Humans vs. Robots: Rethinking Tax Policy For a More Sustainable Future

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INTRODUCTION

Bill Gates wants a robot tax.¹ His recent proposal to tax robots that replace human workers highlights a growing concern that rapid innovation, and automation in particular, will displace many workers and cause significant unemployment.² Research supports automation’s potential for widespread worker displacement. One study estimates that 47% of U.S. jobs are at high risk of replacement by robotic or software automation.³ Similarly, McKinsey estimates that by 2030 one third of the human workforce in ad-
vanced economies like the United States may be required to change occupations and learn new skills to remain employed. Rapid automation is predicted to increase unemployment rates and intensify economic inequality.

The current fourth industrial revolution, like the previous three industrial revolutions, is transforming workplaces with machinery improvements. The first industrial revolution’s steam engine is today’s artificial intelligence. However, the speed of innovation and the effect on so many diverse industries is unprecedented. Software and robotics are not only automating blue collar jobs, but also threaten to replace the white-collar jobs historically thought protected.

Displaced workers often rely on social aid to ease the transition between jobs and to prevent poverty. The U.S. social safety net provides retirement, disability, medical, and unemployment benefits for displaced, retired, and disabled workers through Social Security, Medicare, and unemployment insurance. U.S. social safety net programs kept 36 million people out of poverty in 2017. Ninety-seven percent of U.S. persons aged sixty- to eighty-


6. See Brown, supra note 5, at 210 (documenting that the fourth revolution appears to be evolving “faster than its predecessors”); see also infra Part I (discussing the evolution of industrialization in the United States).

7. See Brown, supra note 5, at 210.


9. See infra Part II.


nine-years-old collect or will collect Social Security, and Medicare, as the largest health insurance program, provides benefits to 44 million. In addition, unemployment benefits are paid to nearly 2 million Americans annually. Social safety net programs ameliorate poverty, and more than 60% of the U.S. population favors expansion of these types of programs.

Payroll taxes finance Social Security, Medicare, and unemployment programs. Payroll taxes, imposed on wages earned, provide 33% of total federal revenue. As innovation advancements lead toward escalated automation substitution in the workforce, displaced workers will increasingly rely on benefits and will be incapable of contributing to the payroll tax that funds them.

Increased labor substitution resulting from automation innovation threatens to undermine the safety net programs. This threat is the impetus for Mr. Gates’ proposal to tax robots. His suggestion appears elegant on its face, in that it proposes to fill the revenue deficit by taxing the very catalyst

18. See Matthew T. Bodie, Employment as Fiduciary Relationship, 105 GEO. L.J. 819, 846 (2017) (noting the 33% revenue source); see also Sachin S. Pandya, Tax Liability for Wage Theft, 3 COLUM. J. TAX L. 113, 126 (2012) (documenting that the payroll tax is imposed on both employers and employees).
19. See infra Section I.B.
20. See Dexter, supra note 17, at 351–52 (identifying that a similar concern was raised several decades ago when Social Security administrators realized that “the level of contributing workers would be unable to meet the demand” of baby boomers entering retirement and requesting benefits).
21. See infra Part III.
for the lost revenue. Although robotic taxation presents interesting inquiries, we suggest that the robot tax proposal masks the underlying tension between innovation tax and employment tax policies, and this long-standing tension cannot be resolved with superficial suggestions. The growing strain of automation substitution on the U.S. workforce shows that the social safety net is fraying because employment tax and innovation policies are disharmonized.

This Article will analyze the intersection of U.S. industrialization with employment and innovation tax policies. It will investigate how seemingly disconnected tax policies collectively imperil the U.S. social safety net system and chart a course towards harmonizing them. Part I will show how industrialization and innovation have historically shaped the U.S. workforce and will use this foundation to predict how automation substitution will impact the workforce in the near term. It will use economic research to validate concerns about automation substitution and its negative impact on employment. Part II will analyze the social benefit goals underpinning U.S. employment tax policy and will identify the detrimental effects of automation substitution on social safety net funding. Part III will examine how innovation policy has supported the third and fourth industrial revolutions but, in so doing, has strayed from the original twin goals of economic development and social benefit. This Part will also show how economic progress has eclipsed the importance of social benefits in this policy. Finally, Part IV will determine that existing tax literature has not required employment tax and innovation policies to remain faithful to their original social goals. Consequently, this Article will make the case for a new approach to tax policy analysis, one that asks fundamental, normative questions. It will explain how sustainability provides an approach for balancing economic and social goals and addressing intergenerational equity. It also will show that sustainability will not supplant other approaches to tax policy but is sufficiently interdisciplinary and robust to incorporate their lessons.

I. INDUSTRIALIZATION AND INNOVATION

Industrialization denotes more than the historical evolution from manual labor to machinery to robotic technology. As scholar Ruth Cowan notes,
“Every nook and cranny of social and economic life was implicated in the [industrial] process and affected by it . . . young and old, men and women, rich and poor, immigrant and native born.”24 Technology has been an essential cultural component, slowly transforming man-made craftsmanship into a digital production.25 Although industrialization transformed labor markets throughout history, the fourth industrial revolution is poised to alter the future labor pool by replacing human workers in unparalleled fashion.26 The fourth revolution’s automation substitution is more than robots replacing human workers on manufacturing production lines.27 It encompasses smart robots capable of learning and will impact not only manufacturing, but also finance, accounting, management, and healthcare previously assumed free from automation risk.28

This Part provides context for the current fourth industrial revolution’s sweeping changes as well as for the legal regimes in which industrialization operates. To that end, Section I.A offers a historical backdrop for the first, second, and third industrial revolutions. Building upon this historical context, Section I.B identifies the hallmarks of the fourth industrial revolution and explores its relationship to automation substitution and worker displacement.

A. The Impact of the First, Second, and Third Industrial Revolutions

There have been three prior industrial revolutions, with a fourth revolution developing.29 The first revolution transformed farming, cotton, and metal working industries with mechanization during the late eighteenth and early nineteenth centuries, but occurred primarily in Britain.30 The second

24. Id.
25. See id. at 1, 65.
26. See, e.g., Abbott & Bogenschneider, supra note 5, at 159 (noting that improvements in computers are resulting in their ability to replace low-skilled workers); Brown, supra note 5, at 189–90 (discussing the possibility that robots will replace human workers); Chris Fleissner, Note, Inclusive Capitalism Based on Binary Economics and Positive International Human Rights In the Age of Artificial Intelligence, 17 WASH. U. GLOBAL STUD. L. REV. 201, 212 (2018) (offering that the replacement of human workers by artificial intelligence would suppress wages and economic growth).
28. See id. (noting industries affected by automation substitution).
29. See Solomon, supra note 2, at 65 (discussing the first three Industrial Revolutions); see also Peter Miscovich, The Future Is Automated: Here’s How We Can Prepare for It, WORLD ECON. FORUM (Jan. 12, 2017), https://www.weforum.org/agenda/2017/01/the-future-is-automated-here-s-how-we-can-prepare-for-it (noting the emergence of the Fourth Revolution in the workforce).
revolution, from the late nineteenth century until World War I, brought assembly lines, mass production, and large firms to the United States. Microelectronics and computerized technology of the 1980s launched the third industrial revolution. The fourth revolution is now transforming society with digitization, robotization, and cyber systems. Each industrial revolution dramatically altered the workplace.

1. Production: Second Industrial Revolution

Throughout the colonial period and briefly thereafter, most Americans were farmers. Hand labor remained prevalent through the end of the American Civil War, constraining domestic industrial production capabilities. After the Civil War, mechanization emerged in the United States, increasing speed and output. In 1850 there were 116 carpet mills with 6000 workers in the United States; just twenty years later, the industry had doubled in size. As machines replaced hand labor and firms adopted Henry Ford’s 1913 assembly line, production capacity exploded.

The second industrial revolution saw a marked labor shift from farm to factory, and employment increased from “2.5 to 10 million workers from 1880 to 1920.” Until the late 1800s, the term “unemployment” did not exist in the United States. Low population and labor scarcity required laborers

31. See Solomon, supra note 2, at 65 (tracing the industrial revolutions).
32. See id. (discussing the third industrial revolution).
33. See Brown, supra note 5, at 188–89.
34. See id. at 188 (noting that digitalization is having a widespread and evolving impact on production, workers, and labor and employment laws).
40. See History of the United States Industrialization and Reform, supra note 36.
to exploit land and resources on their own; however, industrialization led to urbanization. Between 1870 and 1920, 11 million people relocated to cities, and most of the 25 million European immigrants also settled in American cities.

The birth of industry and corporations resulted in clear demarcation lines between rich and poor, engendering discontent among the population. For the first time in American history, workers experienced job insecurity. Although manufacturing jobs were abundant, wages were low and job security uncertain. In response to social and economic influences of the times, trade unions took shape.

The stock market crash of Black Tuesday catapulted the United States into the Great Depression, coinciding with the end of the second industrial revolution. Before 1929, unemployment was approximately 3.3%; by 1930 that rate increased to 8.9%, and just one year later jumped to 15.9%. By 1933, the unemployment rate hit its pinnacle of 24.9%. To address economic turmoil and mass unemployment, federal social insurance was implemented to help restore national economic stability.

2. Technology Boom: Third Industrial Revolution

Although the shift from farming to urbanization brought about new divisions of labor that embraced innovation, advancements during the first and

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45. See History of the United States Industrialization and Reform, supra note 36.


47. Id.


50. Mullane, supra note 49.

51. Id.

52. See infra Part III for further discussion.
second revolutions were gradual. The introduction of the computer, however, dramatically changed the speed at which innovation evolved, repeatedly doubling computing and technological capabilities over short terms.

Computers and the internet propelled twentieth-century society into the third industrial revolution. Emerging technologies during this period included smartphones, Global Positioning System ("GPS"), and mobile broadband. Computers transformed brick and mortar offices into virtual workplaces. Rapid improvements in information technology and mobile devices influenced businesses and consumers to become more productive.

