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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-

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1. *See* Malcolm James, *Here's How Bill Gates' Plan to Tax Robots Could Actually Happen*, BUS. INSIDER (Mar. 20, 2017, 11:18 AM), http://www.businessinsider.com/bill-gates-robot-tax-brighter-future-2017-3.

2. *See* Carl Benedikt Frey & Michael A. Osborne, *The Future of Employment: How Susceptible Are Jobs to Computerisation?*, 114 TECHNOLOGICAL FORECASTING & SOC. CHANGE 254, 268 (2017) (analyzing tasks and jobs at risk of automation to calculate total risk in the U.S. economy); *see also* Ryan Calo, *Artificial Intelligence Policy: A Primer and Roadmap*, 51 U.C. DAVIS L. REV. 399, 425–27 (2017) (noting public concerns regarding AI taking over human jobs); Cynthia Estlund, *What Should We Do After Work? Automation and Employment Law*, 128 YALE L.J. 254, 258 (2018) (documenting that there are no identifiable industries or sectors that can absorb the number of workers whose jobs will be displaced due to robotics); Lewis D. Solomon, *The Microelectronics Revolution, Job Displacement, and the Future of Work: A Policy Commentary*, 63 CHI.-KENT L. REV. 65, 71–75 (1987) (analyzing the impact of machinery on labor).

3. *See* Frey & Osborne, *supra* note 2, at 268.

vanced economies like the United States may be required to change occupations and learn new skills to remain employed.[4] Rapid automation is predicted to increase unemployment rates and intensify economic inequality.[5]

The current fourth industrial revolution, like the previous three industrial revolutions, is transforming workplaces with machinery improvements.[6] 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.[7] Software and robotics are not only automating blue collar jobs, but also threaten to replace the white-collar jobs historically thought protected.[8]

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[9] through Social Security, Medicare, and unemployment insurance.[10] U.S. social safety net programs kept 36 million people out of poverty in 2017.[11] Ninety-seven percent of U.S. persons aged sixty- to eighty-

4. *See* JAMES MANYIKA ET AL., MCKINSEY GLOBAL INST., JOBS LOST, JOBS GAINED: WORKFORCE TRANSITIONS IN A TIME OF AUTOMATION 1, 11 (2017), https://www.mckinsey.com/featured-insights/future-of-work/jobs-lost-jobs-gained-what-the-future-of-work-will-mean-for-jobs-skills-and-wages (estimating size of workforce changes based on various scenarios).

5. *See* Ryan Abbott & Bret Bogenschneider, *Should Robots Pay Taxes? Tax Policy in the Age of Automation*, 12 HARV. L. POL'Y REV. 145, 147 (2018) (regarding unemployment and economic inequality); *see also* Ronald C. Brown, *Made in China 2025: Implications of Robotization and Digitalization on MNC Labor Supply Chains and Workers' Labor Rights in China*, 9 TSINGHUA CHINA L. REV. 186, 200 (2017) (commenting that automation could trigger a loss of social security benefits).

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.

8. *See, e.g.*, Matthew J. Belvedere, *AI Will Obliterate Half of All Jobs, Starting with White Collar, Says Ex-Google China President*, CNBC (Nov. 13, 2017, 11:35 AM), https://www.cnbc.com/2017/11/13/ex-google-china-president-a-i-to-obliterate-white-collar-jobs-first.html; Pedro Nicolaci da Costa, *Robots and Automation Are Going White Collar—But They're Not Here to Steal Your Job Just Yet*, BUS. INSIDER (Apr. 1, 2017, 9:41 AM), https://www.businessinsider.com/white-collar-jobs-and-automation-2017-3; Will Knight, *Is Technology About to Decimate White-Collar Work?*, MIT TECH. REV. (Nov. 6, 2017), https://www.technologyreview.com/s/609337/is-technology-about-to-decimate-white-collar-work/; Alison DeNisco Rayome, *Robots Will Steal Your White Collar Office Job, Too: 3 Case Studies*, TECHREPUBLIC (July 9, 2018, 10:16 AM), https://www.techrepublic.com/article/robots-will-steal-your-white-collar-office-job-too-3-case-studies/.

9. *See infra* Part II.

10. *See* Kenneth R. Wing, *The Impact of Reagan-Era Politics on the Federal Medicaid Program*, 33 CATH. U. L. REV. 1, 34 (1983) (noting inclusions to the U.S. social safety net).

11. DANILO TRISI & MATT SAENZ, CTR. ON BUDGET & POLICY PRIORITIES, ECONOMIC SECURITY PROGRAMS CUT POVERTY NEARLY IN HALF OVER LAST 50 YEARS 4 (2019), https://www.cbpp.org/sites/default/files/atoms/files/9-14-18pov.pdf.

nine-years-old collect or will collect Social Security,[12] and Medicare, as the largest health insurance program,[13] provides benefits to 44 million.[14] In addition, unemployment benefits are paid to nearly 2 million Americans annually.[15] Social safety net programs ameliorate poverty, and more than 60% of the U.S. population favors expansion of these types of programs.[16]

Payroll taxes finance Social Security, Medicare, and unemployment programs.[17] Payroll taxes, imposed on wages earned, provide 33% of total federal revenue.[18] As innovation advancements lead toward escalated automation substitution in the workforce,[19] displaced workers will increasingly rely on benefits and will be incapable of contributing to the payroll tax that funds them.[20]

Increased labor substitution resulting from automation innovation threatens to undermine the safety net programs.[21] 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

12. *Policy Basics: Top Ten Facts About Social Security*, CTR. ON BUDGET & POL'Y PRIORITIES, https://www.cbpp.org/sites/default/files/atoms/files/8-8-16socsec.pdf (last updated Aug. 14, 2019).

13. *See* Bruce D. Meyer & Derek Wu, *The Poverty Reduction of Social Security and Means-Tested Transfers* 7 (Nat'l Bureau of Econ. Research, Working Paper No. 24567, 2018), https://www.nber.org/papers/w24567.

14. BEN UMANS & K. LYNN NONNEMAKER, AARP PUB. POLICY INST., THE MEDICARE BENEFICIARY POPULATION 1 (2009), https://assets.aarp.org/rgcenter/health/fs149_medicare.pdf (providing overview of Medicare program which provides care for 58 million people in the United States).

15. *See* Paul Wiseman, *U.S. Unemployment Claims Fall to 220,000, Lowest in 44 Years*, USA TODAY (Oct. 19, 2017, 10:19 AM), https://www.usatoday.com/story/money/economy/2017/10/19/u-s-unemployment-claims-fall-222-000-lowest-44-years/779522001/ (reporting on Labor Department statistics as well as causes and effects of change in statistics).

16. PUB. POLICY POLLING, NATIONAL SURVEY RESULTS (2018), https://www.socialsecurityworks.org/wp-content/uploads/2018/03/Nat-Social-Security-March-18-2-Results.pdf (pertaining to Social Security and Medicare).

17. *See Policy Basics: Federal Payroll Taxes*, CTR. ON BUDGET & POL'Y PRIORITIES, https://www.cbpp.org/research/federal-tax/policy-basics-federal-payroll-taxes (last updated Jun. 24, 2019) (noting that payroll taxes fund "Social Security, Medicare, and other social insurance benefits"); *see also* Bobby L. Dexter, *Tenure Buyouts: Employment Death Taxes and the Curious Obesity of "Wages,"* 70 U. PITT. L. REV. 343, 351 (2009) (documenting the United States uses payroll taxes to pay those entitled to collect Social Security benefits).

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,[22] 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.[23] As scholar Ruth Cowan notes,

22. *See* Abbott & Bogenschneider, *supra* note 5, at 149–50 (suggesting that existing tax policies must change in anticipation of substantial job loss due to automation substitution); Sami Ahmed, *Cryptocurrency & Robots: How to Tax and Pay Tax on Them*, 69 S.C. L. REV. 697, 731–32 (2018) (discussing advantages and disadvantages of implementing a robot tax); Orly Mazur, *Taxing the Robots*, 46 PEPP. L. REV. 277, 280–82 (2019) (proposing tax and non-tax policy measures to improve the future labor market with a focus on balancing capital and labor income).

23. *See* RUTH SCHWARTZ COWAN, A SOCIAL HISTORY OF AMERICAN TECHNOLOGY 67 (1997).

"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).

27. *See* Michael Chui, James Manyika & Mehdi Miremadi, *Where Machines Could Replace Humans—and Where They Can't (Yet)*, MCKINSEY Q. (July 8, 2016), https://www.mckinsey.com/business-functions/digital-mckinsey/our-insights/where-machines-could-replace-humans-and-where-they-cant-yet (using data to predict automation substitution trends by work activity).

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).

30. *See Industrial Revolution*, ENCYCLOPEDIA BRITANNICA (Sept. 4, 2019), https://www.britannica.com/event/Industrial-Revolution.

revolution, from the late nineteenth century until World War I, brought assembly lines, mass production, and large firms to the United States.[31] Microelectronics and computerized technology of the 1980s launched the third industrial revolution.[32] The fourth revolution is now transforming society with digitization, robotization, and cyber systems.[33] Each industrial revolution dramatically altered the workplace.[34]

1. Production: Second Industrial Revolution

Throughout the colonial period and briefly thereafter, most Americans were farmers.[35] Hand labor remained prevalent through the end of the American Civil War, constraining domestic industrial production capabilities.[36] After the Civil War, mechanization emerged in the United States, increasing speed and output.[37] In 1850 there were 116 carpet mills with 6000 workers in the United States; just twenty years later, the industry had doubled in size.[38] As machines replaced hand labor and firms adopted Henry Ford's 1913 assembly line,[39] production capacity exploded.[40]

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."[41] Until the late 1800s, the term "unemployment" did not exist in the United States.[42] 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).

35. Susan Pace Hamill, *From Special Privilege to General Utility: A Continuation of Willard Hurst's Study of Corporations*, 49 AM. U. L. REV. 81, 92 (1999).

36. *See History of the United States Industrialization and Reform (1870–1916)*, THEUSAONLINE.COM, http://www.theusaonline.com/history/industrialization.htm (last visited Jan. 11, 2019).

37. *See* Ed Crews, *Weaving, Spinning, and Dyeing*, TREND & TRADITION, Winter 2007, at 84–87.

38. *See* Randall L. Patton, *A History of the U.S. Carpet Industry*, EH.NET, https://eh.net/encyclopedia/a-history-of-the-u-s-carpet-industry/ (last visited Jan. 11, 2019).

