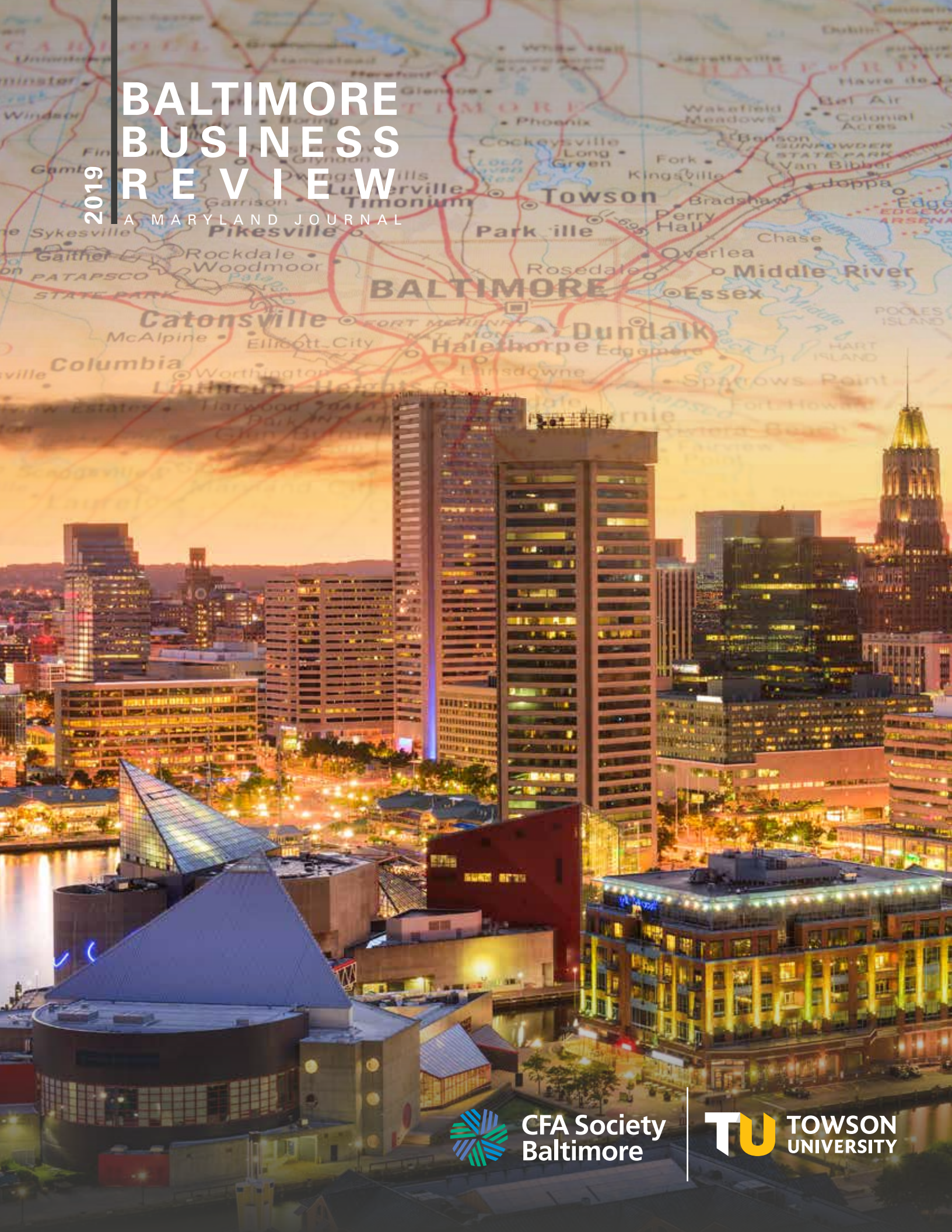


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Message from the Dean

Towson University, College of Business and Economics



Dear Colleagues and Friends,

I take great pleasure in sharing with you the annual issue of the *Baltimore Business Review: A Maryland Journal*. With the inaugural issue in 2010, this marks our tenth year of partnership with the CFA Society Baltimore. Year after year, *Baltimore Business Review* has made it possible for the academic and professional worlds to be fully connected to each other and to be directly involved in the Baltimore and Maryland business communities and beyond.

Consistent with our vision, this issue creates a variety of topics that are relevant, challenging, thought-provoking, and inclusive of a diverse range of voices and perspectives, including scholars, local business practitioners, students, and other open-minded contributors. In this issue, we present the impact of the Tax Cuts and Jobs Act (TCJA) on low-income families in Maryland, which is a very relevant and interesting reading. Further, we focus our attention on how we can protect Maryland's voting process and mitigate potential cyber vulnerabilities to be extended to industries at large. You will also find other studies collaboratively produced by faculty and students addressing topics such as the contribution of the Maryland startup community to job creation and determinants of college student consumption in Maryland. Finally, we are proud to showcase an update from the Towson University Investment Group on the survey portfolio they created.

The strength of our journal lies with a strong editorial board and with active and high-quality contributors and interested readers. We are delighted that you are joining us as readers, and would like to appreciate your feedback and impressions of this publication.

Best regards,

Shohreh A. Kaynama, Ph.D.
Dean, College of Business and Economics

Message from the President
CFA Society Baltimore



Dear Colleagues and Friends,

It gives me great pleasure to share with you the tenth edition of the Baltimore Business Review. This publication represents an important partnership between the business and academic communities in Baltimore and its adjoining metropolitan areas. CFA Society Baltimore is grateful to have such a great partner in the Towson College of Business and Economics to make this world-class publication possible.

I want to thank the many individuals who have worked tirelessly to bring this issue to reality. I want to thank the editorial staff of Farhan Mustafa from CFA Society Baltimore and Jian Huang and Lijing Du from Towson University. I would also like to extend a special thank you to many of the contributors to this year's edition and to Rick Pallansch and Chris Komisar from the Towson University Creative Services team. Your time and efforts are warmly appreciated.

The CFA Society Baltimore traces its history back to 1948 and serves over 750 members today. The society proudly leads the investment community locally by promoting the highest standard of ethics, education, and professional excellence all for the benefit of our community. Participation and membership in the CFA Society Baltimore is open to all professionals dedicated to these standards. Adjacent to this message, you can see a list of the top ten employers of our society's members.

While CFA Society Baltimore advocates and promotes the principles of the CFA program, we are a professional organization. Our vision for the society includes expanding membership to other finance-related and non-finance professional, including financial advisors, registered investment advisors, accountants, actuaries, and lawyers, just to name a few. Living in Smaltimore, we hope to create a mutually beneficial organization and learn from one another, best serve our respective clients, and advance our professional careers and personal networks.

We at CFA Society Baltimore work hard to create valuable educational, networking, and soft skills training programs for our membership and future members. We hope to engage in conversations about timely topics and trends impacting the financial services industry. We cordially invite you to join us at one of our frequent speaker events or our upcoming Future of Finance Conference.

Please enjoy this excellent publication. As always, we would welcome your feedback and insights. To learn more about how CFA Society Baltimore can help support your career and professional network, please visit our website or find us on social media.

A handwritten signature in black ink, reading "Mark J. Andrusis".

Mark J. Andrusis, CFA
President, CFA Society Baltimore



**Top 10 Employers of
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- Brown Advisory
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- Stifel Financial Corporation
- Bank of America Merrill Lynch
- Wells Fargo
- Legg Mason
- Aegon
- Bank of New York Mellon Corporation



A Beginner's Guide to Navigating Through Lost Profits in Corporate Litigation

By Zachary C. Reichenbach, CFA, CPA/ABV/CFP
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Analyst, Ellin & Tucker

We live in a highly litigious business environment. For those of you who have been involved in a business litigation matter know that the litigation process can be time consuming and very expensive. Litigation cases can take years to resolve and in the process, attorneys and other professionals may incur thousands of hours to litigate the case. Additionally, time and resources may be taken away from business operations if employees need to get involved. This article will introduce the concept of lost profits in corporate litigation and underscore the importance of good recordkeeping and detailed financial documents to help you manage through any future litigations.

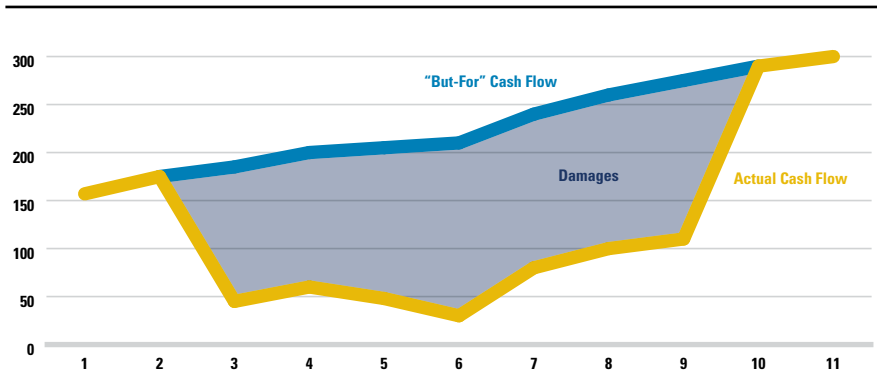
As a result of the U.S. economy growing and the Tax Cuts and Jobs Act increasing cash flows to businesses, the cash spent on business litigation has grown. With the increase in available cash due to lower taxes, businesses have chosen to spend some of that additional cash in pursuing litigation matters. In 2018 and beyond, forecasters expect to see a 10 percent increase in litigation matters which will result in higher legal and professional costs for businesses. Some large companies are expected to add approximately \$1 billion in litigation spending in 2018, and that trend is expected to continue beyond 2018. In addition, settlements for these business lawsuits are reaching record highs, meaning the average payouts are some of the highest on record.

There can be a variety of reasons why a business might file suit against another business or individual. The reasons could range from a breach of contract, to an insurance claim to intellectual property infringement. Regardless of the reason for the lawsuit, the plaintiff in the matter will likely pursue some form of compensatory damages. One of the most common forms of compensatory damages is lost profits.

For those individuals who have experience with business litigation, it is likely that lost profits was the measure of damages. For those individuals who have not had experience with litigation or lost profits, it is important to know the concepts. Understanding lost profits can be a deciding factor to winning or losing a case, especially in this current litigious environment.

Lost profits are a measure of the impairment of profits that would have been earned by a business but-for the damaging event. Lost profits are calculated by determining the difference between the profits that would have been incurred but-for the damaging event and the actual profits that occurred after the damaging event.

Figure 1: Lost Profits



The calculation of lost profits begins after the damaging event occurs and ends when the business is operating at a level it was prior to the damaging event. The chart above is an illustrative example of lost profits.

There are two lines shown in the chart above. Each line represents a scenario where the profits are calculated. The difference between the two lines represents lost profits; it is depicted as the “middle part.”

The first line in the chart is the “but-for” scenario. This hypothetical scenario considers the profits that the business would have earned had the damaging event never occurred. The calculation of the profits under this scenario are hypothetical in nature and thus can be speculative since the analysis is not based on reality. The person calculating the but-for scenario would have to put themselves back on the day before the damaging event and determine what the profits would have been at this time, having no idea this damaging event was going to occur. To determine the revenue and variable costs in this scenario, a projection that was prepared prior to the damaging event may be utilized since it was created without any litigation or damaging event in mind. There may be some adjustments that need to be made to the projections, but this can be a starting point in determining lost profits in the but-for scenario. The business needs to consider whether there were new product or service offerings during that time and what the general expectation of the business was before the damaging event. This type of information is relevant to calculating the but-for scenario.

The second line in the chart is the actual scenario. This scenario calculates the actual profits the business earned after the damaging event occurred. This scenario is based on the actual profits earned after the damaging event. This is less speculative than the but-for scenario since the profit calculations are based on actual results.

The calculation of profits for each scenario is different than typical accounting profits such as gross profit, operating income or net income. The measure of profits for a lost profits calculation is the contribution margin. Only variable costs (also known as avoidable costs) are deducted from revenues in a lost profits calculation. Fixed costs are typically not deducted in a lost profits calculation. As a result, the profits from each scenario are typically higher than the net income or operating income since fixed costs are not considered. The revenues and variable costs that are included in the calculation should be directly related to the damaged product/service line of the business. For example, if we were calculating lost profits for Proctor and Gamble's Tide department, we would only include the revenues and variable costs associated with Tide. We would not include Proctor and Gamble's other brands such as Bounty or Head and Shoulders since these are unrelated to the damaged department.

The difference in the scenarios (lines in the chart) as noted above is lost profits. There is a definitive end period for which lost profits are calculated. In the chart above, the end of the damage period is when the actual profits or cash flows are back at a level they would have been but-for the damaging event. The end of the damage period could be the end of a contract that was breached. In this example, the damaged businesses may not be back at the profit level it was prior to the breach; however, since the terms of the contract expired, there is no presumption of additional profits generated beyond contract expiration.

In a litigation setting, the most credible lost profits calculations are the ones that are based on facts and objective information. In litigation, the business' counsel may hire a damages expert to calculate lost profits and to testify on their opinions. The attorneys and the damages expert will analyze every document and piece of information available to build a credible and objective lost profits analysis. Typical documentation that is needed includes the business' financial statements, tax returns, general ledgers, budgets and any projections prepared by the business before, during and after the damaging event. If the business routinely creates budgets and projections, then that can help their legal team build a credible lost profits analysis. The use of management interviews, depositions or interrogatories may be used to get information in the event budgets and projections are not available for the attorney or damages expert.

The opposing party may also hire their own damages expert in the litigation case. In matters where there are dueling experts, the outcome is usually decided by fact-based analysis and objective information. Each expert bases their analysis on the data that is provided from the parties of the lawsuit. To the extent one party can provide more credible information than the other, there can be a positive impact on the litigation matter. Each damages expert may make different assumptions and therefore prepare different projections. However, so long as the financial expert can qualify their decisions and support the basis for these assumptions, their opinion may stand as reliable and relevant. Discussions with management serve a great purpose in identifying projected revenues or variable costs – a major variable in the financial expert's opinion of lost profits.

Today's environment is highly litigious, so businesses small or large should anticipate lawsuits in the future. The businesses who are successful in litigation tend to be the ones who have credible information through good recordkeeping and detailed financial documents assisting their legal team. From this style of organized management, a business helps itself in future litigation matters.



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Understanding the Tax Cuts and Jobs Act for Maryland Lower-Income Families

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On December 22, 2017, Congress passed, and the President signed the Tax Cuts and Jobs Act (TCJA). The TCJA is one of the largest tax cuts in the U.S. history. A recent study by the Tax Foundation estimates that, on a conventional basis, TCJA will reduce federal revenues by about 638 billion over the next decade (Kaeding et al. July 2018). The TCJA will impact American families in various ways. According to the IRS, the TCJA will reduce the average time to complete an individual income tax return by four to seven percent. In 2016, it took American individuals 2.6 billion hours to complete their tax returns (Hodge 2016). Therefore, the TCJA is estimated to save American families 104 million hours to 182 million hours in tax preparation. Multiplied by the average total employer compensation costs for private industry workers of \$34.17, the total saving in compliance costs will range from 3.5 billion to 6.2 billion dollars. Among all impacts of the TCJA, the most important consideration for American individuals perhaps is how the TCJA impacts their after-tax income, i.e. take-home pay. This study focuses on the impact of the TCJA on Maryland lower-income families.

Lower-income families

For purpose of this study, lower-income families refer to the families that report an adjusted gross income (AGI) under \$50,000. According to the most recent information pulled from the IRS, in 2016, more than half (53.88%) of the 2,950,840 tax returns filed in Maryland reported AGI under \$50,000. Figure 1 shows the distribution of filers across income groups.