Evolving technology also changed communication. Cell phones provided “email and web browsing capabilities.” Smart phones replaced the need for landlines, answering machines, scanners, point and click cameras, and digital music players. Social technologies like blogs, wikis, and social networks transformed communication culturally and organizationally. Today more than one third of the global population uses some form of social

54. See id. at 27–28.
media platform—Facebook, Snapchat, Twitter, or Instagram—to share information. The Internet also introduced retail electronic commerce (“e-commerce”) and eased barriers to global business. Thanks in large part to Amazon.com, e-commerce is expected to comprise 17% of U.S. retail sales by 2022.

Although the speed at which technological advancements occurred during the third industrial revolution was previously unmatched, society is now on the brink of even more explosive innovations with automation and robotics. The momentum of today’s fourth industrial revolution sets the stage for profound transformations in the way society works and lives. As technology author Byron Reese documented in his recent book, The Fourth Age: Smart Robots, Conscious Computers, and the Future of Humanity, “while it took us almost five thousand years to get from the abacus to the iPad, twenty-five years from now, we will have something as far ahead of the iPad as it is ahead of the abacus.”

B. The Impact of Automation Innovation and Robotics in the Fourth Industrial Revolution

Technologists foresee the fourth industrial revolution as the time period for which artificial intelligence and robots facilitate change fundamentally different in type, speed, and reach from the incremental machinery improvements of the previous revolutions. Genetic engineering, artificial intelligence, robotics, and three-dimensional (“3D”) printing are opportunities for

67. See Brown, supra note 5, at 209–10 (documenting that the fourth revolution appears to be evolving faster than its predecessors).
68. See id. at 187 (noting that the technology of the fourth industrial revolution will radically change industry, production value chains, and business models).
humans to even more closely collaborate with machinery.71 The human-machine alliance is becoming ubiquitous globally and a daily experience for many. The technologies of the fourth industrial revolution have a “systems level impact” on nearly all aspects of human lives; this impact is in contrast to the breadth of previous revolutions.72 For example, one in six Americans owns a voice-activated smart speaker.73 Domino’s successfully delivered its first pizza via drone, and Amazon added 55,000 robots in 2017 to automate internal operations.74 While the fourth industrial revolution is indeed radical in many ways, the focus of this Article is automation substitution for workers.

Recent studies suggest that automation innovation may be a catalyst for job displacement in the future. A recent study estimates that 47% of U.S. jobs are at high risk for automation replacement.75 While jobs in lower-risk categories include management, business, education, and media performance positions,76 occupations exhibiting a high probability of automation substitution include sales, services, construction, transportation, office administration and material moving positions.77 In assessing automation risk, the study


72. See UNESCWA, supra note 70, at 4–5.


75. See Frey & Osborne, supra note 2, at 268.

76. See id. at 266–67 (further noting that while media occupations are vastly different from those of chief executives, they require a wide range of tasks involving social intelligence and thus unlikely to be subject to computerization).

77. See id. at 266–68.
found a correlation between high-risk positions and worker wages, forecasting that automation will be a main substitute for low-skilled and low-wage jobs in the future.\textsuperscript{78}

A 2017 McKinsey Global Institute study estimated that 400 to 800 million persons globally may be displaced by automation by 2030.\textsuperscript{79} Of that total, 75 to 375 million individuals may have to change occupations or learn new skills to remain employable.\textsuperscript{80} For advanced economies like the United States and Germany, one third of the workforce may be affected by 2030.\textsuperscript{81} Automation substitution also threatens white collar jobs.\textsuperscript{82} Tasks previously conducted by highly-skilled persons but can now be augmented by automation\textsuperscript{83} include accounting, law, and medicine.\textsuperscript{84}

In 2017, the Pew Research Center found that 72\% of Americans worry that “robots and computers are capable of doing many jobs that are currently done by humans,”\textsuperscript{85} Seventy-five percent felt that the U.S. economy will not create enough new and better-paying human jobs if robots and computers displace human workers in the future.\textsuperscript{86} Although only 30\% of participants found it somewhat likely that their own jobs would be replaced by robots or computers during their lifetime, participants viewed certain professions as being at greater risk, including fast food workers, insurance claims processors, software engineers, and legal clerks.\textsuperscript{87}

While these studies prompt important questions about the impact of automation substitution on the workforce, this paper does not support that every robot introduced into the labor market will displace a human worker. Robots produce two different economic effects: a displacement effect and a productivity effect.\textsuperscript{88} Automation innovation displaces workers, but it also creates

\textsuperscript{78} See id. at 269.
\textsuperscript{79} See Manyika et al., supra note 4, at 11.
\textsuperscript{80} See id.
\textsuperscript{81} See id. In China, for example, the percent of the workforce forecast to require an occupational change is upwards of 13\%, while in India that percentage drops to 6\%. Id.
\textsuperscript{82} See Belvedere, supra note 8.
\textsuperscript{83} See id.
\textsuperscript{84} See Nicolaci da Costa, supra note 8.
\textsuperscript{86} See id.
\textsuperscript{87} See id. The report notes that 77\% of respondents indicated that fast food workers are at greater risk of automation, 65\% highlighted insurance claims processors to be at risk; 53\% viewed software engineers as being at greater risk, and 50\% noted legal clerks as being at risk for substitution. Other highlighted professions include: construction workers (42\%), teachers (36\%), and nurses (20\%). Id.
a productivity effect that drives up labor and wages in other areas of the economy. As economics scholars note,

> [E]ven if the presumed technological advances materialize, there is no guarantee that firms would choose to automate; that would depend on the costs of substituting machines for labor and how much wages change in response to this threat. Second, the labor market impacts of new technologies depend not only on where they hit but also on the adjustment in other parts of the economy. For example, other sectors and occupations might expand to soak up the labor freed from the tasks that are now performed by machines, and productivity improvements due to new machines may even expand employment in affected industries.

Even accounting for the productivity effect, scholars predict increased robot usage will have a negative impact on employment and wages and that automation substitution significantly targets low-skilled workers.

Society is only at the dawn of the fourth industrial revolution, and the effect of automation substitution on the workforce is foreboding. Each of the prior revolutions increased worker productivity. This fourth industrial revolution, however, is setting up to be vastly different from its predecessors in both speed and breadth of labor substitution, prompting concerns about future job displacement and the negative impact of automation substitution on wages. Workforce unease, and the resulting social impact that may ensue, has led prominent figures like Bill Gates to propose a tax on robots that take over human jobs.

89. See id.

90. See id. at 4 (“[I]n practice, the more intensive use of robots in a commuting zone reduces the costs of the products now produced using robots in the entire US economy, and thus trigger some expansion of employment and wages in other commuting zones. Our model, by incorporating trade between commuting zones, enables us to quantify this effect.”)

91. Id. at 1–2.

92. See id. at 36 (“[I]f the spread of robots proceeds as expected by experts over the next two decades . . . the future aggregate implications of the spread of robots could be much more sizable.” (citing ERIK BRYNJOLFSSON & ANDREW MCAFEE, THE SECOND MACHINE AGE: WORK, PROGRESS, AND PROSPERITY IN A TIME OF BRILLIANT TECHNOLOGIES (2014))).

93. See Georg Graetz & Guy Michaels, Robots at Work, 100 REV. ECON. & STAT. 753, 766 (2018); see also Acemoglu & Restrepo, supra note 88, at 6 (“Most closely related to our work is the pioneering paper by Graetz and Michaels (2015). Focusing on the variation in robot usage across industries in different countries, they estimate that industrial robots increase productivity and wages, but reduce the employment of low-skill workers.”).

94. See James, supra note 1.
The United States has historically encouraged innovation because of the social and economic spillover effects. However, as society evolved towards greater human-machine alliances, innovation tax policy began to promote the economic gains of innovation at the expense of social benefits. While the fundamental premise behind U.S. employment tax policy is the promotion of social general welfare, worker displacement due to automation substitution could result in our country’s inability to meet benefit demands. The intersection of technology and existing legal regimes threatens to undermine rather than improve the human condition. The next two Parts examine the foundations of the legal regimes at issue, employment tax and innovation tax policies, to expose how these policies function together during the fourth industrial revolution.

II. EMPLOYMENT TAX POLICY AND INDUSTRIALIZATION

The federal employment tax ("payroll tax") is the major revenue source for social insurance contributions in the United States, including Social Security, Medicare, and unemployment. The payroll tax is imposed on wages earned by employees via the Federal Insurance Contributions Act ("FICA") and Medicare and on the self-employed via the Self-Employed Contributions Act ("SECA"). The tax promotes social responsibility by shielding retirees, disabled, and survivors of deceased workers against poverty and financial dependency. In addition, the federal unemployment tax ("FUTA") is assessed on employers and provides financial benefits to involuntarily unemployed workers.

95. See infra text accompanying notes 157–198.
96. See infra Part III.C.
97. See Abbott & Bogenschneider, supra note 5, at 170; see also Dexter, supra note 17, at 351–52 (noting that a parallel concern was raised when Social Security administrators realized that the level of contributing workers was unable to meet the demands of baby boomers entering retirement and requesting benefits several decades ago; this issue has raised the concern that baby boomers will bankrupt Social Security).
100. Id. §§ 1401–03.
101. See Joel F. Handler, The "Third Way" or the Old Way?, 48 KAN. L. REV. 765, 768 (2000) (noting that France and Sweden are more effective at "reducing poverty and minimizing dependency among lone-parent families than the United States").
103. See Griffin, supra note 98, at 321.
Since passage of the Social Security Act in 1935, the United States has depended on employment tax revenue generated by the working class to fund social security payments to retirees. Displacement of wage earners due to automation substitution could result in the inability to meet benefit demands.

A. Origin and Purpose of the Federal Employment Tax

Congress adopted the beginnings of what would later be known as the Old Age, Survivors, and Disability Insurance program (“OASDI”) in 1935, as part of the Social Security Act, and substantially amended it in 1939 before it had been fully implemented. President Franklin D. Roosevelt promoted social insurance to restore U.S. economic stability during the Great Depression. The legislation included provisions for old-age and unemployment benefits. The Act was later amended to include child dependent, survivor, and disability benefits, and, in 1965, health insurance (Medicare) was incorporated into the program.

