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THE TAX CUTS AND JOBS ACT AND ITS IMPACT ON  
AUTOMATION AND ARTIFICIAL INTELLIGENCE

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## ABSTRACT

The Tax Cuts and Jobs Act of 2017 (TCJA) is a major change to the United States Internal Revenue Code, the tax law that governs individuals and businesses. The Act is the largest and most significant of its kind since 1986, when the IRC was last modified to this extent. The overall purpose of the TCJA is to provide tax relief to all taxpayers, stimulate the economy, and create jobs. The most well known provision is the reduction of income tax rates, particularly the corporate tax rate. There has been much public discussion on the economic effects of the tax rate cut and other major provisions. Although its results are difficult to measure in the early stages of its implementation, some indicators point toward economic growth with more money in the hands of taxpayers. A more in-depth analysis of the TCJA in the context of current technological trends reveals other possible impacts. The U.S. is now experiencing rapid growth in automation and artificial intelligence in many industries, and the TCJA provides incentives for additional investments in productive assets. This, together with the full employment environment, leads me to predict that the new tax plan will ultimately translate to the deployment of more automation and artificial intelligence. In this paper I examine major factors and trends that are currently driving growth in automation and AI, key provisions of the TCJA that create incentives to invest, and the status of the U.S. economy and unemployment rate which establishes conditions under which companies may be faced with a *need* to invest. This paper is not speculating on the overall positive or negative implications of an increase of automation on the U.S. economy and job market, but merely establishing a connection that analysts might have overlooked in the early stages of the Act's implementation.

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## **Chapter 1**

### **The Tax Cuts and Jobs Act - Background**

The legislation that Americans refer to today as the Tax Cuts and Jobs Act (TCJA), GOP Tax Reform, or Trump Tax Cuts was actually brought before Congress on November 2, 2017 under the title “An Act to provide for reconciliation pursuant to titles II and V of the concurrent resolution on the budget for fiscal year 2018”. The Act amended the existing Internal Revenue Code (IRC), and was signed into law on December 22, 2017 by President Donald Trump.

The TCJA was created with the intentions of reforming and simplifying the Internal Revenue Code (IRC), and decreasing the tax burden on both individuals and corporations. The Act broadens the tax base by eliminating certain deductions, lowers the tax bracket rates for individuals, and creates a flat tax rate for corporations. By reducing taxes for individuals and businesses, Congress hopes to grow the economy and increase the national Gross Domestic Product (GDP), while creating hundreds of thousands of U.S. jobs (Tax Foundation).

The TCJA has been in effect for less than a year, and its full effects are not yet known. However, many analysts have speculated about which groups will be helped the most by the Act, and who might be harmed instead. Most analysts believe that the TCJA is more beneficial for businesses than it is for individuals. This is largely because many of the business tax cuts or helpful provisions are permanent, while those tailored to individuals are temporary in many cases (Amadeo). One counterpoint to this hypothesis is that the benefits of the TCJA for businesses will be passed from a company to its employees through increased hiring and higher wages. Several examples of this can already be seen. Following the implementation of the TCJA,

Walmart, the United States' largest private employer, announced in January 2018 that they would be using some of the money saved under the TCJA to increase wages for employees, grant bonuses, and expand benefits. The company raised their minimum wage from \$9 to \$11, granted bonuses of up to \$1,000 for eligible employees, and increased maternity and family leave benefits (Corkery). More recently, Amazon, the internet retail giant that is one of the largest and most valuable companies in the world, announced it would be raising its minimum wage to \$15 for all employees. This change will benefit an estimated 250,000 employees, and workers already making at least \$15 an hour will also see a wage increase. Amazon CEO Jeff Bezos stated, "We listened to our critics, thought hard about what we wanted to do, and decided we want to lead. We're excited about this change and encourage our competitors and other large employers to join us" (Salinas). While Amazon did not directly state that this action was made due to TCJA savings, as was the case with Walmart, it is reasonable to believe that the Act had some impact on their decision. Regardless, this move by Amazon, Walmart, and other industry leaders such as Target may put pressure on other companies to pass some of their tax savings on to their employees as well, through raises, bonuses, and benefits.

Skeptics of the TCJA believe that there will be some negative repercussions for individuals under the ACT, particularly middle class households. Much of this has to do with the removal or phase-out of some deductions that previously yielded tax savings for eligible individuals. One such deduction is the removal of the personal exemption, which in 2017 allowed taxpayers to lower their taxable income by \$4,150 for each taxpayer and dependent. This will have a negative impact on large families. Other deductions that have been eliminated are moving expenses and alimony. Itemized deductions for mortgage interest and state and local income taxes have been reduced (Amadeo).

Another notable change is the repeal of the tax on individuals who do not have health insurance coverage, established under the Affordable Care Act (ACA) of 2010. This tax, on average, was estimated to be around \$4,500 for individuals and \$12,000 for families. Under the TCJA, this tax is no longer enforced, a change that is estimated to cause roughly 13 million people to drop their health insurance plans, according to the Congressional Budget Office (Amadeo). It is speculated that this result will actually lead to increased healthcare costs for several reasons. First, those forfeiting their coverage will miss out on many of the preventative care resources and well checkups currently available to them, leaving them more defenseless against sickness and disease. This could lead to more sickness overall, driving up the costs to treat all patients. In addition, healthcare premiums for those who still hold a plan may increase, as the costs of covering everyone are distributed among fewer people (Amadeo).