39. *See* Sally H. Clarke, *Unmanageable Risks:* MacPherson v. Buick *and the Emergence of a Mass Consumer Market*, 23 L. & HIST. REV. 1, 11 (2005); *see also* Kat Eschner, *One Hundred and Three Years Ago Today, Henry Ford Introduced the Assembly Line: His Workers Hated It*, SMITHSONIAN MAG.:SMARTNEWS (Dec. 1, 2016), https://www.smithsonianmag.com/smart-news/one-hundred-and-three-years-ago-today-henry-ford-introduced-assembly-line-his-workers-hated-it-180961267/ (discussing early employment numbers at Ford).

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

41. *See* Charles Hirschman & Elizabeth Mogford, *Immigration and the American Industrial Revolution from 1880 to 1920*, 38 SOC. SCI. RES. 897 (2009).

42. Cynthia Crossen, *Until the Late 1800's, U.S. Had Never Known Unemployment Woes*, WALL STREET J. (Dec. 3, 2003, 12:01 AM), https://www.wsj.com/articles/SB107040655254249400.

to exploit land and resources on their own;[43] 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.[44]

The birth of industry and corporations resulted in clear demarcation lines between rich and poor, engendering discontent among the population.[45] For the first time in American history, workers experienced job insecurity.[46] Although manufacturing jobs were abundant, wages were low and job security uncertain.[47] In response to social and economic influences of the times, trade unions took shape.[48]

The stock market crash of Black Tuesday catapulted the United States into the Great Depression, coinciding with the end of the second industrial revolution.[49] Before 1929, unemployment was approximately 3.3%; by 1930 that rate increased to 8.9%, and just one year later jumped to 15.9%.[50] By 1933, the unemployment rate hit its pinnacle of 24.9%.[51] To address economic turmoil and mass unemployment, federal social insurance was implemented to help restore national economic stability.[52]

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

43. *See* Stanley L. Engerman & Kenneth L. Sokoloff, *Once Upon a Time in the Americas: Land and Immigration Policies in the New World*, *in* UNDERSTANDING LONG-RUN ECONOMIC GROWTH: GEOGRAPHY, INSTITUTIONS, AND THE KNOWLEDGE ECONOMY 13, 14 (Dora L. Costa & Naomi R. Lamoreaux eds., 2011).

44. *See America Moves to the City*, KHAN ACADEMY, https://www.khanacademy.org/humanities/ap-us-history/period-6/apush-gilded-age/a/america-moves-to-the-city (last visited Jan. 11, 2019).

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

46. *See* Gary Minda, *Aging Workers in the Postindustrial Era*, 26 STETSON L. REV. 561, 594 (1996) (noting "great anxiety and job insecurity" of the American workforce as a result of industrial revolution).

47. *See id.*

48. *See* G. William Domhoff, *The Rise and Fall of Labor Unions in the U.S.*, WHO RULES AMERICA?, https://whorulesamerica.ucsc.edu/power/history_of_labor_unions.html (last visited Jan. 11, 2019) (providing a history of labor unions in the United States from the 1830s to 1980s).

49. *See* Joy Sabino Mullane, *Perfect Storms: Congressional Regulation of Executive Compensation*, 57 VILL. L. REV. 589, 594 (2012) (noting the impact of the stock market crash on the Great Depression); *see also* Bradford L. Smith, *The Third Industrial Revolution: Policymaking for the Internet*, 3 COLUM. SCI. & TECH. L. REV. 1, 2 (2001) (noting the Second Industrial Revolution ended in about 1930).

50. Mullane, *supra* note 49.

51. *Id.*

52. See *infra* Part III for further discussion.

second revolutions were gradual.[53] The introduction of the computer, however, dramatically changed the speed at which innovation evolved, repeatedly doubling computing and technological capabilities over short terms.[54]

Computers and the internet propelled twentieth-century society into the third industrial revolution.[55] Emerging technologies during this period included smartphones, Global Positioning System ("GPS"), and mobile broadband.[56] Computers transformed brick and mortar offices into virtual workplaces.[57] Rapid improvements in information technology and mobile devices influenced businesses and consumers to become more productive.[58]

Evolving technology also changed communication.[59] Cell phones provided "email and web browsing capabilities."[60] Smart phones replaced the need for landlines, answering machines, scanners, point and click cameras, and digital music players.[61] Social technologies like blogs, wikis, and social networks transformed communication culturally and organizationally.[62] Today more than one third of the global population uses some form of social

53. *See* BYRON REESE, THE FOURTH AGE: SMART ROBOTS, CONSCIOUS COMPUTERS, AND THE FUTURE OF HUMANITY 21, 25 (2018).

54. *See id.* at 27–28.

55. *See* Goncalo de Vasconcelos, *The Third Industrial Revolution–Internet, Energy and a New Financial System*, FORBES (Mar. 4, 2015, 8:50 AM), https://www.forbes.com/sites/goncalodevasconcelos/2015/03/04/the-third-industrial-revolution-internet-energy-and-a-new-financial-system/#5aa121b3271a (documenting that the third industrial revolution emerged in the mid-1990s).

56. *See* Annalisa Quinn, *Move over Millennials, Here Comes 'iGen' . . . or Maybe Not*, NPR (Sept. 17, 2017, 7:01 AM), https://www.npr.org/2017/09/17/548664627/move-over-millennials-here-comes-igen-or-maybe-not (discussing the impact of Generation Z); *see also* Will McLennan, *Great Life-Improving Inventions of the 2000s*, THERICHEST (Nov. 23, 2013), https://www.therichest.com/business/technology/the-top-10-life-improving-inventions-of-the-2000s/ (documenting some of the greatest technological inventions of the 2000s).

57. *See* Nancy J. King, *Labor Law for Managers of Non-Union Employees in Traditional and Cyber Workplaces*, 40 AM. BUS. L.J. 827, 830 (2003) (further discussing cyber and virtual workspaces).

58. *See* Clayton Browne, *How Have Computers Changed the Workplace?*, CAREER TREND (July 5, 2017), https://careertrend.com/computers-changed-workplace-2197.html.

59. *See* Ric Simmons, *Why 2007 Is Not Like 1984: A Broader Perspective on Technology's Effect on Privacy and Fourth Amendment Jurisprudence*, 97 J. CRIM. L. & CRIMINOLOGY 531, 568 (2007) (noting that "technology has changed the way we communicate and store information").

60. Robert A. Pikowsky, *The Need for Revisions to the Law of Wiretapping and Interception of Email*, 10 MICH. TELECOMM. TECH. L. REV. 1, 2–3 (2003).

61. Tim Stenovec, *13 Things the Smartphone Has Made Obsolete*, BUS. INSIDER (Nov. 21, 2015, 9:56 AM), http://www.businessinsider.com/13-things-the-smartphone-has-made-obsolete-2015-11.

62. *See* Martin Harrysson, *The Evolution of Social Technologies*, MCKINSEY Q. (June 29, 2016), https://www.mckinsey.com/industries/high-tech/our-insights/the-evolution-of-social-technologies (discussing the incorporation of social network culture in business models).

media platform—Facebook, Snapchat, Twitter, or Instagram—to share information.[63] The Internet also introduced retail electronic commerce ("e-commerce")[64] and eased barriers to global business.[65] Thanks in large part to Amazon.com, e-commerce is expected to comprise 17% of U.S. retail sales by 2022.[66]

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.[67] The momentum of today's fourth industrial revolution sets the stage for profound transformations in the way society works and lives.[68] 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."[69]

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.[70] Genetic engineering, artificial intelligence, robotics, and three-dimensional ("3D") printing are opportunities for

63. Audrey Willis, *6 Ways Social Media Changed the Way We Communicate*, HIGHER EDUC. MARKETING J. (Aug. 15, 2017), http://circaedu.com/hemj/how-social-media-changed-the-way-we-communicate/.

64. *See* Tapio Puurunen, *The Judicial Jurisdiction of States over International Business-to-Consumer Electronic Commerce from the Perspective of Legal Certainty*, 8 U.C. DAVIS J. INT'L L. & POL'Y 133, 136 (2002) (discussing the rise of electronic commercial retail).

65. *See* Kathryn Kisska-Schulze, *The Future of E-Mail Taxation in the Wake of the Expiration of the Internet Tax Freedom Act*, 51 AM. BUS. L.J. 315, 321 (2014) (discussing how the rise of electronic commercial retail has enabled customers to remotely pass national borders).

66. Daniel Keyes, *E-Commerce Will Make Up 17% of All U.S. Retail Sales by 2022—and One Company is the Main Reason*, BUS. INSIDER (Aug. 11, 2017, 11:12 AM), http://www.businessinsider.com/e-commerce-retail-sales-2022-amazon-2017-8; *see also* Note, *Online Retailers Battle with Sales Tax: A Physical Rule Living in a Digital World*, 46 SUFFOLK U. L. REV. 673, 678 (2013) (noting the date of Amazon's incorporation).

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).

69. REESE, *supra* note 53, at 30.

70. *See* UNITED NATIONS ECON. & SOC. COMM'N FOR W. ASIA (UNESCWA), FOURTH INDUSTRIAL REVOLUTION: IMPACT OF THE FOURTH INDUSTRIAL REVOLUTION ON DEVELOPMENT IN THE ARAB REGION 3–4 (2019), https://www.unescwa.org/sites/www.unescwa.org/files/publications/files/impact-fourth-industrial-revolution-development-arab-region-english.pdf (discussing

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

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the speed, breadth, impact and disruption of the fourth industrial revolution and contrasting it with previous industrial revolutions) [hereinafter UNESCWA]; *see also* James Pethokoukis, *We Aren't Doomed: My Review of "The Fourth Age: Smart Robots, Conscious Computers, and the Future of Humanity" by Byron Reese*, AEI (Oct. 19, 2018), https://www.aei.org/economics/we-arent-doomed-my-review-of-the-fourth-age-smart-robots-conscious-computers-and-the-future-of-humanity-by-byron-reese/ (discussing the fourth industrial revolution in the context of Reese's book).

71. *See* Klaus Schwab & Richard Samans, *Preface* to WORLD ECON. FORUM, THE FUTURE OF JOBS: EMPLOYMENT, SKILLS AND WORKFORCE STRATEGY FOR THE FOURTH INDUSTRIAL REVOLUTION v (2016), http://www3.weforum.org/docs/WEF_Future_of_Jobs.pdf (specifying the various types of technology propelling us into the fourth industrial revolution); *see also* Insights Contributor, *How The World's Top Executives Are Approaching The Fourth Industrial Revolution*, FORBES INSIGHTS (Jan. 22, 2018, 9:00 AM), https://www.forbes.com/sites/insights-deloitte/2018/01/22/how-the-worlds-top-executives-are-approaching-the-fourth-industrial-revolution/#5ba399547abd (noting that the fourth industrial revolution will allow for collaboration between human and machine).

