |
| Utilities | 0.12 | 1 | 1.18 | 0.82 | 0.71 |
| Manufacturing | 0.13 | -47 | -0.45 | -5.53 | -0.15 |
| Miscellaneous | 0.12 | 6 | 0.04 | 2.95 | 0.16 |
| Processed food | 0.04 | 0 | 0.03 | 0.26 | 0.17 |
| Agriculture | 0.01 | 0 | 0.04 | 0.01 | 0.10 |
| Mining and quarrying | 0.00 | 0 | 0.01 | 0.01 | 0.10 |
| Total | | 3,110 | | 442.56 | |
| Labor Income | | | | 126.34 | 2.65 |
| Gross household income | | | | 174.27 | 1.06 |
| Federal government revenue | | | | 21.83 | 0.56 |
| State government revenue | | | | 38.73 | 1.55 |
| Federal indirect taxes | | | | 1.01 | 1.25 |
| State indirect taxes | | | | 9.06 | 1.25 |
| GDP | | | | 266.07 | 2.80 |

Given the baseline values, simulations are conducted in two stages: the first stage is the impacts of the construction of new residential/mixed-use projects in the short run. For this stage, we only consider the impacts of project construction and its overall effects on the Babylon economy. In the second stage, we estimate the long-run economic benefits of these projects once the construction phase has ended and they become operational. Two simulations are conducted under the assumptions of 100 percent and 75 percent occupancy.

The stimulus from the construction projects are shown in Table 4 with $234 million of direct investments in the construction sector over the five-year period. During that time, construction costs (prices) increased slightly by 7.8 percent. Associated price increases in the real estate and trade and service sectors are 0.58% and 0.37% respectively. A total of 3,110 jobs (over 600 per year) were created due to the investment in the town. At 84 percent, the majority of jobs created (2,614) were in the construction sector, followed by trade and services sectors (521) and real estate (14). The negative impact on the manufacturing employment is the result of substitution among sectors. The value of output increased by $443 million, which is 1.9 times the original

investments. About $360 million results from construction, which increases by 21 percent. Real Estate and trade and services sectors also contribute $85 million with a nearly 1 percent increase in each sector.

**Table 5:** Change of economic impacts from Baseline Values under the operation phase.

| Sectors | Price | Job | | Value of output | |
|---|---|---|---|---|---|
| | % | Value | % | Value($Million) | % |
| Economic Impact of a "Normal" Year of Operations (Full Use) | | | | | |
| Construction | 0.14 | 6 | 0.06 | 2.22 | 0.13 |
| Real Estate | 0.20 | 14 | 0.44 | 1.77 | 0.37 |
| Wholesale and retail trade & services | 0.30 | 592 | 1.00 | 77.08 | 0.89 |
| Utilities | 0.01 | -3 | -0.42 | -0.45 | -0.29 |
| Manufacturing | 0.00 | 0 | -0.05 | 0.06 | 0.05 |
| Miscellaneous | 0.02 | -59 | -0.57 | -13.02 | -0.35 |
| Processed food | 0.04 | 32 | 0.22 | 4.16 | 0.22 |
| Agriculture | 0.00 | 0 | -0.04 | 0.00 | -0.01 |
| Mining and quarrying | 0.00 | 0 | -0.02 | 0.00 | -0.01 |
| Total | | 583 | | 71.82 | |
| Economic Impact of a "Normal" Year of Operations (75% Use) | | | | | |
| Construction | 0.10 | 4 | 0.05 | 1.66 | 0.10 |
| Real Estate | 0.15 | 11 | 0.33 | 1.33 | 0.28 |
| Wholesale and retail trade & services | 0.22 | 444 | 0.75 | 57.81 | 0.67 |
| Utilities | 0.01 | -2 | -0.32 | -0.34 | -0.22 |
| Manufacturing | 0.00 | 0 | -0.04 | 0.05 | 0.04 |
| Miscellaneous | 0.01 | -44 | -0.43 | -9.76 | -0.26 |
| Processed food | 0.03 | 24 | 0.17 | 3.12 | 0.17 |
| Agriculture | 0.00 | 0 | -0.03 | 0.00 | -0.01 |
| Mining and quarrying | 0.00 | 0 | -0.02 | 0.00 | -0.01 |
| Total | | 437 | | 53.86 | |
| Economic Impact of a "Normal" Year of Operations (Full Use) | | | | | |
| Labor Income | | | | 22.24 | 0.47 |
| Gross household income | | | | 30.73 | 0.28 |
| Federal government revenue | | | | 7.27 | 0.29 |
| State government revenue | | | | 8.66 | 0.22 |
| Federal indirect taxes | | | | 0.62 | 0.77 |
| State indirect taxes | | | | 5.59 | 0.77 |
| GDP | | | | 51.40 | 0.54 |
| Economic Impact of a "Normal" Year of Operations (75% Use) | | | | | |
| Labor Income | | | | 16.68 | 0.35 |
| Gross household income | | | | 23.04 | 0.21 |
| Federal government revenue | | | | 5.45 | 0.22 |
| State government revenue | | | | 6.50 | 0.17 |
| Federal indirect taxes | | | | 0.47 | 0.58 |
| State indirect taxes | | | | 4.19 | 0.58 |
| GDP | | | | 38.55 | 0.41 |

The impacts at the macro-level are significant. GDP increased by $266 million, a 2.8 percent increase, which implies that these projects contributed to local GDP growth by 0.56 percent for each year during the construction phase. Gross household income increased by 1.06 percent compared with the increase of 2.65 percent in labor income. A total of $22 million (state and local) and $38 million federal government revenue was generated as were indirect taxes of $1 million (state and local) and 9 million (federal).

The economic impact of operations is rather modest. Under the assumption of 100% occupancy, the total effect of housing development operations in the employment and value of output estimates are 583 jobs and $72 million annually. Most of the impacts arise through the trade and services sectors in which there are 592 jobs and $77 million in outputs, followed by processed food, construction, and real estate. More substitution effects appear in other sectors such as utilities, manufacturing, miscellaneous, agriculture, mining and quarrying, however, those effects are tiny. Operations lead to increases of regional GDP of 0.54 percent annually, with a 0.47 percent increase in labor income and 0.28 percent increase in household income.

Government revenue increased by 0.29 percent in federal and 0.22 percent in state revenue and is associated with a 0.77 percent increase in indirect taxes. The more realistic assumption of 75% occupancy leads to estimates of output increases by $54 million and 437 jobs generated. The GDP contribution is about 0.41 percent per year with an increase in household income by 0.22 percent.

## Conclusions

The CGE simulation of IDA supported projects in the Town of Babylon suggest that these projects have a positive and significant impact on regional growth and the economic well-being of these communities. It should be noted that the greatest economic impact arises during the construction phase of these projects. The employment impact from these projects is much more muted once they become operational. The analysis assumes that these developments are attracting new residents to the community, and not simply drawing some residents out of existing housing. Many renters in towns like Babylon live in unregistered apartments in single-family homes, or also may be family members that are still living at home (college graduates that have returned home and work in the NY metro area).

From a public policy point of view, new housing options likely have a very positive impact on towns like Babylon by alleviating housing shortages and may help to create a more vigorous community. The operational aspects of these developments suggest that they are not best vehicles for generating significant income and employment gains in the community or for creating extensive backwards or forwards linkages between or within sectors. Other types of projects could produce far greater operational impacts in terms of employment and income than housing. If however, as many of business and community leaders suggest is the case, the lack of rental housing is strangling growth in the region, then IDA support of these types of projects may be very appropriate.

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