Compared to middle- or high-income taxpayers, lower-income families are more likely to benefit from the following provisions under the pre-TCJA tax laws: standard deductions, personal and dependency exemptions, child tax credit and earned income credit. While the TCJA makes no changes to earned income credit, there are major changes to the other three provisions.

Figure 1: Distribution of filers in Maryland by income groups (2016)

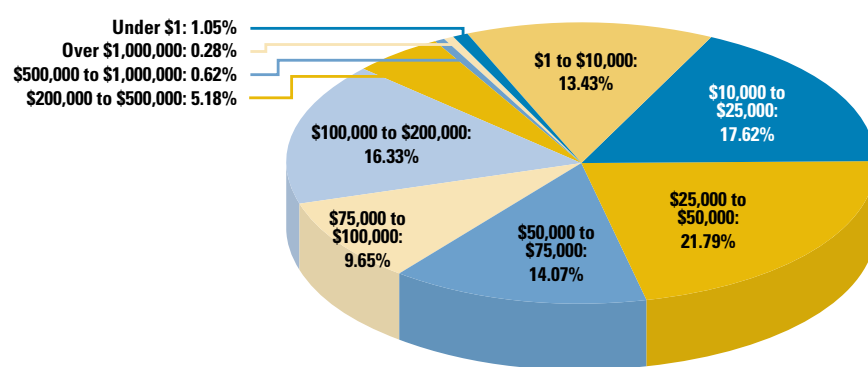


Table 1: Standard deductions for the federal individual tax returns

| Filing status | Standard deductions | | |
|--|---------------------|---------|---------|
| | 2018 | 2017 | 2016 |
| Single | \$12,000 | \$6,350 | \$6,300 |
| Head of household | 18,000 | 9,350 | 9,300 |
| Married filing jointly or qualifying widow(er) | 24,000 | 12,700 | 12,600 |
| Married filing separately | 12,000 | 6,350 | 6,300 |

The Tax Cuts and Jobs Act – Provisions

Standard deductions

The standard deduction is a fixed amount of deduction that taxpayers can use to reduce their taxable income. Alternatively, taxpayers can itemize their deductions, i.e. they keep track of certain deductible expenses and then subtract them from their income. In general, standard deductions are adjusted every year for inflation. The TCJA, however, nearly doubles the standard deductions for all filing status. Table 1 compares the new standard deductions in 2018 with those in the pre-TCJA tax years 2016 and 2017.

Figure 2 provides the percentage of families using standard deductions in each income group. In 2016, 81.34% of lower-income families used standard deductions, and we can expect that the provisions of the nearly-doubled standard deductions will greatly reduce their taxable income. Moreover, among the families that claim itemized deductions in 2016, lower-income families on average claim a smaller amount of itemized deductions than middle- or high-income families, and thus, they are more likely to switch to standard deductions after TCJA, which further reduces the compliance costs for lower-income families.

Figure 2: Percentage of Maryland families using standard deductions by income groups (2016)

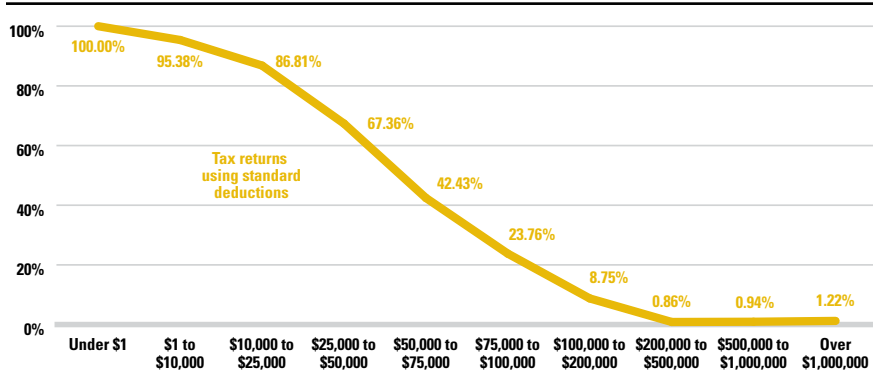
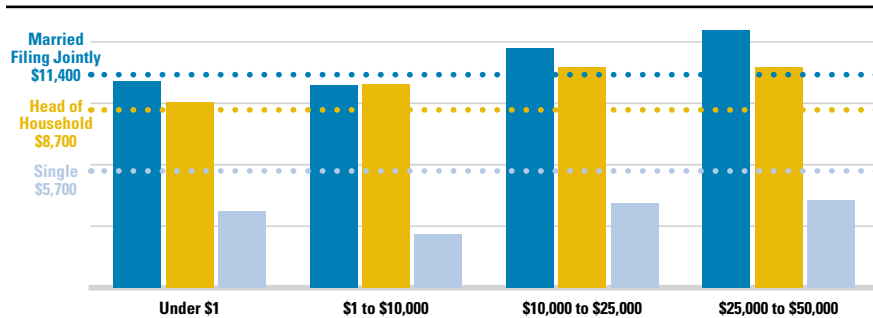


Figure 3: Estimated average amount of exemptions by income groups, Maryland 2016



Personal and dependency exemptions

The provision of the nearly-doubled standard deductions is great news for lower-income families; however, the offset to it is the elimination of personal and dependency exemptions. In 2016 and 2017, the exemption valued \$4,050, meaning that taxpayers can claim an exemption of \$4,050 each for themselves and their dependents. The total amount of exemptions reduces the taxable income. Figure 3 shows, by filing status, the estimated average amount of exemptions claimed by each income group in Maryland in 2016.

The three benchmark lines represent the increases in standard deductions in TCJA for each filing status. As shown in Table 1, compared to the standard deductions in 2016, TCJA increases the standard deductions by \$11,400 for married filing jointly, \$8,700 for head of household, and \$5,700 for single. In Figure 3, the green benchmark line is above the green bars of all income groups, suggesting that, for single taxpayers, the increases in standard deductions can offset the average negative impact of the elimination of exemption. In opposite, for families filing head of household, the net effect of the changes in standard deductions (orange benchmark line) and exemptions (orange bars) would raise their taxable income. By examining the positions of the blue benchmark line and the blue bars, the effect on the taxpayers filing married filing jointly is mixed. The net effect reduces the taxable income of those with AGI below \$10,000 while increases the taxable income of those with AGI between \$10,000 and \$50,000.

Child tax credit

In addition to the nearly-doubled standard deductions, another change in the TCJA to compensate for the elimination of exemptions is the improvement to child tax credit. Under the pre-TCJA law, the child tax credit was \$1,000 per qualifying child under age 17. It was nonrefundable, meaning that the child tax credit reduces or eliminates taxpayer’s tax liability, but any leftover amount of the credit just disappears. Also, the total credit starts to phaseout once the taxpayer’s

AGI exceeded the phaseout threshold. The phaseout threshold was \$110,000 for married filing jointly and \$75,000 for unmarried taxpayers. Table 2 provides the number and percentage of tax returns claiming child tax credit in Maryland in 2016. It also shows the average amount of child tax credit deducted in those returns claiming child credit.

In 2016, average benefits are small for families with AGI under \$25,000 because many lower-income families do not owe enough tax to be eligible for the full \$1,000-per-child credit.

The TCJA doubles the child tax credit to \$2,000 per qualifying child under age 17. It also allows a new \$500 credit for any other qualifying dependents. Other qualifying dependent could be a qualifying child over age 17 or other qualifying relatives. Moreover, the TCJA substantially increases the phaseout threshold to \$400,000 for married filing jointly and \$200,000 for any others. Another change to the child tax credit in TCJA is that the child tax credit becomes partially refundable. Under TCJA, up to \$1,400 of the \$2,000 credit is refundable, i.e. any leftover credit, after eliminating taxpayer's tax liabilities, will get the taxpayer a refund up to \$1,400. This refund is limited to 15 percent of earnings above \$2,500.

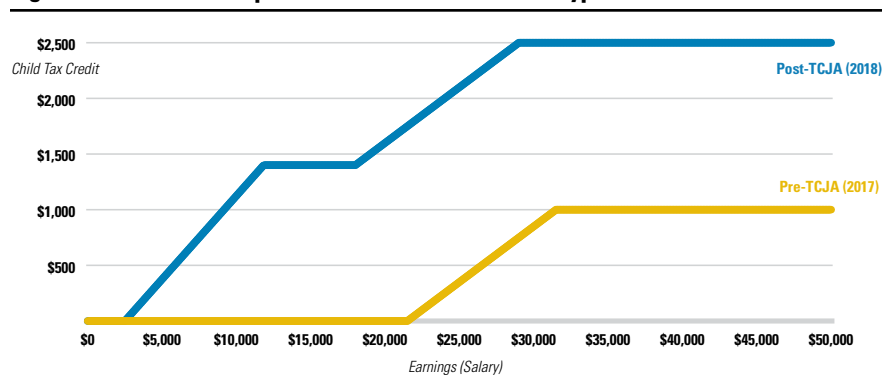
The change to the phaseout threshold has little impact on lower-income families because their income are below the threshold. The major benefit comes from the provision that the credit becomes partially refundable. Figure 4 compares the amount of child tax credits pre-TCJA (in 2017) and post-TCJA (in 2018) that can be claimed by a single mom filing head of household, who has a young child under 17 and a dependent parent. The analysis assumes that the only source of income is salary and that the taxpayer uses standard deduction.

Pre-TCJA, the taxpayer receives no benefits from the child tax credit when her total earning is below \$21,500. That's because her tax due is zero when her total earning is lower than the standard deduction (\$9,350) and the three exemptions (\$12,150). As her earning grows, she starts to have a tax liability. For earnings between \$21,500 and \$31,500, the tax due gradually increases from \$1 to \$1,000, and accordingly, the child tax credit to offset the tax due grows in the same amount. The

Table 2: Child tax credit of Maryland lower-income families in 2016

| Adjusted gross income | \$1 to \$10,000 | \$10,000 to \$25,000 | \$25,000 to \$50,000 |
|---|-----------------|----------------------|----------------------|
| Number of returns | 396,170 | 519,900 | 642,940 |
| Number of returns claiming child tax credit | 200 | 27,590 | 132,900 |
| Percentage of returns claiming child tax credit | 0.05% | 5.31% | 20.67% |
| Average amount of child credit claimed per return | \$235.00 | \$319.21 | \$894.79 |

Figure 4: Pre-TCJA and post-TCJA child tax credit: a hypothetical scenario



child tax credit maxes and remains at \$1,000 until the earning meets the phaseout threshold of \$75,000. Post-TCJA, the taxpayer starts to benefit from the refundable portion of the child tax credit once her total earning reaches \$2,500, even though she has no tax due yet. She starts to receive a refund of 15 cents from the IRS for every dollar she earns. The refundable child tax credit caps at \$1,400 when she earns \$11,833. The benefit of the child tax credit climbs again when her earning reaches \$18,000 and she starts to have a tax due. The maximum credit available is \$2,500 including a \$2,000 child tax credit for her young child and a \$500 family tax credit for her dependent parent. The maximum credit of \$2,500 is realized when her earning is \$29,000.

Data sources:

Taxpayer statistics (Maryland): IRS Statistics, Individual Income and Tax Data by Size of Adjusted Gross Income, Maryland 2016

Average dependency exemption by income group: IRS Statistics, All Returns: Exemptions by Type and Number of Exemptions, 2016

Tax cuts by congressional districts and income level: <https://taxfoundation.org/2018-tax-reform-congressional-districts-map/>

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Table 3: Estimated average tax cuts for Maryland lower-income families

| Adjusted Gross Income | \$0 to \$10,000 | | \$10,000 to \$25,000 | | \$25,000 to \$50,000 | |
|-----------------------|-----------------|-------------|----------------------|-------------|----------------------|-------------|
| | Ave. tax cuts | % of income | Ave. tax cuts | % of income | Ave. tax cuts | % of income |
| District 1 | \$18 | 0.4% | \$200 | 1.2% | \$813 | 2.2% |
| District 2 | \$18 | 0.4% | \$153 | 0.9% | \$829 | 2.3% |
| District 3 | \$18 | 0.4% | \$141 | 0.8% | \$888 | 2.4% |
| District 4 | \$13 | 0.3% | \$133 | 0.8% | \$914 | 2.5% |
| District 5 | \$13 | 0.3% | \$141 | 0.8% | \$916 | 2.5% |
| District 6 | \$18 | 0.4% | \$203 | 1.2% | \$882 | 2.4% |
| District 7 | \$20 | 0.4% | \$134 | 0.8% | \$944 | 2.6% |
| District 8 | \$16 | 0.4% | \$178 | 1.0% | \$907 | 2.5% |

The Tax Cuts

Although it is not exclusive, this article covers major provisions in the Tax Cuts and Jobs Act that are most significant for Maryland lower-income families. The elimination of exemptions is the greatest force dragging up the taxable income and tax liabilities. The nearly-doubled standard deductions and the doubled and extended child tax credit, on the other hand, help push down the tax numbers.

The cuts to the tax liabilities among Maryland lower-income families vary by households. The Tax Foundation estimated the average tax cuts at each income level for every congressional district. Table 3 provides the estimated average tax cuts for lower-income families in the eight congressional districts in Maryland.

Lower-income families in Maryland can expect reductions in their tax dues in 2018. Families within the same income level will expect similar tax cuts regardless of the congressional districts.

Taxpayers can also calculate the effect of the TCJA on their own families by creating a custom scenario using the 2018 tax reform calculator at <https://taxfoundation.org/2018-tax-reform-calculator/>. Employees, who receive W-2s and have their federal income tax withheld from the paycheck, can also determine the estimated 2018 federal income tax liability using the IRS Withholding Calculator <https://www.irs.gov/payments/tax-withholding>. Using the calculators to estimate the 2018 federal income tax liabilities under the newly-enacted TCJA can help taxpayers make proper and timely adjustments to the income tax withholdings with their employers and to their quarterly estimated tax payment amounts.

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When to Sell? How Should You Protect Yourself from the Risk of Falling Values?

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These are two of the most important questions in my conversations with investors as I write this article in September 2018. The U.S. equity markets have posted positive returns in each of the past nine calendar years. This is only the second time over the past century that equities have posted gains for nine consecutive years. I am going to lay out important considerations that should be factored in when investors consider and evaluate strategies to protect their investments from downside risks. An investment is only successful if you buy low and sell high. Being able to do that takes discipline and active management.

Why Is Risk Management Important?

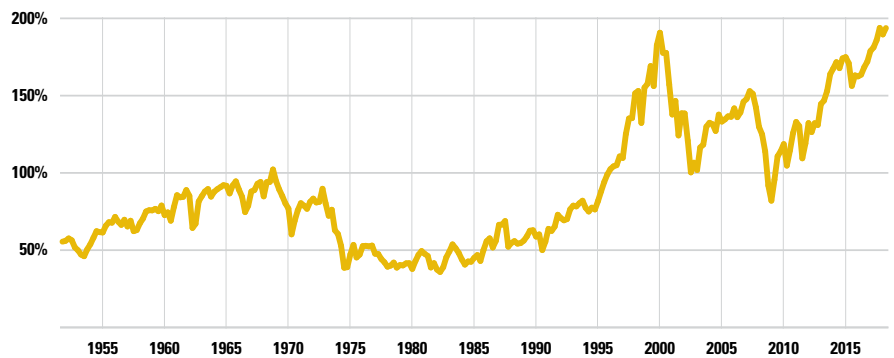
Risk management seeks to mitigate downside risk. It is easy to forget that the risk of a downturn quietly accumulates as asset prices rise over time. One of the most dramatic risks of late is valuation of the U.S. stock market. Printed money from Central Banks has fallen like snow since the financial crisis. For 10 years, printed money has been quickly absorbed by financial markets and has led to rising valuations. Warren Buffett likes to compare the value of the U.S. equity market to U.S. GDP. As Figure 1 indicates, the stock market's valuation considerably exceeds the valuation of U.S. Gross Domestic Product. The printed money effect has been amplified by record low interest rates. The only period with a higher valuation was the 2001 Internet bubble, which means the need for risk management should be a significant consideration.