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

73. *Following Holiday Surge, One in Six Americans Owns a Voice-Activated Smart Speaker*, NPR (Jan. 10, 2018), https://www.npr.org/about-npr/577007267/jan-2018-smart-audio-report.

74. *See* Erin Winick, *Amazon's Investment in Robots Is Eliminating Human Jobs*, MIT TECH. REV. (Dec. 4, 2017), https://www.technologyreview.com/the-download/609672/amazons-investment-in-robots-is-eliminating-human-jobs/ (discussing Amazon's investment in robotics); *see also* Andrew Meola, *Shop Online and Get Your Items Delivery by a Drone Delivery Service: The Future Amazon and Domino's Have Envisioned for Us*, BUS. INSIDER (July 18, 2017, 12:30 PM), http://www.businessinsider.com/delivery-drones-market-service-2017-7 (analyzing drone delivery in the retail industry).

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.[78]

A 2017 McKinsey Global Institute study estimated that 400 to 800 million persons globally may be displaced by automation by 2030.[79] Of that total, 75 to 375 million individuals may have to change occupations or learn new skills to remain employable.[80] For advanced economies like the United States and Germany, one third of the workforce may be affected by 2030.[81] Automation substitution also threatens white collar jobs.[82] Tasks previously conducted by highly-skilled persons but can now be augmented by automation[83] include accounting, law, and medicine.[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."[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.[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.[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.[88] Automation innovation displaces workers, but it also creates

78. *See id.* at 269.

79. *See* Manyika et al., *supra* note 4, at 11.

80. *See id.*

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.*

82. *See* Belvedere, *supra* note 8.

83. *See id.*

84. *See* Nicolaci da Costa, *supra* note 8.

85. Aaron Smith & Monica Anderson, *Automation in Everyday Life*, PEW RES. CTR. (Oct. 4, 2017), http://www.pewinternet.org/2017/10/04/automation-in-everyday-life/.

86. *See id.*

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.*

88. *See* Daron Acemoglu & Pascual Restrepo, *Robots and Jobs: Evidence from U.S. Labor Markets* 2–3 (Nat'l Bureau of Econ. Research, Working Paper No. 23285, 2017), http://www.nber.org/papers/w23285.

a productivity effect that drives up labor and wages in other areas of the economy.[89] Just as robot usage in one industry has labor and wage effects in other industries, it also ripples through related economies.[90] 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.[91]

Even accounting for the productivity effect, scholars predict increased robot usage will have a negative impact on employment and wages[92] and that automation substitution significantly targets low-skilled workers.[93]

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.[94]

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.[95] 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.[96] 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.[97] 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.[98] The payroll tax is imposed on wages earned by employees via the Federal Insurance Contributions Act ("FICA")[99] and Medicare and on the self-employed via the Self-Employed Contributions Act ("SECA").[100] The tax promotes social responsibility by shielding retirees, disabled, and survivors of deceased workers against poverty and financial dependency.[101] In addition, the federal unemployment tax ("FUTA")[102] is assessed on employers and provides financial benefits to involuntarily unemployed workers.[103]

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).

98. *See* MAUREEN ANNE GRIFFIN, CONG. BUDGET OFFICE, PAYROLL TAX, FEDERAL 320 (1999), https://www.urban.org/sites/default/files/publication/69526/1000540-Payroll-Tax-Federal.PDF.

99. I.R.C. §§ 3101–28 (2012).

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").

102. I.R.C. §§ 3301–11.

103. *See* Griffin, *supra* note 98, at 321.

Since passage of the Social Security Act in 1935,[104] the United States has depended on employment tax revenue generated by the working class to fund social security payments to retirees.[105] Displacement of wage earners due to automation substitution could result in the inability to meet benefit demands.[106]

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,[107] and substantially amended it in 1939[108] before it had been fully implemented.[109] President Franklin D. Roosevelt promoted social insurance to restore U.S. economic stability during the Great Depression.[110] The legislation included provisions for old-age and unemployment benefits.[111] The Act was later amended to include child dependent, survivor, and disability benefits,[112] and, in 1965, health insurance (Medicare) was incorporated into the program.[113]

104. Social Security Act, ch. 531, 49 Stat. 620 (1935) (codified as amended in scattered sections of 42 U.S.C.).

105. *See Policy Basics: Where Do Federal Tax Revenues Come From?*, CTR. ON BUDGET & POL'Y PRIORITIES, https://www.cbpp.org/sites/default/files/atoms/files/PolicyBasics_WhereDoFederalTaxRevsComeFrom_08-20-12.pdf (last updated June 20, 2019) (documenting that 35% of all federal revenue is generated from payroll taxes to fund Social Security, Medicare and unemployment insurance).

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).

107. Social Security Act, ch. 531, 49 Stat. 620.

108. Social Security Act Amendments of 1939, ch. 666, § 205(a), 53 Stat. 1360, 1368.

109. *See* Larry DeWitt, *The Development of Social Security in America*, 70 SOC. SECURITY BULL., Aug. 2010, at 1, 1–2, https://www.ssa.gov/policy/docs/ssb/v70n3/v70n3p1.pdf (defining the purpose of social insurance); *see also* John R. Kearney, *Social Security and the "D" in OASDI: The History of a Federal Program Insuring Earners Against Disability*, 66 SOC. SECURITY BULL., Aug. 2006, at 1, 3, https://www.ssa.gov/policy/docs/ssb/v66n3/v66n3p1.pdf; Susan L. Waysdorf, *Fighting for Their Lives: Women, Poverty, and the Historical Role of United States Law in Shaping Access to Women's Health Care*, 84 KY. L.J. 745, 805 (1995–96) (documenting a history of the Social Security Act).

110. *See* Kearney, *supra* note 109, at 2.

111. *Id.* at 3.

112. The Social Security Act has been amended in substantial ways many times, including in 1939, 1950, 1952, 1954, 1956, 1958, 1960, 1961, 1965, 1966, 1967, 1969, 1971. 1972, 1973, 1977, 1980, 1981, 1983, 1984, 1985, 1986, 1987, 1989, 1990, 1993, 1994, 1996, 1999, 2000, and 2004. The major changes to dependent benefits were in 1939, with the Social Security Act Amendments of 1939, ch. 666, § 205(a), 53 Stat. 1360, 1368. The major changes to disability benefits were in 1954, with the Social Security Act Amendments of 1954, Pub. L. 83-761, 68 Stat. 1052.

113. Social Security Amendments of 1965, Pub. L. No. 89-97, § 121(a), 79 Stat. 286, 343 (1965) (codified as amended as 42 U.S.C. § 1396 (2012)).

The Social Security Act was designed to ease deprivation and hardship during the depression and its aftermath,[114] 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.[115]

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.[116] The second industrial revolution resulted in unfamiliar and unwelcome recessions, layoffs, and corporate closures.[117] 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.[118] The payroll tax includes the FICA tax paid by employers and employees, and the FUTA tax paid by employers only.[119]

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.[120] Today, the FICA tax sustains two major programs: OASDI and Medicare.[121] At

114. *See* Nancy J. Altman, *The Striking Superiority of Social Security in the Provision of Wage Insurance*, 50 HARV. J. ON LEGIS. 109, 113 (2013).

115. Daniel N. Price, *Unemployment Insurance, Then and Now, 1935–85*, 48 SOC. SECURITY BULL., Oct. 1985, at 22, 24, https://www.ssa.gov/policy/docs/ssb/v48n10/v48n10p22.pdf.

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

117. *See Historical Background and Development of Social Security*, SOC. SECURITY ADMIN, https://www.ssa.gov/history/briefhistory3.html (last visited Jan. 11, 2019).

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).

119. *Understanding Employment Taxes*, INTERNAL REVENUE SERV., https://www.irs.gov/businesses/small-businesses-self-employed/understanding-employment-taxes (last updated Jan. 16, 2020).

120. *See* Benjamin A. Templin, *Social Security Reform: The Politics of the Payroll Tax*, 32 QUINNIPIAC L. REV. 1, 11 (2013) (documenting that "the payroll tax was implemented in 1937"); *see also* I.R.C. §§ 3101–28 (2012) (covering the FICA); Patricia E. Dilley, *Through the Doughnut Hole: Reimagining the Social Security Contribution and Benefit Base Limit*, 62 ADMIN. L. REV. 367, 383 (2010) (noting that the payroll contribution plan was imposed on both employees and employers).

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.[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.[123] Most wages earned by employees up to the scheduled ceiling are subject to the FICA tax.[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.[125] Absent these benefits, an additional 8% (for a total of 24%) of the U.S. population would live below the poverty line.[126]

In addition to funding Social Security, FICA also funds Medicare benefits.[127] Established by Congress in 1965, Medicare is funded by a 2.9%

medicare-information/brief-history-of-medicare/ (documenting that Medicare health coverage was not signed into law until after 1965).

122. *See* Templin, *supra* note 120, at 11; *see also Payroll Tax Rates: 1937 to 2019*, TAX POL'Y CTR. (July 15, 2019) https://www.taxpolicycenter.org/statistics/payroll-tax-rates (noting that the 2% rate was not increased until 1950); *What Are the Major Federal Payroll Taxes, and How Much Money Do They Raise?*, TAX POL'Y CTR., http://www.taxpolicycenter.org/briefing-book/what-are-major-federal-payroll-taxes-and-how-much-money-do-they-raise (last visited Jan. 11, 2019) (noting 1940 as date of first recording).

123. *See* Templin, *supra* note 120, at 11 (documenting the steady increase in rate and tax maximum); *see also Research, Statistics & Policy Analysis, OASDI and SSI Program Rates & Limits, 2020*, SOC. SECURITY ADMIN., (Oct. 2019), https://www.ssa.gov/policy/docs/quickfacts/prog_highlights/index.html (listing tax rate and maximum taxable earnings as of 2020); *Source of Revenue as Share of GDP*, TAX POL'Y CTR. (July 18, 2019), http://www.taxpolicycenter.org/statistics/source-revenue-share-gdp (providing receipts by source as a percentage of GDP).

124. *See Publication 15 (2020), (Circular E), Employer's Tax Guide*, INTERNAL REVENUE SERV., https://www.irs.gov/publications/p15#en_US_2020_publink1000202402 (last updated Mar. 13, 2020) (explaining that "Social security and Medicare taxes have different rates and only the social security tax has a wage base limit."); *see also* John Spencer Treu, *Less Is More: Applying a Modified Reasonable Compensation Standard to Eliminate the Inconsistencies Among the Payroll Tax Bases and the Net Investment Income Tax Base Under the Affordable Care Act*, 92 NEB. L. REV. 586, 589–90 (2014).