106. See Abbott & Bogenschneider, supra note 5, at 170; see also Dexter, supra note 17, at 351–52 (noting that a parallel concern was raised when Social Security administrators realized that the level of contributing workers was unable to meet the demands of baby boomers entering retirement and requesting benefits several decades ago, which some feared could bankrupt social security).
110. See Kearney, supra note 109, at 2.
111. Id. at 3.
The Social Security Act was designed to ease deprivation and hardship during the depression and its aftermath, as identified in its objectives:

(1) Unemployment insurance is intended to offer workers income maintenance during periods of unemployment due to lack of work, providing partial wage replacement as a matter of right; (2) it is to help maintain purchasing power and to stabilize the economy; and (3) it is to help prevent dispersal of the employer’s trained labor force, the sacrifice of skills, and the breakdown of labor standards during temporary unemployment.

Although the Act’s purpose was to provide welfare assistance, the federal government sought long-term solutions to prevent poverty and economic security for an increasingly aging population. The second industrial revolution resulted in unfamiliar and unwelcome recessions, layoffs, and corporate closures. Government funding to protect employees and dependents against lost wages, disability, and death while supporting an increasingly maturing population was the impetus behind the imposition of the payroll tax. The payroll tax includes the FICA tax paid by employers and employees, and the FUTA tax paid by employers only.

1. The Federal Insurance Contributions Act (“FICA”)

In 1937, the payroll tax was established as a contribution plan split between employees and employers on most wages paid to employees. Today, the FICA tax sustains two major programs: OASDI and Medicare. At

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116. See Altman, supra note 114, at 113 (documenting poverty prevention); see also DeWitt, supra note 109, at 1–2 (noting economic security).


118. See Altman, supra note 114, at 113–14 (discussing the legislative history and purpose of the Social Security Act of 1935 and its progeny).


121. See Richard Winchester, Working for Free: It Ought to Be Against the (Tax) Law, 76 MISS. L.J. 227, 245–46 (2006). However, prior to the enactment of Medicare, the tax only subsidized OASDI. See Templin, supra note 120, at 11; see also Steve Anderson, A Brief History of Medicare in America, MEDICARERESOURCES.ORG (Sept. 1, 2019), https://www.medicareresources.org/basic-
its inception, a 2% Social Security tax was imposed on and shared between employers and employees on the first $3000 of taxable wages, making up less than 2% of the total U.S. Gross Domestic Product (“GDP”) at that time.\footnote{122} Both the rate and taxable minimum have progressively risen to a current shared rate of 12.4% up to a $137,700 wage cap, contributing to nearly 6% of the total U.S. GDP.\footnote{123} Most wages earned by employees up to the scheduled ceiling are subject to the FICA tax.\footnote{124}

Social Security OASDI benefits are now the chief income source for the majority of U.S. senior citizens and provide benefits to retired persons, survivors of deceased workers, and the disabled.\footnote{125} Absent these benefits, an additional 8% (for a total of 24%) of the U.S. population would live below the poverty line.\footnote{126}

In addition to funding Social Security, FICA also funds Medicare benefits.\footnote{127} Established by Congress in 1965, Medicare is funded by a 2.9%
employment tax rate shared between employers and employees (1.45% imposed on each) on all qualified earnings without a cap. In 2018, Medicare accounted for 15% of the total federal budget. The initial Medicare budget was about $10 billion for 19 million participants, and is now $705.9 billion for 60.6 million participants. Today it is the largest health insurance program in the United States and, unlike Social Security benefits, its benefits are distributed equally to qualifying taxpayers without regard to lifetime wages earned.

2. The Federal Unemployment Tax Act (“FUTA”) The FUTA serves as a social insurance to fund unemployment costs in the United States. It is imposed on employers at a rate of 6% on the first $7000 of each employee’s earnings. The FUTA provides unemployment benefits to workers who lose jobs due to no fault of their own. By providing replacement wages to unemployed workers, the FUTA tax has significantly influenced economic stability in the United States.


130. See Anderson, supra note 121.

131. See Treu, supra note 124, at 598 (further documenting that Medicare benefits apply to persons “who are sixty-five years or older and who worked for at least forty quarters, or ten years, in Medicare-covered employment”); see also Michael J. DeBoer, Medicare Coverage Policy and Decision Making, Preventive Services, and Comparative Effectiveness Research Before and After the Affordable Care Act, 7 J. HEALTH & BIOMEDICAL L. 493, 501 (2012) (discussing Medicare eligibility, which includes individuals sixty-five and over, spouses, individuals under sixty-five years of age with certain disabilities, and those with end-stage renal disease).


133. See Harrington, supra note 127, at 62 (discussing FUTA’s purpose).


2017, 1.87 million people were receiving unemployment insurance benefits.  

B. The Effect of U.S. Employment Tax Policy

Revenue generated by the payroll tax is vital to the promotion of U.S. economic stability. Only the individual income tax collects more federal revenue. The payroll tax base is particularly broad, and the supply of workers since its inception has helped maintain revenue production; however, the tax significantly burdens low and middle income taxpayers as compared to higher income workers.

Scholars and policy advocates have raised concerns about employment tax disparity. Using the measure of effective tax rate, the payroll tax is substantially more burdensome on wage earners as compared to wealthy investors. For numerous working class taxpayers, the employment tax is a larger financial burden than that of the income tax. Only within households where incomes reach the six figure mark does the income tax owed
exceed that of the payroll tax. Additionally, although the tax is shared between employers and employees, employers can eliminate their portion by crafting downward adjustments in salaries and wages.

Despite claims of unfairness, politicians have been reluctant to enter into this discussion, instead preferring to focus debate on the income tax. Although the income tax is the largest revenue source for the federal government, politicians’ hesitancy to address the employment tax is troubling considering that, in 2016, 44% of households paid zero dollars in federal income tax while 60% were subject to the FICA tax.

The payroll tax underpinning requires that the federal government collect revenue from present-day workers to fund current beneficiaries. Although more than 60 million people rely on benefits generated by the employment tax, the long-term sustainability of the Social Security program could be jeopardized due to two demographic swings—the continuous retirement of baby boomers and the increasing life expectancies of Americans. U.S. Census data supports that 10,000 of the total estimated 73 million baby boomers turn age sixty-five every day, and the entire baby boomer population will be sixty-five or older by 2030. In addition, the average life expectancy in 1935 was 61.9 years; since then, life expectancy in the United States has

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found that 80 million low-earning taxpayers pay no federal income tax but pay $121 billion in payroll taxes, while middle-income families pay three times as much in payroll taxes as federal income tax; see also Geier, supra note 141, at 18 (documenting that payroll taxes are not creditable against the income tax due nor deductible by employees under the income tax).

144. See id.; see also Sugin, supra note 138, at 119 (acknowledging that “[t]he income tax exceeds the payroll tax only for the top quintile of taxpayers”).

145. See Sugin, supra note 138, at 119.

146. See Geier, supra note 141, at 3 (noting that few politicians speak about the payroll tax, instead allowing debates to center on the federal income tax burden).


148. See Dexter, supra note 17, at 351.


increased to 78.86 years. This surge has resulted in qualifying persons receiving benefits for lengthier periods of time.

These statistics raise important questions about whether employment tax revenue is sufficient to sustain Social Security and Medicare benefits in the future. It is estimated that 88.4 million beneficiaries will be entitled to receive $1.672 trillion in benefits by 2035. The Social Security Act reports that there are currently 2.8 workers per Social Security beneficiary; however, this number is expected to drop to 2.3 workers per beneficiary by 2035. This future projection does not take into account recent research estimates regarding the impact of automation substitution in the workforce.

Social Security and Medicare continue to be instrumental in realizing social policy goals by providing necessary insurance and healthcare to stabilize the U.S. economy. In addition, the FUTA tax revenue provides essential benefits to unemployed workers. Automation substitution, however, is threatening the continued viability of these programs. Employment tax policy goals cannot be realized if they are undermined by the promotion of innovation. U.S. innovation tax policy, which evolved from more generalized innovation policy, supports invention stimulation. Although tax incentives can improve social welfare by motivating research and development, the public benefit must be more than consumers’ use of invention. As discussed in the following Part, evolving innovation policy has shifted away from social welfare goals towards increased economic advancement, resulting in a disharmony with U.S. employment tax policy.

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156. See infra text accompanying notes 170–179.
III. INNOVATION TAX POLICY AND INDUSTRIALIZATION

While U.S. employment tax policy originated with adoption of the OASDI, innovation tax policy—dedicated to unlocking innovation potential—evolved incrementally from the time of the founding fathers.\(^{157}\) Intellectual property protection dates back to the United States Constitution, which gives Congress the power “[t]o promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries.”\(^{158}\) Mindful of the importance of innovation, the founding fathers sought to preserve inventors’ ability to reap the economic fruits of their labors by ensuring ownership rights to their creations.\(^{159}\)

In 1813, Thomas Jefferson noted that intellectual property rights not only afford profits to those pursuing innovation but also benefit society.\(^{160}\) The United States Supreme Court has repeatedly acknowledged Jefferson’s perspective and recognized both social and economic benefits of intellectual property.\(^{161}\) Similarly, scholars also note innovation policy’s twin goals of economic progress and knowledge spillover.\(^{162}\)


\(^{158}\) U.S. CONST. art. I, § 8, cl. 8.

\(^{159}\) See The Federalist No. 43 (James Madison) (“The right to useful inventions seems with equal reason to belong to the inventors.”); see also Jennifer L. Case, How the America Invents Act Hurts American Inventors and Weakens Incentives to Innovate, 82 UMKC L. REV. 29, 51, 62 (2013).


\(^{161}\) See Graham v. John Deere Co., 383 U.S. 1, 8–9 (1966) (stating that Jefferson “clearly recognized the social and economic rationale of the patent system”); see also Mazer v. Stein, 347 U.S. 201, 219 (1954) (“The economic philosophy behind the clause empowering Congress to grant patents and copyrights is the conviction that encouragement of individual effort by personal gain is the best way to advance public welfare through the talents of authors and inventors in ‘Science and useful Arts.’”).