How to Solve Valuation Risk?

Reducing valuation risk does not mean you need to place cash under your mattress. There are other, more effective active management techniques. The U.S. economic recovery — now the longest in history — is a mature cycle that is closer to the end than the beginning. We are already seeing breakdowns in the valuation of automotive companies and home builders. Ask yourself if the companies in your portfolio have the ability to grow at or above the level of economic growth. If a company has become more of your portfolio than anticipated, then it is time to think about harvesting the gains. Selling a portion of the holding allows you to take profits and reduce concentration risk within your portfolio. Perhaps one of the best byproducts of harvesting profitable and unprofitable positions is that it creates cash — dry powder — that can be used when a correction occurs and valuations become more attractive.

Figure 1: The Rising Stock Market Valuation to Percentage of GDP

The Buffett Indicator: Corporate Equities to GDP



Source FactSet

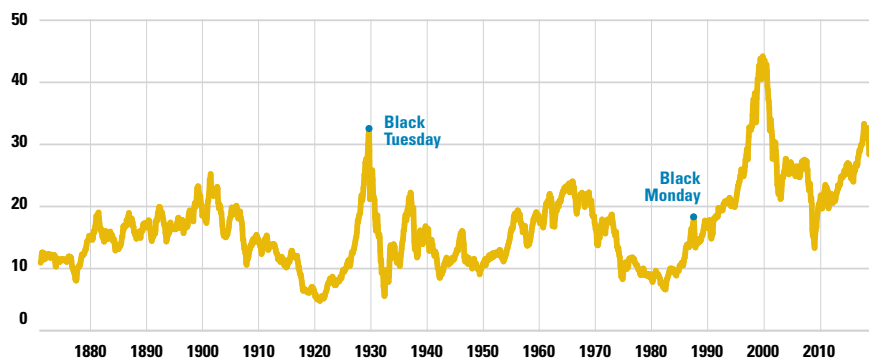
When evaluating a company's valuation, another important consideration is its potential market share growth. Ask if the company can continue to gain market share at the same rate, or has the company's valuation exceeded the total market opportunity? Valuation issues are particularly challenging in the technology sector where today's winner can become tomorrow's loser.

Cash is an Underappreciated Asset Class

The cash generated from the sale of securities sits ready for deployment in your investment account, waiting for attractive opportunities. Stock markets cannot continue going up unabated, which creates a downside to holding cash in your portfolio. Like any other form of insurance, the cash in your portfolio has an opportunity cost, but there is also the potential of a benefit. Currently, by two important valuation risk measures, Buffett Indicator (Corporate Equity Valuation to GDP) and the Shiller P/E Ratio (Cyclically adjusted P/E Ratio – see Figure 2), there is reason to take pause.

We live in a world of instant gratification that encourages us to want more, but sometimes more is exactly the opposite of what we need. Since the future is unknown, having a practiced approach to harvesting returns — using cash as an asset class — will reduce downside risk, while giving you the dry powder to take advantage of investment opportunities in the future. Harvesting returns also avoids portfolio concentration and maintains portfolio diversification, which further reduces downside risk.

Figure 2: The Cyclically Adjusted P/E Ratio Indicates Valuation is Rising



Price earnings ratio is based on average inflation-adjusted earnings from the previous 10 years, known as the Cyclically Adjusted P/E Ratio (CAPE Ratio), Shiller P/E Ratio.

Source data <http://www.multpl.com/shiller-pe/table>

Valuation and Portfolio Concentration are Key Considerations

Some useful valuation measures include the Price to Earnings (P/E) and the P/E-to-growth (PEG) ratios. What is the current P/E multiple versus the forward P/E multiple (using next year’s estimated earnings)? Is the company growing into a lower valuation? A humbling way to use a P/E multiple is to remember the valuation measure indicates the number of years you would have to hold the stock to earn back the price being currently paid for the stock. This exercise will push you to re-examine a 180x P/E multiple paid for some technology stocks. Earnings growth will have to be 10-fold to bring the P/E multiple down to the S&P 500’s forward (using next year’s estimated earnings) 18x P/E ratio. Another way to look at the P/E multiple – assuming earnings do not grow – is that the technology stock would have to be held for 180 years to earn back the share price paid. Technology companies are an important part of any portfolio, but rich valuation levels may not be sustainable and warrant profit taking.

Another measure of valuation is the PEG Ratio, where the P/E ratio divided by the company’s estimated five-year projected earnings growth rate. A PEG ratio below 1 is often considered a value stock. Emerging companies with high P/E multiples and high growth rates can boast PEG ratios above 3.

Table 1: Price/Earnings Growth (PEG Ratio)

| |
|--------------------------------------|
| Technology Stock ABC |
| Current P/E: 180 times earnings |
| Five year projected growth rate: 69% |
| PEG 180/69, or 2.61 |
| Automotive Company XYZ |
| Current P/E: 6 times earnings |
| Five year projected growth rate: 15% |
| PEG 6/15, or 0.40 |

Interest Rates – The Changing Cost Of Money

In 2008, the Federal Reserve’s emergency intervention cut the Fed Funds rate from 5.25% to 0%. In the 10 years since the financial crisis, governments, corporations and consumers have been over-served cheap debt. Developed and emerging market governments have dramatically increased the use of debt to stimulate demand. Corporations have also taken advantage of the low-rate environment to improve their perceived performance by issuing debt to buy back trillions of dollars of shares. So, following the financial crisis of 2008, the world is much more indebted than it was before. Now, the Federal Reserve is engaged in quantitative tightening instead of quantitative easing. In 2014, the Federal Reserve stopped buying bonds, and now bonds held by the Federal Reserve are maturing and are not being replaced, thus reducing the money supply as the quantity of money is reduced. The European Central Bank (ECB) is on track to end its 2.5 trillion quantitative easing program by the end of 2018, which will further reduce liquidity. The Federal Reserve is also normalizing interest rates which means Fed Funds are projected to be over 3% by 2020. Higher Fed Funds rates increase the interest cost for indebted borrowers. The steady increase in interest rates will cause a dramatic increase in interest expense as rates rise above the emergency accommodation provided by the Federal Reserve.

Are Fixed Income Securities at Risk In A Rising Interest Rate Environment?

To understand the impact of higher interest rates on fixed income securities it is important to understand the “fixed” part of fixed income, which means the value of the fixed income securities falls as interest rates increase. For example, the typical 10-year bond provides regular interest payments and a principal payment when the security matures. The periodic interest payments return cash to the investor and shorten the duration of the typical 10-year bond to 7 years. Duration measures the price sensitivity of the bond to a 1% change in interest rate. A 1% change in interest rate for a bond with a 7-year duration is 7% ($1\% \times 7 = 7\%$). Duration is a multiplier that dramatically increases the price impact of interest rate changes. If interest rates increase 2% the negative price impact is 14%. The price impact increases as the term of the fixed income bond increases. Many investors in a low interest rate environment buy longer-term bonds not realizing the impact higher interest rates can have on their investment. There are a wide range of floating rate or indexed securities that lower price impact associated with higher interest rates.

Do Equities Offer A Hedge Against Higher Inflation?

Equity securities from companies whose products are in demand have a hedge against inflation since these companies can raise prices. Companies with pricing power can insulate themselves from rising rates by passing on additional costs; however, studies have shown the ability to pass on cost increases breaks down once inflation exceeds 5%. In the fixed income space there are also securities that limit the securities exposure to inflation. For example, Treasury Inflation Protected Securities (TIPS) offer inflation protection as measured by the Consumer Price Index (CPI) but TIPS do not offer protection from higher interest rates. All of this is to say that there are investment options in the capital markets when interest rates are on the rise, but it is key to understand how these securities are impacted by rates.

Maryland's Equity and Bond Markets

Baltimore has had a long history as a regional financial center. Between 1881 and 1949, the Baltimore Stock Exchange created a regional market for stocks and bonds. In 1949, scale and technology favored consolidation and the Baltimore Stock Exchange on 210 East Redwood Street merged with the Philadelphia Stock Exchange. In 1954, the Washington Stock Exchange merged with the Philadelphia Stock Exchange. In 2008, the Philadelphia Stock Exchange (PHLX) was purchased by the NASDAQ. Today, Marylanders have easy access to the New York Stock Exchange (NYSE), NASDAQ, and debt markets. The equity markets offered by the NYSE and NASDAQ offer best price execution, while debt markets help finance Maryland's state and local Government. It is these same debt markets that provide financing and investment opportunities for Baltimore and Maryland based companies.

Summary: What is a Successful Investment?

Successful investing can easily be described as buying low and selling high, but to reach that outcome requires research and a strong stomach. The initial investment in a company is challenging since it requires a great deal of research to address the unknowns. Often it is hard to let a successful or failed investment go due to its success or failure. Objectivity is required to sell an investment when demand for the investment is greater, and the outlook is positive but potentially not sustainable. It is important to remember that we live in a changing world. What works today may not work tomorrow. Active management of investments requires thoughtful attention to valuation, market share growth and the interest rate environment. Further, risk management requires diversification and cash can also be a useful asset class. In combination these tactics help make growth more sustainable, while lowering your portfolio's downside risk.

Further readings:

<https://www.investopedia.com/articles/analyst/043002.asp>

http://www.wsj.com/mdc/public/page/2_3021-peyield.html?mod=topnav_2_3002

https://www.washingtonpost.com/business/stocks-can-be-your-best-hedge-against-inflation/2011/05/17/AFj9tc8G_story.html?utm_term=.89093506185f<https://www.bloomberg.com/news/articles/2018-07-09/after-years-of-easing-meet-quantitative-tightening-quicktake>

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<https://www.institutionalinvestor.com/article/b14zbcxn7mhn0w/how-to-pick-the-best-inflation-hedging-stocks>

<https://www.kiplinger.com/article/investing/T052-C019-S001-stocks-the-best-inflation-hedge.html>



The Startup Ecosystem in Maryland

Matthew O. Lowinger

Lead Associate of Student Launch Pad, Towson University

Jan Baum

Director of Center for Innovation and Entrepreneurship, Towson University

“Small business is America’s engine of job creation.”

— Samuel Graves (the 6th congressional district in Missouri)

Introduction:

Maryland is a hub for innovation and entrepreneurship possessing a large ecosystem of STEM professionals, a high density of technology companies, and significant research and development spending per capita, leading Forbes to rank Maryland as the second most innovative state behind only the District of Columbia in 2017 (WaltHub, 2017). Maryland’s diverse landscape in terms of business sectors, proximity to the District of Columbia, and educational institutions have been contributing to Maryland’s rise in national rankings. Job creation in the startup sector in Maryland is multiplying, and along with a dynamic innovation and entrepreneurial ecosystem, more startups continue to start in or relocate to the great state of Maryland. In this article, we first describe the thriving startup sectors in Maryland, and expand the discussion to higher education institutions. Then, we summarize the implication of venture financing in the last section.

Startups in Aerospace and Defense Sectors in Maryland:

Maryland has been thriving on the successes of aerospace + defense and information technology + cybersecurity. Maryland is the leading employer of computer scientists, electronics engineers, software developers, and information security analysts (Maryland Department of Commerce, 2018).

The aerospace and defense sectors in Maryland are one of the best in the world. Lockheed Martin (97,000 employees), Northrop Grumman (30,000 employees), and 13 of 20 other top aerospace and defense companies in the United States are located in Maryland (Maryland Department of Commerce, 2018). The supply chain for aviation and space-related products in Maryland amount to over 8,700 businesses. Maryland aerospace and defense firms have been awarded over 247 defense contracts totaling \$187 billion (Aerospace Maryland, 2018). Year after year, these companies hire idealists, some of whom were entrepreneurs, to elevate their companies to be innovative and cutting-edge.

Startups in Information Technology and Cybersecurity in Maryland:

Maryland has been coined the hotbed for breakthroughs in information technology and cybersecurity. National Security Agency, National Institutes of Standards and Technology, and Defense Information Systems Agency among 60 other federal agencies all are located in Maryland. Companies in threat intelligence + automation, big data analytics, and advanced network security are leading the way for innovation in the state. Protecting the state are the 20 military facilities, like Fort Meade (location of National Security Agency), Aberdeen Proving Ground, and U.S. Cyber Command (Maryland Department of Commerce, 2018).

Higher Education Institutions in Maryland:

Maryland is home to some of the finest public schools and institutions in the United States. Take Towson University which is the second largest public school in the University Systems of Maryland for example. Under the leadership of President Kim Schatzel, TU’s exemplary status continues to rise as a main contributing factor to the economy in Greater Baltimore and Maryland. Highlighted in *TU 2020: A Focused Vision for Towson University*, TU’s strategic plan, there is a focus towards STEM workforce development, community and state-wide strategic partnerships, and internship + experiential learning opportunities (Towson University, 2018). TU has produced Vince Talbert’s Bill Me Later, Larry Fiorino’s G1440, and Matt Goddard’s R2integrated.

As a mid-sized public institution, TU proudly has contributed to over \$139.4 billion of a total economic impact since 2014. Moreover, over \$887 million in output have been contributed by TU STEM graduates. Since 1866, TU has contributed a total of \$2.2 billion in state and local fiscal revenues to Maryland’s economy (Towson University’s Regional Economic Studies Institute, 2015).

The total number of jobs supported grew from 2,677 in 1962 to 21,386 jobs in 2014, a growth of eight times. Maryland’s economy from \$1.5 billion in output between 1866 and 1962 to \$97.4 billion in output between 1963 and 2014.

Per Table 1, graduates of TU have proudly supported 2,677 jobs as of 1962, an impact which grew to 21,386 jobs as of 2014, of which over 37 percent were sup-

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Table 1: Towson University’s Economic Impact as of 2014

| Impact Type | Graduate Careers | Operations | Student Spending | Alumni Giving | TU Foundation | TU Event Spending |
|---------------------|------------------|------------|------------------|---------------|---------------|-------------------|
| Jobs | 21,386 | 8,088 | 2,740 | 119 | 17 | 2,526 |
| Output (in million) | \$97,396 | \$26,610 | \$12,576 | \$247 | \$24 | \$177 |
| Wages (in million) | \$72,175 | \$21,770 | \$6,895 | \$199 | \$20 | \$105 |

Note: Towson University’s Regional Economic Studies Institute: Towson University’s Economic Impact, 2015

Table 2: Maryland Financial Incentives as of 2016

| | Economic Output | Total Jobs | Average Annual Salary | Annual State Tax Revenues |
|---|-----------------|------------|-----------------------|---------------------------|
| Job Creation and Retention | \$3,771,696,805 | 16,545 | \$41,876 | \$36,546,638 |
| Leveraging Private Sector Investment | \$1,901,148 | 12 | \$37,434 | \$23,618 |
| Assistance to Small + Minority Businesses | \$530,907,228 | 2,839 | \$40,961 | \$5,793,985 |
| Technology Startups + Innovation | \$708,039,587 | 257 | \$55,235 | \$7,584,363 |

Note: Maryland Department of Commerce: Consolidated Incentives Performance Report FY2016, 2016

ported by STEM graduates. As of today, TU’s graduates support approximately \$97.4 billion in output for Maryland. Since 1963, student spending has added \$812.0 million in fiscal revenues. Meanwhile, TU’s operations have contributed \$884.8 million to Maryland’s tax revenues (Towson University’s Regional Economic Studies Institute, 2015). TU’s contribution will continue to be significant as it focuses on innovation and entrepreneurship among other presidential priorities.