125. *See* SOC. SEC. ADMIN., FAST FACTS & FIGURES ABOUT SOCIAL SECURITY, 2017 ii (2017), https://www.ssa.gov/policy/docs/chartbooks/fast_facts/2017/fast_facts17.pdf (noting that 62% of the elderly "received at least half of their income from Social Security in 2015"); *see also* Francine J. Lipman, *(Anti)Poverty Measures Exposed*, 21 FLA. TAX REV. 389, 439–50 (2017) (discussing and providing statistics for the role Social Security benefits play in limiting poverty).

126. Lipman, *supra* note 125, at 439 (citing KATHLEEN SHORT, U.S. CENSUS BUREAU, P60-254, THE SUPPLEMENTAL POVERTY MEASURE: 2014 9 (2015), https://www.census.gov/content/dam/Census/library/publications/2015/demo/p60-254.pdf)).

127. *See* Kirsten Harrington, *Employment Taxes: What Can the Small Businessman Do?*, 10 AKRON TAX J. 61, 61 (1993).

employment tax rate shared between employers and employees (1.45% imposed on each) on all qualified earnings without a cap.[128] In 2018, Medicare accounted for 15% of the total federal budget.[129] The initial Medicare budget was about $10 billion for 19 million participants, and is now $705.9 billion for 60.6 million participants.[130] 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.[131]

2. The Federal Unemployment Tax Act ("FUTA")

The FUTA[132] serves as a social insurance to fund unemployment costs in the United States.[133] It is imposed on employers at a rate of 6% on the first $7000 of each employee's earnings.[134] The FUTA provides unemployment benefits to workers who lose jobs due to no fault of their own.[135] By providing replacement wages to unemployed workers, the FUTA tax has significantly influenced economic stability in the United States.[136] At the close of

128. *See* Social Security Amendments of 1965, Pub. L. No. 89-97, § 102(a), 79 Stat. 286, 291 (codified as amended at 42 U.S.C. §§1395-1395kkk-1 (2012)); Social Security Amendments of 1965, Pub. L. No. 89-97, § 121(a), 79 Stat. 286, 343 (codified as amended at 42 U.S.C. §§1396-1396w-5 (2012)) (Medicaid); *see also* Juliette Cubanski et al., *A Primer on Medicare: Key Facts About the Medicare Program and the People It Covers*, KAISER FAM. FOUND. (Mar. 20, 2015), https://www.kff.org/report-section/a-primer-on-medicare-how-is-medicare-financed-and-what-are-medicares-future-financing-challenges/; *Research, Statistics & Policy Analysis*, *supra* note 123 (documenting the 2020 Medicare tax rate of 1.45%); Treu, *supra* note 124, at 597–98 (describing the inception of Medicare).

129. Juliette Cubanski et al., *The Facts on Medicare Spending and Financing*, KAISER FAM. FOUND. (Aug. 20, 2019), https://www.kff.org/medicare/issue-brief/the-facts-on-medicare-spending-and-financing/.

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).

132. I.R.C. §§ 3301–11 (2012).

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

134. *See id.*; *see also* I.R.C. § 3301; Robyn L. Robinson, *A Discussion of the Application of FICA and FUTA to Indian Tribes' On-Reservation Activities*, 25 AM. INDIAN L. REV. 37, 40 (2000-2001) (providing an explanation of the Federal Unemployment Tax Act).

135. *See* Charles P. Sabatino & Simi Litvak, *Liability Issues Affecting Consumer-Directed Personal Assistance Services—Report and Recommendations*, 4 ELDER L.J. 247, 270 (1996).

136. *See* Price, *supra* note 115, at 30.

2017, 1.87 million people were receiving unemployment insurance benefits.[137]

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.[138] The payroll tax base is particularly broad, and the supply of workers since its inception has helped maintain revenue production;[139] however, the tax significantly burdens low and middle income taxpayers as compared to higher income workers.[140]

Scholars and policy advocates have raised concerns about employment tax disparity.[141] Using the measure of effective tax rate, the payroll tax is substantially more burdensome on wage earners as compared to wealthy investors.[142] For numerous working class taxpayers, the employment tax is a larger financial burden than that of the income tax.[143] Only within households where incomes reach the six figure mark does the income tax owed

137. Joseph Lawler, *Number of Workers Receiving Unemployment Benefits Falls to Lowest Level in 44 Years*, WASH. EXAMINER (Jan. 11, 2018, 8:36 AM), https://www.washingtonexaminer.com/number-of-workers-receiving-unemployment-benefits-falls-to-lowest-level-in-44-years.

138. *See Federal Payroll Taxes*, CTR. BUDGET & POL'Y PRIORITIES (Apr. 17, 2020), https://www.cbpp.org/sites/default/files/atoms/files/10-17-12tax.pdf (noting that in 2019, 35.9% of federal revenue was generated from the payroll tax); *see also* Linda Sugin, *Payroll Taxes, Mythology, and Fairness*, 51 HARV. J. ON LEGIS. 113, 118 (2014) (noting role that payroll tax plays in the United States).

139. *See* John Olson, *Payroll Taxes: The Good, the Bad, and the Solutions*, TAX FOUND. (Aug. 2, 2016), https://taxfoundation.org/payroll-taxes-good-bad-and-solutions/ (implying that tax evasion of payroll taxes is difficult due to the requisite withholding requirements at the employer level).

140. *See* Dexter, *supra* note 17, at 371; *see also Policy Basics: Top Ten Facts About Social Security*, *supra* note 12.

141. *See* Sugin, *supra* note 138, at 119 (stating it is difficult to argue the fairness of the payroll tax); *see also* Deborah A. Geier, *Integrating the Tax Burdens of the Federal Income and Payroll Taxes on Labor Income*, 22 VA. TAX REV. 1, 6 (2002) (questioning whether the distribution of the tax burden with regard to Social Security and Medicare rates and wage bases is "fair"); Michael J. Graetz, *The Troubled Marriage of Retirement Security and Tax Policies*, 135 U. PA. L. REV. 851, 852 (1987) (arguing that there is unfairness in the social security tax and payments scheme); Dan Seltzer, *Attacks on a Tax: An Alternative to the Earned Income Tax Credit to Remedy the Unfairness in the Payroll Tax System*, 77 S. CAL. L. REV. 187, 187 (2003) (stating that the payroll tax "fall[s] disproportionately on the poor and middle-class"); Templin, *supra* note 120, at 28 (discussing the disparities in wage growth between workers and the fairness of the regressive payroll tax).

142. *See* Sugin, *supra* note 138, at 113 (noting that the payroll tax is only imposed on wages, thus reducing or eliminating the tax burden on the wealthy who earn money via investment opportunities); *see also* Geier, *supra* note 141, at 3 (stating that the payroll tax "results in a "higher portion of the federal tax burden being borne by labor income (as opposed to capital income, which is concentrated in the wealthier households)").

143. *See* Howard Gleckman, *For Most Households, It's About the Payroll Tax, Not the Income Tax*, TAX POL'Y CTR. (Apr. 2, 2015), http://www.taxpolicycenter.org/taxvox/most-households-its-about-payroll-tax-not-income-tax (noting that a 2015 report by the Joint Committee on Taxation

exceed that of the payroll tax.[144] Additionally, although the tax is shared between employers and employees, employers can eliminate their portion by crafting downward adjustments in salaries and wages.[145]

Despite claims of unfairness, politicians have been reluctant to enter into this discussion, instead preferring to focus debate on the income tax.[146] 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.[147]

The payroll tax underpinning requires that the federal government collect revenue from present-day workers to fund current beneficiaries.[148] 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.[149] 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.[150] In addition, the average life expectancy in 1935 was 61.9 years; since then, life expectancy in the United States has

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).

147. *See* Roberton C. Williams, *Most Americans Pay More Payroll Tax than Income Tax*, TAX POL'Y CTR.: TAXVOX (Sept. 6, 2016), https://www.taxpolicycenter.org/taxvox/most-americans-pay-more-payroll-tax-income-tax.

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

149. *See* Sean Williams, *Republican Efforts to Reform Social Security Could Financially Cripple Most Seniors*, MOTLEY FOOL (Jan. 1, 2017, 6:02 AM), https://www.fool.com/retirement/2017/01/01/republican-efforts-to-reform-social-security-could.aspx.

150. America Counts Staff, *2020 Census Will Help Policymakers Prepare for the Incoming Wave of Aging Boomers*, U.S. CENSUS BUREAU (Dec. 10, 2019), https://www.census.gov/library/stories/2019/12/by-2030-all-baby-boomers-will-be-age-65-or-older.html.

increased to 78.86 years.[151] This surge has resulted in qualifying persons receiving benefits for lengthier periods of time.[152]

These statistics raise important questions about whether employment tax revenue is sufficient to sustain Social Security and Medicare benefits in the future.[153] It is estimated that 88.4 million beneficiaries will be entitled to receive $1.672 trillion in benefits by 2035.[154] 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.[155] 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.[156] 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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151. *See Life Expectancy in the USA, 1900–98*, BERKELEY DEMOGRAPHY, http://www.demog.berkeley.edu/~andrew/1918/figure2.html (last visited Jan. 11, 2018); *see also Life Expectancy All Races*, WORLDLIFEEXPECTANCY.COM, http://www.worldlifeexpectancy.com/usa/life-expectancy (last visited Jan. 11, 2019).

152. *See* Adi Libson, *Confronting the Retirement Savings Problem: Redesigning the Saver's Credit*, 54 HARV. J. ON LEGIS. 207, 216 (2017) (noting that increased life expectancy and reduced mortality rates impact Social Security solvency).

153. *See* Templin, *supra* note 120, at 1–3 (generally assessing policy options of increasing the retirement age); *see also* Jagadeesh Gokhale, *Social Security Reform: Does Privatization Still Make Sense?*, 50 HARV. J. ON LEGIS. 169, 169 (2013) (discussing the privatization of Social Security as the program heads for insolvency due to the onslaught of baby boomer retirements); Martha Holstein & Kristen Pavle, *The "Crisis" in Retirement Security: Social Security Is the Answer, Not the Problem*, 46 J. MARSHALL L. REV. 719, 719 (2013) (addressing the threats to retirement security); Peter H. Schuck, *The Golden Age of Aging, and Its Discontents*, 18 ELDER L.J. 25, 27 (2010) (noting the approaching insolvency of Social Security and Medicare); Alexander G. Karl, Note, *Uncle Sam Killed Grandma: How the Estate Tax Can Help Alleviate Medicare Uncertainty*, 25 ELDER L.J. 443, 445 (2018) (proposing the sustainability of Medicare funding through the federal Estate Tax).