The above implications of the Tax Cuts and Jobs Act have been widely discussed and analyzed since the Act's conception by businesses and individuals on all sides of the political spectrum. However, there are significant provisions of the TCJA that very few researchers and analysts are discussing, particularly the heavy incentives for businesses to make capital investments. Given the recent trends in automated technology and artificial intelligence over the past few decades, this is likely the direction in which firms will be investing.

In this paper, I define automation and artificial intelligence (AI) as any form of machinery, equipment, or software that operates without human assistance. This definition encompasses a wide range of assets, and automation can be attained through many means. Automated technologies are currently deployed in almost every industry and sector in the United States, some of the largest being manufacturing, transportation, information technology, utilities,



finance, and defense. Some common examples of technologies driven by artificial intelligence are industrial factory robots, self-driving cars, and online banking platforms.

The relevant provisions of the TCJA, in conjunction with the current employment landscape in the United States, could lead to a surge in the usage and deployment of automation and AI. In the following sections, I will discuss the reasons why I believe this correlation is inevitable under the TCJA. First, the trends driving automation and AI have been in play for several decades already, and only grow stronger each year. Second, the TCJA contains changes and provisions that give companies the financial incentive to invest immediately in new technologies. And lastly, as of 2018, the United States is experiencing record lows in the unemployment rate, while the TCJA aims to stimulate the economy. This set of circumstances may force many companies to automate to meet expected levels of output and demand. Only time will tell whether an increase in automation and artificial intelligence ultimately helps or hinders the U.S. economy and workforce. However, the coexistence of these technological changes and the Tax Cuts and Jobs Act of 2017 is intriguing, and the possible implications will be explored in this paper.

## Chapter 2

### Existing Trends in Automation and Artificial Intelligence

#### Overview

In order to speculate on the future of automation and artificial intelligence in the United States, it is essential to fully understand the existing trends and growth factors that are already in play, especially growth and changes over the past two decades. In his book, *The Economic Singularity: Artificial Intelligence and the Death of Capitalism*, Calum Chace lays out several of the most important factors that have led to increased automation in recent years (Chace, 15). According to Chace, these influences will continue to drive the use of automated machinery, robots, and artificial intelligence for decades to come. I examined his statements and conducted additional research to verify or refute his claims, in order to establish an accurate picture of the current situation in the U.S. regarding the state of automation and AI. Based on my findings, I then speculate on the further implications of the Tax Cuts and Jobs Act in this area.

#### Increasing Labor Costs

The first factor cited by Chace was increasing labor costs. When wages and salaries begin to increase for firms, they may look for alternative methods to meet demand while still keeping costs low. For example, in industries where production can be automated, companies may employ automation throughout their production cycle. To test the claim that labor costs are

rising, I looked at an index created by Trading Economics, based on statistics from the Bureau of Labor Statistics. A plot of the index shows that over the past ten years, nonfarm unit labor cost has been steadily increasing. Between 2010 and 2018, it has risen over 14% (Trading Economics).

**Figure 1: US Nonfarm Unit Labor Cost**



Another way to consider the trend of increasing labor costs is through minimum wage. While it is true that the federal minimum wage has remained at \$7.25 since 2009, a majority of states have adopted their own, higher minimum wage. Currently, thirty out of fifty states have a minimum wage higher than what is required by the federal government, and many are continuing to raise it year after year. For example, since the beginning of 2018, eighteen states have already increased the minimum wage, either as a result of an automatic adjustment for cost of living, or through new legislation. In addition, petitions to increase minimum wage are presently in play in states such as Massachusetts, North Dakota, Arkansas, Florida, and others (Brainerd). Many of these petitions demand sizable raises to minimum wage, some up to \$15 per hour. Mounting