Maryland Fuels Small Businesses and Startups Through Incentives:

Under the Hogan administration, Maryland is open for business. Maryland is fueling small business and startups by providing an abundance of resources to launch global brands for women + minorities and military veterans. There are over 40 financial incentives for businesses revolving around agriculture to cybersecurity to energy. Of the 40 different financial incentives, there are various types of opportunities including grants, loans, venture capital investments, tax credits, training + services, bonds, and tech transfers. In the fiscal year of 2016, Maryland’s Department of Commerce provided 584 businesses opportunities for financial incentives totaling \$96,874,782. This resulted in the creation of 24,000 jobs and annual State tax revenues of \$53.7 million. Maryland’s Department of Commerce invested \$46 million in direct assistance and \$50 million in tax credits (Maryland Department of Commerce, 2018).

Over 20,000 Maryland-based jobs have been created in 2016 because of the strong Maryland incentives to foster an entrepreneurial ecosystem. As per Table 2, job creation and retention leads the way by creating the most jobs totaling roughly 16,500 jobs while having an economic impact of \$3.7 billion. Over \$5 billion resulted from the financial incentives offered through the State. Maryland supports minority entrepreneurs. With this focus, startups in Maryland created 2,389 jobs (11.78% of the total jobs created).

Venture Capital, M&As, and IPOs in Maryland:

Maryland has been experiencing tremendous growth with the size of venture capital deals. Typically, Silicon Valley, New York, and Boston have major cities for venture deals. Steve Case, Founder of AOL, has a program called “Rise of the Rest” where he highlights up-and-coming cities for venture investments. One of Steve Case’s tour stops was in Baltimore, Maryland. He emphasized that there was incredible growth coming out of Baltimore and the rest of Maryland.

Venture funding for Maryland has skyrocketed in recent years. For example, companies like Personal Genome Diagnostics (\$75 million) and ZeroFOX (\$40 million) have led the States’ increase in venture funding from \$87.2 million in 2016 to \$276.8 million in 2017. This is a growth of 217.43% over one year. While the size of the venture deals, the number of deals remained constant

Table 3: Venture Capital Funding by Small-Medium Enterprises in Baltimore as of 2016

| | Seed | Early | Late | All |
|----------------------------------|--------------|---------------|---------------|---------------|
| Number of Individual Investments | 174 | 231 | 88 | 493 |
| % of Investors from Baltimore | 29% | 16% | 14% | 21% |
| % Investors from Maryland | 28% | 25% | 18% | 21% |
| % Investors Outside Maryland | 43% | 59% | 68% | 58% |
| \$ Amount | \$48,100,000 | \$376,968,276 | \$417,721,846 | \$842,790,122 |

Note: Baltimore Business Review: "Financing Baltimore's Growth – Measuring Small Companies' Access to Capital", 2016

year-over-year at 66 (Technical.ly, 2018). The unprecedented growth heated up even more in the third quarter of 2018. In the first three months of 2018, 16 Maryland companies raised \$406 million, a 46.68% increase from all of 2017. In all of 2018, 17 Baltimore startups received venture funding of \$157.8 million (Technical.ly, 2018). This is the second consecutive quarter in where Maryland startups received funding of at least \$400 million; it is the fifth consecutive quarter of at least \$100 million raised. Gaithersburg-based biotechnology company Viela Bio received the largest amount of funding thus far at \$250 million. In the third quarter, Maryland firms raised \$251 million (Baltimore Business Journal, 2018). Internet and healthcare ventures received the most amount of deals at six. Healthcare companies received funding of \$377.7 million. Baltimore-based companies were able to collect \$100.68 worth of funding with Dracen Pharmaceuticals leading \$40 million of the total amount in the city (Baltimore Business Journal, 2018).

The largest deal included a \$78 million investment for IronNet Cybersecurity (based in Fulton). WindMIL Therapeutics, a startup developing new cancer treatments, raised the largest round in Baltimore at \$32.5 million. The second and third largest deals of 2018 in Baltimore came from Pixlligent, a nanocrystal manufacturer, totaling \$7.6 million and LifeSprout, a soft tissue developer, raising \$6.5 million (Technical.ly, 2018).

Baltimore's small businesses and startups have experienced drastic growth in the past decade. This is especially apparent over the past two years when venture capital and other forms of equity investment exceeded \$200 million annually, compared to \$50 million invested per year nine years ago (Baltimore Business Review, 2018). While the number of investments of Baltimore City small businesses has slightly fallen from 2015's high of roughly 80, the total dollar amount continues

to rise. The majority of funding of years 2007 through 2016 have been dominated by investments of \$250 thousand and under.

Baltimore City entrepreneurs have received \$845 million of funding from 2007 – 2016. Most of the funding came in the seed and early stages totaling 405 investments. As shown in Table 3, 21% of the venture funding came from Maryland-based firms. In order for Maryland to retain its exemplary status as a startup hub, there needs to be more funding from Maryland-based venture firms.

Future Trajectory of Startup Growth:

While it is hard to predict startup growth in Maryland over the following years, it is to be expected that innovation in Maryland will continue to rise. Being so close to the Nation's Capital has a large factor in Maryland's future.

During the second quarter of 2018, investors poured \$247 million into 23 Maryland-based companies. One-year prior during the second quarter, \$102 million was invested in Maryland startups. 58.7% higher. Halfway through the year venture funding has reached \$655 million. This number is more than two-thirds of last year's funding topping \$903 million (Technical.ly, 2018). It is fair to say that startup growth in Maryland will continue to rise year-over-year if venture funding continues to rise.

Overall, the next wave for startup talent is Maryland. Silicon Valley, New York, and Boston are the old wave of tech talent. Although the San Francisco region still represents a large proportion of venture capital, Baltimore and Washington, D.C. continue to rise in the rankings. As more venture funding becomes available in the region, startup jobs will continue to flourish.

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The Status of Women in Management

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Gender Diversity in Executive Ranks 2018

In 2018 CFA Society Baltimore hosted our first conference, CFA Society Baltimore Alpha and Gender Diversity 2018. Our theme was chosen to reflect an increased focus in many asset management firms on mentoring young professional women up the ranks and on retaining them as they enter mid-career. At the conference, former presidential candidate and CEO of Hewlett Packard Carly Fiorina delivered a nuanced keynote address discussing her career trajectory and the challenges she encountered on her path to the C-suite.

Women have made enormous strides in the work place over the past three decades. Moreover, empirical data shows that the entrance of women into management has had a significant positive on the bottom line of firms. This BBR article outlines their impact. We also review the current the status of women in boardrooms and senior management in the US and Maryland, pointing out the barriers women still experience in career-building.

Women in Management Boost the Bottom Line

The positive impact of women on corporate profitability is now well-established by many studies done in the private sector and academia. While correlation does not establish causality, as our time series grows longer, the more data we will have to validate the strongly positive marginal impact.

The results from a 2016 study by Credit Suisse Research Institute (CSRI), “The CS Gender 3000: Reward for Change,” are particularly interesting.¹ Among other aspects, this study looks at the stock performance of companies with at least one woman on the board over 10 years. CSRI found that larger firms have more deeply developed diversity programs overall, so the dramatic outperformance is usually seen at companies this size or larger. Among firms with a market capitalization greater than US\$10 bn, stock prices of firms with more than one woman on the board considerably outperform firms with no woman on the board (See Figure 1).

Importantly, they also find that the higher the percentage of women in top management, the greater the excess returns for shareholders. This is true both for their share price performance as well as hard metrics of financial performance (See Table 1). They note that companies in the “50% Club,” in which women represent at least 50% of the management positions, show particularly strong outperformance.

Figure 1: Global Performance: Companies Market Cap >USD 10 Billion

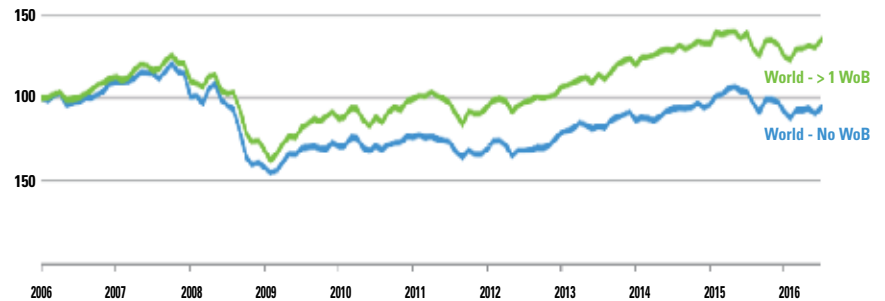
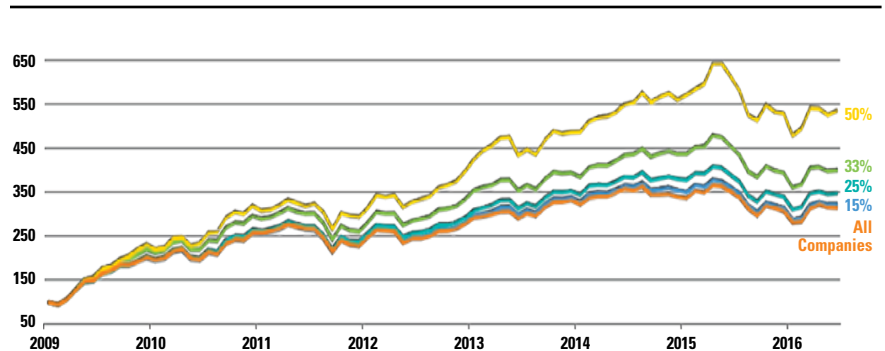


Table 1: Comparative returns for women in senior management

| | ROE (%) | Net debt/equity (%) | Price/book (x) | Payout ratio (%) |
|--------------------------|---------|---------------------|----------------|------------------|
| CEO | | | | |
| – Male | 12.8 | 1.39 | 1.84 | 43 |
| – Female | 15.2 | 1.34 | 2.18 | 46.9 |
| Premium | 19% | -4% | 19% | 9% |
| Senior management | | | | |
| – Women <10% | 13 | 1.35 | 2.03 | 47.7 |
| – Women > 15% | 15.3 | 1.21 | 2.09 | 41.7 |
| Premium | 18% | -10% | 3% | -13% |

Source: CRSI 2016, pg. 25

Figure 2: Share Price for Baskets with Different Tiers of Female Participation in Senior Management



A separate study from MCSI, “Women on Boards: Global Diversity in Gender on Corporate Boards”² supports the CSRI research. The MSCI report finds that:

- Companies with strong female leadership generated a return on equity of 10.1% per year versus 7.4% for those without (on an equal-weighted basis).
- Companies lacking board diversity tend to suffer more governance-related controversies than average.
- Strong evidence was not found that having more women in board positions indicates greater risk aversion.

Table 2: MSCI Status of Women on Boards 2015

| | |
|--|-------|
| MSCI World Index % Women | 18.2% |
| MSCI USA Index % Women | 19.1% |
| MSCI Emerging Markets Index % Women | 17.9% |
| Companies with One Woman Director | 73.5% |
| Companies with 3 or more Women Directors | 20.1% |

Global Boardrooms

The reality of women in the workplace suggests that the empirical benefits of gender diversity is still not widely known or appreciated. MSCI's report shows the state of women on boards.

If the 50% Club is the correct benchmark for outperformance, it would appear that there is a significant opportunity for companies to attain such outperformance by closing the gender gap. Around the globe, Europe has led the way in bringing women to boards. The specific driver of boardroom numbers in Europe has been the introduction of quotas and targets in recent years, so that the average representation of women in the boardroom in the region stood at 24.4% at year-end 2015, an 80% increase over the previous six years, according to the CSRI study.³

The largest increase of women on boards was in Norway, where women comprised 46.7% of board members in 2016 an increase from 36.6% in 2010. In that year, legislation was introduced requiring that each gender must be represented by at least 40% of publicly-traded company boards. The improvement in Europe overall is a unique achievement, though the pattern of improvement holds across the globe.

Board Talent Pipeline

Although having women in the boardroom sends an important message to all stakeholders, outperformance is also inextricably linked to having women in the ranks of senior management. A key obstacle to bringing women on boards has historically been the lack of a talent pipeline. The CSRI study of 27,000 CEOs and senior management globally in 2016 found that the pipeline of women remains relatively weak despite great strides especially in the past two decades.

At the level of business unit heads, the CSRI study shows that women now make up 9.9% of key senior positions that typically involve P&L responsibility for specific functions or geographic areas and which entail a considerable range of management and commercial

Table 3: CSRI Global Study of 27,000 CEOs and senior management⁴

| | |
|-------------------------------------|-------|
| Women in Management, globally | 13.8% |
| Women in Management, USA | 16% |
| Women CEOs, globally | 3.9% |
| Women CFOs, globally | 14.1% |
| Women CFOs, China | 22% |
| Women business unit heads, globally | 9.9% |

skills. Compared to the 8.5% of business unit heads in 2014, this is a hopeful sign of progress.

Women on Executive Committees

A study by Oliver Wyman consultants looks at the senior management question from the perspective of Executive Committees (ExCos) in the US financial services sector.⁵ Wyman suggests that building the pipeline depends more on getting women onto ExCos than on boards, because ExCo members are more visible—both internally and externally—than Board members. Their competence and visibility make them more effective as role models and sponsors.

Wyman's report shows that in 2003 women on boards and on ExCos were roughly equal. In 2016, the number of women on board grew by 8 percentage points to 20% globally, but women on ExCos grew only 5 percentage points to 16%. The authors attribute this difference to the policies mandating female inclusion on board that was not carried down to the ExCo level.

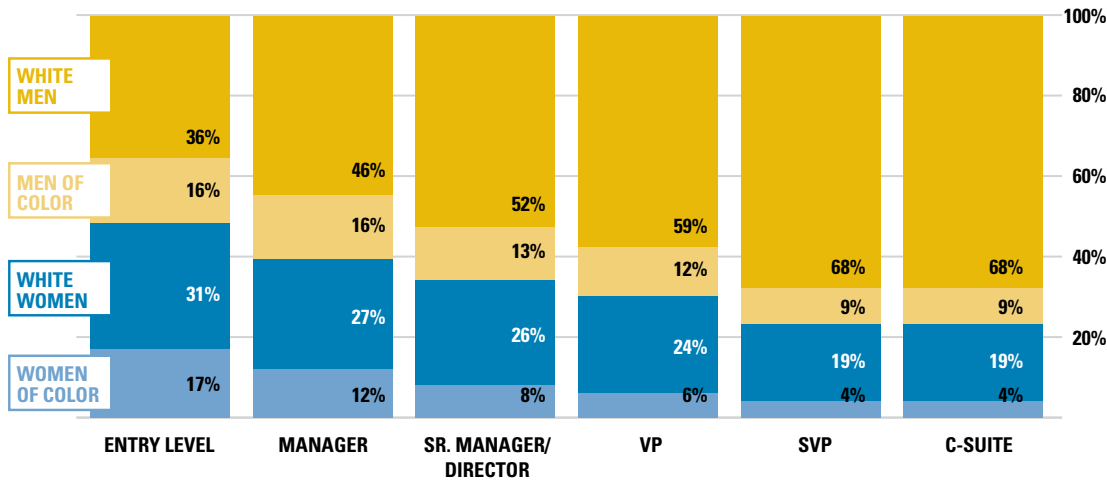
The Early- & Mid-Career Barriers

What has prevented the development of a more robust pipeline of women in senior management? The studies by Credit Suisse Research Institute and Oliver Wyman both show that the mid-career is the moment at which women face barriers that often stunt their career development.

