

# The Distributional Consequences of The American Knowledge Economy: Inequality in an Age of Intellectual Property Production

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## Abstract

As the American political economy has become unequal in many respects, so it has also undergone profound structural transformations in the form of increasing financialization and increasing reliance on technological innovation as a source of economic advantage as part of the knowledge economy transition. But while the relationship between financialization and rising inequality is relatively well explored, the relationship between the knowledge economy transition and growing inequality is less clear. Mounting evidence suggests that the peculiar institutional form of the American knowledge economy—which relies intensely on intellectual property to incentivize private sector investment in new technology—has made it a tremendous engine of geographic, economic, and political inequality. Financialization and intellectual property production also appear to be mutually reinforcing, a relationship that also makes the American political economy more unequal.

**Keywords:** political economy, knowledge based economy, innovation, inequality, regional inequality, institutional complementarity

**JEL Classifications:** O10 Economic Development: General, O30 Innovation, Research and Development, Technological Change, Intellectual Property Rights: General, P16 Political Economy

## 1 Introduction

Over the last forty years, the American political economy has become more unequal in many important ways. Nationwide, both the income and wealth distributions have become substantially more polarized (Piketty, 2014; Saez and Zucman, 2016) while inter-generational mobility has declined (Chetty *et al.*, 2017). These trends also have a distinct geographic expression. While many rural areas and some heavily industrialized cities have endured intense economic stagnation, a relatively small number of metropolitan areas have experienced dramatic economic growth (Moretti, 2013) and, paradoxically, these well-performing regions seem to produce high degrees of income inequality and high levels of mobility at the same time (Chetty *et al.*, 2014; Galbraith, 2012, Ch. 6), contrary to conventional expectations (Corak, 2013). Similarly, the augmented gap in economic opportunities between rich and poor nationwide has created a widening academic achievement gap (Reardon, 2011; Corak, 2013), and the more affluent and educated segments of the population have become much more geographically segregated (Reardon and

Bischoff, 2011; Murray, 2012). And all of this has unfolded in a context where the nation's troubling history of racial oppression has made many of these trends even more stark for Black Americans (Rugh and Massey, 2010; Chetty *et al.*, 2020) and has complicated the creation of social policies designed to ameliorate rising inequality (Soss, Fording, and Schram, 2008; Tesler, 2012).

This complex thicket of troubling socio-economic symptoms emerged while the American political economy navigated two substantial transformations, both generated in response to the political and economic crises of the 1970s. On the one hand, the American political economy became increasingly financialized in the sense that families, governments, and businesses began to accrue larger shares of profits through financial intermediation rather than through productive investment or trade (Krippner, 2005). To depoliticize macroeconomic management in the wake of Keynesian decline, the American government—led by Republicans but with the support of many Democrats—engaged in a series of experiments in monetary policy, financing deficits through foreign borrowing, and financial deregulation that expanded the supply of credit for financial intermediation and pushed non-financial firms to increasingly seek revenue through financial markets (Krippner, 2011).

On the other hand, the nation also accelerated its transition into the knowledge economy but did so in way that depended intensely on the commodification of new technological knowledge in the form of intellectual property (IP) (Coriat and Weinstein, 2012). In a context of declining economic competitiveness, the American government—led by Democrats but with the support of many Republicans—sought to generate economic advantage through the production of new technologies, but in an era of divided government, the political consensus in support of the knowledge economy converged around a set of market-oriented reforms to strengthen IP rights in lieu of other policies that envisioned a more substantial role for the state (Short, 2021; Schwartz, 2020; Sell, 2003).

In what ways have these two profound transformations in the American political economy contributed to or exacerbated the kinds of inequality described above? The distributional consequences

of increasing financialization are somewhat straightforward, theoretically, and relatively well explored in existing scholarship (Davis and Kim, 2015). As argued in one prominent review article, financialization increases the economic returns flowing to the relatively small segment of the population that has disposable assets to invest in financial markets while also causing wage stagnation which forces many wage earners to rely increasingly on debt to maintain consumption (Davis and Kim, 2015). More fundamentally, by making financial speculation more attractive than productive investment, a financialized economy creates large wage premiums for those highly educated professionals who can engineer lucrative financial opportunities even if (some would say especially if) those opportunities impose great costs on the working class. For example, some strategies for producing financial income like large corporate mergers lead to layoffs and economic stagnation for many workers while also generating golden parachutes for executives and enormous advisory fees for legal and financial professionals (Short, 2019; Philippon and Reshef, 2012). In these and other ways, the relationship between financialization and growing inequality is somewhat manifest.