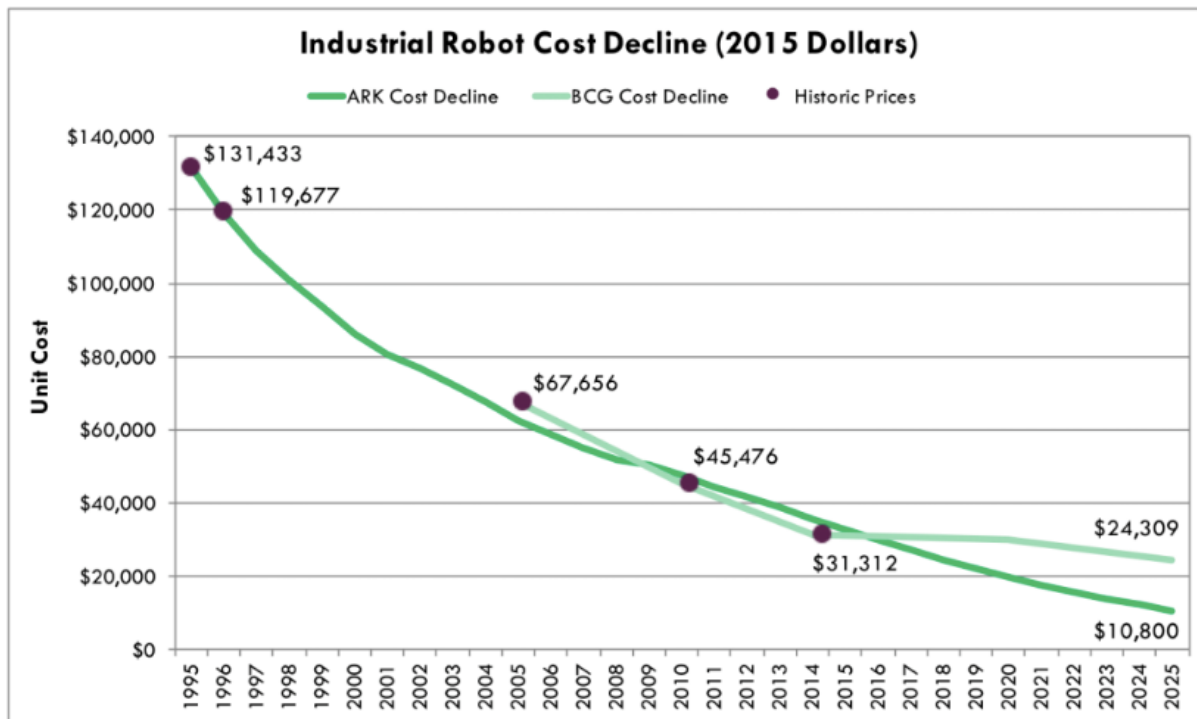
pressure such as this may even lead to an increase in the federal minimum wage within the next few years.

### **Declining Technology Costs**

Calum Chace also notes declining technology costs as a factor that incentivizes businesses to automate. Like most technologies, automated industrial robots have seen a decrease in cost over the years as they become easier to design, engineer, and produce. Both the software and hardware components of AI-driven machinery can be made more efficiently and inexpensively than they could be made twenty or thirty years ago. In addition, more technology companies have joined the industry, competing on price with the original robot manufacturers.

A research study by Ark-Invest shows that the price of an average industrial robot in 1995 was over \$131,000 (in 2015 dollars). Today, those costs have dipped below \$30,000, a 77% decline. In addition, the article postulates that costs will continue to decline over the next decade, reaching less than \$11,000 per unit by 2025 as shown in Figure 2 (Korus).

**Figure 2: Industrial Robot Cost Decline (2015 Dollars)**



Source: ARK Investment Management LLC | [ark-invest.com](http://ark-invest.com)

As the costs of automated technology used in production decrease, businesses have a greater incentive to turn to them as alternatives to traditional labor. Coupled with increasing labor costs discussed above, this suggests that the likelihood of more companies automating in the near future is quite high.

### **Increasing Societal Acceptance of Technology and AI**

You don't have to look far to see the increased acceptance for automated technologies, the third trend identified by Chace. It is increasingly common for an American household to be protected by an advanced automated home security system, kept at a perfect temperature by an automatic thermostat, and cleaned by a Roomba, a robot that patrols every corner of the floor, searching for dust and dirt to remove. If people are comfortable enough to accept AI into their

homes, its use throughout the rest of society is limitless. For example, consumers and corporations keep track of their finances over mobile banking platforms, fraud is detected automatically by highly intelligent systems, and customer service can be delivered immediately by virtual receptionists.

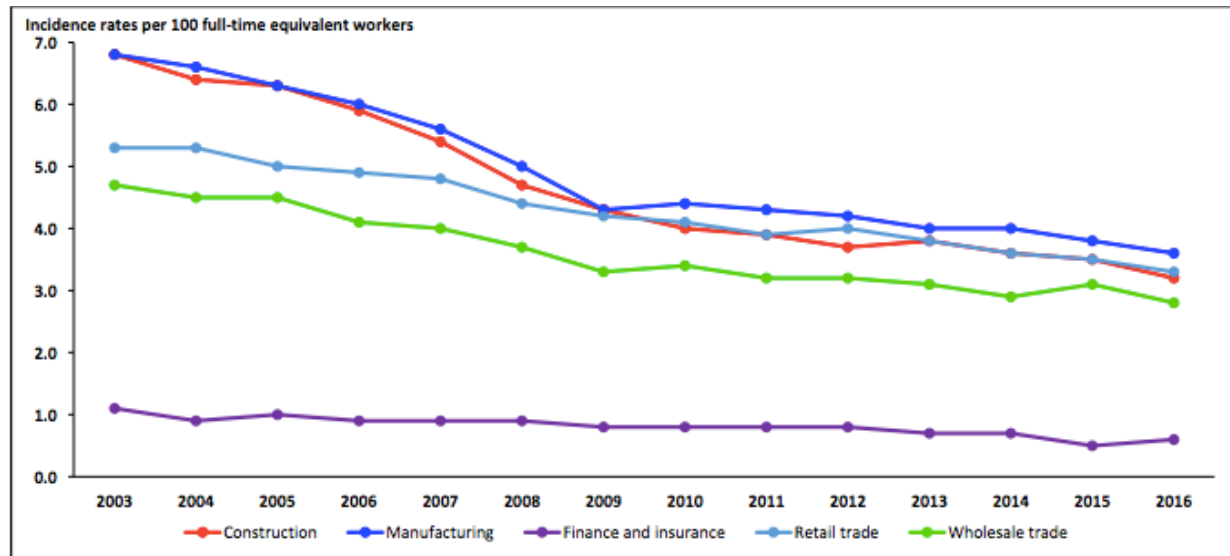
It is reasonable to expect that these trends will only continue into the next few decades. A clear example of this is self-driving vehicles, which are piloted by artificial intelligence systems. It has been predicted that most of the major automobile manufacturers, including Honda, GM, Ford, Toyota, and others, will have produced fully autonomous cars within the next several years (Walker). Again, this suggests that society's acceptance of AI has reached an all-time high and will only continue. In line with this, companies today are more likely to implement automated technologies into their manufacturing and supply chains, not only because they are usually more efficient than manual labor, but are also more widely accepted than ever before.