Oliver Wyman and CSRI both document considerable efforts to increase the number of women in senior roles. Yet many companies seem to be stuck in the mud. In the financial services sector, Wyman attributes this to several factors, including:

- insufficiently flexible working options or stigma associated with using them;
- insufficient support for family responsibilities, for both men and women;
- lack of transparency in the promotion process and equal pay;
- lack of internal sponsorship, and;
- persistent unconscious bias.

Figure 3: Representation in the Corporate Pipeline by Gender and Race



Source: McKinsey, *Women in the Workplace 2018*, pg. 6.

In addition, Wyman points out that because many women receive lower pay (and often significantly lower bonuses), they are more likely to perceive the cost/benefits of a career differently than men. While the financial and personal cost of outsourcing child care falls disproportionately on women, it is the pay gap that cements the incentive for women to sacrifice their careers when they do so. In addition, structural constructs, such as maternity leave that is not matched by equal paternity leave, also tip the balance toward female attrition from the work place. While many Maryland institutions have now initiated paid paternity as well as maternity leave, the numbers are relatively small.

McKinsey’s “Women in the Workplace 2018” study of all US corporate sectors shows that young women encounter greater barriers not only at the mid-career level, but that they enter the job market on disadvantaged footing relative to their male counterparts.⁶ Although women graduate from college at a far higher rate, they represent 48% of the new hires relative to the 52% male entry-level hires.

Moreover, this gap widens early in the career life cycle. At the first critical step up from entry-level to manager, two men are promoted for every one woman to the manager level. In other words, women start their careers with weaker initial conditions than their male counterparts, and this gap further widens in the early stages. The table above from the McKinsey report demonstrates the early attrition.

Lack of interest in promotion cannot explain the gender gap. In fact, women are just as ambitious about promotions as men are. The 2017 McKinsey survey shows that US women in aggregate negotiate for promotions and salary increases nearly as often as men do — but clearly with differing outcomes.⁷ Wyman’s study validates this assessment.⁸ In their survey, 58% of women and 59% of men “stated a desire or strong desire to reach a senior position in their organization.”

McKinsey’s 2017 study pinpoints another surprising result. It is a considerably persistent belief that women often choose to leave the workforce due to family obligations. For the fourth year in a row, their study shows that “women and men leave their companies at similar rates, and they have similar intentions to remain in the workforce... Among those who intend to leave, 81 percent say they plan to stay in the workforce... Very few women and men say they intend to leave to focus on the family.” Only 1-2% of employees explicitly say they are leaving to focus on the family.

Table 4: Executive and Millennial Perspectives on What has not Changed

| What Has Not Changed | Executive Perspective | Millennial Perspective |
|--|---|--|
| The issues are subtle and invisible | <i>“The first step is helping people understand that there is a problem”</i> | <i>“I have to adapt to the style and preferences of men. It is subtle but always there at the back of my mind everyday... gender is always there. Men never have to think about it – this is an advantage for them”</i> |
| Men and women are subject to different standards | <i>“Organizations focus so much on women’s weaknesses. They are far more critical of women than men”</i> | <i>“If a woman raises her voice it’s seen as complaining, but when a man does the same, he is making a point, he is being assertive”</i> <i>“All of the women at the top are extraordinary. Some of the men at the top are extraordinary, but all of the women are”</i> |
| Women don’t get enough stretch opportunities | <i>“Firms are more willing to take risks on men. With a woman, she has to prove it first – and because of that, women have less confidence. Men are also likely to take credit when they do not deserve it”</i> | <i>“I see it time and time again where competent women are passed over and a man is promoted instead”</i> |
| Think successful, think men | <i>“When I first started, you had to act like a guy or you did not stand a chance”</i> | <i>“High performers are associated with masculine character traits, so we end up having to ‘masculinize’ our female traits”</i> |
| Networking and bonding are critical – but harder for women | <i>“Women tend to focus on execution – on getting their tasks done. But networking is what gets you the opportunities and enables you to succeed. You have to find ways and time to connect with the senior men”</i> | <i>“Women are given more formal programs but fewer informal opportunities. We are not part of the conversation, of the network”</i> <i>“We are not in the ‘club’. The guys are already, naturally in the club”</i> |
| Too many women remain silent | <i>“I spent most of my career thinking that if I do a good job, I will be recognized. It took me a long time to realize I needed to do more than that”</i> | <i>“You have to ask for the promotion, for the raise, for what you want. But you have to do so carefully. Otherwise, you get told you are too demanding or pushy. Or making trouble. The potential blowback on women for asking for what they want is much bigger than for men”</i> |
| Traditional gender roles and assumptions are still there | <i>“There has been and still is a lot of social pressure for both men and women to fulfill traditional gender roles”</i> | <i>“Many men of our generation still assume their career will take precedence over their wife’s career”</i> <i>“When a woman gets married the assumption is that she is less committed to the job because now she has a husband to support her”</i> |
| There is a lack of role models at the top | <i>“Only when you have someone who looks like you do you internalize that you can make it too”</i> <i>“We set targets for everything in business that is important. So if we value having more women at the top, then we should set targets”</i> | <i>“Women beget women. We need more women at the top – otherwise it will never change”</i> <i>“Each time a senior woman leaves or gets fired - it’s not just about the loss of her. It also crushes the hopes and dreams of all junior women who have so few role models”</i> <i>“I feel alone, isolated. There are so few women we can look to and see that they have made it. Makes you wonder if you can make it”</i> |

Source: *Women in the Financial Services*, Oliver Wyman 2016, pg. 35.

The McKinsey research validates what was also found in the Wyman study. According to the Wyman study, the US market is among those that are “getting there” in terms of their ability to attract and keep women in the workforce. They observe that the US has done all the right things to address the “visible” aspects of gender inequality.

The “invisible” aspects of gender inequality are the next frontier in advancing women in the US. The Wyman report summarizes the tougher issues that remain unresolved in table 4 on page 26. These are major contributors to the intractable, “stuck-in-the-mud” quality of gender diversity efforts in many organizations.

Women in Maryland

We close by looking at the status of female representation at executive levels in Maryland, drawing on the work of the Executive Alliance. For the past 10 years, the group has been measuring the representation of women in the boardroom of public companies headquartered in Maryland. Executive Alliance is a non-profit professional organization whose mission is to accelerate the success and leadership of accomplished women by expanding their impact and influence through advocacy, education and mentorship.

According to their 2018 Census,⁹ women now hold 15% of the board seats in Maryland, an improvement from 9% in 2008. Maryland lags the national average of 22.2% for Fortune 500 companies. Twenty companies in Maryland still have no women board directors.

Encouragingly, the number of companies where women held 20% or more of board seats doubled over the past 10 years to 26 from 13. In addition, the number of women executives increased to 63 in 2018 from 51 in 2008. Of those, 7 women are CEOs from a total 75.

Companies with NO Gender Diversity Improved Greatly

The number of Maryland companies with no women in either the boardroom or the executive suite declined from 31 in 2008 to six in 2018. Five of the six companies in 2018 that did not have women in either the boardroom or the executive suite were not part of the Census in 2008. They are all newer companies and concentrated in STEM industries.

Figure 4: Percentage of Maryland Companies with No Women in Boardroom or Executive Suite

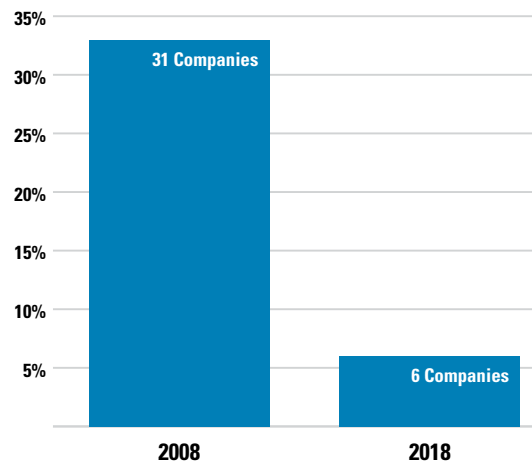
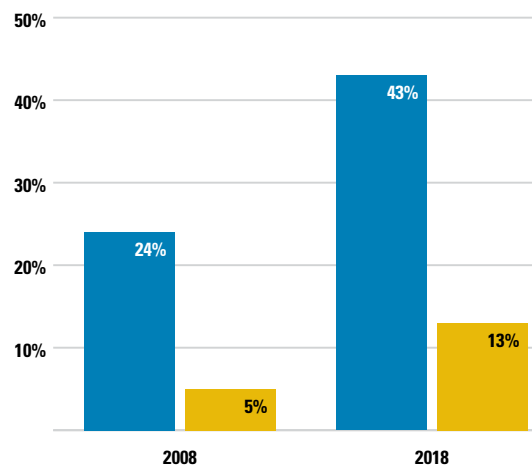


Figure 5: Percentage of Maryland Companies with Women on the Board or Executive Officers



Companies with at least one woman on the board and one woman executive officer

Companies where at least 20% of the board and executive officers are women

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¹ “The CS Gender 3000: the Reward for Change,” Credit Suisse Research Institute, 2016, found at <https://www.credit-suisse.com/corporate/en/research/research-institute/publications.html>

² “Women on Boards: Global Diversity in Gender on Corporate Boards,” MSCI Research Inc, November 2015, as referenced by CFA Institute, <https://blogs.cfainstitute.org/marketintegrity/2016/10/07/the-current-status-of-women-on-boards-in-2016-a-global-roundup/>

³ “The CS Gender 3000: the Reward for Change,” Credit Suisse Research Institute, 2016.

⁴ There is a cultural element to this in China, where finance is considered a stable profession for women. Indeed, the finance major is often more popular at Chinese universities among women than men by a large margin.

⁵ “Women in Financial Services,” Oliver Wyman, 2016.

⁶ “Women in the Workplace 2018,” McKinsey & Company and LeanIn.org, 2018. <https://womenintheworkplace.com/>

⁷ McKinsey, “Women in the Workplace 2017,” pg. 8, <https://womenintheworkplace.com/>

⁸ “Women in Financial Services,” Oliver Wyman, 2016, pg. 16.

⁹ “2018 Census Report: Women Board Directors in Maryland,” Executive Alliance, 2018, <https://www.executivealliance.org/census-report>.



Determinants of College Student Consumption in Maryland

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Have you ever wondered why you bought that ugly Christmas sweater or why your sister grocery shops online? These were the types of questions that motivated our research on the determinants of college student consumption. We asked ourselves why some students make the spending decisions that they do, and what accounts for differences among students, realizing that from an economic perspective how people make decisions about even a Christmas sweater can have a significant and lasting economic effect. We reviewed the existing literature and surveyed students at Towson University in the Fall of 2018 to better understand the economic relationship between social media, materialism and consumption choices for students at a competitive regional public university.

Social Media, Materialism and Student Consumption

Existing literature contains many studies regarding social media, materialism or consumption, however, few consider the relationship between all three or how they influence student consumption decisions. Focusing primarily on materialism, Richins and Rudmin (1994) conclude that those high in materialism are more likely to want tangible items and their findings are supported and extended by the independent work of Richins (1994a, 1994b) who concluded that materialistic individuals are, "...strongly influenced by the perceptions of others when selecting products and prefer possessions that are publicly visible and highly prestigious." Also, Goldberg et. al. (2003) who looked specifically at adolescents found those with high materialism shopped more, saved less and were more interested in new products. This area of the literature has a consistently found positive and significant relationships between materialism and consumption and we expect to find the same result in our research.

The research on social media and its impact has expanded significantly over the past twenty years but we are focused specifically on how social media interacts with online commerce through its influence on materialism. Kamal et. al. (2013) find that materialism is a consequence of social media usage and Vandana (2013) suggests that the media, in all forms, is among the leading cause of materialistic mindsets among youth. The work of Zhang et. al. (2017) begins with an overview of the literature on how consumer engagement in social media relates to e-commerce activities and concludes that there are significant disparities in the findings with some studies suggesting a positive relationship, some none and others a negative. Zhang et. al. (2017) present how this variation is consistent with a Becker type model of time allocation where consumers maximize utility by allocating internet time to social media, shopping, or a mixture of the two. Therefore, they argue that consumers engaged in social media are likely to be more informed which, however has little influence on the likelihood of purchase. These findings are important in part because of the growing use of social media as well as the possible negative impact of materialism on wellbeing as found in Dittmar et. al. (2014) that materialism was associated with higher negative emotions such as depression and anxiety.

The Evidence in Maryland

Our study expands upon what we know about consumer behavior by investigating what determines an individual's level of materialism and how this then influences consumption decisions. After completing human subject training and Institutional Review Board approval, we surveyed Towson University students in the Fall of 2018. With over three hundred and fifty respondents we considered three distinct models: one attempting to model an individual's level of materialism, and two using materialism to predict individual consumer decisions. We use a simple OLS model to estimate the relationship and present a section of the results in Table 1 (page 30).

Our results suggest that students who utilize a greater diversity of social media forms, and those majoring in the College of Business and Economics or the College of Health Professions are more materialistic. These findings are statistically significant and consistent with the argument that students more concerned with materialistic possessions are likely to tend toward the higher status and pay majors as well as toward peers who are

Table 1: OLS model estimating materialism (MVS)

| | coeff. | std. error | p-value |
|---------------------------|--------|------------|---------|
| CBE or CHP students | 2.54 | 0.884 | 0.004 |
| Diversity of social media | 1.05 | 0.381 | 0.006 |
| Low Income | 2.70 | 1.702 | 0.113 |
| Black | 0.159 | 1.180 | 0.893 |
| Hispanic | -5.42 | 4.524 | 0.232 |
| Asian | 0.226 | 1.500 | 0.880 |
| Other Race | 5.99 | 2.303 | 0.010 |

*Model also includes sex, age, college year, sexual orientation, financial aid recipient, employment status, other measures of household income, and if individual considers themselves a lgbtq ally. N = 354.

Table 2: OLS and Logit models using materialism

| | Ad Influence | | | Charity Preference | | |
|--------------------|--------------|--------------|---------|--------------------|--------------|---------|
| | OLS coeff. | Marg. effect | p-value | OLS coeff. | Marg. effect | p-value |
| Materialism | 0.015 | 0.015 | 0.000 | -0.008 | -0.008 | 0.008 |
| College year | 0.058 | 0.061 | 0.031 | -0.072 | -0.080 | 0.004 |
| Sexual orientation | 0.168 | 0.111 | 0.022 | 0.007 | 0.005 | 0.839 |
| Male | -0.115 | -0.124 | 0.033 | -0.102 | -0.101 | 0.034 |

*Models also include age, race, financial aid recipient, measures of household income, employment status and if individual was a student in the college of business and economics or the college of health professions. Reported p-values are from OLS models and N = 354.

more like them. Also, while the literature is mixed on whether social media use has an impact on materialism, our findings suggest a positive relationship between the diversity of social media and materialism and is therefore consistent broadly with Kamal et. al. (2013) and Vandana (2013). We propose that inconsistencies in prior findings outlined by Zhang et. al. (2017) may be due to the measurement of social media – time or likelihood of purchase is not as important as the diversity of social media.

Our findings also indicate that household income and race may help to explain materialism, with students from lower income families and those not falling into standard race categories tending to be more materialistic. While the findings for low household income fall slightly outside of what is traditionally acceptable as being statistically significant in academic research ($p < 0.10$), the parameters are consistent with theory and therefore included in our model. The results for race are a bit more complicated while we find no statisti-



These estimates indicate that a senior is more than eighteen percent more likely to have a purchase decision impacted by advertisements than a freshman.

cally significant differences by race among standard race groups (Black, Hispanic, White and Asian). Those who self-identify as belonging to none of these groups are more materialistic than whites.