Although both economic progress and social welfare have long been noted as the underpinning of U.S. innovation policy, the United States has allowed the pursuit of economic progress to eclipse the importance of social benefits in innovation tax policy. To support such conclusion, this Part discusses U.S. innovation policy and economic and social benefits. This Part also demonstrates how innovation tax policy evolved from a broader innovation policy and provides evidence that innovation tax policy has shifted its focus from social welfare towards economic progress.

A. U.S. Innovation Policy

U.S. policy expressly seeks to advance innovation.\(^{163}\) Indeed, the United States employs an arsenal of tools to ensure that its citizens reap the benefits of continued technological advancement.\(^{164}\) As previously noted, the United States Constitution and other federal law\(^{165}\) provides limited time

is to incentivize persons to create for the public good); Mark A. Lemley, Romantic Authorship and the Rhetoric of Property, 75 TEX. L. REV. 873, 902–03 (1997) (reviewing JAMES BOYLE, SHAMANS, SOFTWARE, AND SPLEENS: LAW AND THE CONSTRUCTION OF THE INFORMATION SOCIETY (1996)) (elevating the public interest goal by characterizing intellectual property rights as “a necessary evil—a restriction on the free flow of information to the minimum extent necessary to encourage needed investment in innovation.”).


legal monopolies in the form of copyrights and patents (among others).\textsuperscript{166} The federal government also uses prizes and grants to incentivize innovation.\textsuperscript{167} More than two dozen federal agencies and departments directly fund research and development ("R&D") activities.\textsuperscript{168} In fiscal year 2016, this funding topped $142 billion.\textsuperscript{169} In addition to direct expenditures, the United States also makes extensive use of tax expenditures to promote innovation.\textsuperscript{170} Tax expenditures are tax code provisions that preference certain activities or taxpayers.\textsuperscript{171} Tax expenditures may take the form of exclusions, deductions, deferrals, credits, or tax rates.\textsuperscript{172} Innovation preferences enjoy wide political and public support, and tax incentives for innovation have been particularly popular.\textsuperscript{173}

1. **Innovation Policy Goal: Economic Progress**

Innovation policy is strongly linked, both economically and politically, to prosperity.\textsuperscript{174} The United States, as well as other nations, view innovation-
based productivity increases as an economic catalyst and critical to improving national and global standards of living. The general public believes, and many scholars concur, that the competitiveness of the national economy hinges on technological advancement: “Achieving preeminence in high technology is widely viewed as a critical element of the economic competitiveness...” These beliefs are well-founded. Research has substantiated the link between innovation and productivity, and pro-innovation federal policy has been correlated with increased U.S. manufacturing productivity.

U.S. policymakers have asserted both implicitly and explicitly that they assume innovation increases long-term productivity. Pursuit of increased productivity through technology takes the form of a public-private partnership in the United States. Although businesses own most of today’s valuable

175. *See id.* at 351 (noting the benefits of R&D, including substantial “geographic spillovers” and stating, “National governments also want the resulting IP to be governed by their laws, their citizens to be the principal beneficiaries of the economic growth resulting from technological innovations, their resident MNEs to own the resulting technology, and the tax revenues from such innovations to flow into their own treasury”).


178. *See Asa Hansson & Cécile Brokelind, Tax Incentives, Tax Expenditures Theories in R&D: The Case of Sweden,* 6 World Tax J. 168, 176 (2014) (“[S]tudies based on European data have found that R&D activities improve productivity and stimulate economic growth.”).

179. *See Graetz & Doud, supra* note 164, at 388 (“Productivity has increased, reducing the number of employees required to produce similar output. The average American factory worker now produces $180,000 worth of goods a year, which is more than three times what he would have produced in 1978 in today’s dollars. Further, while the number of U.S. manufacturing jobs has decreased from twenty million in 1979 to twelve million today, value added in U.S. manufacturing increased by more than two-thirds during that period.” (citing Enrico Moretti, *The New Geography of Jobs* 10–17 (2012))); *see also* Hansson & Brokelind, *supra* note 178, at 175 (noting increasing productivity and spillover effects to other businesses and industries).

180. *See Preface to Cong. Budget Office, Federal Support for Research and Development* VII–XII, 1 (2007), https://www.cbo.gov/sites/default/files/ftpdocs/82xx/doc8221/06-18-research.pdf (noting direct and indirect subsidies for innovation in that “lawmakers have provided about $137 billion in budget authority to support federal research and development (R&D) activities” and that “tax preferences are in place to encourage the private sector to increase its R&D spending”). This report also notes productivity gains of innovation. *Id.; see also* Cong. Budget Office, R&D and Productivity Growth 2 (2005) (presenting the theoretical premise and evidence for a link between research and development spending and productivity growth); Lital Helman, *Curated Innovation,* 49 Akron L. Rev. 695, 701 (2016) (finding governmental innovation incentive instruments, including grants or prizes).
intellectual property, the federal government endeavors to create opportunities for collaboration among industry, academia, and the government to stimulate creativity and innovation. However, U.S. innovation policy requires that economic progress be balanced against the twin goal of preserving public knowledge and welfare.

2. **Innovation Policy Goal: Advancing Public Knowledge and Welfare**

In addition to economic progress, a primary objective of U.S. innovation policy is to enhance social welfare with knowledge spillover. Thomas Jefferson characterized intellectual property as a public good, declaring that “ideas should freely spread from one to another over the globe, for the moral and mutual instruction of man.”

This perspective continues to find support centuries later. The United States Supreme Court has expressly noted public benefit as the foundational principle for intellectual property rights. Three times during the mid-twentieth century the Court cited public knowledge and interest as primary motivations for intellectual property rights. In 1948, the Court identified the “benefits derived by the public from the labors of authors” as the primary purpose of intellectual property rights. Less than ten years later, the Court noted that “[t]he economic philosophy behind the [intellectual property] clause . . . is the conviction that encouragement of individual effort by personal gain is the best way to advance public welfare.” Later, in 1966, the Court cited to

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185. See Fogerty v. Fantasy, Inc., 510 U.S. 517, 524 (1994) (“The primary objective of the Copyright Act is to encourage the production of original literary, artistic, and musical expression for the good of the public.”); Feist Pub’ns, Inc. v. Rural Tel. Serv. Co., 499 U.S. 340, 349–50 (1991) (stating that the public interest is the “primary objective of copyright”); Stewart v. Abend, 495 U.S. 207, 228 (1990) (stating that copyright balances “the artist’s right to control [his or her] work” with “the public’s need for access”).


Jefferson to support the proposition that “[t]he patent monopoly was not designed to secure to the inventor his natural right in his discoveries. Rather, it was a reward, an inducement, to bring forth new knowledge.”

One scholar so elevates the public interest in innovation that he characterizes intellectual property rights as “a necessary evil—a restriction on the free flow of information to the minimum extent necessary to encourage needed investment in innovation.” Indeed, some argue that intellectual property rights for innovation are warranted because innovation provides “a net benefit to society” in that the promotion of innovation swaps “the disutility of restricted output and higher prices for the greater social utility . . . that might otherwise not be produced.”

The concern that firms underinvest in innovation is often used to justify governmental efforts to incentivize innovation, whether through intellectual property rights, grants, or tax expenditures. Economic theory suggests that innovation suffers from market failure because discoveries and inventions are often nonexcludable, meaning that—without the help of interventions like intellectual property rights—a creator often cannot prevent others from using his or her invention. Nonexcludable goods like discoveries are “expensive to produce but easy to appropriate.” Innovation is also often nonrivalrous, meaning that the knowledge manifested in a discovery or invention can be used repeatedly for no additional cost. Innovation’s nature as nonrivalrous and nonexcludable makes it a public good. Consequently, firms cannot solely capture the benefits of innovation—they share at least some of the benefits with the public. For these reasons, among others, economic theory

189. Lemley, supra note 162, at 902–03.
190. Burk & Lemley, supra note 173, at 1580; see also ROBERT P. MERGES, JUSTIFYING INTELLECTUAL PROPERTY 2 (2011) (noting IP law as seeking “to maximize the net social benefit of the practices it regulates”); Jacob Nussim & Anat Sorek, Theorizing Tax Incentives for Innovation, 36 VA. TAX REV. 25, 31 (2017) (opining that “[m]arket failures represent situations in which free competitive markets do not necessarily accomplish first best optimal outcomes, and therefore, government intervention may be warranted in order to fix the failures—and in our case, to induce further innovation”); Shay et al., supra note 173, at 419–20.
191. See Burk & Lemley, supra note 173, at 1580.
192. Id.
193. See Nussim & Sorek, supra note 190, at 31 (discussing the market failures and nonrivalrous nature of information and its production).
194. See id.; see also Burk & Lemley, supra note 173, at 1580.
suggests that firms are under-incentivized to invest in innovation and must be offered an incentive to engage in a desirable level of innovation.

Economic theory also suggests that “innovation responds to incentives,” and firms are enticed by the hanging carrot of financial gain to engage in more desirable levels of innovation. Some scholars argue that inducements like tax incentives are necessary to drive the U.S. economy forward while also benefitting the social welfare. The need for incentives to further promote R&D brought about the birth of innovation tax policy in the United States.

B. Tax in U.S. Innovation Policy

Although the Constitution and early patent laws secured intellectual property rights at the nation’s inception, innovation and intellectual property received no special treatment for income tax purposes. Innovation tax policy did not begin taking shape until the 1954 U.S. Tax Code (the “Code”)

195. See Burk & Lemley, supra note 173, at 1580; Hansson & Brokelind, supra note 178, at 175 (stating that knowledge is “a public good and “for efficiency reasons, should be distributed to others to use at no cost” because of the inability to exclude others); see also Shay et al., supra note 173, at 419–20.

196. MERGES, supra note 190, at 2 (“Society offers above-market rewards to creators of certain works that would not be created, or not created as soon or as well, in the absence of reward.”). The concept of innovation being nonrivalrous and nonexcludable promotes the public good, but without additional gratification has historically resulted in firms being under-incentivized to invest in innovation. See Burk & Lemley, supra note 173, at 1580 (providing that the patent system promotes innovation through exclusive rights); Hansson & Brokelind, supra note 178, at 175 (discussing the nature of knowledge production); Shay et al., supra note 173, at 419–20 (noting that the United States advances R&D through expenditures and tax policies).