### **Increased Usefulness of Automated Technologies**

Arguably the most significant trend in AI and automation, according to Chace, is the heightened usefulness of these technologies. Automated processes are becoming more heavily integrated within all facets of production and manufacturing. Technology has been able to increase speed and efficiency, lower costs, and improve safety conditions for workers. Many high-level processes such as order management and production planning are already being automated, and it is predicted that by 2021, 20% of manufacturers will depend on blockchain, cognitive, and other technologies (ISCOOP).

Industrial robots speed up production by removing the human component of menial, repetitive tasks. In doing so, this also eliminates many instances of human error. Furthermore, robots improve consistency, as they are programmed to perform exactly the same action repeatedly, while laborers simply cannot maintain the same level of accuracy. In addition, when there are fewer human workers in the process, there is less chance for workplace hazards and injuries. The following figure from the Bureau of Labor Statistics shows that nonfatal occupational injury and illness incidence rates have declined steadily from 2003-2016. Two sectors that have been significantly impacted by technological advancements during that period, construction and manufacturing, have seen the most significant decreases (Bureau of Labor Statistics).

**Figure 3: Nonfatal occupational injury and illness incidence rates by selected private industry sector, 2003-2016**



The importance of these statistics, and Chace's claim, is that due to the increased usefulness of automated technology, visible through improvements to efficiency, accuracy, and

safety, companies are highly incentivized to invest in them. Automation and AI are improving the way companies do business, manufacture, and interact with customers and suppliers. This can also be seen at the worldwide level, where global sales of industrial robots increased 31% from 2016 to 2017, according to a 2018 report (IFR International Federation of Robotics).

These four large-scale trends identified by Calum Chace suggest that the implementation and usage of automation and artificial intelligence will continue into the next several decades. These existing trends, in conjunction with the effects of the 2017 Tax Cuts and Jobs Act (TCJA), will lead to significant developments in technology that will have a profound impact on the future of the United States. Certain TCJA provisions and their implications for automation are discussed next.



## **Chapter 3**

### **Relevant TCJA Provisions and Implications**

#### **Overview**

After establishing the economic and societal trends incentivizing automation, I examined the Tax Cuts and Jobs Act to identify the provisions that will likely have an impact on accentuating these trends. Much of my research led me to significant modifications regarding depreciation, in particular changes to bonus depreciation and Section 179 expensing, as well the implementation of shorter recovery periods, all of which lead to more accelerated depreciation deductions for companies. These provisions, in conjunction with the reduction of the corporate income tax rate and the repeal of the corporate AMT, could provide firms with both the incentive and the financial means to automate their production.

#### **Changes to Special Depreciation Allowance (Bonus Depreciation)**

Perhaps one of the most impactful changes of the Tax Cuts and Jobs Act on increasing automation and AI is the amendment to the special depreciation allowance, known as bonus depreciation. In recent years, bonus depreciation allowed a deduction of 50% of the cost of qualified property (KatzAbosch). Qualified property included a broad range of assets as long as the assets were new rather than used, among other qualifications (Joint Committee on Taxation).

This 50% of cost deduction provided a nice incentive for companies to invest in new equipment, technology, and software.

Under the TCJA, the 50% deduction is temporarily increased to 100%, substantially increasing the incentive for businesses to make further investments in assets. In addition, the TCJA expands the definition of qualified property to now include *used* property as well (House of Representatives). It is important to note that the automated equipment and even certain computer software discussed throughout this paper are considered qualified property. Thus, 100% of the cost of many investments in automation may be deducted on the business's tax return.

The 100% deduction for qualified equipment applies to property placed in service after September 27, 2017 and will be phased out incrementally beginning in 2023. Thus, there is a five-year window of time for companies to invest in productive assets and receive a tax deduction for the full cost. This narrow timeframe represents a lucrative opportunity for firms that are interested in automating their operations. They can purchase machinery such as industrial robots and other forms of AI driven equipment, and reap substantial tax savings from 2018 until 2023 planned phase-out begins. This time-sensitive incentive will likely drive many businesses with disposable income to substantially invest in additional operational assets within the next few years. Forward-thinking companies will be aware that under the TCJA, this window represents the single best time to make large capital investments in the foreseeable future. Coupled with the aforementioned existing trends motivating businesses to deploy automated technologies, the five years from 2018 to 2023 may well be one of the most influential in the history of automation in the United States.