In addition to these findings, we are also interested in how materialism influences consumer decisions among a college aged population. More specifically, we look at how materialism influences the impact of advertising on the decision to buy and whether materialism increases the likelihood that an individual will prefer to purchase goods with a charity component. Using detailed models with standard controls, we anticipate that higher levels of materialism will be positively related to the influence of advertising and negatively related to the likelihood of a purchase with a charity component. To test our hypotheses, we run two models using both simple OLS and logistic regressions for a more intuitive interpretation of parameter estimates and selected results presented in Table 2.

We find that materialism has a positive and statistically significant impact on the influence of advertising, with a one-point increase in an individual's materialism increasing the likelihood of purchasing a good because of advertising by 1.5 percentage points. Individuals who are more materialistic are thus more likely to be influenced by advertising; at the extremes the individual with the highest material values score is 70.5 percent more likely to be influenced by advertisements to purchase a specific item than the person with the lowest score. In addition, spending time in college increases the likelihood that an advertisement will influence your purchase decisions with each year increasing the likelihood by 6.1 percentage points. These estimates indicate that a senior is more than eighteen percent more likely to have a purchase decision impacted by advertisements than a freshman. Males are 12.4 percent less likely to be influenced by advertisements while identification as a heterosexual increases the likelihood of being influenced by an advertisement by 11 percentage points. These both, we hypothesize, may be due to the target audience for advertisements.

The second model in Table 2 predicts whether a purchase is influenced by a charity preference, meaning the individual decided to make the purchase decision in part because it was tied to some type of charitable contribution. Our results indicate that more materialistic individuals are less likely to purchase if the good or service is tied to a charity with a one unit increase in materialism resulting in a 0.8 percent decrease in the likelihood of purchasing a good with a charity component. Again, a more intuitive interpretation is that the individual with the highest material values score is 32.9 percentage points less likely to purchase an item because of a charity preference than is the person with the lowest material values score. In addition, effects of both college year and sex are statistically significant. Males are 10 percent less likely to make a purchase because of a charitable contribution. Each year in college reduces the likelihood by 8 percentage points that an individual will choose a good because it is tied to a charitable cause, meaning that seniors are more than 24 percentage points less likely to make these types of purchases.

Conclusion

Based on survey data from Towson University, our findings support previous conclusions that social media usage has a positive impact on materialism and that materialism has a statistically significant and meaningful impact on an individual's consumption decisions. With growing consumer debt expected to reach four trillion dollars by the end of 2018, we believe that it is critical to better understand consumption decisions and how an increasingly prevalent social media may influence consumption through its impact on materialism. We hope that you did not buy that Christmas sweater.

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The New Tax Law and the Effect on Values for Privately Owned Businesses

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The Tax Cuts and Jobs Act of 2017 (TCJA), signed into law a year ago on December 22, 2017, has had several direct effects on valuations of privately owned businesses. This article will explore the TCJA's effects on valuations of privately owned C Corporations and the ways business appraisers are modifying components of two of the common valuation methods — the income approach and the market approach — to account for these changes.

This article will specifically discuss how the TCJA changed the effective corporate tax rate, generally increasing the value of privately owned businesses. The adjustments being made to the cost of capital calculation, discount rates and changes to methods under the market approach will also be outlined.¹

Changes to the Income Approach

As highlighted in national news headlines, the TCJA permanently decreased the statutory federal corporate tax rate from 35 percent to 21 percent, a decrease of 40 percent. This results in significantly lower effective corporate tax rates, which — all else being equal — increases the valuation of privately owned businesses. Specifically, the lower effective tax rate impacts projected cash flows used in the income approach, which focuses on the income producing capability of a company. In this approach, after-tax earnings are discounted back to present value using a discounted cash flow (DCF) or an income capitalization model. In both models, the TCJA's lower effective tax rates increase after-tax earnings, thereby generally increasing the value of privately owned businesses.

Some DCF and income capitalization models include a calculation of a company's weighted-average cost of capital (WACC) to determine a discount rate. The WACC's cost of debt and equity is based on the company's existing capital structure.

The TCJA's lower statutory tax rates cause a decrease in the federal tax deduction on the cost of debt, which increases the after-tax cost of debt in calculating the WACC. A higher after-tax cost of debt will typically result in a higher WACC. There are other TCJA changes such as the deductibility of interest expense which can alter the WACC.

Reducing the tax deduction associated with the cost of debt will ultimately increase the after-tax cost of debt. Holding all else equal, this will result in a higher WACC.² The WACC has an inverse relationship with value meaning the higher the WACC, the lower the value and vice versa.

Overall, higher after-tax earnings discussed earlier typically offset an increase in the WACC. In other words, the TCJA generally increased the value of private businesses.

Changes to the Market Approach

There are two common methods to value privately owned companies using market multiples. The two methods derive market multiples from comparable public companies and historical transactions. Both are useful methods to value privately held companies, but each are impacted differently by the TCJA. Multiples derived from comparable public companies will likely not warrant a TCJA adjustment; however, multiples derived from historical transactions likely will require an adjustment. The reasons for this are explained below.

Market multiples that are derived from comparable public companies are based on the current stock and financial data of the comparable company on a specific date. Common data collected includes the current stock price, shares outstanding and various information from the public company's 10-Ks and 10-Qs. Utilizing this data results in a computation of market multiples that can take many forms such as revenue multiples, discretionary earnings multiples and profitability multiples (examples: EBIT and EBITDA multiples).

That date in which this data is obtained is an important concept when using comparable public company data to derive a relative valuation for a privately owned business. This is the main reason why this method does not warrant a TCJA adjustment. A privately owned company is valued as of a certain date. That date may be as of January 15, 2018, or it could be as of April 1, 2015. There is no limitation on the date. However, whatever date is utilized for the valuation, only the known or knowable information as of the date can be utilized in the valuation. If the valuation date is January 15, 2018, then only known or knowable information as of the date can be utilized. The same concept applies for other dates such as April 1, 2015.

Under the assumption of efficient markets, any TCJA adjustments were reflected in equity prices either before the TCJA was passed (considering it was known beforehand it would pass) or shortly after December 22, 2017. Since the public company equity prices already reflect the TCJA effects for any point in time after December 22, 2017 (or shortly thereafter), no additional adjustment is necessary when using this method for a private company valuation.

If a valuation was performed for a private company in August 2017, there would be no adjustment necessary either because it was not known or knowable at that point in time if the TCJA would be impacted.

A TCJA adjustment is warranted when using transaction data to derive multiples for valuing privately owned companies. The TCJA adjustment would apply when 1) the valuation date is after the date that the TCJA passed and 2) the transaction data that is being used occurred before the TCJA passed. In this instance, the transactions were based on pre-TCJA tax law with higher corporate taxes. The transactions that occurred pre-TCJA do not reflect a multiple that is based on today's current tax structure.

The pre-TCJA transactions can be useful and derive a meaningful multiple to be applied to the privately owned business. However, they must be adjusted to reflect the differences in the tax structure between the time these transactions occurred pre-TCJA and the valuation date post-TCJA.

There is a different level of adjustment depending on whether an equity multiple or enterprise value multiple is used. An equity multiple would yield the market value of equity for the private company and an enterprise value multiple would yield the market value of the debt and equity of the private company. The TCJA adjustment for the equity and enterprise value multiple is an approximately 15 to 25 percent increase. The TCJA adjustments will vary slightly based on state tax rates and other factors. The data used in this example is based on Federal and Maryland state tax rates.⁴

To illustrate, let's say a previously acquired company had an enterprise value of \$120,000,000 and an equity value of \$80,000,000. These values were on the date that the company was acquired prior to the TCJA. This company's latest 12-month (LTM) EBITDA was \$25,000,000 and its LTM net income was \$8,100,000. The implied MVIC/EBITDA⁵ multiple was 6.0 and the implied MVE/Net Income⁶ multiple was 9.88. Based on the pre-TCJA tax structures, these will both lead to the same equity or enterprise value.

As shown in the table below, when changing the tax rate from 40 percent to 25 percent, the implied MVIC/EBITDA and MVE/Net Income multiples are no longer equal. This is due to Net Income increasing but EBITDA remaining the same.

When the implied multiples are applied to the subject company in the table above, the market value of the company's equity changed by \$20,000,000 (or 20 percent) due to the change in tax rate. The new market value of equity is now \$100,000,000. To correct for this difference, a mathematical formula can be used to adjust both equity and enterprise value multiples. See the formula (Table 2).

By making this adjustment, the new tax rate will be reflected in these multiples. As a result, pre-TCJA transactions can be utilized when valuing private companies post-TCJA. Using the example of a 40 percent tax rate (old) and 25 percent tax rate (new), the adjustment to the equity multiple is 1.25 and the enterprise value multiple is 1.167. The table below shows how incorporating these adjustments make the equity and enterprise values equity based on the new tax law:

Once the multiple adjustments are applied, we can see that the value has increased to reflect the lower effective tax rate. These adjustments enable practitioners to continue to use pre-TCJA transaction to derive market multiples for valuation purposes. Transactions from 2016 and 2017 can be useful for valuing private business in 2018, but an adjustment is required due to the TCJA. The adjustment differs by state and jurisdiction depending on the state and local tax laws.

Table 1: Change in Equity and Enterprise Value between Old v New Tax Law

| | Old Tax Law | New Tax Law |
|---|---------------|---------------|
| Equity Value Adjustment Using EBITDA Multiple Approach | | |
| EBITDA | \$20,000,000 | \$20,000,000 |
| Pre-2018 Multiple | 6.00 | 6.00 |
| Enterprise Value | 120,000,000 | 120,000,000 |
| Less: Debt | (40,000,000) | (40,000,000) |
| Equity Value | 80,000,000 | 80,000,000 |
| Equity Value Adjustment | 1.00 | 1.25 |
| Adjusted Equity Value | \$80,000,000 | \$100,000,000 |
| Equity Value Adjustment Using Net Income Multiple Approach | | |
| Pretax Income | \$13,500,000 | \$13,500,000 |
| Taxes (40% old tax law, 25% new tax law) | (5,400,000) | (3,375,000) |
| Net Income | 8,100,000 | 10,125,000 |
| Pre-2018 MVE/Net Income Multiple | 9.88 | 9.88 |
| FMV of Equity | \$80,000,000 | \$100,000,000 |
| Enterprise Adjustment | | |
| Enterprise Value | \$120,000,000 | \$120,000,000 |
| Enterprise Value Adjustment | 1.000 | 1.167 |
| Adjusted Enterprise Value | 120,000,000 | 140,000,000 |
| Less: Debt | (40,000,000) | (40,000,000) |
| Adjusted Equity Value | \$80,000,000 | \$100,000,000 |

Table 2: Formula to Adjust Equity and Enterprise Value for Tax Law Change

Equity Value Adjustment

$$\frac{(1 - \text{Old Tax Rate})}{(1 - \text{New Tax Rate})}$$

Enterprise Value Adjustment

$$1 + \frac{(1 - \text{Old Tax Rate})}{(1 - \text{New Tax Rate})} - 1 \times \frac{\text{Equity}}{\text{Enterprise Value}}$$

There are a lot of nuances of the TCJA that will have an impact on the value of privately held businesses which may increase or decrease value. Holding all else equal, the decreased corporate tax rate and the adjustments to market multiples could increase value for these businesses. The effects of the TCJA are still being studied and discussed but there's no doubt that there are changes to the way privately owned business are valued as a result.

Reference

¹ Please note that this article is not all-inclusive and will not apply to every privately owned business. There are many factors and elements that may change the results of value based on the TCJA. The information presented in this article is the outcome of various stress models and research done on the TCJA and the effects on business value holding many variables constant.

² The Cost of Equity may change as well, but we have held it constant in this example for simplicity.

³ The TCJA also provides a new individual tax rate structure, and various other permanent and temporary changes to individual income tax deductions, and as a result the tax law will change the value of pass-through entities including partnerships, LLCs and S Corporations. While pass-through entities have historically benefited from tax advantages over C Corporations, these advantages may be diminished under the TCJA for some businesses. This article is focused on the changes affecting C Corporations and will not address the TCJA and pass-through entities.

⁴ There may be a situation where an adjustment is not warranted and should not be used. The example given is a hypothetical example in which an adjustment is required.

⁵ Market value of invested capital (MVIC) is assumed to be the same as enterprise value and abbreviated for purposes of this article.

⁶ MVE = market value of equity.



Protecting Maryland's Voting Processes

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Introduction & Motivation

The Help America Vote Act of 2002 made sweeping reforms to the nation’s voting processes to include replacing electronic voting equipment and phasing out paper punch cards, the latter of which became a point of contention during the 2000 Presidential election (US EAC, 2018). The integrity of the new electronic systems was not challenged until the 2016 Presidential election, when the Department of Homeland Security admitted that the voting systems from 21 states, including Maryland, were targets of attacks (Horwitz, Nakashima, and Gold, 2017). Such news, along with continued mainstream media reporting regarding interference by and continued potential for a foreign actor or nation state to influence or destabilize the outcome of an election, has led to concern about the integrity of voting processes (NYT, 2018). Our applied research addresses these concerns and explicitly speaks to the security of Maryland’s voting processes by developing process maps for election systems, identifying vulnerabilities in the voting process based upon these process maps, and establishing a risk model framework to assess and mitigate the vulnerabilities. We also contribute public service education of training modules for Election Judges, providing guidelines and best practices for poll workers to identify and mitigate threats, which supports the overall security of the voting systems. We partner with Harford County, Maryland, to identify specific cyber, physical, and human vulnerabilities in the election process. The State of Maryland uses the same election process throughout the state, so by analyzing Harford County’s election process, we generalize our results to the overall process for Maryland. Our methodology can also be extended to industries at large, as a basic approach for identifying and mitigating potential cyber vulnerabilities.

The Center for American Progress (Root, et al., 2018a) conducted a detailed study of each state’s election systems, along with the District of Columbia, and created a grade for each state based on the requirements and practices related to audit trails, absentee ballots, voting machines, and voter registration systems. Grades ranged from A to F, similar to a report card. Maryland was a top scoring state with an overall grade of B, implying that the state is rather secure in its voting process. No state received a grade of A (Root, et al., 2018b). According to the report, Maryland adheres to cybersecurity standards and has a paper audit trail, but struggles with post-election audits. Therefore, opportunities for improving the voting process exist; in general, states must be responsive to evolving and adaptive adversaries.