198. See Burk & Lemley, supra note 173, at 1580 (noting the purpose of a “net benefit to society” when discussing government inducements for innovation); see also MERGES, supra note 190, at 2 (noting the goal of social benefit in intellectual property law); Nussim & Sorek, supra note 190, at 31 (discussing the government action to remedy innovation market failure); Shay et al., supra note 173, at 419–20.

199. See Xuan-Thai Nguyen & Jeffrey A. Maine, The History of Intellectual Property Taxation: Promoting Innovation and Other Intellectual Property Goals?, 64 SMU L. REV. 795, 811–13 (2011) (providing a comprehensive history of the taxation of intellectual property law noting that “[a]lthough it was well-established that intellectual property was property, many early tax cases struggled to identify when intangible intellectual property rights constituted separable property for tax purposes”).
Prior to this mid-twentieth-century revision, the courts, taxpayers, and the Internal Revenue Service applied tangible property tax laws to intangible know-how and creations.201

In 1954, Congress adopted two provisions to govern intellectual property taxation. Congress enacted the first of these, Internal Revenue Code section 174, to incentivize investment in R&D.202 This section, which was recently amended in 2017,203 allows taxpayers to “treat research or experimental expenditures . . . as expenses which are not chargeable to capital account.”204 It allows taxpayers to immediately deduct from their gross income R&D expenses connected to their businesses, reducing the tax basis.205 Without section 174, these expenses would otherwise be capitalized and could not be recouped without a realization event—at an unknown time in the future.

In simple terms, investors can elect to bundle and deduct their qualifying R&D expenses when initially incurred, thus reducing their tax liability in the early years of research.206 For example, if ABC Corp. spends $500,000 in qualifying R&D expenditures in year 2021, it can elect to immediately reduce its net income by $500,000 that same year. This provision is elective, however, and taxpayers may instead choose to capitalize their R&D expenses over no less than a sixty-month period in which they first realize benefits from their expenditures.207

The second provision that Congress added during the 1954 Code revision was Internal Revenue Code section 1235.208 This section allows patent owners to qualify for lower, long-term capital gain tax rates when selling

200. Id. at 831.
201. Professors Nguyen and Maine provide a comprehensive compilation of the long and winding road of jurisprudence courts used in using tangible property rules to determine the tax treatment of intangible property during this period. See Nguyen & Maine, supra note 199.
203. In 2017, Internal Revenue Code section 174 was amended to ostensibly require taxpayers to capitalize R&D expenditures beginning December 31, 2021. See I.R.C. § 174(a)(2). However, the amendment permits R&D expenditures conducted in the United States to be amortized over a five-year period. See I.R.C. § 174(a)(2)(B). While this change appears, on its face, to force capitalization of R&D expenses and remove the expensing benefits of section 174, a closer reading shows that the change is only a five-year amortization. Consequently, firms are unlikely to have to capitalize R&D expenses; the recovery is merely lengthened to five years, which is significantly more beneficial than capitalization.
206. See Drennan, supra note 205, at 1135.
207. See I.R.C. § 174(b)(1).
208. See I.R.C. § 1235; see also Nguyen & Maine, supra note 205, at 794–95 (discussing the origin and function of section 1235).
their intellectual property rights. Without section 1235, proceeds from the sale of a patent would be taxed at the generally higher ordinary income tax rates.

In the decades following the adoption of these two provisions, Congress made minimal changes to U.S. innovation tax policy. The onset of the third industrial revolution, however, refueled Congress’s interest in stimulating innovation. Unlike the Supreme Court opinions of the mid-century that extolled public benefits as being primary motivations for intellectual property rights, Congress shifted its attention toward achieving economic progress with the Economic Recovery Tax Act of 1981 (“ERTA”). ERTA was designed to “ensure economic growth in the years ahead” and “stimulate productivity and innovation throughout the economy.”

In the ERTA, Congress adopted Internal Revenue Code section 41, a research credit to be used in combination with the section 174 deduction to stimulate research activity. Section 41, adopted as a temporary provision, was extended sixteen times and ultimately made permanent in 2015. Known as the Research and Experimentation (“R&E”) tax credit, section 41 rewards U.S. businesses that intensify their investment efforts in R&D. This provision provides firms a dollar-for-dollar reduction in tax liability for up to 20% of their qualified research expenses over a historical base amount.

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209. See I.R.C. § 1235(a); see also Drennan, supra note 205, at 1139–40.
210. See Drennan, supra note 205, at 1139.
211. See Nguyen & Maine, supra note 199, at 831 (noting the ad hoc changes to innovation tax policy); see e.g., I.R.C. § 177 (1982) (repealed 1986) (amended in 1956 regarding small business issues with trademarks); I.R.C. § 170(e) (amended in 1969 regarding charitable deduction abuse by copyright owners); I.R.C. § 1253 (amended in 1969 regarding trademark transfers).
217. See I.R.C. § 41(a)(1)–(2) (2018); see also Crimm, supra note 214, at 1058–59. The base amount is the “product of (A) the fixed-base percentage, and (B) the average annual gross receipts of the taxpayer for the [four] taxable years preceding the taxable year for which the credit is being determined.” Id. § 41(c)(1).
section 197, which allows taxpayers to amortize the purchase price of intangible assets, such as patents and copyrights, over a fifteen-year period.218

Since its temporary adoption in 1981, the section 41 R&E credit has been so heavily employed by industry that it resulted in $10.4 billion in forgone federal revenue in 2016 and is projected to cost the federal government $12.7 billion in 2020.219 After the Code section was made permanent in 2015, Congress further inflated its value by allowing the research credit to offset payroll tax obligations of qualifying small businesses (“QSBs”).220 QSBs can now use up to $250,000 of R&E tax credit to satisfy their payroll tax liability.221

C. The Effect of U. S. Innovation Tax Policy

Congress adopted Internal Revenue Code sections 174 and 1235 in the mid-twentieth century to bolster innovation and better govern intellectual property from a tax perspective, at a time when the Supreme Court was repeatedly noting the public purpose of innovation. Innovation tax policy changed very little from 1954 until the third industrial revolution arrived in the 1980s. In 1981, Congress adopted the massively expensive section 41 R&E tax credit to create “economic growth” and “stimulate productivity and innovation.”222 The legislative history focuses solely on the economic purpose of section 41 and makes no mention of the social purposes or benefits of innovation. The addition and ultimate permanency of the section 41 R&E tax credit reflects a shift in innovation tax policy goals. The focus is no longer both economic progress and knowledge spillover; by the 1980s, economic stimulus eclipsed the social benefits of innovation.

The focus on economic stimulus to the detriment of public interest manifested again in the fourth industrial revolution. In 2015, Congress amended

218. See Id. § 197(a); see also James E. Tierney, Reassessing Sales and Liquidations of Partnership Interests after the Omnibus Budget Reconciliation Act of 1993, 1 FLA. TAX REV. 681, 682 (1994).
219. See JOINT COMM. ON TAXATION, JCX-3-17, ESTIMATES OF FEDERAL TAX EXPENDITURES FOR FISCAL YEARS 2016–2020, at 29 (2017) (adding the tax expenditure projections for section 41 for corporations ($9.4 billion in 2016 and $11.4 billion in 2020) to that for individuals ($1.0 billion in 2016 and $1.3 billion in 2020)).
220. See I.R.C. §§ 41(h), 3111(f); see also Jaime Park, David Culp & Tyrone Montague, Research Credit Made Permanent and New Potential Abilities to Use Credit to Offset AMT and Payroll Taxes, KPMG: WHAT’S NEWS IN TAX (Feb. 15, 2016), https://home.kpmg.com/content/dam/kpmg/pdf/2016/02/tnt-us-068-feb15-2016.pdf.
222. See JOINT COMM. ON TAXATION, supra note 213, at 17.
section 41 to allow QSBs to apply R&E tax credits to offset payroll tax obligations.\footnote{223 See \textit{Joint Comm. on Taxation, JCX-144-15, Technical Explanation of the Protecting Americans from Tax Hikes Act of 2015, House Amendment #2 to the Senate Amendment to H.R. 2029 (Rules Committee Print 114–40) 30 (2015), https://www.jct.gov/publications.html?func=startdown&id=4861 (stating that “Under the provision, for taxable years beginning after December 31, 2015, a qualified small business may elect for any taxable year to claim a certain amount of its research credit as a payroll tax credit against its employer OASDI liability . . . ”).} This provision promotes innovation at the direct expense of funding the U.S. social safety net. Tax law changes since 1980 and their legislative history suggest that disharmony is emerging between employment tax policy and innovation tax policy.

Innovation tax policy should honor both economic progress and public welfare.\footnote{224 See Brett M. Frischmann \& Mark A. Lemley, \textit{Spillovers}, 107 Colum. L. Rev. 257, 259–261 (2007) (discussing social and economic spillover effects of innovation); see \textit{also} Shaun P. Mahaffy, \textit{The Case for Tax: A Comparative Approach to Innovation Policy}, 123 Yale L.J. 812, 819–20 (2013) (noting reasoning for subsidizing innovation).} Inventions provide social value; the U.S. patent system improves social welfare and economic vitality with innovations that would otherwise not exist absent governmental protection and regulation.\footnote{225 See \textit{Mahaffy, supra} note 224.} Tax incentives should enhance social welfare by stimulating industry research towards advancements that have yet to be discovered.\footnote{226 \textit{Id.}} However, improving social welfare through innovation must extend beyond the application of invention to consumers’ daily lives.\footnote{227 See Peter Lee, \textit{Social Innovation}, 92 Wash. U. L. Rev. 1, 9 (2014).} As one scholar notes, deeper issues of “health, safety, education, homelessness, crime prevention, environmental protection, racial and gender discrimination, and inequality in economic opportunity” must be considered.\footnote{228 \textit{Id.}} U.S. innovation tax policy has moved away from advancing public welfare, instead incentivizing companies to continue their R&D at the expense of social safety net funding. The resulting disconnect between two separate tax policies of employment and innovation is further imperiling the U.S. social safety net system, thus requiring an examination of how to better harmonize the two through the lens of sustainability.