But if the relationship between financialization and inequality is relatively straightforward, the distributional consequences of the turn towards the American knowledge economy (AKE) are not as apparent and have only recently garnered any systematic treatment from social scientists (Kwon, 2016; Hope and Martelli, 2019; Iversen and Soskice, 2019; Ansell and Gingrich, 2022; Schwartz, 2022). Existing research provides important insights about the connection between the knowledge economy transition and rising inequality in the United States, but also suffers from a common limitation: these analyses lack a precise definition of the AKE rooted in observable facts about institutional change and tend to sweep a vast and growing array of socio-economic trends under the broad banner of the knowledge economy transition. In this article, I follow Coriat and Weinstein (2012) and (Short, 2021) in defining the AKE as a politically contested growth regime that relies intensely on the production not of knowledge, per se, but of commodified forms of technological knowledge, like patents and trade secrets, to guide the nation's

economic development. I then draw on existing research and some newly developed data sets to argue that this peculiar institutional form, in which the state prioritizes IP production over human capital formation, exacerbates many forms of inequality.

From this vantage point, it is possible to focus the analysis by first clarifying what the American knowledge economy is not. It is not a synonym for the service transition or the broader theory of post-industrialism constructed around the observation of the service transition (Bell, 1974; Kwon, 2016; Ansell and Gingrich, 2022); nor is it a form of political economy tied to any specific changes in the occupational structure or in the supply and demand for any specific kind of labor, skilled or otherwise (Iversen and Soskice, 2019; Autor, 2019); nor is it a form of political economy tied to any particular technological domain, like internet and communication technologies (or ICT) (Iversen and Soskice, 2019; Hope and Martelli, 2019; Soskice, 2022). Importantly, it is also not a political economy organized around the production of all forms of “intangible” capital (Haskel and Westlake, 2018; Ansell and Gingrich, 2022), a broad and inchoate category including “soft” (non-technological) forms of intellectual property like copyrights<sup>1</sup> and trademarks and a wide array of other legal rights (licensing rights, operating rights, franchise fees, mineral rights, etc.). It is instead a political economy organized around the production and utilization of specific kinds of intellectual property that promote technological innovation, especially patent rights.<sup>2</sup> The question raised in this article is therefore: through what mechanisms has this specific form of knowledge economy made the American political economy more unequal, either alone or in combination with other institutions or policies?

In the argument that follows, I survey existing research and introduce some new empirical observations using patent data to argue that the AKE exacerbates inequality along many dimensions and to specify in closer detail the plausible mechanisms through which this happens. In this respect, the argument is closest in spirit to Ansell and Gingrich (2022) and Schwartz (2017, 2022). I agree with Ansell and Gingrich (2022, p. 387) that “[t]he knowledge economy is not destiny” and that it is instead shaped by

institutions and policy. But those authors assume that the knowledge economy transition has exacerbated income and regional inequality through standard economic theories like skill-biased technological change (Goldin and Katz, 2008) and agglomeration effects (Moretti, 2013), and then try to identify how the electoral constraints of U.S. political institutions prevented the formation of coalitions supporting a social or industrial policy response after 1990. In contrast, I question the utility of those standard economic frameworks for understanding the distributional consequences of the knowledge economy transition and try to identify the institutions and policies (and combinations thereof) that caused the American political economy to become more unequal from the outset. Schwartz (2017, 2022) examines how the knowledge economy transition intersected with other policies, like the shift towards a shareholder value model of business management and developments in the legal framework governing franchise rights, to induce changes in firm organization that have exacerbated income inequality. I build on that analysis by considering a broader set of distributional consequences beyond income inequality and by probing in greater depth how the knowledge economy transition and financialization have intersected to magnify inequality.

## **2 Geographic Inequality**

The AKE is relatively unique among advanced capitalist democracies in that it relies intensely on market-oriented reforms, like strong patent laws, to promote private sector investments in technological innovation while minimizing or forgoing strategies, like increased investments in education and public research or robust industrial policies, that leverage state action to make participation in the knowledge economy more equitable. As a result, the AKE tends to exacerbate inequality along many different dimensions, including across various levels of spatial geography.