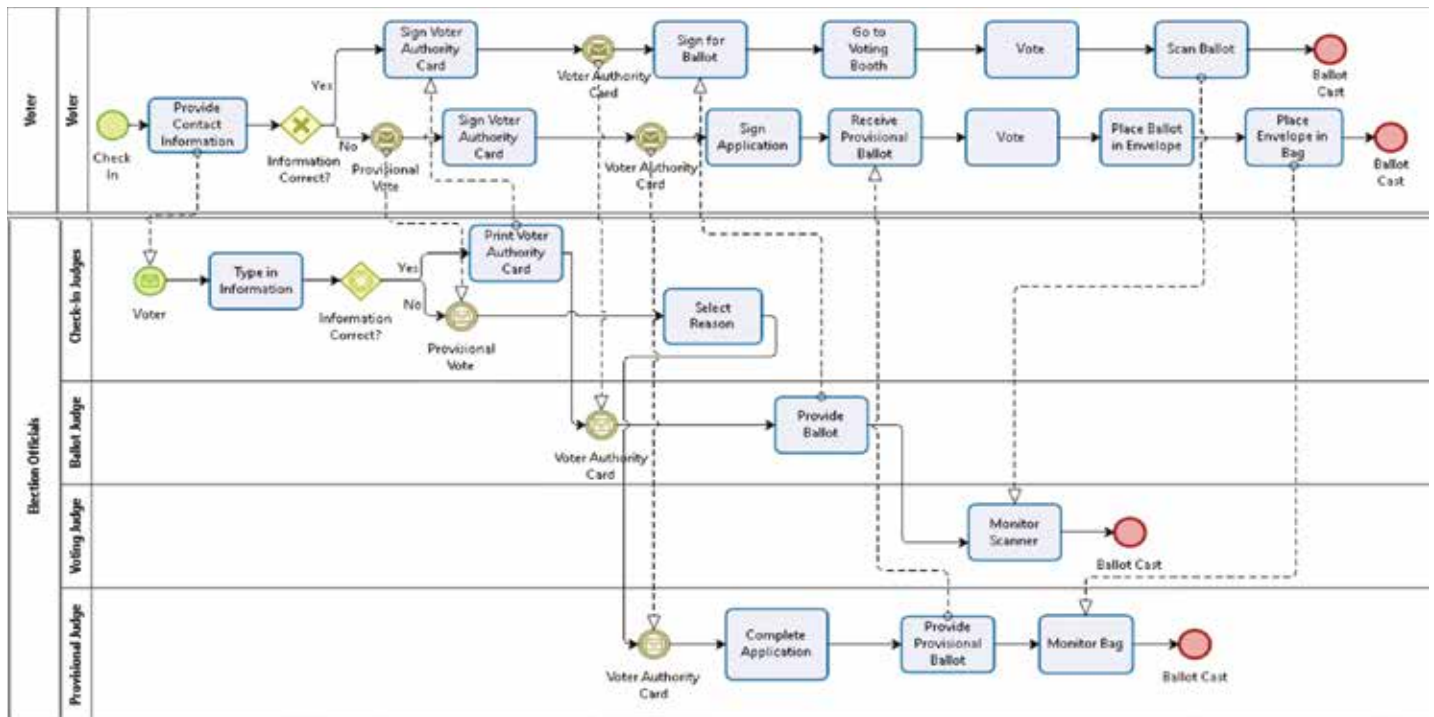
Table 1: Threat Scenarios, Mitigations, and Risk Assessment

| Threat | Vulnerability | Mitigations in Place | Highest Risk |
|----------|---|----------------------|--------------|
| CYBER | Hacking of electronic poll books or voter registration data. | ■ | ■ |
| | Compromised data is copied onto flash drives containing the data for all registered voters, which is then passed onto the local Board of Elections. | ■ | ■ |
| | The certified State of Maryland network is hacked, whereby all information uploaded is then compromised. | ■ | ■ |
| | Hacking of the Maryland State Board of Elections database results in malware being passed to the local Board of Elections through local certified network servers. | ■ | ■ |
| | A malicious cyber actor overwrites unprotected memory on the memory cards used by optical scanners. | ■ | |
| | Memory storage devices containing voter data are not encrypted properly. | ■ | |
| | Phones issued by the local Board of Elections and used on-site contain existing malware or other cyber-related concerns. | ■ | |
| INSIDER | Election Judges may compromise the polling place, election equipment, ballots, and tabulated results by error, carelessness, distraction, or deliberate means. | ■ | |
| | An individual posing as an Election Judge assists in the set up of the voting equipment, deliberately changing the settings or information and thus corrupting the process. | ■ | |
| | A Chief Judge tampers with the memory sticks or ballots, thus corrupting the whole election process. | ■ | |
| | An individual uses their cell phone or other electronic device during the election process to remotely tamper with the equipment. | ■ | |
| | Observers selected by electoral candidates distract the election officials during the voting process. | ■ | |
| | Individuals posing as observers are actually malicious actors. | ■ | |
| | An individual training to be an Election Judge prior to the election informs others of the voting process or election procedures. | ■ | |
| | An individual can become an Election Judge without a background check. | ■ | |
| | A county hires an Election Judge on the day of the election. | ■ | |
| | An observer who surveys the electoral data, such as the number of voters who have cast provisional ballots, uses the data to compromise the system. | ■ | |
| PHYSICAL | Access compartments on ballot scanning units are not secured. | ■ | ■ |
| | Ballots and memory sticks are intercepted or stolen and replaced with replicas that have corrupted information. | ■ | |
| | An individual claims to have a disability and has another individual help them vote; they both act to corrupt the machinery. | | |
| | Memory sticks are compromised on trips to or from the election board site and the polling place. | ■ | |
| | Voting machines are compromised within the supply chain. | ■ | |
| | An individual steals the passwords for the voting equipment and resets the settings to the machines prior to the election. | ■ | |
| | An individual installs malware on the memory sticks prior to the voting process. | ■ | |
| | The chain of custody is not preserved when transporting voting equipment. | ■ | |

Risk Model

Risks and threats to voting systems can be organized into three groups: cyber, physical, and insider. Cyber-related threats include the use of digital machines and media for collecting, tallying, and transmitting votes, regardless of any existence of an Internet connection in the system. Physical threats involve tampering with equipment before, during, or after Election Day. Human behavior threats are related to adversary or insider actions, which can range from simple mistakes made by

Figure 1: Voting Process Map



users to a malicious actor's deliberate actions of ill-harm to a system or the process. To facilitate an understanding of the total risk in the Maryland elections process, we examined the literature on voting vulnerabilities (e.g. Blaze, et al., 2017; Brunner, 2007; Cahn, 2017), reviewed Election Judge training manuals (Keene and Livingston, 2016), toured a mock precinct polling place, and interviewed officials at the Harford County Board of Elections. Gathering data at large from the literature as well as details specific to the Harford County process helped to assess the relative security of the elections equipment as well as holistically determine any and all vulnerabilities in the current process.

Our analysis identified 25 vulnerabilities in the Harford County process as of the 2018 primary election, which are outlined in Table 1. Note that concerns span cyber, physical, and insider threats, and these vulnerabilities are a list of potential ways the process can be impacted. We have no data to support that the process has already been impacted negatively in these ways. Figure 1 provides an illustration of the elections process, mapping out the events from when the voter checks into the polling facility to when their ballot is cast. Responsibilities and decisions for both the election official and voter are also shown to aid in identifying who is responsible for each task and making decisions. Understanding roles

of voting process administrators and how they relate to the process facilitates an overall awareness of the potential actions that can mitigate threats.

The State of Maryland and Harford County are already mitigating some of these vulnerabilities through various initiatives and policies. However, in order to understand if enough action is being taken along with the extent of the risk associated with each vulnerability, we develop a model to assess total risk and identify various focus areas for mitigating weaknesses. Through an exhaustive literature search, interviews with Board of Elections personnel, multiple site visits, and a review of best practices in cybersecurity, we identify potential mitigations to decrease the probability and impact of an attack. These mitigations include some practices already in place and other suggestions that we develop. Table 1 identifies the vulnerabilities that have current mitigations in place. For example, mitigating weak passwords includes changing passwords for every election, securing the passwords before and after use, and updating passwords from equipment defaults. Weak encryption can be improved by changing the default encryption settings and wiping the data from each memory card after each use. Vulnerabilities associated with memory can be mitigated by using strong encryption, changing the memory cards for each election, wiping the data off

of the memory card after use, building memory cards to detect changes in software, and keeping the cards locked with unique keys and limited access.

Malware concerns can be mitigated by the state informing localities of potential attacks, building equipment to detect changes in software, auditing the equipment before use with a paper trail, and providing limited access to the equipment. A break in the chain of custody for equipment can be mitigated by ensuring bipartisan teams watch the memory sticks at all times, restricting access to equipment while not in use, building equipment to detect changes in software, and auditing equipment upon arrival at each destination.

The first phase of the risk model is a proof of concept to identify the vulnerabilities considered most risky, specifically those that warrant the greatest attention from the state. To fully understand threat, we employ data from the United States Elections Assistance Commission (2009), which are a comprehensive inventory of attack trees for various types of elections equipment, including the precinct count optical scanning devices used in Maryland. This analysis led to a score related to the probability of an attack against a vulnerability occurring. The score, which is developed by our team, relates to the frequency of T (terminal), A (and), and O (or) nodes on the attack tree and its association with a given vulnerability. Then, vulnerabilities earning scores above a certain threshold score are identified as the riskiest and therefore require the most attention when mitigating threats. Table 1 identifies which cyber, physical, and insider vulnerabilities fall into this category.

The next step is to extend the risk model to a Markov Chain representation, in order to holistically examine tradeoffs between cyber, physical, and insider threats. Such a model will further develop the probability assessment for every vulnerability and also identify when an attack is most likely to occur in the elections process (election preparation, in-person voting, and wrap-up voting). These extensions will demonstrate an evolving threat posture over time and can generalize the model beyond Maryland's process.

Election Judge Training

Identifying vulnerabilities are of concern, but Election Judges need to be empowered to respond to and mitigate cyber, physical, and insider threats if they occur at a polling place. The second phase of our research develops training modules for Election Judges. Currently, poll workers in Maryland do not receive training in

cybersecurity awareness. All training is done in person and can begin a few months before the election. We are developing short 20-minute online modules that Election Judges can view and interact with to gain cyber awareness and threat training. These modules will be used by Harford County as a refresher for judges before Election Day and will be administered via the Cyber4All initiative, which is run by the Department of Computer and Information Sciences at Towson University. This phase of our research translates the academic risk model into action and enables Election Judges to become the first line of defense to the integrity of votes cast on an Election Day.

Extensions

The approach offered in this research can be extended beyond voting processes. Firms can use this methodology to identify potential cyber, physical, and insider threats in their own organizational systems. Then, risk models can be formulated to identify the most important vulnerabilities to mitigate, coupled with employee training, to respond to threats. Such an approach extends cybersecurity concerns into a holistic assessment of the entire system, examining tradeoffs and identifying where to focus critical resources and budget expenditures.

Conclusions

Threats to the country's voting systems are persistent and evolving. Most academic research examining threats to the voting process focus on the state's role. In contrast, this research examines threat at the local precinct level, where the public actually interacts with the voting process. In doing so, the findings may be more practical for election officials to implement in voting processes. Our partnership with Harford County leads to applied impact to increase the integrity of votes cast on Election Day. While Maryland has one of the most secure voting processes, room for improvement exists. By addressing weaknesses found in our state's voting systems, Towson University continues to take a leading role in community engagement, improving security for the citizens of Maryland.

Disclaimer

The views expressed in this paper are those of the authors, and do not represent the official policy or position of the United States Military Academy, the United States Army, or the United States Department of Defense.

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How Towson University Students Would Invest \$100,000

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The Survey

The Towson University Investment Group (TUIG) conducted a research survey that asked participating students what five stocks they would invest in if they had \$100,000. We then created two hypothetical portfolios based on the top 50 stock votes.

Towson University has six colleges: College of Business & Economics (CBE), College of Health Professions (CHP), Jess & Mildred Fisher College of Science & Mathematics (FCSM), College of Liberal Arts (CLA), College of Fine Arts & Communication (COFAC), and College of Education (CE). The survey results from each college will make up two different portfolios: one for CBE students, and one for non-CBE students.

On 10/5/2018 hypothetical portfolios were created via Morningstar to compare key statistics to the S&P 500. Profiles were created to determine whether an aggressive, moderate, or conservative approach was present. Creating two portfolios allows us to show different investment behaviors based on educational background.

Major Holdings

As presented in Table 1, the top five holdings from the 2018 survey account for 55.09% of the CBE portfolio, 68.92% of the Non-CBE portfolio, and 53.25% of the combined portfolio. We see similarities among these portfolios with holdings in Amazon.com (AMZN), Apple Inc. (AAPL), Alphabet (GOOG) and Nike (NKE). Among the top five holdings, the portfolio differences lie in the preference of Tesla (TSLA) for CBE students and Under Armour (UAA) for Non-CBE students.

It is worth noting that the average student response time was only 1 minute and 49 seconds, while in reality one would do extensive research before investing. Warren Buffet once explains that, "In the short term, the market is a popularity contest. In the long term, the market is a weighing machine." The short response time can suggest either prior research or a recency bias.

In 2017's survey the top five holdings were AMZN (11.9%), APPL (10.1%), GOOG (8.8%), MSFT (Microsoft Corp. 7.7%), and UAA (6.0%). Two major changes from 2017 are UAA and MSFT: UAA did not make the CBE top 5 (1.0%) and MSFT did not make either top 5 holding lists (2.35% of CBE and 1.67% of Non-CBE). In 2016 the top five holdings were Twitter Inc. (8.3%), Under Armour Inc. (6.7%), Apple Inc. (6.4%), Yahoo (6.3%), and Facebook, Inc. (6.2%).

Table 1: Top 5 Responses

| CBE | | Non-CBE | | Combined | |
|---------|------------|---------|------------|----------|------------|
| Holding | % of Votes | Holding | % of Votes | Holding | % of Votes |
| AMZN | 13.95% | Cash | 34.78% | Cash | 24.10% |
| Cash | 13.95% | AAPL | 11.59% | AAPL | 10.50% |
| AAPL | 12.17% | AMZN | 6.92% | AMZN | 8.45% |
| GOOG | 6.23% | GOOG | 6.06% | GOOG | 5.44% |
| TSLA | 5.04% | NKE | 5.88% | NKE | 4.76% |
| Total | 51.34% | Total | 65.22% | Total | 53.25% |

Table 2: Portfolio Characteristics and Stock Type Comparison

| | Non-CBE | CBE | S&P 500 |
|-------------------------------|-----------|-----------|-----------|
| Price/Prospective Earnings | 22.1 | 23.79 | 18.02 |
| Price/Book Ratio | 6.15 | 5.92 | 3.15 |
| Return on Assets (ROA) | 8.23% | 7.25% | 7.98% |
| Return on Equity (ROE) | 23.09% | 15.26% | 23.12% |
| Projected EPS Growth - 5 yr% | 17.44% | 20.26% | 12.28% |
| Dividend Yield | 0.60% | 0.68% | 1.62% |
| Average Market Cap (Millions) | \$200,840 | \$201,872 | \$109,713 |
| % of High Yield | 1.97% | 1.85% | 3.64% |
| % of Hard Asset | 0.58% | 1.55% | 7.47% |
| % of Cyclical | 62.64% | 65.09% | 44.13% |
| % of Slow Growth | 6.45% | 3.53% | 17.54% |
| % of Classic Growth | 9.04% | 6.84% | 11.26% |
| % of Aggressive Growth | 6.13% | 9.40% | 6.88% |
| % of Speculative Growth | 11.54% | 10.29% | 5.13% |

Sector Allocations & Performance

Figures 1 and 2 represent sector allocations from each portfolio. Among Towson University students we find favorability in Consumer Cyclical, and Technology, and unfavorability in Utilities, Communications Services, and Basic Materials sectors. Consumer cyclical and technology stock allocations decreased from 85% in 2016, to 76% in 2017, and now a combined average of about 64% in 2018. The increase in diversification is a good sign regarding students' company exposure. We believe that the large portions of cash allocations are attributable to investment disinterest, erroneous results, or lack of knowledge from the posed survey question.