154. Henry Aaron, *How to Keep Social Security Secure*, AM. PROSPECT (May 1, 2018), http://prospect.org/article/how-keep-social-security-secure (designating that benefit amount in 2017 dollars).

155. *See Fact Sheet*, SOC. SECURITY ADMIN., https://www.ssa.gov/news/press/factsheets/basicfact-alt.pdf (last visited Jan. 11, 2019).

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]

157. *See* Jeffrey Owens, *Taxes for Innovation*, OECD OBSERVER, http://oecdobserver.org/news/fullstory.php/aid/3271/Taxes_for_innovation.html (last visited Jan. 11, 2019) (discussing how taxes can spur innovation).

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).

160. Loletta Darden, *Lights, Lights, Lights! Finding Light in the Darkness of The Public/ Private Patent Debate*, 9 AM. U. INTELL. PROP. BRIEF 106, 143 (2018) (citing Letter from Thomas Jefferson to Isaac McPherson (Aug. 13, 1813), *in* 13 THE WRITINGS OF THOMAS JEFFERSON 326, 335 (Andrew A. Lipscomb & Albert Ellery Bergh eds., 1903)).

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.'").

162. *See, e.g.*, Harry First, *Controlling the Intellectual Property Grab: Protect Innovation, Not Innovators*, 38 RUTGERS L. J. 365, 374 (2007) (clarifying that the economic philosophy behind innovation entails both personal gain and public welfare advancement); Thomas L. Hayslett III, *1995 Antitrust Guidelines for the Licensing of Intellectual Property: Harmonizing the Commercial Use of Legal Monopolies with the Prohibitions of Antitrust Law*, 3 J. INTELL. PROP. L. 375, 378–79 (1996) (noting that intellectual property law maximizes consumer welfare by promoting investment in innovation while also extending to inventors "the carrot of supracompetitive profits"); Maayan Perel, *An Ex Ante Theory of Patent Valuation: Transforming Patent Quality into Patent Value*, 14 J. HIGH TECH L. 148, 200 (2014) (evaluating that patents incentivize innovation under the economic basis, and that incentivizing innovation results in increased public welfare); Arti Kaur Rai, *Regulating Scientific Research: Intellectual Property Rights and the Norms of Science*, 94 NW. U. L. REV. 77, 116 (1999) (discussing that the traditional economic justification for granting patent rights

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.").

163. *See* James Goh, *Primer: Innovation Policy in the United States*, UNIV. OF PA. PUB. POL'Y INITIATIVE (Apr. 28, 2017), https://publicpolicy.wharton.upenn.edu/live/news/1840-primer-innovation-policy-in-the-united-states (analyzing the effects of U.S. innovation policy and noting that "the United States has implemented a slew of innovation policies").

164. *See* Michael J. Graetz & Rachael Doud, *Technological Innovation, International Competition, and the Challenges of International Income Taxation*, 113 COLUM. L. REV. 347, 350 (2013); *see also infra* notes 165–172 and accompanying text.

165. Following the adoption of Article 1, Section 8 of the U.S. Constitution, the Patent Act of 1790 was established, followed by the revised Patent Act of 1793. Almost half a century later a major revision resulted in the 1836 Patent Act, designating the U.S. Patent Office as an executive agency, and in 1890 Congress passed the Sherman Act to address improper business monopolizations. Modern reform to the U.S. patent system came with the enactment of the Patent Act of 1952. Since then, case law has served as the prominent outlet for the continued evolution of U.S. patent law, with the 2011 Leahy-Smith America Invents Act ("AIA") representing the most significant legislative change to the U.S. patent system since 1952. *See* Patent Act of 1790, Ch. 7, 1 Stat. 109; Patent Act of 1793, Ch. 11, 1 Stat. 318; Patent Act of 1836, Ch. 357, 5 Stat. 117; Sherman Antitrust Act of 1890, Ch. 647, 26 Stat. 209; Patent Act of 1952, Pub. L. No. 82-593, 66 Stat. 792; Leahy-Smith America Invents Act (AIA), Pub. L. No. 112-29, 125 Stat. 284 (2011); *see also* Diane Lu, Note, *In the Face of Strong Patent Rights: Using The Foreign Trade Antitrust Improvements Act to Combat Patent Abuse in International Commerce*, 21 B.U. J. SCI. & TECH. L. 136, 146–48 (2015) (documenting the adoption of the Sherman Act to combat anticompetitive behavior relating to U.S. patents); *A Brief History of The Patent Law of the United States*, LADAS & PARRY (May 7, 2014), https://ladas.com/education-center/a-brief-history-of-the-patent-law-of-the-united-states-2/ (discussing the major and minor changes to patent law included in the 1952 revision); *see also* Alice Corp. v. CLS Bank Int'l, 573 U.S. 208, 212 (2014) (holding that claims directed to abstract ideas require additional elements capable of rendering them significantly more than the abstract ideas themselves); KSR Int'l Co. v. Teleflex Inc., 550 U.S. 398, 415 (2007) (providing that certain considerations must be given to determine the obviousness of a patent claim); Diamond v. Diehr, 450 U.S. 175, 184 (1981) (determining that controlling the execution of a physical process by running a

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

1. Innovation Policy Goal: Economic Progress

Innovation policy is strongly linked, both economically and politically, to prosperity.[174] The United States, as well as other nations, view innovation-

computer does not preclude the patentability of the invention in its entirety); Diamond v. Chakrabarty, 447 U.S. 303, 304 (1980) (holding that "a live, human-made micro-organism is patentable"); Aro Manufacturing Co. v. Convertible Top Replacement Co., 365 U.S. 336, 345–46 (1961) (redefining the U.S. patent law doctrine of repair and reconstruction); Phillips v. AWH Corp., 415 F. 3d 1303, 1312 (Fed. Cir. 2005) (clarifying the hierarchy of evidentiary sources that can be used for claim construction in patent law).

166. United States law also recognizes trademark rights. State laws recognize trade secret protection.

167. *See* Daniel J. Hemel & Lisa Larrimore Ouellette, *Beyond the Patents-Prizes Debate*, 92 TEX. L. REV. 303, 316 (2013) (noting the use of "prizes, patents, grants, and tax credits to incentivize the invention and commercialization of new technologies""); Graetz & Doud, *supra* note 164, at 350 (stating that the law provides "legal protections for IP; government grants, loans, and loan guarantees to both for-profit firms and not-for-profit research institutions; and tax benefits for both R&D itself and the gains from innovation").

168. NAT'L SCI. FOUND., SCIENCE & ENGINEERING INDICATORS 2018, at 8-74 to 8-76 (2018), https://nsf.gov/statistics/2018/nsb20181/report/sections/invention-knowledge-transfer-and-innovation/innovation-indicators-united-states-and-other-major-economies#government-policies-and-programs-to-reduce-barriers-to-innovation (showing federal R&D expenditure by agency in fiscal years 2011 to 2016).

169. *Id.* at 8-75.

170. *See* Hemel & Ouellette, *supra* note 167.

171. *Briefing Book*, TAX POL'Y CTR., https://www.taxpolicycenter.org/briefing-book/what-are-tax-expenditures-and-how-are-they-structured (last visited Jan. 11, 2019).

172. *Id.*

173. *See* Graetz & Doud, *supra* note 164, at 350 (noting support as "ubiquitous"); *see also* Dan L. Burk & Mark A. Lemley, *Policy Levers in Patent Law*, 89 VA. L. REV. 1575, 1580 (2003); Stephen E. Shay et al., *R&D Tax Incentives: Growth Panacea or Budget Trojan Horse?*, 69 TAX L. REV. 419, 419–20 (2016) (remarking that supporting R&D tax incentives "is the tax equivalent of embracing motherhood and apple pie").

174. *See* Graetz & Doud, *supra* note 164, at 388 (noting impact of technological innovation on national wealth and discussing the spillover effects of research and development).

based productivity increases as an economic catalyst and critical to improving national and global standards of living.[175] The general public believes, and many scholars concur, that the competitiveness of the national economy hinges on technological advancement[176]: "Achieving preeminence in high technology is widely viewed as a critical element of the economic competitiveness . . . ."[177] These beliefs are well-founded. Research has substantiated the link between innovation and productivity,[178] and pro-innovation federal policy has been correlated with increased U.S. manufacturing productivity.[179]

U.S. policymakers have asserted both implicitly and explicitly that they assume innovation increases long-term productivity.[180] 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").

176. *See* Ufuk Akcigit et al., *When America Was Most Innovative, and Why*, HARV. BUS. REV. (Mar. 6, 2017), https://hbr.org/2017/03/when-america-was-most-innovative-and-why; *see also* Ufuk Akcigit & Stefanie Stantcheva, *Taxation and Innovation*, NAT'L BUREAU ECON. RES. REP., Sept. 2018, at 14.(noting the relationship between innovation, technological progress, and economic growth); Darrell M. West, *Technology and the Innovation Economy*, CTR. FOR TECH. INNOVATION AT BROOKINGS (Oct. 19, 2011), https://www.brookings.edu/wp-content/uploads/2016/06/1019_technology_innovation_west.pdf (noting results of 2009 survey showing overwhelming belief in innovation's importance to economy).

177. Linda A. Mabry, *Multinational Corporations and U.S. Technology Policy: Rethinking the Concept of Corporate Nationality*, 87 GEO. L.J. 563, 567 (1999).

178. *See* Åsa 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/cbofiles/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,[181] the federal government endeavors to create opportunities for collaboration among industry, academia, and the government to stimulate creativity and innovation.[182] 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.[183] 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."[184]

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.[185] 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.[186] 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."[187] Later, in 1966, the Court cited to

181. *See* Stephanie Plamondon Bair, *Innovation Inc.*, 32 BERKELEY TECH. L.J. 713, 716 (2017) (citing Jeanne C. Fromer, *Expressive Incentives in Intellectual Property*, 98 VA. L. REV. 1745, 1779–81 (2012)).

182. *See* Rishi Iyengar, *These Three Countries Are Winning the Global Robot Race*, CNN BUS. (Aug. 21, 2017, 10:14 AM), http://money.cnn.com/2017/08/21/technology/future/artificial-intelligence-robots-india-china-us/index.html; *see also* Stanley "Skip" Pruss, *The Case for Clean Energy Technology Manufacturing: Ten Steps Business and Industry Must Take to Optimize Opportunities in the Emerging Clean Energy Economy*, 18 MICH. TELECOMM. TECH. L. REV. 349, 360 (2011) (noting the collaborative efforts the United States has taken to remain a leader in global innovation).