At the global level, many of the institutions of the global knowledge economy, in which the AKE is situated, arguably reproduce economic inequality between the global North and South by increasing the monopolistic rents that accrue to IP producers of wealthier nations while suppressing the economic and

technological development of less developed nations. Consider the case of textbooks. In 1960, many former colonies and other developing nations faced substantial shortages in basic textbooks and their citizens could not afford the high royalties paid by consumers in more affluent nations. But when the leaders of those nations suggested revising the global copyright regime (the Berne Convention for the Protection of Literary and Artistic Works of 1886) to account for their plight, they triggered a political crisis that ended with no meaningful changes to the status quo. From the perspective of IP producers, the economic logic is simple: any lowering of global legal standards would allow individual publishers to break ranks and bilaterally negotiate with developing nations to supply textbooks at much lower royalties, and those copies could be exported back to developed nations. From the perspective of the former colonies, global copyright agreements and the substance of their own copyright laws are legacies of colonialism, and IP producers are stifling the free flow of information that is so crucial to knowledge economy development, all for the sake of maintaining a global cartel (Drahos and Braithwaite, 2003, pp. 74-79). Other examples, like Nelson Mandela's experience trying to import patented HIV medication into South Africa, abound. They all point to possibility that the institutions of global knowledge economy keep less developed nations relatively impoverished.

The AKE also perpetuates a form of North-South divide within the United States and therefore magnifies regional inequalities. As the Democratic Party turned towards the AKE in the early 1980s while also strengthening its ties to the environmental movement and severing its ties to organized labor, many elected officials in the Party became increasingly indifferent to the "smokestack" industries that were struggling to compete against companies backed by foreign governments abroad (Short, 2021). Their indifference to the plight of American manufacturers and commodity producers had a concrete geographic bias: by 1980, decades of federal defense spending (Schulman, 1994), right to work laws, and tax incentives had precipitated a substantial relocation of traditional manufacturing from northern states to the southern Sunbelt (Eisinger, 1988, pp. 49, 57-60). Democratic proponents of the AKE claimed to reject a mode of

economic production that, in their view, had little prospect for wage growth and harmed the environment. But they also implicitly rejected the regions within the United States where that mode of production still predominated.

The AKE does not simply solidify these kinds of regional advantages but also increases their severity over time. Economists refer to this effect as agglomeration or increasing returns to scale. Agglomeration occurs, in theory, when early movers (firms or regions) capture an advantage that tends to accelerate over time. In this perspective, a region like California's Silicon Valley develops, by some accident, robust institutions for venture capital and an entrepreneurial culture with little risk aversion, those institutions generate some successes (startups that rapidly dominate markets in new technologies), and those successes attract yet more engineers, investors, and businesses that accelerate economic development. Agglomeration tends to occur not because of any single actor, but because the rational decisions of many actors lead to a kind of economic ecosystem that thrives because its constituent elements—thick labor markets of highly educated workers, employers drawn to those types of employees, and local legal and financial services to intermediate the needs of those kinds of employers—are mutually reinforcing. Agglomeration is therefore a theory in which early advantages are largely accidental or unplanned and rational actors generate desirable economic outcomes in the aggregate (Moretti, 2013).

For political scholars, this framing ignores the fact that the government often plays a central role in creating and maintaining early advantages and policy largely determines how the economic benefits of those advantages will be either shared or used to level the playing field. In some ways, this perspective is abutted by the fact that the public institutions that promote technological development in the United States have been so thoroughly depoliticized they have evolved into what Fred Block calls a “hidden developmental state” (Block, 2008). California's Silicon Valley, Massachusetts' Route 128 corridor, and the innovation hub surrounding Seattle may owe a great deal to luck and individual ambition. But it is hard to ignore the fact that aerospace and defense contractors like Lockheed, Raytheon, and Boeing resided at the

heart of those regions and profited enormously from the Cold War defense buildup (O'Mara, 2019, 29; Short, 2021, pp. 51-52).