## Faster Depreciation

One industry that is favored under the TCJA is agriculture. There exists an opportunity for farming operations of all sizes to invest in modern automated technology to improve the speed and efficiency of their production. Today, industrial robots are beginning to automate many elements of the farming process, including seeding, weed control, spraying, mowing, sorting, packing and more. Harvesting and picking, traditionally some of the most time-intensive and monotonous tasks, are also being automated by agricultural robots, which can be deployed for less money than what it would cost for a traditional labor force. Fully autonomous tractors like the one seen below in Figure 4, capable of efficient harvesting, are being developed and implemented in both large and small scale-farming operations (Daniels).

**Figure 4: Fully Autonomous Tractor**



The TCJA includes changes that make it more financially feasible for farmers to invest in these automated technologies. Farm equipment is eligible for the 100% bonus depreciation deduction, as well as Section 179 expensing, discussed below. Moreover, for those

agribusinesses that do not wish to utilize immediate expensing, depreciation on farm machinery is now more accelerated under the TCJA. For 2018 and forward, most machinery and equipment used in farming will be depreciated over five years, reduced from a recovery period of seven years before the TCJA (Mitchell Wiggins). The two-year reduction in recovery period does not appear like a huge change on paper, it grants farmers the ability to deduct more depreciation each year, because the same amount of total depreciation is now being recognized over fewer years. More importantly, this extra financial incentive makes it more likely for farmers to invest in machinery for their operations. Today, this can be expected to translate to the purchase of automated farming robots, which are already becoming more prevalent each year. Considering that under the TCJA, these types of agricultural machinery have a shorter recovery period, and more depreciation can be deducted year-to-year, it is very reasonable to expect that the farming industry will experience increased levels of automation over the next decades, as farmers begin to take advantage of this change.

### **Changes to Section 179 Depreciation**

For businesses concerned with the 2023 phase-out of bonus depreciation, the Tax Cuts and Jobs Act includes a permanent change to Section 179 depreciation that will provide savings for companies going forward.

Under the previous code, Section 179 allowed companies to fully expense certain qualified property in the first year it was placed into service, including tangible assets and off-the-shelf computer software. This allowance was capped at \$510,000 per year as of 2017, and the

deduction was phased out if assets placed in service during the year exceeded a total cost of \$2,030,000.

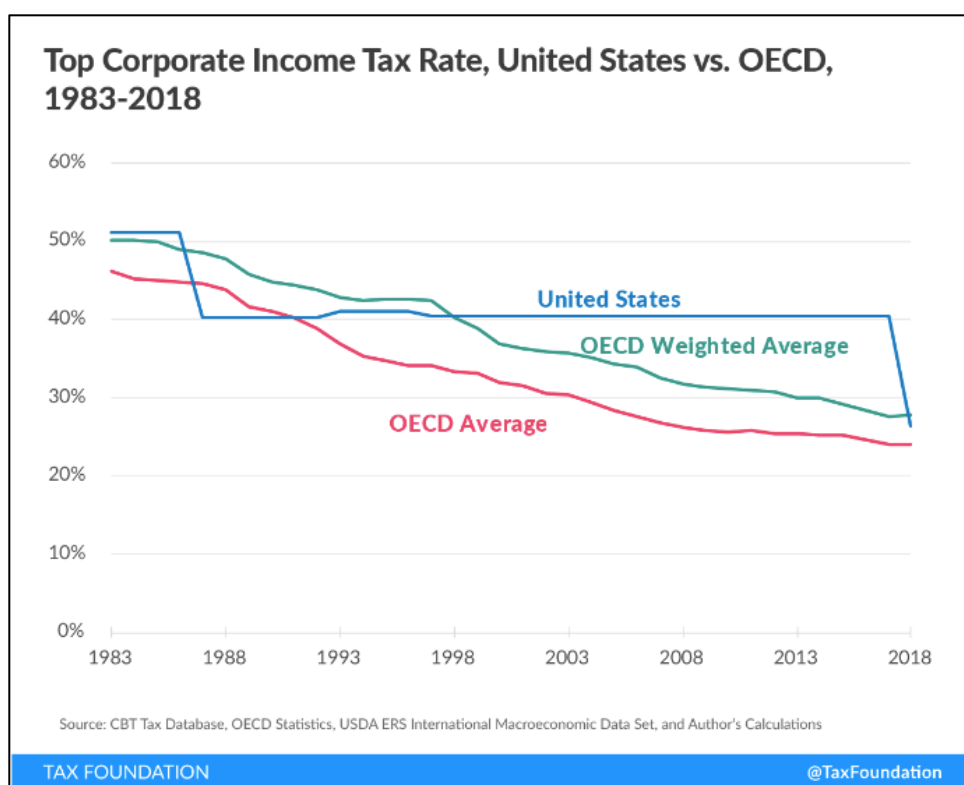
Under the TCJA, the amount of the immediate expense was increased to \$1,000,000 per year, for qualified assets placed into service after 2018. In addition, the phase-out threshold was also raised, to \$2,500,000 (House of Representatives). Another significant addition under the TCJA is the expansion of the asset categories to which Section 179 applies. The new list includes several technologies which, as previously discussed, are commonly automated today, such as heating, ventilation, air-conditioning, fire protection, alarm, and security systems (Bradford Tax Institute). Modern systems such as these are equipped with advanced artificial intelligence systems. Due to the increased Section 179 write-off available, it is now more affordable for companies to invest in multiple systems for their businesses.