183. *See* Ramsey Hanna, *Misusing Antitrust: The Search for Functional Copyright Misuse Standards*, 46 STAN. L. REV. 401, 420 (1994).

184. *See* Graham v. John Deere Co., 383 U.S. 1, 9 n.2 (1966) (quoting VI WRITINGS OF THOMAS JEFFERSON 180–81 (H. A. Washington ed. 1861)).

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 Publ'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").

186. United States v. Paramount Pictures, Inc., 334 U.S. 131, 158 (1948).

187. Mazer v. Stein, 347 U.S. 201, 219 (1954).

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."[188]

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."[189] 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."[190]

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.[191] Nonexcludable goods like discoveries are "expensive to produce but easy to appropriate."[192] Innovation is also often nonrivalrous, meaning that the knowledge manifested in a discovery or invention can be used repeatedly for no additional cost.[193] Innovation's nature as nonrivalrous and nonexcludable makes it a public good.[194] 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

188. *Graham*, 383 U.S. at 9.

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[195] and must be offered an incentive to engage in a desirable level of innovation.[196]

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.[197] Some scholars argue that inducements like tax incentives are necessary to drive the U.S. economy forward while also benefitting the social welfare.[198] 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.[199] 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).

197. Lisa Larrimore Ouellette, *Patent Experimentalism*, 101 VA. L. REV. 65, 75 (2015); *see also* MERGES, *supra* note 190, at 2 (discussing the economic incentives necessary for the production of intellectual property).

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-Thao 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").

revision.[200] 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.

202. *See* I.R.C. § 174(a) (2012).

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.

204. I.R.C. § 174(a)(1).

205. *See id.*; *see also* Xuan-Thao Nguyen & Jeffrey A. Maine, *Acquiring Innovation*, 57 AM. U. L. REV. 775, 793 (2008) (discussing the origin and function of section 174); *see also* William A. Drennan, *Changing Invention Economics by Encouraging Corporate Inventors to Sell Patents*, 58 U. MIAMI L. REV. 1045, 1059 (2004) (explaining the tax benefit accompanying section 174(a)(1)).

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.[209] Without section 1235, proceeds from the sale of a patent would be taxed at the generally higher ordinary income tax rates.[210]

In the decades following the adoption of these two provisions, Congress made minimal changes to U.S. innovation tax policy.[211] 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").[212] ERTA was designed to "ensure economic growth in the years ahead" and "stimulate productivity and innovation throughout the economy."[213]

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.[214] Section 41, adopted as a temporary provision, was extended sixteen times and ultimately made permanent in 2015.[215] Known as the Research and Experimentation ("R&E") tax credit, section 41 rewards U.S. businesses that intensify their investment efforts in R&D.[216] 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.[217] A decade later, Congress implemented Internal Revenue Code

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).

212. *See* Pub. L. No. 97-34, § 101, 95 Stat. 172, 176–85.

213. *See* JOINT COMM. ON TAXATION, JCS-71-81, GENERAL EXPLANATION OF THE ECONOMIC RECOVERY TAX ACT OF 1981 17 (1981).

214. *See* Nina J. Crimm, *A Tax Proposal to Promote Pharmacologic Research, to Encourage Conventional Prescription Drug Innovation and Improvement, and to Reduce Product Liability Claims*, 29 WAKE FOREST L. REV. 1007, 1057–58 (1994); *see also Tax Treatment Legislative History*, R&D COALITION, https://investinamericasfuture.org/tax-treatment-legislative-history/ (last visited Jan. 3, 2019) (noting that section 41 was extended fifteen times until it was made permanent in 2015).

215. GARY GUENTHER, CONG. RESEARCH SERV., RL 31181, RESEARCH TAX CREDIT: CURRENT LAW AND POLICY ISSUES FOR THE 114TH CONGRESS Summary (2015), https://fas.org/sgp/crs/misc/RL31181.pdf (noting that "[s]ince its enactment in mid-1981, the credit has been extended 16 times and significantly modified 5 times").

216. *See* Yair Holtzman, *U.S. Research and Development Tax Credit*, CPA J. (Oct. 2017), https://www.cpajournal.com/2017/10/30/u-s-research-development-tax-credit/.

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/tnf-us-068-feb15-2016.pdf.

221. *See* I.R.C. §§ 41(h)(4)(B)(i), 3111(f).

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.[223] 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.[224] 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.[225] Tax incentives should enhance social welfare by stimulating industry research towards advancements that have yet to be discovered.[226] However, improving social welfare through innovation must extend beyond the application of invention to consumers' daily lives.[227] 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.[228] 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.

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.[229] Maintaining their current structure, the Medicare trust

223. *See* 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 . . . .").

224. *See* Brett M. Frischmann & Mark A. Lemley, *Spillovers*, 107 COLUM. L. REV. 257, 259–261 (2007) (discussing social and economic spillover effects of innovation); *see also* Shaun P. Mahaffy, *The Case for Tax: A Comparative Approach to Innovation Policy*, 123 YALE L. J. 812, 819–20 (2013) (noting reasoning for subsidizing innovation).

225. *See* Mahaffy, *supra* note 224.

226. *Id.*

227. *See* Peter Lee, *Social Innovation*, 92 WASH. U. L. REV. 1, 9 (2014).

228. *Id.*

229. *See infra* Parts I–III.

fund will run out of funding in six years (2026),[230] and the Social Security trust fund will run out of funding in fourteen years (2034).[231] Portions of Medicare already outpace the employment tax revenues that support them.[232] With an aging population and a dramatic decrease in the number of workers per beneficiary during the last half century,[233] the current funding structure of Medicare and Social Security is unsustainable.[234] The aforementioned revenue and expense estimates do not account for the projected levels of job automation.[235] Fourth industrial revolution trends suggest that the presently fraying U.S. social safety net may be stretched past the breaking point.[236]

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,[237] and the employment tax structure funding the social safety net cannot survive without significant revision.[238] Employment tax, in its current form, is insufficiently robust to adjust to automation substitution.[239] Simply put, employment tax is in danger of being incapable of fulfilling its original social purpose.[240] For innovation policy, the focus has changed from the twin goals of social benefit and economic stimulus, to the pursuit of primarily economic goals.[241] As economic goals have eclipsed the importance of social goals, innovation policy no longer works in concert with

230. *See* Robert Pear, *Medicare's Trust Fund Is Set to Run Out in 8 Years. Social Security, 16*, N.Y. TIMES (Jun. 5, 2018), https://www.nytimes.com/2018/06/05/us/politics/medicare-social-security-finances.html; *see also* THE BDS. OF TRS., FED. HOSP. INS. & FED. SUPPLEMENTARY MED. INS. TR. FUNDS, 2018 ANNUAL REPORT OF THE BOARDS OF TRUSTEES OF THE FEDERAL HOSPITAL INSURANCE AND FEDERAL SUPPLEMENTARY MEDICAL INSURANCE TRUST FUNDS 7 (2018), https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/ReportsTrustFunds/Downloads/TR2018.pdf [hereinafter MEDICARE REPORT 2018].

231. *See* THE BD. OF TRS., FED. OLD-AGE AND SURVIVORS INS. & FED. DISABILITY INS. TR. FUNDS, THE 2018 ANNUAL REPORT OF THE BOARD OF TRUSTEES OF THE FEDERAL OLD-AGE AND SURVIVORS INSURANCE AND FEDERAL DISABILITY INSURANCE TRUST FUNDS 5 (2018), https://www.ssa.gov/oact/tr/2018/tr2018.pdf (predicting trust fund depletion in 2034).

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 refocusing these policies toward their goals. To that end, this Article suggests an alternative approach to tax policy analysis.[242] 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, individually or in concert, nor have these approaches required in any regular or systematic way tax provisions to remain true to their goals.[243] Here, this Article seeks to harmonize two areas of the law that have compatible goals,[244] 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.[245] 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.[246] We make the case that the attributes of sustainability can assist in harmonizing disparate tax policies.[247] Finally, we apply a sustainable tax approach to employment tax and innovation tax proposals in an effort to bring them into concert.[248]

A. Tax Analysis, Disharmony, and Macro Effects

In the thirty years since the major tax overhaul of 1986,[249] Congress has most often adopted tax law incrementally.[250] 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.[251] 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.

249. *See generally* JEFFEREY H. BIRNBAUM & ALAN S. MURRAY, SHOWDOWN AT GUCCI GULCH: LAWMAKERS, LOBBYISTS, AND THE UNLIKELY TRIUMPH OF TAX REFORM (1987) (telling the story of 1986 tax reform).

250. *See* Sheldon D. Pollack, *Tax Reform: The 1980's in Perspective*, 46 TAX L. REV. 489, 503–07 (1991) (discussing incrementalism in tax reform); *see also* Daniel Shaviro, *Beyond Public Choice and Public Interest: A Study of the Legislative Process as Illustrated by Tax Legislation in the 1980s*, 139 U. PA. L. REV. 1, 4 (1990) (noting that Congress adopted "[i]mportant, though not historic" tax legislation "in 1982, 1984, and 1987").

251. *See, e.g.*, *Major Enacted Tax Legislation, 1990–1999*, TAX POL'Y CTR., https://www.taxpolicycenter.org/laws-proposals/major-enacted-tax-legislation-1990-1999; *Major Enacted Tax Legislation, 2000–2009*, TAX POL'Y CTR., https://www.taxpolicycenter.org/laws-proposals/major-

incremental legal revision,[252] 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.[253] To be sure, any tax lawyer or scholar will affirm that details matter enormously in tax;[254] 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.[255]

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.[256] We are not the first to make this observation.[257] 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.[258] 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-

enacted-tax-legislation-2000-2009; *Major Enacted Tax Legislation 2010–2019*, TAX POL'Y CTR., https://www.taxpolicycenter.org/laws-and-proposals/major-enacted-tax-legislation-2010.

252. *Compare* CASS R. SUNSTEIN, ONE CASE AT A TIME: JUDICIAL MINIMALISM ON THE SUPREME COURT (1999) (examining and advocating for judicial minimalism, which is an incremental approach to lawmaking), *with* Saul Levmore, *Interest Groups and the Problem with Incrementalism*, 158 U. PA. L. REV. 815 (2010) (critiquing an incremental approach to lawmaking).

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").

254. *See, e.g.*, Steven A. Dean, *Attractive Complexity: Tax Deregulation, the Check-the-Box Election, and the Future of Tax Simplification*, 34 HOFSTRA L. REV. 405, 406 (2005) ("Dissatisfaction with the complexity of the income tax is nothing new."); David M. Schizer, *Frictions as a Constraint on Tax Planning*, 101 COLUM. L. REV. 1312, 1315 (2001) (stating that "in recent years the government has used . . . narrow reforms that target specific planning strategies").