Figure 1 indicates that this relationship is more than hypothetical. To produce the figure, I first calculated the share of per capita defense prime contract awards accruing to the top 210 core based statistical areas in the year 1960, which is plotted on the horizontal axis. These awards account for 86.7 percent of all defense prime contracts over \$10,000 in that year. I then calculated each area's per capita patent production from 2010-2015, which is plotted on the vertical axis, using subsequent citations to give more weight to patents that are more valuable. The blue line illustrates the line of best fit generated by running a linear regression of 2010 shares of patent value on 1960 shares of defense spending. As the figure reveals, these two values are significantly correlated despite being separated by 50 years in time. It is worth noting that this significant relationship exists even in simple defense procurement data available to the public, data which does not include the substantial sums spent through other agencies, like the Atomic Energy Commission (which managed the nation's federal laboratories at the time) and the National Aeronautics and Space Administration, or through defense spending that is not publicly available, like investments made by the Defense Advanced Research Projects Agency.

[Figure 1 goes here]

As a result of political contestation, the hidden developmental state promoting technological innovation in the United States has always exacerbated regional and other forms of inequality, including during the Fordist period. Consider, for example, the political debate that took place between Vannevar Bush and Harley Kilgore over the founding of the National Science Foundation. Bush, Dean of MIT's College of Engineering and founder of Raytheon, wanted the agency to distribute federal funds according to a system of peer-review executed solely by scientists and insulated from the concern of other interests like labor leaders. Kilgore believed that such a system would bestow most of its benefits on a handful of defense contractors and elite universities, like Raytheon and MIT, and proposed more democratic modes

of decision-making as well as funding formulas that would have distributed specified shares of federal monies to regions and firms that were relative laggards in scientific and technological development. Both choices are inherently political and have distributional consequences. That Congress sided with Bush demonstrates that Congress wished to maximize scientific output regardless of the distributional consequences (Kleinman, 1995; Hart, 1998).

But additional political choices and economic developments associated with the knowledge economy transition have only served to magnify these effects, especially with respect to the programs that have been layered on top of the hidden developmental state since the knowledge economy transition began around 1980. As a source of private sector technological innovation, venture capital (VC) financing has always tended to exacerbate regional inequality. Inventors are naturally drawn to regions with established and successful VC firms and those firms naturally find it easier to fund and manage (through Board membership) locally based entrepreneurs. A 1982 law that effectively set up a federal VC fund in the Small Business Administration might have counter-balanced this regional imbalance, and the law was partly motivated by a desire to help minority and disadvantaged persons participate in the knowledge economy. But like the NSF, the program's meritocratic system of review tends to magnify regional imbalances so that about 40 percent of all federal investments consistently accrue to companies in California and Massachusetts, a trend that is known and has drawn Congressional scrutiny in the past (Lerner, 1999). Other (now defunct) programs for promoting technological innovation through the National Institute of Standards and Technology relied primarily on matching grants, a mechanism that is known to exacerbate regional inequality. Similarly, when the Democratic Party failed to generate bi-partisan consensus on some form of federal industrial policy in the 1980s, these efforts devolved to the states, and regions that already had significant knowledge economy infrastructure were in the best position to design effective state-level industrial policies and take advantage of federal matching commitments (Eisinger, 1988; Short, 2021, pp. 48-53).

The regions that are thriving in the AKE therefore owe much of their success not just to the Fordist era defense spending that erected critical knowledge economy infrastructure, but to ongoing federal investments in innovation and entrepreneurship, investments that are crucial for IP production. Unsurprisingly, then, IP production is geographically concentrated (Ansell and Gingrich, 2022, Fig. 13.1), and while it is difficult to measure geographic patent concentration prior to 1980, there are reasons to suspect it has grown significantly over time.<sup>3</sup> While this may have something to do with agglomeration effects, it is also a byproduct of the AKE's institutional design, a design which relies heavily on legal incentives promoting private sector investments in IP production in lieu of increasing government commitments to education and research (Short, 2021) but also bestows the lion's share of federal investments to only a few regions with long-standing advantages in technological innovation.

The AKE also magnifies geographic inequalities within regions at more local levels of governance. The largely white and affluent suburban professionals that emerged so forcefully as AKE proponents in the New Democrat coalition were incredibly active in state and local politics, but as these suburban liberals splintered in the 1970s, they failed to produce policies that would share the benefits of the AKE more broadly. In Boston's Route 128 corridor, for example, suburban residents readily embraced minimum lot sizes and zoning restrictions that propped up housing prices, minimized the tax burden that supported local schools, and restricted the growth of more affordable housing. They also aligned behind anti-growth initiatives that prevented public transportation from making suburban areas accessible to urban residents who did not own a car. Those suburban liberals who supported affordable housing found themselves engaged in intense political combat with their former collaborators during the anti-war movement and civil rights struggles of the 1960s, some of whom now felt that economic exclusion was an acceptable side effect of anti-growth policies that would protect the environment and others who became squeamish in the face of policies that might undermine the excellence of their own children's local public schools. The economic and racial implications of this stalemate did not go unnoticed. Working class whites and blacks

in the inner city struggled to gain access to the new knowledge economy jobs of the moment and the educational opportunities that would help their kids grasp the knowledge economy jobs of the future. Many local Democratic politicians championed Route 128 as America's "Technology Highway"; the United States Commission on Civil Rights bemoaned "Route 128: Boston's Road to Segregation" (Geismer, 2015, Chs. 7-8).