### **New Corporate Tax Rate**

Probably the most well known change implemented under the Tax Cuts and Jobs Act is the reduction of the corporate income tax rate from a maximum of 35% under a tiered tax rate schedule to a 21% flat tax rate. After factoring in the average state corporate tax rate, this number increases to an effective tax rate of around 25%, still a significant decrease from pre-2018 (Pomerleau). This change is certainly very impactful for both large and small corporations. The following graph illustrates the recent change under the TCJA and how the United States compares alongside the Organization for Cooperation and Economic Development (OECD) average. For much of the past twenty years, the U.S. ranked among the highest in corporate tax

rates, and only now under the TCJA has the corporate rate been aligned more closely with the world average (Pomerleau).

**Figure 5: Top Corporate Income Tax Rate, United States vs. OECD, 1983-2018**



Neoclassical economic theory states that corporate capital expenditures for assets such as machinery and equipment are one of the most significant drivers of economic growth. The rate of capital expenditures is directly impacted by tax rates, the most significant one being the corporate tax rate (Pomerleau).

It is very plausible that these expected tax savings for firms may be reinvested in the companies, to increase both the labor force and productive assets. Taking into account the other previously discussed provisions regarding depreciation, as well as the new corporate tax rate, the

changes to the tax code suggest that companies may find themselves with more disposable income as well as significant incentives to reinvest in emerging technologies.

### **Changes to the Alternative Minimum Tax**

The TCJA also repeals the corporate Alternative Minimum Tax, or AMT. Under the AMT, the corporate income tax was calculated differently from the standard income tax system, and limited certain deductions and credits available to businesses. Corporations were required to pay the higher of the taxes computed under the two systems. Of course, the repeal of the AMT along with the new corporate tax rate under the TCJA further reduces income taxes for companies that were previously subject to the AMT.

The repeal of the AMT also means that companies looking to invest in new machinery and equipment who were formerly paying the AMT are no longer incentivized to lease rather than to buy certain equipment. Under the AMT, depreciation on assets other than real property was less accelerated than under the standard corporate tax system. This essentially meant that for AMT payers, the benefits of recognizing depreciation were practically nonexistent (Baker). Now, given the repeal of the AMT, all companies can reap the tax benefits of more accelerated depreciation deductions, and they will be encouraged to buy new equipment and machinery instead of lease it.

### **Effect of Similar Past Legislation**

To supplement my predictions on the expected impact of the TCJA's depreciation changes, I looked into research on similar historical tax legislation to see if any measurable

results had been achieved in the past. I found that studies are few, and findings are varied and inconclusive. However, one 2017 study from Eric Zwick and James Mahon used a model which accounted for imperfections in capital markets to conclude that increasing bonus depreciation drove up investments in qualified assets. Their model claimed that business investment as a result of bonus depreciation increased 10.4% from 2001-2004, and 16.9% from 2008-2010. In addition, their study found that small and medium-sized businesses were significantly more responsive to an increase in bonus depreciation than larger businesses (Gunther). The findings of this study support my claim that tax changes such as increased depreciation deductions may incentivize businesses to invest in capital assets.

As outlined, there is an abundance of new provisions within the TCJA that can yield an incentive for businesses to invest in automated technologies. The 100% expensing of qualified equipment under the special depreciation allowance, modifications to section 179 expensing, the acceleration of depreciation, reduction of the corporate tax rate, and the removal of the corporate AMT, all provide firms with favorable financial outcomes if they are looking to grow and expand, or improve the efficiency of their operations with automation. Many of them will see the advantages of doing so in the next several years, thanks to these impactful TCJA modifications.



## **Chapter 4**

### **The Implications of the Stimulus and Current U.S. Unemployment Rate**

#### **Overview**

The foregoing chapters outlined the recent trends affecting the deployment and usage of AI and automated technologies, and explained the key provisions in the TCJA that could directly bolster these trends. Another factor that could further link the TCJA to increases in automation is the stimulus effect on the economy coupled with a low unemployment rate.

As stated previously, one of the primary objectives of the TCJA is to stimulate the economy. Early research and findings have shown that some measurable results have been achieved, and may continue at least in the short term. It is also important to consider that the current unemployment rate in the U.S. is at a historic low. In this section I will discuss the definition of full employment, and how a stimulated economy that is already at full employment could force the deployment of even more automation.