Figure 1: 2018 Sector Allocation of CBE Students Survey Portfolio

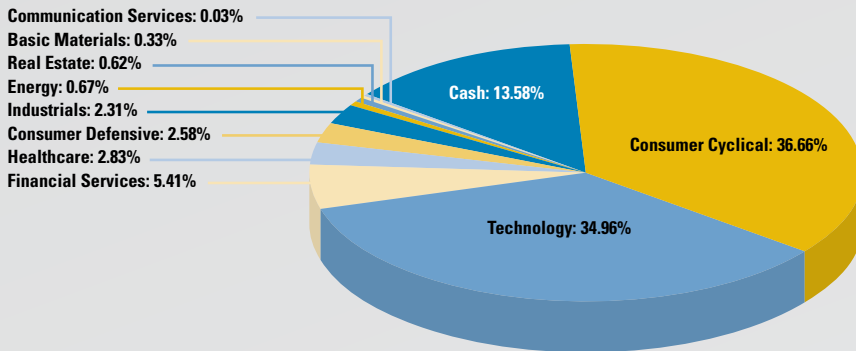


Figure 2: 2018 Sector Allocation of Non-CBE Students Survey Portfolio

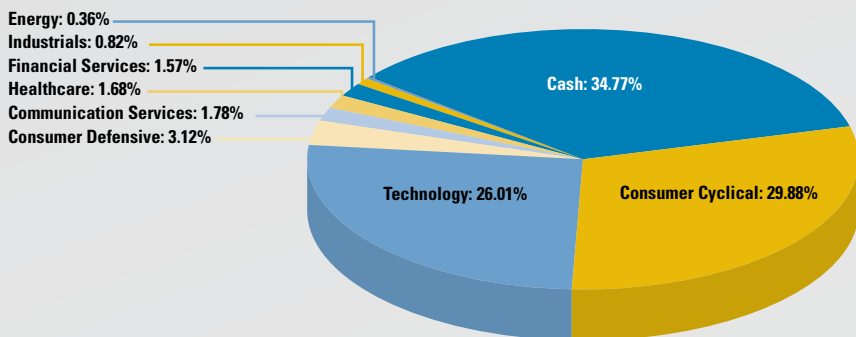


Figure 3: TU Survey Portfolio Performance

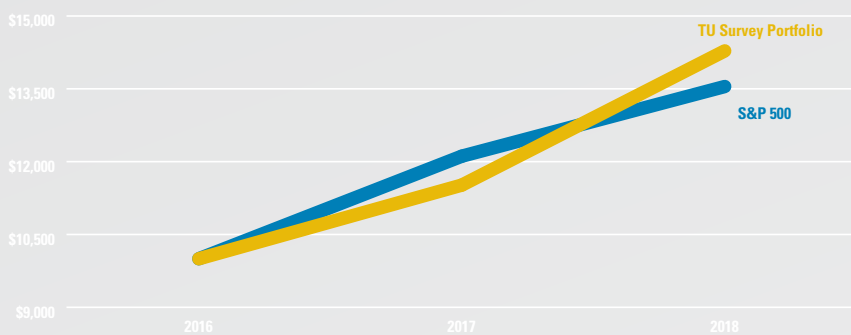


Table 3 Portfolio Performance

| | TU Survey Portfolio | S&P 500 |
|----------|---------------------|-------------|
| 10/31/16 | \$10,000.00 | \$10,000.00 |
| 10/31/17 | \$11,516.81 | \$12,112.32 |
| 10/10/18 | \$14,281.03 | \$13,547.20 |

Portfolio Metrics

Table 2 illustrates portfolio characteristics compared to the S&P 500. Attributable to the large weighting of information technology stocks, both student portfolios have higher market capitalization and higher P/E, however with lower dividend yields. Table 2 also provides insight to the respective approaches in each portfolio and suggests that both portfolios focus towards aggressive growth stocks. Both student portfolios are overweight in cyclical and speculative growth stock types. This subjects student portfolios to an increase in individual stock risk than the S&P 500.

Observations

We deem survey votes to represent investment interest in company stock and utilize them to illustrate popular trends and company presence among Towson University students. Table 1 reports top five holdings among all Towson students, whereas Tesla (2.72%), Facebook (2.33%), Disney (2.24%), Under Armor (2.24%), Microsoft (1.75%) and Netflix (1.75%) ranked sixth to tenth, respectively.

Facebook, once a top holding in 2016, is an unfavorable social media platform among Towson University students. Volatility from the 2017 election allegations with Cambridge Analytica concerns students with issues of privacy and cyber security. Google, Amazon, and Apple face similar issues, but students favor these companies due to the heavy integration with research, shopping, and communication. YTD, Amazon shares are up 53.32%, Apple shares are up 31.70%, Google shares are up 7.33%, while Facebook shares are down 12.96%.

Last year Tesla received 32 votes in 2017, which has decreased to 28 this year. Even though Tesla shares are down 18.01% YTD, many students still favor this company for its innovative technology. It will be interesting if Musk can build a team for Tesla, as production pressures loom over backorders. Utilizing delegation could help drive more of his innovation and visionary efforts towards SpaceX.

Tilray and Canopy Growth retained a total of 11 votes, which is a 55% growth in marijuana industry interest

among Towson University students. While there were only 10 dispensaries positioned to open in Maryland last year, there are now 34 open and 102 approved dispensaries in the state. It is eminent that the industry is beginning to look brighter, as Tilray became the first company to export legal marijuana into the US for clinical trials to treat essential tremors at the University of California at San Diego. Canopy Growth was the largest publicly traded marijuana company, but recently became dethroned by Tilray. From its IPO in June, shares of Tilray have grown over 475%.

Performance

Table 3 presents the two-year hypothetical growth of \$10,000 invested in the S&P 500 Index, and the TU Survey Portfolio from October 2016 to October 2018. The TU Survey Portfolio is reallocated every year based on most recent survey results. As we can see, the TU Survey Portfolio outperformed the S&P 500 Index in 2018. This is a result of high performances in top allocations through October 10, 2018. Stellar performances of Twitter (+9.30%), NFLX (+62.08%), APPL (+25.60%), and AMZN (+47.62%) weighed in on outperforming the benchmark. Their weights are 11.67%, 7.52%, 6.99%, 6.72% respectively. These top performers overshadowed losses from AABA (-20.13%), FB (-16.56%), SBUX (2.81%), and WMT (-2.87). Their weights are 7.09%, 4.96%, 4.39%, and 2.17% respectively.

CBE vs Non-CBE Confidence

As a part of our survey we asked participants to rate their confidence on a scale from 1 - 5: 1 being least confident and 5 being most confident. We then measure the averages, rank colleges from least to most confident [Disclosure]. Based on our analysis, we find that CBE students ranked highest (2.92) and College of Education students ranked lowest (1.36) in their hypothetical investment decisions. We see a correlation in that lower confidence levels result in higher cash allocations.

President Trump recently replaced NAFTA with the USMCA (United States- Mexico- Canada- Agreement), and is now focusing his efforts towards ending the China trade skirmish. Tariffs are weighing in on billions of dollars worth of goods and raw materials. We anticipate the impact on domestic supply chain management characterizes the favoritism in tech stocks, and also the uncertainty and risk-aversion (which is what we believe to be represented by the large allocation to cash) among TU students.

Conclusion

Our survey resulted in a total of 206 responses from Towson University Students. Among the two portfolios, students generally had similar sector weightings, but no school posted an above average confidence level. Our economic indicators suggest that the U.S. may be approaching a changing point in the business cycle. We believe this indicates the higher risk-aversion among students. Additionally, student confidence levels could suggest that a lack of financial knowledge may inhibit response accuracy. Through evaluating macroeconomic indicators, tallying stock votes, aggregating portfolios, and analyzing results we find evidence to suggest that students trend towards familiarity, but lack confidence in making investment decisions.

Through our tenure as TUIG executives we have seen first hand that financial literacy is lacking in many young Americans. Institutions, specifically primary and secondary schools, are taking action by outsourcing the task of teaching financial literacy. One example is Ortus Academy, a Baltimore based nonprofit organization, which teaches financial literacy through a simulation based game. Members of TUIG volunteer with Ortus Academy annually, because we believe that programs like this will lead future generations to becoming more financially literate.

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TUIG Disclosure:

The average confidence level of all TU students is 2.38, with an average of 2.92 for CBE students and 2.09 for non-CBE students. Averages for students in other colleges are: FMS (2.37), FA (2.26), HP (2.22), LA (1.82), and EDU (1.36).

TUIG is a student run organization that was created as a forum for highly driven, like minded students to gain real-world experience through quantitative and qualitative research. We offer students a professional environment to discuss, learn, and connect with real-world financial experiences. TUIG maintains professional relationships with a widespread network of integrated local Maryland businesses in order to provide members with the opportunity to create interpersonal relationships with mentors and potential future employers.



Contributors

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KAI JOHNSON is a senior Economics major at Towson University. She is the president of the Undergraduate Research Club and has taken on various roles including recruitment officer, HCLC committee head, and currently holds the highest student role in the Honors College as the Student Director. This past summer Kai was selected to intern at Morgan Stanley on the Cash Settlements and Foreign Exchange team and has been offered a job at Morgan Stanley upon graduation, which she has recently accepted.



MATTHEW Q. LOWINGER is a junior majoring in Business Administration with a Concentration in Entrepreneurship and minoring in Business, Communications and Liberal Arts at Towson University. He excites, imagines and transforms the entrepreneurship ecosystem in Baltimore, Maryland acting as a startup consultant and advisor. Matthew has worked for wealth management, hedge fund, incubators/startup hubs, and consulting firms conducting capital raising projects, generating financial analysis + modeling, and consulting early-stage ventures. He is the Co-Founder of Innov8MD, an initiative to celebrate collegiate entrepreneurship across Maryland. Matthew is an active volunteer with Baltimore's chapter of National Foundation for Teaching Entrepreneurship.



BRADFORD MUIR is an Associate in Ellin & Tucker's Forensic and Valuation Services (FVS) Group. Brad has a background in finance and a Bachelor's degree in Economics from the George Washington University. He performs valuations for industries including government contracting, manufacturing and distribution and professional services. Brad also prepares financial models and conducts financial statement analysis and industry and economic research in support of commercial and intellectual property damages litigation engagements.



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MEGAN PRICE is a May 2018 graduate of Towson University. She graduated with a Bachelor's Degree in Business Administration with a concentration in Project Management and Business Analysis. She has experience as the founder of the first student-run business at Towson University and is currently working as an inventory planner at Rhee Brothers.



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Contributors

TYLER SIMONDS is an undergraduate senior majoring in Mathematics with a concentration in Applied Mathematics at Towson University. As Portfolio Manager for the Towson University Investment Group, he analyzes companies' financial metrics and underlying trends to determine suitable investment opportunities to grow the group's \$180,000 portfolio. Tyler currently holds an internship at Heritage Financial Consultants, a financial planning firm in Hunt Valley, MD. Following his graduation in May of 2019, he plans to complete the CFA program



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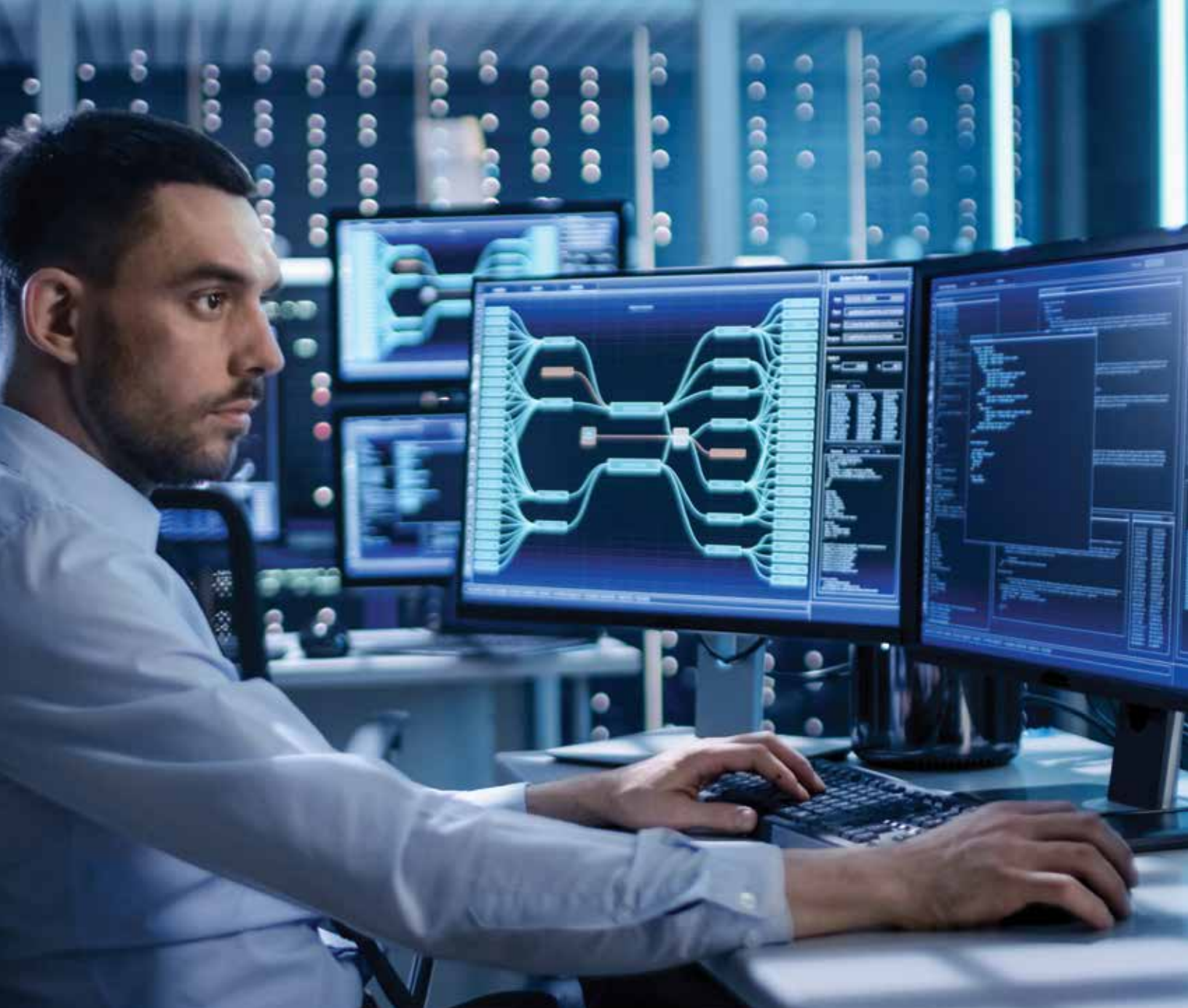


DYLAN VASBINDER is an undergraduate senior majoring in Business Administration with a concentration in Financial Planning. He currently serves as the President of the Towson University Investment Group, and this year he aims for organizational success through outperforming the S&P 500, curating specialized events for students seeking to new learning opportunities, and promoting professionalism, camaraderie, and achievement within the student body. Additionally, Dylan holds an internship at Heritage Financial Consultants, a financial planning firm in Hunt Valley, MD. Succeeding graduation, Dylan plans to obtain the CFP designation by joining an advisor program with a Registered Investment Advisor firm.



ZHEN ZHANG, PH.D., CPA, is an assistant professor in the Department of Accounting at Towson University. Her research focuses on organizational environment affecting employee behavior, including how top management integrity impacts employee budgetary reporting behavior, how financial reporting reliability impacts top management turnover. Her research interests expand to various areas in Accounting, including management accounting, financial accounting, taxation and accounting education. She teaches costs accounting and taxation. She completed her Ph.D. in accounting at Georgia State University in 2015. She worked as a tax accountant in public accounting before her Ph.D. study. She also received Master of Taxation, Master of Accounting and Bachelor of Economics.





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