\section*{IV. Harmonizing Innovation and Employment Tax Policy Through Sustainability}

As shown in Parts I–III, automation innovation in the fourth industrial revolution is becoming so pervasive that it threatens to undermine the U.S. social safety net.\footnote{229 See \textit{infra} Parts I–III.} Maintaining their current structure, the Medicare trust
fund will run out of funding in six years (2026), and the Social Security trust fund will run out of funding in fourteen years (2034). Portions of Medicare already outpace the employment tax revenues that support them. With an aging population and a dramatic decrease in the number of workers per beneficiary during the last half century, the current funding structure of Medicare and Social Security is unsustainable. The aforementioned revenue and expense estimates do not account for the projected levels of job automation. Fourth industrial revolution trends suggest that the presently fraying U.S. social safety net may be stretched past the breaking point.

The U.S. social safety net is fraying in part because neither employment tax nor innovation policy are effectively pursuing their original social goals. Employment tax policy never contemplated the extent and rapid arrival of automation substitution, and the employment tax structure funding the social safety net cannot survive without significant revision. Employment tax, in its current form, is insufficiently robust to adjust to automation substitution. Simply put, employment tax is in danger of being incapable of fulfilling its original social purpose. For innovation policy, the focus has changed from the twin goals of social benefit and economic stimulus, to the pursuit of primarily economic goals. As economic goals have eclipsed the importance of social goals, innovation policy no longer works in concert with


232. See MEDICARE REPORT 2018, supra note 230, at 23 (noting expected outlays are to surpass GDP and payroll tax growth).

233. See Pear, supra note 230 (noting reasons for the long-term financial problems as decreasing workers per beneficiary and an aging population).

234. See id. (quoting Alex M. Azar II, the Secretary of Health and Human Services and a trustee of Medicare and Social Security stating: “The current trajectories in health spending are both unsustainable and unmatched by increases in quality”).

235. See Acemoglu & Restrepo, supra note 88, at 1.

236. See supra Sections I, II.B.

237. See supra Section II.B.

238. See supra text accompanying notes 230–234.

239. See id.

240. See supra Section II.A.1–2.

241. See supra Section III.A–C.
employment tax policy. Indeed, insofar as innovation policy fosters automation substitution to the detriment of the social safety net, it may undermine employment tax policy.

Reforming employment and innovation tax policies must begin by refo-cusing these policies toward their goals. To that end, this Article suggests an alternative approach to tax policy analysis. Prior approaches to tax policy analysis offer helpful insights to tax, but the most common approaches have not rigorously interrogated the fundamental purpose of tax provisions, individu-ally or in concert, nor have these approaches required in any regular or systematic way tax provisions to remain true to their goals. Here, this Article seeks to harmonize two areas of the law that have compatible goals, yet do not work in concert.

In this Part, we first explore the factors that permit ongoing disharmony in tax analysis generally, and in employment tax and innovation tax policies specifically. Noting that current approaches to tax policy analysis provide opportunity for disharmony, we suggest using established and accepted principles of sustainability to reform these policies. We make the case that the attributes of sustainability can assist in harmonizing disparate tax policies. Finally, we apply a sustainable tax approach to employment tax and innovation tax proposals in an effort to bring them into concert.

A. Tax Analysis, Disharmony, and Macro Effects

In the thirty years since the major tax overhaul of 1986, Congress has most often adopted tax law incrementally. There have been a few sizable tax bills in the intervening decades, but comprehensive and concerted overhaul has not been undertaken in a holistic way. While there are benefits to

242. See infra Section IV.B.
243. See infra Section IV.A.
244. See supra text accompanying notes 237–241.
245. See infra Section IV.A.
246. See infra Section IV.B.
247. See infra Section IV.B.
248. See infra Section IV.C.
incremental legal revision, legislation adopted in such a manner can permit policy to stray from its motivations.

Similarly, tax law is often analyzed on a micro level in academia. This approach permits scholars to take deep dives into the nuances of provisions or groups of provisions. To be sure, any tax lawyer or scholar will affirm that details matter enormously in tax, however, a narrow or deep dive approach does not always permit the effects of the tax code, as a whole, to be seen on a macro level. Narrow approaches to tax analysis may not illuminate how provisions of the Code struggle to find harmony with each other, other legal provisions, or larger economic trends. Indeed, we argue that these macro effects have been ignored for employment tax and innovation tax policies.

Compounding the effects of this approach to tax policy analysis is the limited scholarship that interrogates foundational principles of tax and requires tax to be placed in the context of broader philosophical frameworks. We are not the first to make this observation. In their book, The Myth of Ownership: Taxes and Justice, Professors Murphy and Nagel expressly critique tax scholarship, suggesting that its contextual relationship to legal, moral, and political theory had not been adequately explored. In other words, tax scholarship has not been sufficiently connected to the broader context in which it lives. Murphy and Nagel are critical of tax scholarship’s attempts to adopt tax-specific normative concepts. They point out that com-


253. See, e.g., Nancy J. Knauer, Critical Tax Policy: A Pathway to Reform?, 9 NW. J. L. & SOC. POL’Y 206, 208 (2014) (noting that “tax practices can sometimes produce a string of unintended consequences that . . . traditional tax policy would consider both irrelevant to its goals and beyond its power to correct”); Leo P. Martinez, A Critique of Critical Tax Policy Critiques (or You’ve Got to Speak Out Against the Madness), 28 BERKELEY LA RAZA L.J. 49, 51 (2018) (noting one criticism of critical tax analysis as “too narrow and purposely taking a selective view through examination of only those Code provisions that advanced a particular point of view”).


255. See supra Parts II–III.


257. See id.

258. Id.
mon tax concepts such as “vertical equity, horizontal equity, the benefit principle, equal sacrifice, [and] ability to pay” do not “adequately capture the considerations that ought to enter into the normative assessment of tax policy.” Murphy and Nagel are not alone in their criticism of tax policy analysis; similar criticism was noted three decades before they published their book.

Although this weakness in tax scholarship has been noted by Murphy, Nagel, and others, it has not yet been remedied on a broadly accepted basis. To that end, we suggest a different approach. A superior approach to tax scholarship would (1) require tax to identify and remain faithful to normative foundations, (2) integrate tax policy, provisions, and goals more holistically with other tax policies as well as other legal and economic institutions, and (3) require tax to continually adapt to societal, economic, and technological changes destined to occur.

It is easy to lose sight of the concept that tax is but one tool in the regulatory arsenal. As Professor Sugin notes, “no tax system, by itself, is capable of carrying out a conception of . . . justice, and fairness in government cannot be determined by isolating elements of any tax system.” Tax must be viewed in context with other legal rules and relevant societal norms to understand its full effect and have any chance to effectively reform it. In subsequent work to The Myth of Ownership, Professor Murphy continues to argue that, only when viewing tax in its broader context with other rules and norms, can it be determined whether tax fulfills foundational principles. Indeed, he notes that “[a] tax scheme will be just if it finds its place in a just set of economic and legal institutions. Economic and legal institutions, as a system, will be just depending on how well they secure certain values—values such

259. Id. at 7–8.
261. See Jeffrey A. Schoenblum, Myth of Ownership/Myth of Government, 22 Va. Tax Rev. 555, 586–87 (2003) (reviewing Liam Murphy & Thomas Nagel, The Myth of Ownership: Taxes and Justice (2002)) (noting that “many of the dominant concerns of taxation, such as vertical and horizontal equity and the debate over income versus consumption tax, diminish in importance or even vanish when the focus turns to first principles”).
263. See infra Section IV.B.
264. See infra Section IV.B.
266. See id.
as liberty, welfare, opportunity, and personal responsibility.”

The approach that Murphy recommends—viewing tax in its societal context and interrogating its normative goals—both motivates and suggests solutions to the issues facing the unraveling safety net. While this informs our thinking, it is not sufficient.

The struggle to adapt and modernize tax policy when societal and economic trends arise is just as critical to tax as a lack of broader context and foundational unmooring. Legal regimes that are static provide certainty, but they risk becoming outmoded. This is a particular concern when technology and labor market changes move so quickly. Consequently, an approach to a tax analysis should address each of those deficiencies. These inquiries are well framed for an analysis based in sustainability.

B. Sustainability as a Superior Approach

We propose a sustainability approach to tax policy analysis because “[t]he fundamental cause of the current crisis in sustainability is the industrialization that followed the industrial revolution and the rapid economic growth it fostered.” We also propose using a sustainability approach because its attributes directly address weaknesses in prior analyses. Sustainability can be viewed as a “framework for managing change.” More critically important, however, sustainability asks foundational, normative questions and requires a multi-disciplinary approach focusing on long-term solutions and adjusting to changes in technology, society, and the economy.

From its inception, sustainability has asked whether a system “meets the needs of the present without compromising the ability of future generations

268. Id.
269. See id.
270. See infra Section IV.B.
271. See infra Section IV.B.
273. See supra Section IV.A.
275. See Davis-Nozemack & Kisska-Schulze, supra note 262.
276. See infra text accompanying notes 277–304.
to meet their own needs.” This question is sustainability’s guiding principle; it directs the entry into thinking sustainably. This question also invites a dual normative and analytical enquiry. In other words, it asks what needs should be met and asks to what extent we are meeting them. A dual-pronged normative and analytical approach requires significant work but promises robustness in its outcomes.

Many assume that sustainability only involves environmental protectionism; however, sustainability is much broader than climate and resource issues. While there is an entire body of research across multiple disciplines involving sustainability, for the purposes of harmonizing the employment and innovation tax policies in this paper, a few points are most critical.


278. See United Nations, Development Report, supra note 277; see also Hirokawa, supra note 274, at 10152.


282. See Hirokawa, supra note 274, at 10152 (noting environmental and economic outcomes as “complementary policy objectives”).