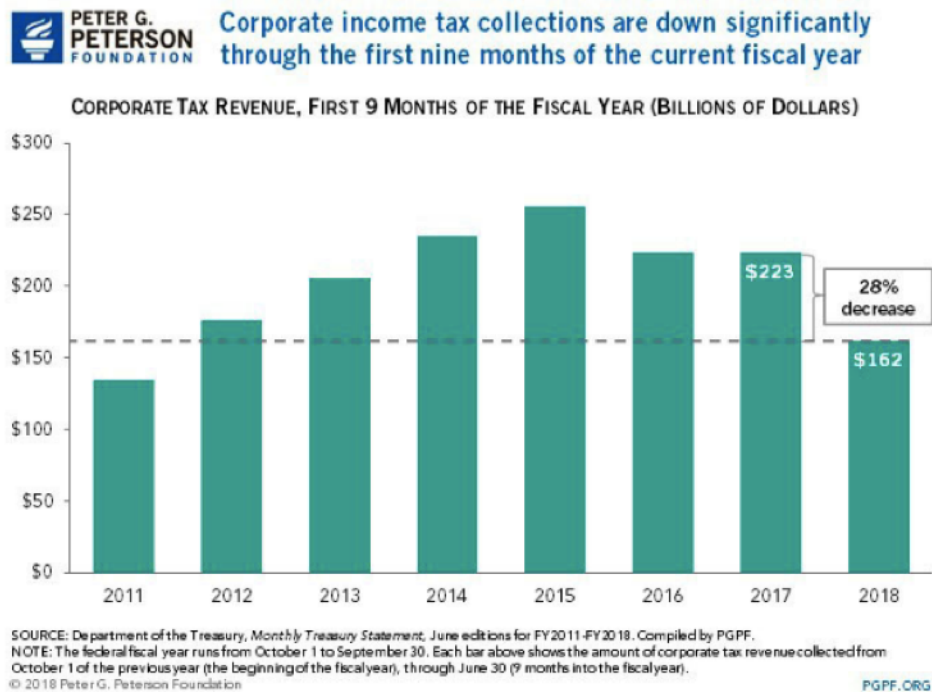
#### **How the TCJA is Stimulating the Economy**

Given that the Tax Cuts and Jobs Act has only been placed into effect as of January 2018, the full impacts of its expected stimulus have not fully manifested, and cannot be assessed completely yet. However, early findings point to the fact that the TCJA has begun to provide short-term stimulus to the U.S. economy.

As of August, 2018, the TCJA's tax cuts have at least marginally increased the amount of tax dollars remaining in the hands of businesses and consumers. One way of visualizing this is

by examining the decline in federal revenues. According to the Department of Treasury, the first three quarters of 2018 are comparatively 28% lower than the first three quarters of 2017 in collections of corporate income taxes (Peter G. Peterson Foundation).

**Figure 6: Corporate Tax Revenues, 2011-2018**



In addition, the U.S. economic growth rate appears to be reacting favorably in conjunction with the TCJA. The second quarter of 2018 yielded growth of 4.2%, the largest positive Gross Domestic Product (GDP) increase in any quarter since 2014. Exports also rose by 9.3%, another positive sign for U.S. businesses (Trading Economics).

**Figure 7: US GDP Growth Rate**

Some analysts have suggested that these initial gains under the TJCA are exclusively short-term in their scope, and within several years the overall positive impact on national GDP will be minimal. A June 2018 study by the Tax Policy Center states: “TCJA will stimulate the economy in the near term. But, most models indicate that the long-term impact on GDP will be small. . . . It will make the distribution of after-tax income more unequal, raise federal debt, and impose burdens on future generations.” While this forecasted outlook might be troubling for the U.S. economy in the future, immediate and measurable findings have linked positive short-term economic stimulus with the TCJA (Gale, et al). This fact could have serious implications when coupled with the state of U.S. unemployment rates.

### **The Current Unemployment Rate in the United States**

The unemployment rate is a key factor when analyzing the impact of the TCJA on driving automation in the U.S. It is crucial to understand the implications of the current U.S. unemployment rate, as well as the definition of full employment. Below is the five year

unemployment rate graph, which shows that as of September, 2018, the U.S. rate has dropped to 3.7%, the lowest figure since December of 1969 (Trading Economics).

**Figure 8: United State Unemployment Rate**



A question that can be asked at this point is: does this mean that the U.S. economy is at full employment? Bloomberg defines full employment as a state of the economy in which “...unemployment has fallen to the lowest possible level that won’t cause inflation.” It represents an economy in which virtually all workers who want to be employed are employed. Over the past several decades, economists have agreed that the actual number representing full employment falls somewhere in the five to seven percent range (Crook), and 3.7% falls well below this range. A strong case can be made that the U.S. is currently at full employment.

## **What Full Employment Means in Conjunction with the TCJA**

The unemployment statistics are certainly significant, and will likely influence the trends toward automation and artificial intelligence, bolstered by the TCJA, that I have described.

Specifically, I believe that the stimulation of the economy while it is already at full employment will force many companies to resort to automation to compete with industry growth. A recent article highlights two sides to this issue, stating that there are multiple types of automated technologies that may increase as a result of the TCJA and recent government stimuli. On one hand, there are technologies that augment human labor, which consist of semi-autonomous robots that require a human operator on standby— like most “self-driving” cars today. Industrial robots like this will be needed even more as job growth trends upwards, as it has been in 2018. There are also automated technologies that replace human labor, which should be a serious concern for communities and governments operating with a long-term mindset. Careful planning must be conducted to ensure that a community does not face high levels of unemployment in the event that big businesses in the area begin to implement these technologies. (Charleston).