### **3 Economic Inequality**

Because of its deep reliance on IP, the AKE also magnifies economic inequality. The innovative regions that produce large amounts of IP are largely responsible for the dramatic increase in income inequality since 1980. Aghion *et al.* (2019) find, for example, that top income shares at the state level are strongly correlated with the value of the region's patents, and that a one percent increase in the number of patents awarded to the firms in a state in a single year will increase the state's top one percent income share by 0.2 percent (*see also* Galbraith, 2012, Ch. 2). And Koh, Santaaulalia-Llopis, and Zheng (2015) contend that all of the decline in labor's share of national income can be attributed to the capitalization of IP in national income and product accounts. At the same time, we also know that IP production is skewed towards the affluent. Using a unique dataset containing demographic information about the inventors named on patents issued from 1996 to 2014, Bell *et al.* (2016) find that children of low-income parents are much less likely to become inventors than children of higher-income parents and that some of the gap stems from differences in human capital that emerge in early education. This result suggests that the institutional structure of the AKE intersects with suburban exclusivity and the widespread practice of financing primary and secondary education through local property taxes to perpetuate income inequality and decrease opportunities for the less advantaged to participate in the knowledge economy.

Legal doctrine governing IP rights can be designed in ways that dampen the relationship between IP production and income inequality. Patents confer on their owner a form of market power and therefore enable IP producers to generate rents or profits in excess of what would otherwise prevail in a more

competitive setting (Stiglitz, 2013, 54). In fact, the promise of excess profits is what provides the financial incentive for businesses to invest in innovation; it is also the reward for disclosing the details of new technologies to the public by applying for a patent. But because patents are effectively legal rights, their strength, enforceability, and geographic reach are all controlled by legal doctrine. During the Fordist period, U.S. law contained many such safeguards or checks on patent power. But, as indicated in the Introduction, the state abandoned virtually all these safeguards during the knowledge economy transition (Short, 2021), and these institutional shifts are, in fact, what differentiate the AKE from the Fordist period. To take just one example, from 1941 to 1959, antitrust officials procured 107 consent decrees forcing major technology companies to license their patents more broadly to their competitors, agreements that covered between forty and fifty thousand patents including some patents in key technological domains like semiconductors and synthetic materials (Hart, 1998, pp. 95-96). Since 1980, antitrust officials have not even attempted to force a single technology company to license its patents more broadly, even in the context of a global pandemic where doing so would dramatically accelerate global vaccine production and distribution.

Though these institutional shifts substantially increased the rents that patents can generate, that alone would not necessarily exacerbate the economic inequality if patent ownership were broadly distributed. Unfortunately, the evidence strongly suggests that patent ownership has always been highly concentrated. Figure 2 shows that concentration in the ownership of patents rose dramatically between 1935 and 2010. To generate the figure, I used IFI Claims patent data hosted on Google BigQuery, which has standardized names for the institutional owner of each patent including corporations and public entities. I excluded patents owned by individuals, aggregated the institutionally owned patents into portfolios by simply adding up new grants and depreciating prior patent value on a time scale of 17 years, and then calculated the share of patent portfolio value held by the top 1 percent of organizations. From 1945 to the early 1970s, concentration in the ownership of patents rose rapidly, but political institutions—especially

antitrust enforcement— counterbalanced this trend by forcing corporations to license their IP more broadly. Since 1980, concentration in the ownership of patents has continued to rise and is now reaching unprecedented heights, with the top 1 percent of organizations owning around 65 percent of all patents. And these figures substantially underestimate the true extent of concentration because they only capture patents developed in-house and do not account for patents the companies purchase or acquire through mergers and acquisitions. Additional studies have found that the largest firms purchase substantial amounts of new patents (55 percent in 2010) by acquiring small emerging competitors and that patent ownership since 2000 is strongly correlated with broader measures of industrial concentration (Akçigit and Ates, 2019; Grullon, Larkin, and Michaely, 2017).