255. *See supra* Parts II–III.

256. *See* LIAM MURPHY & THOMAS NAGEL, THE MYTH OF OWNERSHIP: TAXES AND JUSTICE 3–8 (2002).

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."[259] Murphy and Nagel are not alone in their criticism of tax policy analysis; similar criticism was noted three decades before they published their book.[260]

Although this weakness in tax scholarship has been noted by Murphy, Nagel, and others,[261] it has not yet been remedied on a broadly accepted basis.[262] To that end, we suggest a different approach.[263] 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.[264]

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."[265] 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.[266] 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.[267] 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.

260. *See* Lawrence Zelenak, *The Myth of Pretax Income*, 101 MICH. L. REV. 2261, 2262 (2003) (reviewing LIAM MURPHY & THOMAS NAGEL, THE MYTH OF OWNERSHIP: TAXES AND JUSTICE (2002)) (citing CARL S. SHOUP, PUBLIC FINANCE 577–78 (1969)) (noting similar criticism by Carl Shoup).

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").

262. *See* Karie Davis-Nozemack & Kathryn Kisska-Schulze, *Applying Sustainability to Tax*, 23 FLA. TAX. REV. (forthcoming 2020).

263. *See infra* Section IV.B.

264. *See infra* Section IV.B.

265. Linda Sugin, *Theories of Distributive Justice and Limitations on Taxation: What Rawls Demands from Tax Systems*, 72 FORDHAM L. REV. 1991, 1992–93 (2004)

266. *See id.*

267. *See* Liam Murphy, *Taxes, Property, Justice*, 1 N.Y.U. J.L. & LIBERTY 983, 983 (2005).

as liberty, welfare, opportunity, and personal responsibility."[268] The approach that Murphy recommends—viewing tax in its societal context and interrogating its normative goals[269]—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.[270] 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.[271]

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."[272] We also propose using a sustainability approach because its attributes directly address weaknesses in prior analyses.[273] Sustainability can be viewed as a "framework for managing change."[274] More critically important, however, sustainability asks foundational, normative questions[275] and requires a multi-disciplinary approach focusing on long-term solutions and adjusting to changes in technology, society, and the economy.[276]

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.

272. Hiroshi Komiyama & Kazuhiko Takeuchi, *Sustainability Science: Building a New Discipline*, 1 SUSTAINABILITY. SCI. 1, 3–4 (2006).

273. *See supra* Section IV.A.

274. Keith H. Hirokawa, *Saving Sustainability*, 46 ENVTL. L. REP. NEWS & ANALYSIS 10151, 10151 (2016).

275. *See* Davis-Nozemack & Kisska-Schulze, *supra* note 262.

276. *See infra* text accompanying notes 277–304.

to meet their own needs."[277] This question is sustainability's guiding principle; it directs the entry into thinking sustainably.[278] This question also invites a dual normative and analytical enquiry.[279] In other words, it asks what needs should be met and asks to what extent we are meeting them.[280] A dual-pronged normative and analytical approach requires significant work but promises robustness in its outcomes.

Many assume that sustainability only involves environmental protectionism;[281] however, sustainability is much broader than climate and resource issues.[282] While there is an entire body of research across multiple disciplines involving sustainability,[283] for the purposes of harmonizing the employment and innovation tax policies in this paper, a few points are most critical.

277. *Compare Report of the World Commission on Environment and Development: Our Common Future*, 24, U.N. Doc. A/42/427 (Mar. 20, 1987) (providing a definition of and laying the foundation for sustainable development), https://sustainabledevelopment.un.org/content/documents/5987our-common-future.pdf [hereinafter United Nations, *Development Report*], *with* R.K. TURNER, SUSTAINABLE ENVIRONMENTAL MANAGEMENT: PRINCIPLES AND PRACTICE 12 (1988) (defining sustainable growth differently than the United Nations as "an acceptable rate of growth in per-capita real incomes without depleting the national capital asset stock or the natural environmental asset stock.").

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

279. *See* Egon Becker, Thomas Jahn & Immanuel Stiess, *Exploring Uncommon Ground: Sustainability and the Social Sciences*, *in* SUSTAINABILITY AND THE SOCIAL SCIENCES: A CROSS-DISCIPLINARY APPROACH TO INTEGRATING ENVIRONMENTAL CONSIDERATIONS INTO THEORETICAL REORIENTATION 1–22 (Egon Becker & Thomas Jahn eds., 1999); *see also* Erich Griessler & Beate Littig, *Social Sustainability: A Catchword between Political Pragmatism and Social Theory*, 8 INT'L J. OF SUSTAINABLE DEV. 65–79 (2005).

280. *See* SUSTAINABILITY: CRITICAL CONCEPTS IN THE SOCIAL SCIENCES 382–83 (Michael Redclift ed., 2005) (discussing the normative and analytical aspects, among others, of sustainability).

281. *See* Dave Newport, Thomas Chesnes, & Angela S. Lindner, *The "Environmental Sustainability" Problem: Ensuring that Sustainability Stands on Three Legs*, 4 INT'L J. OF SUSTAINABILITY IN HIGHER ED. 357, 357 (2003) (discussing environmental primacy).

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

283. *See, e.g.*, BLUE RIBBON TASK FORCE ON SUSTAINABLE DIG. PRES. & ACCESS, SUSTAINABLE ECONOMICS FOR A DIGITAL PLANET: ENSURING LONG-TERM ACCESS TO DIGITAL INFORMATION 9 (2010), http://brtf.sdsc.edu/biblio/BRTF_Final_Report.pdf (linking sustainability and information management); Stefan Baumgärtner & Martin Quaas, *What is Sustainability Economics?*, 69 ECOLOGICAL ECON. 3, 445–50 (2010) (linking sustainability and economics); William R. Blackburn, *The Practice of Sustainability at Colleges and Universities*, 46 ENVTL. L. REP. NEWS & ANALYSIS 10394, 10394 (2016) (noting the relationship between sustainability and higher education); Wynn Calder & Richard M. Clugston, *Progress Toward Sustainability in Higher Education*, 33 ENVTL. L. REP. 10003, 10003 (2003) (using sustainability for higher education issues); Iveta Cherneva, *The Business Case for Sustainable Finance: Beyond Public Relations, Ethics, and Philanthropy*, 36 FLETCHER F. WORLD. AFF. 93, 96 (2012) (linking sustainability and finance); Virginia Harper Ho, *Sustainable Finance & China's Green Credit Reforms: A Test Case for Bank Monitoring of Environmental Risk*, 51 CORNELL INT'L L.J. 609, 609 (2018); Mozaffar Khan, George Serafeim & Aaron Yoon, *Corporate Sustainability: First Evidence on Materiality*, 91 ACCT. REV. 1697–1724 (2016) (linking sustainability, accounting, and firm performance); David Millon,

First, sustainability is much broader and implicates far more than environmentalism.[284] There are various approaches to understanding sustainability, but one of the most widely accepted is the three pillars approach.[285] 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.[286] Much focus in sustainability is on the environmental pillar because the effects of climate change threaten future irreversible damage;[287] however, the three pillars are interdependent.[288] Addressing problems under sustainability requires considering the effects on each of the pillars and necessitates a balanced approach.[289]

Two Models of Corporate Social Responsibility, 46 WAKE FOREST L. REV. 523, 523 (2011) (examining sustainability and corporate governance); Stephen Kim Park & Gerlinde Berger-Walliser, *A Firm-Driven Approach to Global Governance and Sustainability*, 52 AM. BUS. L. J. 255, 255 (2015) (linking sustainability and firm governance); Stephen Kim Park, *Investors as Regulators: Green Bonds and the Governance Challenges of the Sustainable Finance Revolution*, 54 STAN. J. INT'L L. 1, 6 (2018) (linking sustainability and finance); Tara J. Radin, *Stakeholders and Sustainability: An Argument for Responsible Corporate Decision-Making*, 31 WM. & MARY ENVTL. L. & POL'Y REV. 363, 367 (2007) (linking sustainability and management).

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

285. *See* Robert W. Kates, Thomas M. Parris & Anthony A. Leiserowitz, *What Is Sustainable Development? Goals, Indicators, Values, and Practice*, 47 ENV'T: SCI. & POL'Y FOR SUSTAINABLE DEV. 8, 12 (2005), (providing historical context for sustainable development and discussing the three pillars approach to sustainability).

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

287. *See, e.g.*, Markku Lehtonen, *The Environmental-Social Interface of Sustainable Development: Capabilities, Social Capital, Institutions*, 49 ECOLOGICAL ECON. 199, 199–200 (2004) (discussing the relationship amongst the three pillars); Gerald Rebitzer, David Hunkeler & Olivier Jolliett, *LCC—The Economic Pillar of Sustainability: Methodology and Application to Wastewater Treatment*, 22 ENVTL. PROGRESS 241, 241 (2003) (noting the importance of each of the three pillars).

288. *See* Robert B. Gibson, *Beyond the Pillars: Sustainability Assessment as a Framework for Effective Integration of Social, Economic and Ecological Considerations in Significant Decision-Making*, *in* TOOLS, TECHNIQUES AND APPROACHES FOR SUSTAINABILITY: COLLECTED WRITINGS IN ENVIRONMENTAL ASSESSMENT POLICY AND MANAGEMENT 389, 391 (William R. Sheate ed., 2010) (discussing the relationship amongst the three pillars); Susan M. Opp & Kyle L. Saunders, *Pillar Talk: Local Sustainability Initiatives and Policies in the United States—Finding Evidence of the "Three E's": Economic Development, Environmental Protection, and Social Equity*, 49 URB. AFF. REV. 678, 681 (2012) (discussing the interaction amongst the three pillars); *see also* Ralph Hansmann, Harald A. Mieg & Peter Frischknecht, *Principal Sustainability Components: Empirical Analysis of Synergies Between the Three Pillars of Sustainability*, 19 INT'L J. SUSTAINABLE DEV. & WORLD ECOLOGY 451, 451 (2012) (exploring the relationship amongst the pillars); David Hess, *The Three Pillars of Corporate Social Reporting as New Governance Regulation: Disclosure, Dialogue, and Development*, 18 BUS. ETHICS Q. 447, 449–50 (2008) (noting the pillars in sustainability).