Given the statistics concerning unemployment levels under current economic conditions, it is reasonable to assume that most workers looking for jobs have already found them, and firms looking to hire more workers may have trouble doing so under this set of circumstances. Automation may be an absolute necessity for companies that want to increase production and remain competitive, given the short-term economic growth driven by the TCJA. Since companies have greater disposable income as a result of the tax cuts and incentives, they are likely to invest in automation.

## **Chapter 5**

### **Conclusion**

The Tax Cuts and Jobs Act of 2017 is the most significant overhaul of the United States tax code in several decades. Its arrival was anxiously anticipated by some, while feared by others. Its overall impact on the U.S. economy is difficult to predict at this point, and preliminary research in its first year of applicability is limited.

While some forecasters debate the effects of the legislation in terms of who will benefit and who will not, I believe there is a significant potential consequence of the TCJA that has been almost entirely overlooked. Automation and artificial intelligence are often-heard buzzwords in today's highly competitive economy that is increasingly focused on speed, efficiency, and cost savings. It is no surprise that advancement in these areas is being embraced by more and more businesses each year, a trend that will very likely be enhanced by the TCJA. The TCJA includes a number of provisions aimed at reducing the tax burden on corporations and individuals. Its provisions have created both the incentive and the financial means for companies to purchase and deploy new machinery and equipment, and those that do are likely to choose some form of automated technology.

In addition to the tax cuts and favorable depreciation options under the TCJA, there is also a high likelihood that the Act could further drive automation by stimulating growth in the economy at a time of full employment. With a shrinking pool of qualified workers, companies may have a real necessity to automate their production and operations. Along with this necessity to automate, there is a short window of time in which companies can capitalize on one of the

most potentially impactful TCJA provisions, the 100% special depreciation allowance, before it begins to phase out.

The existing trends related to automation and AI, the new tax incentives to invest in productive assets, and the current economic and employment landscape, individually create pressure on companies to increase their deployment of automation and AI. Now that they are all occurring at the same time, I believe it is not only likely, but highly probable, that the next several years will prove to be one of the most defining and impactful periods in the history of automation and artificial intelligence in the United States.

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# Christopher J. Chiappa

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## EDUCATION

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### The Pennsylvania State University, *Schreyer Honors College*

- Smeal College of Business; *Expected Graduation: December 2018*
- Intended Major: Accounting; International Business Minor
- Enrolled in Masters of Accounting Program

**University Park, PA**  
*August 2014-Present*

### International Studies Institute at Palazzo Rucelai

- Studied International Business and Renaissance Art in Florence, Italy
- Immersed in Italian culture and traveled across the country

**Florence, Italy**  
*May 2015 – June 2015*

## RELEVANT EXPERIENCE

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### KPMG LLP – Audit Intern

- Assisted engagement teams on clients within financial services and software industries
- Contributed to quarterly filing for a large public bank, as well as control documentation
- Experienced client interactions and on-site visits, walkthroughs, earnings calls, and more

**Pittsburgh, PA**  
*June 2018 – Aug 2018*

### rue21 – Accounting Intern

- Performed various duties to support accounting team
  - Created and uploaded journal entries, accrued for monthly utilities
- Assisted other teams in finance department such as Tax, Sales Audit, and Accounts Payable
- Helped plan and manage a “Sample Sale” that raised \$21,000 for rue21 internal associate relief fund
- Developed a proposal for a reverse mentoring program and presented it to all company executives

**Warrendale, PA**  
*May 2016 – Aug 2016*

### Mallet and Company – Office Assistant

- Completed various clerical and administrative duties in the HR and Finance Departments
  - Sorted invoices, created employee records portfolios, organized office space

**Carnegie, PA**  
*Jan 2015 – Jan 2016*

## LEADERSHIP

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### Penn State International Business Association

*President; Secretary; Fundraising Chair*

- Designed events and meetings focused on building a global perspective
- Organized and carried out fundraisers to help support club activities and events
- Planned itinerary and arranged financials for spring trips to various cities in 2016, 2017, and 2018

**University Park, PA**  
*Sep 2015 – Present*

### Penn State Schreyer Student Council

*Treasurer; Alternative Fundraising Chair (THON)*

- Led dozens of Schreyer merchandise sales generating over \$15,000 in revenue
- Organized merchandise committee to carry out sales and promote involvement
- Danced in THON2018, a 46 hour dance marathon raising money for families battling pediatric cancer

**University Park, PA**  
*Aug 2014 – Present*

### Penn State Sapphire Leadership Program

- Selected to join a 50 member cohort representing the top 5% of Smeal Students
- Participated in various leadership development activities
  - Microsoft Excel training, case competitions, networking events
- Volunteered as a Sapphire THON member; helped with initiatives such as canning

**University Park, PA**  
*Aug 2014 – Present*

## SKILLS AND INTERESTS

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**Language** – Conversational in Spanish

**Technical** – Working knowledge of Microsoft Office Products including Word, PowerPoint, and Excel; iMovie

**Travel** – Visited over 10 countries including Germany, Netherlands, France, Italy, Mexico, Ireland, United Kingdom