First, sustainability is much broader and implicates far more than environmentalism. There are various approaches to understanding sustainability, but one of the most widely accepted is the three pillars approach. Under this approach, sustainability analysis looks to (1) social development, (2) economic development, as well as (3) environmental development to understand whether a proposal will meet the needs of the present without compromising the ability of future generations to meet their own needs. Much focus in sustainability is on the environmental pillar because the effects of climate change threaten future irreversible damage; however, the three pillars are interdependent. Addressing problems under sustainability requires considering the effects on each of the pillars and necessitates a balanced approach.


284. See KENT E. PORTNEY, SUSTAINABILITY 6 (2015) (discussing the development of sustainability, including the three pillars approach).


286. See PORTNEY, supra note 284; see also Kates, Parris & Leiserowitz, supra note 285.


289. See Gibson, supra note 288, at 391.
A multi-dimensional, or three pillars, approach is appropriate to address issues that are complex and dramatic in scale.\footnote{See Marilu Hastings, *Foreword to Examining Interdisciplinary Sustainability Institutes at Major Research Universities: Innovations in Cross-Campus & Cross-Disciplinary Models* (2017).} No single discipline can solve issues as multifaceted and entrenched as climate change.\footnote{See Hirokawa, *supra* note 274, at 10155 (noting that “environmental, economic, and social considerations cannot be accomplished when viewed in isolation”).} Similarly, no single discipline is likely to solve other multifaceted and entrenched problems, like an eroding social safety net and dramatic changes in labor markets. Sustainability integrates knowledge, theories, and analysis from as many disciplines as can contribute.\footnote{See Gibson, *supra* note 288 (discussing integrative aspects of sustainability).} An approach that acknowledges the need for contribution from so many scholars can be daunting;\footnote{See id.; see also Komiyama & Takeuchi, *supra* note 272, at 3–4.} however, scholarly contribution must be broad and diverse to address complex, interdisciplinary questions. The need for collaboration amongst academic disciplines, rather than a single-discipline approach, can strengthen and add robustness to solutions.\footnote{See Emma Partridge, “Social Sustainability”: A Useful Theoretical Framework? (Sept. 28. 2005) (unpublished manuscript, presented at the 2005 Australasian Political Science Association Annual Conference) (noting the integrative ability of sustainability) (on file with author).} Such collaboration presents possibilities for knowledge spillover effects.

Sustainability is radical in its approach to the timeline for analysis. The guiding principle of sustainability—whether a solution “meets the needs of the present without compromising the ability of future generations to meet their own needs”\footnote{See United Nations, *Development Report, supra* note 277.}—inherently requires long-term thinking. This question does not permit scholars to contemplate solutions that address only current needs. This question acknowledges an implicit conflict amongst the resources we need for today and what we (and others) may need for tomorrow.\footnote{See Sudhir Anand & Amartya Sen, *Human Development and Economic Sustainability*, 28 *World Dev.* 2029, 2030 (2000) (discussing equity between generations); Amartya Sen, *The Ends and Means of Sustainability*, 14 *J. Hum. Dev. & Capabilities* 6, 6 (2013) (noting justice issues amongst generations).} Sustainability also provides resources to people who do not yet exist, those in future generations. This is an unusual approach for any discipline, let alone for tax.\footnote{See Anand & Sen, *supra* note 296, at 2030 (noting the need for various generations to share resources).} Nonetheless, the future-focus of sustainability is critical to its ability to craft lasting and livable solutions.\footnote{Magnus Boström, *A Missing Pillar? Challenges in Theorizing and Practicing Social Sustainability: Introduction to the Special Issue,* 8 *Sustainability: Scl., Practice & Pol’y.* 3–14 (2012).}
Sustainability also inherently embraces change. Sustainability acknowledges that today’s status quo will change. Technology, society, and the economy continually evolve. Because of this acknowledgement, sustainability seeks solutions, models, and theories that adapt to change. Sustainability demands adaptability in its component parts because the complex and interconnected problems it addresses are also constantly evolving. To ensure adaptability, it presents as an iterative process. Sustainability acts like a dynamic system that cycles through asking normative questions to set goals, measuring whether the goals have been met, and repeating the cycle again.

A sustainability analysis is appropriate in addressing the fraying social safety net because, as economist and philosopher Amartya Sen has noted, “it is only now that humankind itself and its economic activity has reached a scale that is potentially big enough to threaten the welfare prospects of future generations.” The impending collision of automation substitution and social safety net funding is economic activity on a scale big enough to threaten future generations. The current collision of employment tax and innovation tax policies sets up a classic intergenerational conflict common in sustainability issues. With automation substitution and social safety net funding, the social and economic pillars are also in conflict but must be harmonized.


300. See Hirokawa, supra note 274, at 10154 (noting the need to incorporate “evolving needs”).

301. Komiyama & Takeuchi, supra note 272, at 5 (noting the importance of change management in sustainability).

302. See id.

303. See Efrat Eizenberg & Yosef Jabareen, Social Sustainability: A New Conceptual Framework, 9 SUSTAINABILITY 68 (2017) (noting the use of process in sustainability); see also THIELE, supra note 299 (noting that sustainability uses a systems approach to fulfilling its goals).

304. See Gibson, supra note 288 (providing examples of iterative decisionmaking in sustainability); see also PORTNEY, supra note 284 (noting the process and systems nature of sustainability); Griesler & Littig, supra note 279 (describing an iterative process).


307. See Anand & Sen, supra note 296, at 2039 (noting the relationship amongst the pillars to improve the human condition).
C. A Sustainability Approach to Employment and Innovation Tax Policies

U.S. innovation policy has veered away from advancing social goals and promoted R&D at the expense of social safety net funding. Automation substitution in the fourth industrial revolution further endangers the viability of social safety net programs supported by employment tax policy. Employment tax policy goals cannot be fulfilled if undermined by the promotion of innovation. The resulting disharmony amongst employment and innovation tax policies is imperiling the U.S. social safety net system, requiring an examination of how better to balance the two. A sustainable taxation approach to U.S. employment and innovation tax policies could help; a sustainable taxation approach requires an interdisciplinary examination to create complementary tax policies aimed at supporting the kind of society we want to sustain.

Existing tax literature has not specifically focused on introducing methodologies to harmonize employment and innovation tax policies so they each remain faithful to their original social goals. As such, a new approach to tax policy analysis that asks fundamental, normative questions and addresses intergenerational equity is vital. Introducing a sustainability approach to taxation invites tax scholars to engage in interdisciplinary collaboration to explore this proposed analysis. Using the lens of sustainability to harmonize tax policy will not displace other approaches currently in place but, instead, is suitably interdisciplinary and robust enough to incorporate historical lessons. As explained above, current approaches to tax scholarship are not sufficient to tackle the issues we face; however, prior work in taxation is very valuable and can be integrated within and support a sustainable framework.

1. Applying Sustainability to Employment Tax Proposals

A sustainability tax analysis must begin with the question of whether U.S. employment and innovation policies “meet[] the needs of the present without compromising the ability of future generations to meet their own

308. See supra Sections III.A, C.
309. See supra Sections III.A, C.
310. See supra Section II.B.
311. See supra Part II–III.
312. See infra Section IV.C.1–2.
313. See supra Section IV.B.
314. See supra Section IV.A.
315. See supra text accompanying notes 272–280, 295–298.
316. See supra text accompanying notes 281–294.
317. See supra text accompanying notes 299–304.
needs.” As explained above, Medicare and Social Security are currently funded but are predicted to become insolvent in the next six to fourteen years. This funding structure meets neither the needs of the present nor future generations and is likely compounded by projected levels of job automation.

The normative underpinning of employment tax has been long established and was explored in Section II.A. The Social Security Act was to provide welfare assistance, poverty prevention, financial security for the aging, economic stability, and labor force stabilization. Program insolvency jeopardizes these public policy goals for current and future beneficiaries. Several reforms to address program insolvency have been proposed, including (1) increasing wage caps for FICA and FUTA to generate additional payroll tax revenue, (2) use of chained consumer price index (CPI) to allow benefit payments to more easily adapt to economic trends, and (3) use of post-mortem austerity to recoup benefits from wealthy beneficiaries who do not require governmental support. We apply a sustainability analysis to determine their viability.

One of the most popular proposals has been limiting erosion of the social security wage base by lifting the cap on taxable Social Security wages. Social Security wage base erosion has not been addressed since 1983. Because the Social Security and Medicare Trustees have reported impending insolvency of the trust funds to the public regularly for many years, public opinion sees merit in such a proposal and is in favor of increasing employment tax contributions to prevent insolvency. Similarly, some have also

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319. See MEDICARE REPORT 2018, supra note 230.
320. See Acemoglu & Restrepo, supra note 88.
321. See supra Section II.A.
322. See Altman, supra note 114; DeWitt, supra note 109; Price, supra note 115.
323. See infra text accompanying notes 326–348.
324. See infra text accompanying notes 326–348.
suggested raising the low wage base for FUTA. Both of these proposals have the benefits of increasing employment tax revenues without undermining the established goals of the programs. These reforms are not particularly adaptive, however. One-time wage base increases or rate increases are another example of incremental change that does not adapt to future societal or economic changes. Depending upon the size of base or rate increase, these one-time changes also do not necessarily balance the needs of the present with the needs of the future.

Other often discussed proposals, like the use of the chained Consumer Price Index (often noted as “C-CPI”) instead of the Consumer Price Index for Urban Wage Earners and Clerical Workers (“CPI-W”) to set program benefits or increase the ages of eligibility for Social Security and Medicare are also likely to address the programs’ insolvency. The use of chained CPI is inherently more adaptive than the currently applied CPI measures, because chained CPI is calculated monthly as opposed to biannually. While more adaptive to on-the-ground economic changes, use of chained CPI for program benefits is predicted to slow inflation adjustments

18-29 (81%) agree that they are willing to contribute more now for a more secure retirement, compared to approximately two in three or less among adults age 30-49 (68%) and 50-64 (57%).