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.[290] No single discipline can solve issues as multifaceted and entrenched as climate change.[291] 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.[292] An approach that acknowledges the need for contribution from so many scholars can be daunting;[293] 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.[294] 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"[295]—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.[296] 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.[297] Nonetheless, the future-focus of sustainability is critical to its ability to craft lasting and livable solutions.[298]

290. *See* Marilu Hastings, *Foreword* to EXAMINING INTERDISCIPLINARY SUSTAINABILITY INSTITUTES AT MAJOR RESEARCH UNIVERSITIES: INNOVATIONS IN CROSS-CAMPUS & CROSS-DISCIPLINARY MODELS i (2017).

291. *See* Hirokawa, *supra* note 274, at 10155 (noting that "environmental, economic, and social considerations cannot be accomplished when viewed in isolation").

292. *See* Gibson, *supra* note 288 (discussing integrative aspects of sustainability).

293. *See id.*; *see also* Komiyama & Takeuchi, *supra* note 272, at 3–4.

294. *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).

295. United Nations, *Development Report*, *supra* note 277.

296. *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).

297. *See* Anand & Sen, *supra* note 296, at 2030 (noting the need for various generations to share resources).

298. Magnus Boström, *A Missing Pillar? Challenges in Theorizing and Practicing Social Sustainability: Introduction to the Special Issue*, 8 SUSTAINABILITY: SCI., PRACTICE & POL'Y. 3–14 (2012).

Sustainability also inherently embraces change.[299] Sustainability acknowledges that today's status quo will change.[300] Technology, society, and the economy continually evolve. Because of this acknowledgement, sustainability seeks solutions, models, and theories that adapt to change.[301] Sustainability demands adaptability in its component parts because the complex and interconnected problems it addresses are also constantly evolving.[302] To ensure adaptability, it presents as an iterative process.[303] 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.[304]

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."[305] 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.[306] With automation substitution and social safety net funding, the social and economic pillars are also in conflict but must be harmonized.[307]

299. *See* Hirokawa, *supra* note 274, at 10154 (noting sustainability as "pluralistic, evolving, and adaptive"); LESLIE PAUL THIELE, SUSTAINABILITY 4 (2016) (noting sustainability's relationship to adaptation).

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); Griessler & Littig, *supra* note 279 (describing an iterative process).

305. ERIC NEUMAYER, WEAK VERSUS STRONG SUSTAINABILITY: EXPLORING THE LIMITS OF TWO OPPOSING PARADIGMS 15 (4th ed. 2013).

306. *See* Hansmann, Mieg & Frischknecht, *supra* note 288, at 458.

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[308] and promoted R&D at the expense of social safety net funding.[309] Automation substitution in the fourth industrial revolution further endangers the viability of social safety net programs supported by employment tax policy.[310] Employment tax policy goals cannot be fulfilled if undermined by the promotion of innovation.[311] 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.[312] 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.[313]

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.[314] As such, a new approach to tax policy analysis that asks fundamental, normative questions and addresses intergenerational equity is vital.[315] Introducing a sustainability approach to taxation invites tax scholars to engage in interdisciplinary collaboration to explore this proposed analysis.[316] 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.[317] 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."[318] As explained above, Medicare and Social Security are currently funded but are predicted to become insolvent in the next six to fourteen years.[319] This funding structure meets neither the needs of the present nor future generations and is likely compounded by projected levels of job automation.[320]

The normative underpinning of employment tax has been long established and was explored in Section II.A.[321] The Social Security Act was to provide welfare assistance, poverty prevention, financial security for the aging, economic stability, and labor force stabilization.[322] Program insolvency jeopardizes these public policy goals for current and future beneficiaries.[323] 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 postmortem austerity to recoup benefits from wealthy beneficiaries who do not require governmental support.[324] We apply a sustainability analysis to determine their viability.[325]

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.[326] Social Security wage base erosion has not been addressed since 1983.[327] Because the Social Security and Medicare Trustees have reported impending insolvency of the trust funds to the public regularly for many years,[328] public opinion sees merit in such a proposal and is in favor of increasing employment tax contributions to prevent insolvency.[329] Similarly, some have also

318. *See* United Nations, *Development Report*, *supra* note 277.

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 supra* Section II.B.

324. *See infra* text accompanying notes 326–348.

325. *See infra* text accompanying notes 326–348.

326. *See Policy Basics: Top Ten Facts About Social Security*, *supra* note 12.

327. Social Security Amendments Act of 1983, Pub. L. No. 98-21, 97 Stat. 65 (codified as amended at 42 U.S.C. § 418); *see also* Lewis D. Solomon & Geoffrey A. Barrow, *Privatization of Social Security: A Legal and Policy Analysis*, 5 KAN. J.L. & PUB. POL'Y, 9, 15 (1995) (discussing the legislative history of the 1983 amendments).

328. *See* Press Release, U.S. Dep't of Treasury, Fact Sheet: 2019 Social Security and Medicare Trustees Reports' (Apr. 22, 2019), https://home.treasury.gov/news/press-releases/sm665 (summarizing 2019 trustee reports, including insolvency dates).

329. *See Social Security*, GALLUP, https://news.gallup.com/poll/1693/social-security.aspx (last visited Feb. 29, 2020) (finding that, in 2005, 2010, and 2015, a majority of Americans would rather raise social security taxes than limit benefits); AARP, SOCIAL SECURITY 80TH ANNIVERSARY SURVEY REPORT: PUBLIC OPINION TRENDS 18 (2015), https://www.aarp.org/research/topics/economics/info-2015/social-security-80th-anniversary-report.html (finding that "four in five adults age

suggested raising the low wage base for FUTA.[330] 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[331] or increase the ages of eligibility for Social Security and Medicare,[332] 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.[333] 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%)").

330. *See Unemployment Insurance: An Overview of the Challenges and Strengths of Today's System: Hearing Before the Subcomm. on Human Res. of the H. Comm. on Ways & Means*, 114th Cong. 7 (2016) (testimony of Judith M. Conti, Federal Advocacy Coordinator, National Employment Law Project) (proposing increase to FUTA wage base to $59,000 and indexing to Social Security); Christopher J. O'Leary, *Restoring Unemployment Insurance as Social Insurance*, W.E. UPJOHN INST. EMP. RES. (Nov. 7, 2018), https://research.upjohn.org/cgi/viewcontent.cgi?article=1058&context=presentations (proposing indexing FUTA wage base to Social Security wage base); *Increase Taxes That Finance the Federal Share of the Unemployment Insurance System*, CONG. BUDGET OFF. (Dec. 13, 2018), https://www.cbo.gov/budget-options/2018/54809 (analyzing the proposal to expand FUTA wage base from $7000 to $40,000 and index the wage base).

331. *See* Emily Brandon, *How the Chained CPI Affects Social Security Payments*, U.S. NEWS & WORLD REP. (Apr. 29, 2013, 9:05 AM), https://money.usnews.com/money/retirement/articles/2013/04/29/how-the-chained-cpi-affects-social-security-payments (reporting on chained CPI for Social Security benefits); *Using the Chained CPI in the Tax Code: Will Social Security Be Next?*, NAT'L COMMITTEE TO PRESERVE SOC. SECURITY & MEDICARE (Nov. 14, 2017), https://www.ncpssm.org/documents/general-archives-2017/using-chained-cpi-tax-code-will-social-security-next (discussing the use of chained CPI).

332. *See generally* Anya Olsen, *Mind the Gap: The Distributional Effects of Raising the Early Eligibility Age and Full Retirement Age*, 72 SOC. SECURITY BULL., Nov. 2012, at 37, https://www.ssa.gov/policy/docs/ssb/v72n4/v72n4p37.html.; *see also* Philip Moeller, *Should We Raise the Retirement Age for Social Security and Medicare?*, PBS NEWSHOUR (Feb. 1, 2017, 3:33 PM), https://www.pbs.org/newshour/economy/raise-retirement-age-social-security-medicare.

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.[334] 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.[335] 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,[336] has twin goals of increasing economic progress and improving social welfare.[337] We have criticized innovation tax policy for evolving to prefer economic improvements over social welfare gains.[338] The trend in innovation tax policy has been to become more generous to business, the primary beneficiary of increased credits, deductions, and offsets.[339] The federal government has relied on economic studies as rationale for increasing tax subsidies.[340] Economic analysis of innovation tax proposals, in many cases, has

334. *See Using the Chained CPI in the Tax Code*, *supra* note 331.

335. *See generally* Reid Kress Weisbord, *Postmortem Austerity and Entitlement Reform*, 71 STAN. L. REV. ONLINE 132, 132 (2018) (proposing post-mortem austerity for Social Security benefits).

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.[341] 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."[342] 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."[343]

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.[344] 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.[345] 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

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").

342. *See* Alexander M. Bell et al., *Do Tax Cuts Produce More Einsteins? The Impacts of Financial Incentives vs. Exposure to Innovation on the Supply of Inventors* 6 (Nat'l Bureau of Econ. Research, Working Paper No. 25493, 2019) (citing Paul M. Romer, *Should the Government Subsidize Supply or Demand in the Market for Scientists and Engineers?* (Nat'l Bureau of Econ. Research, Working Paper No. 7723, 2000)), https://www.nber.org/papers/w25493.

343. *Id.*

344. *See, e.g.*, Dominique Guellec & Bruno van Pottelsberghe de la Potterie, *R&D and Productivity Growth: Panel Data Analysis of 16 OECD Countries*, (Org. for Econ. Cooperation and Dev., Working Paper No. JT00109561, 2001).

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.[346] As we have argued above, legislation should remain faithful to its underpinning.[347] This underpinning can be found often, but not exclusively, in legislative histories.[348] 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.[349] Establishing clear goals is the first step towards an iterative and adaptive system.[350]

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.[351] 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.[352] 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, Saaed 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.[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.[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.[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.[356]

From its inception, the goal of U.S. employment tax policy was to improve social welfare.[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.[358] The long-term sustainability of these programs is already jeopardized, and automation substitution further threatens their viability.[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.[360] However, innovation tax has shifted in favor of economic progression at the expense of social safety net funding.[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

353. *See supra* text accompanying notes 348–351.
354. *See supra* text accompanying notes 74–96.
355. *See supra* text accompanying notes 77–89.
356. *See supra* text accompanying note 243.
357. *See supra* text accompanying notes 111–139.
358. *See supra* text accompanying notes 140–153.
359. *See supra* text accompanying notes 140–153.
360. *See supra* text accompanying notes 165–224.
361. *See supra* text accompanying notes 225–236.

viable approach for harmonizing U.S. employment and innovation tax policies.[362] Sustainability requires an examination of foundational, normative questions, integrates interdisciplinary collaboration, embraces long-term solutions, and adapts to an ever-evolving technological society.[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.[364]

362. *See supra* text accompanying notes 272–307.
363. *See supra* text accompanying notes 272–307.
364. *See supra* text accompanying notes 308–353.