333. Frequently Asked Questions About the Chained Consumer Price Index for All Urban Consumers (C-CPI-U), U.S. BUREAU LABOR STAT., https://www.bls.gov/cpi/additional-resources/chained-cpi-questions-and-answers.htm#Question_4 (last modified Dec. 20, 2019) (“In its final form, the C-CPI-U is a monthly chained price index with the expenditure weights varying each month. The CPI-U and CPI-W, on the other hand, are biennial chained price indexes where their expenditure weights are updated every two years.”).
of Social Security benefits over time. While CPI changes are adaptive and assist with insolvency, such proposals threaten to undermine the welfare assistance, poverty prevention, economic, and security goals of the programs by decreasing benefits received for current and future beneficiaries. Unlike the chained CPI proposals, increasing eligibility age is not adaptive. Moreover, age eligibility proposals are also subject to criticism that they undermine the public policy goals of the programs.

Other proposals, such as post-mortem austerity in which beneficiaries receive assistance during life but can be disqualified for benefits after death based on wealth, offer creative possibilities that could financially shore up the programs without undermining the public policy goals for current and future beneficiaries. Post-mortem austerity is also highly adaptive and balances the needs of current and future beneficiaries. Post-mortem austerity is the type of social safety net reform that satisfies the issue raised under a sustainability analysis and is more likely to lead to a lasting solution that fulfills the needs of the current generation without imperiling the ability of future generations to meet their own needs.

2. Applying Sustainability to Innovation Tax Proposals

The normative underpinning of innovation tax, as explored in Section III.A, has twin goals of increasing economic progress and improving social welfare. We have criticized innovation tax policy for evolving to prefer economic improvements over social welfare gains. The trend in innovation tax policy has been to become more generous to business, the primary beneficiary of increased credits, deductions, and offsets. The federal government has relied on economic studies as rationale for increasing tax subsidies. Economic analysis of innovation tax proposals, in many cases, has

334. See Using the Chained CPI in the Tax Code, supra note 331.
336. See supra Section III.A.
337. See supra Section III.A.
338. See supra Section III.C.
339. See ORG. FOR ECON. COOPERATION & DEV., R&D TAX INCENTIVES: UNITED STATES, 2018 (2019) (concluding that “[a]n increase in the importance of R&D tax incentives is noticeable from 2009 onwards, both in absolute and relative terms”).
340. See generally Bettina Becker, Public R&D Policies and Private R&D Investment: A Survey of the Empirical Evidence, 29 J. ECON. SURVEYS 917, 925 (2015) (analyzing prior literature and concluding that “R&D tax credits have a positive effect on private R&D investment” but also finding that “most of the funding is awarded to larger firms that would have performed the R&D even in the absence of the public subsidy, which suggests that in these cases subsidies could be targeted more effectively”); see also, Bronwyn H. Hall, Tax Policy for Innovation 1–25 (Nat’l Bureau of Econ. Research, Working Paper No. 25773, 2019), https://www.nber.org/papers/w25773 (surveying literature for tax credits and patent boxes).
suggested that increasing innovation tax subsidies yields positive (or at least not negative) revenue projections. In other words, several economic studies suggest that tax subsidies for innovation pay for themselves. However, an admitted weakness of this work is that tax subsidies can shift “the demand curve for innovation outward by subsidizing research and development.” In essence, “if the number of workers in the innovation sector (‘supply’) is fixed,” then tax subsidies merely increase demand for these workers and consequently “may simply drive up their wages with no effect on the quantity of innovation.”

Our primary criticism of this economic analysis is that it is not sufficiently interdisciplinary and does not consider other labor force and employment tax effects. Specifically, some studies focus on productivity gains, an important and valid measure. However, such productivity gains can increase the likelihood of automation substitution, which can intensify pressures on social safety revenue and benefits. The economic models used, and data included in these models, should consider the downstream impact that innovation has on the U.S. labor market and hence on employment tax revenues. Using a single discipline model, such as an economics-only model, limits the utility of solutions found in this work and, more importantly, does not acknowledge the ramifications of using the work without its broader context. Just as the usefulness of tax as a discipline is limited when it is siloed from interdisciplinary work, the same can be said for economics.

The use of economic models is critically important to improving and refining tax policy. These models and their limited view on downstream effects, however, are not sufficient evidence on which to base tax policy. An interdisciplinary approach provides nuance for innovation tax models. The appropriate inquiry is how to foster economic development, including through innovation, while measuring downstream effects on social programs.

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341. See Becker, supra note 340; Hall, supra note 340, at 12 (citing a 2012 research finding that “increase in R&D spending approximately balances or even exceeds the lost tax revenue”).


343. Id.


345. See Neil H. Buchanan, The Role of Economics in Tax Scholarship, in BEYOND ECONOMIC EFFICIENCY IN UNITED STATES TAX LAW 11, 22 (David A. Brennen, Karen B. Brown & Darryll K. Jones eds., 2013) (stating that “[a]ny competent analysis of taxation must certainly address issues that are commonly thought of as ‘economic issues’” but arguing that economic analysis has limited application for tax scholarship, particularly in the case of pareto efficiency).
and providing an adaptive system for pursuing both. The economics research should be considered in light of the twin goals of increasing economic progress and improving social welfare, and the research should be used to ascertain whether it furthers these goals.

In addition to a more interdisciplinary examination of innovation tax policy, a sustainable approach to innovation tax policy would begin with the motivating policies of the legislation itself. As we have argued above, legislation should remain faithful to its underpinning. This underpinning can be found often, but not exclusively, in legislative histories. Because innovation tax policy has strayed from its original social welfare goals, all future innovation tax proposals should express motivating goals clearly. A statement of purpose makes it easier to ensure that the legislation’s intended effects are realized and consistent with these goals. Establishing clear goals is the first step towards an iterative and adaptive system.

In addition, the effects of innovation tax policy must be measured broadly and regularly so as to empower the policy to become more adaptive. These measures should examine the downstream effects on the current and future labor force. Such measures can be generated by dynamic and predictive economic models.

In its current form, innovation tax policy is not sustainable. We recommend policy and legal changes more consistent with sustainable thinking. In particular, we first recommend that all innovation tax legislation expressly state its economic progress and social welfare goals. Such a pronouncement is critical to forcing the legislation to remain faithful to these purposes as it is incrementally amended over time. We also recommend that the measures used to inform innovation tax law become more interdisciplinary and examine downstream effects of the proposals, particularly the effects on labor markets and social programs. These measures should assist in designing adaptive—as opposed to static—policies that can adjust with new technologies and changes in labor markets. Finally, the goals and measures

346. See supra Section IV.A.
347. See supra Section IV.A.
348. See Legislative History, BLACK’S LAW DICTIONARY (10th ed. 2014) (stating that it is used to find the “intent” of a particular statute).
349. See Robert B. Gibson, Sustainability Assessment: Basic Components of a Practical Approach, 24 IMPACT ASSESSMENT & PROJECT APPRAISAL 170, 171–176, 180 (2006) (stating that “[t]he better we understand the objective, the less likely we are to go astray in implementation efforts” and noting the importance of purpose and objectives in the sustainability process).
350. See René Kemp, Saeed Parto, & Robert B. Gibson, Governance for Sustainable Development: Moving from Theory to Practice, 8 INT’L J. SUSTAINABLE DEV. 12, 20-21 (2005) (discussing objective setting as part of sustainable assessment); Gibson, supra note 349 (discussing objective setting as part of sustainability).
351. See supra text accompanying notes 346–348.
352. See supra text accompanying notes 338–345.
should also endeavor to consider intergenerational equity effects of current law and future proposals.\textsuperscript{353} 

V. CONCLUSION

Like the three prior industrial revolutions, the current fourth industrial revolution is altering the workplace with machinery advancements. This revolution is distinguishable from previous industrial revolutions because of the speed of innovation improvements and unprecedented human-machine alliances.\textsuperscript{354} Increased automation is predicted to lead to worker displacement across countless industries, in both blue- and white-collar jobs. This level of worker displacement threatens an already fraying social safety net.\textsuperscript{355} Although some have suggested taxing robots to limit the financial impact of automation substitution, this Article suggests that such a proposal is naïve because it conceals the underlying tension between employment tax and innovation policies.\textsuperscript{356}

From its inception, the goal of U.S. employment tax policy was to improve social welfare.\textsuperscript{357} Increased worker displacement caused by automation substitution could result in society’s inability to meet the benefit demands of Social Security, Medicare, and unemployment that are funded by the employment tax.\textsuperscript{358} The long-term sustainability of these programs is already jeopardized, and automation substitution further threatens their viability.\textsuperscript{359}

Employment tax policy goals cannot be realized if they are undermined by the promotion of innovation. U.S. innovation tax policy evolved from general innovation policy to promote both economic progress and social welfare.\textsuperscript{360} However, innovation tax has shifted in favor of economic progression at the expense of social safety net funding.\textsuperscript{361} This deviation from pursuit of both twin goals of economic progress and social welfare imperils the U.S. social safety net system.

Current analytical approaches are ill-suited to address the impending social safety net crisis. This Article introduces and applies sustainability as a

\textsuperscript{353} See supra text accompanying notes 348–351.
\textsuperscript{354} See supra text accompanying notes 74–96.
\textsuperscript{355} See supra text accompanying notes 77–89.
\textsuperscript{356} See supra text accompanying note 243.
\textsuperscript{357} See supra text accompanying notes 111–139.
\textsuperscript{358} See supra text accompanying notes 140–153.
\textsuperscript{359} See supra text accompanying notes 140–153.
\textsuperscript{360} See supra text accompanying notes 165–224.
\textsuperscript{361} See supra text accompanying notes 225–236.
viable approach for harmonizing U.S. employment and innovation tax policies.\textsuperscript{362} Sustainability requires an examination of foundational, normative questions, integrates interdisciplinary collaboration, embraces long-term solutions, and adapts to an ever-evolving technological society.\textsuperscript{363} With so little scholarly work about sustainable taxation, no comprehensive sustainable tax analysis currently exists. To advance the literature in this arena, we show that sustainability can help harmonize employment tax and innovation tax policies to repair the fraying social safety net.\textsuperscript{364}

\textsuperscript{362} See supra text accompanying notes 272–307.
\textsuperscript{363} See supra text accompanying notes 272–307.
\textsuperscript{364} See supra text accompanying notes 308–353.