[Figure 2 goes here]

Even in a regime of strong patent rights and extreme concentration in patent ownership, knowledge economy development need not generate high degrees of income inequality if the social and political structure in which entrepreneurial firms innovate have robust mechanisms for rent sharing within the boundaries of the firm (Lazonick and Mazzucato, 2013). Here, again, the evidence is troubling. There is some positive news when it comes to rent sharing. Even though legal and contractual norms generally allow firms to acquire ownership in all the IP that their employees generate, there is some evidence that firms share the rents they generate from patents. Kline *et al.* (2017) find, for example, that within the population of startups applying for their first patent, workers capture on average 29 percent of the patent-induced operating surplus, though the share is larger for named inventors and lower for others (Kline *et al.*, 2017). Since the total market capitalization of much larger firms includes the economic value of each firm's patent portfolio (Kogan *et al.*, 2017) and those same firms increasingly use stock options as a form of employee compensation, some tech firm employees who do not invent also indirectly acquire a financial stake in the value of their employer's patents. At the same time, these ownership stakes are minuscule compared to those that accrue to executives.

Much more troubling is that simultaneous shifts in business management strategy towards maximizing shareholder value have forced many IP producers (and many other firms who own non-technological IP) to vertically disintegrate, so that these rents are shared with a much smaller (and much more educated and affluent) segment of the labor force (Schwartz, 2017, 2022). This is one way in which the AKE has intersected with financialization and the “fissuring” of the workplace (Weil, 2014) to exacerbate income inequality (for more about the AKE and financialization, see Section 5). Similarly, though union density consistently tempers income inequality in cross-national studies of nations undergoing knowledge economy transitions (Kwon, 2016), organized labor lost significant economic and political power as the knowledge economy transition unfolded in the United States (Hacker and Pierson, 2010) and IP producers are notorious for not being unionized (Geismer, 2015; O’Mara, 2019).

In a setting where strong patent rights create large patent rents, where patent ownership is highly unequal, and where firm organization and labor market institutions do not create mechanisms for broad rent-sharing, the main way the government can temper economic inequality driven by the knowledge economy transition is through taxation and redistribution or (more promisingly) supply-side investment in under-privileged groups and regions (Unger, 2019; Barnes, 2022). But here, again, the institutional design of the AKE substantially contributes to tax avoidance and hobbles the government in its efforts to level the playing field and increase knowledge economy participation. One quirk about the U.S. patent system is that companies can use patents to implement a basic tax avoidance scheme. A company like Apple can, for example, transfer ownership of its patents to a shell company incorporated in nation like Ireland and then pay “royalties” to that shell company for using those patents when making and selling consumer products. The overall effect is to shift income that would otherwise be recognized in the United States, and taxed accordingly, to a low or no tax jurisdiction.

That income cannot be repatriated without incurring a corporate tax. But some IP producers have become so powerful that they do not need the income for investment and are willing to park the money

offshore until the federal government facilitates repatriation by providing a tax holiday. There have been two such tax holidays in recent history, one in the Homeland Investment Act (HIA) in 2004 during George W Bush's administration and another in the Tax Cuts and Jobs Act (TCJA) in 2017 during Donald Trump's administration. The amount of money at stake is not trivial. Shortly after the TCJA was signed, Apple announced it would repatriate \$285 billion. There is evidence that, in both instances, IP producers used small amounts of the repatriated dollars for new investments or increasing employment, and that the lion's share of the income was used to pay dividends and buy back stock, which mechanically increases stock value and creates capital gains to stockholders (including executives with stock options) (Dharmapala, Foley, and Forbes, 2009; Lazonick and Mazzucato, 2013; Schwartz, 2016). The AKE therefore enables firms to use IP to avoid taxation, and even when foreign revenue is repatriated, it is utilized in ways that exacerbate economic inequality. Similarly, the "excess stock options" tax loophole, which allows companies to deduct stock options from taxable income, helps some of the world's largest IP producers to avoid paying any taxes to the federal government (Citizens for Tax Justice, 2016). In this way, the institutions of the AKE intersect with politically negotiated provisions of the tax code to magnify economic inequality and undermine post-tax efforts to soften the effects or equalize knowledge economy participation.

The economic inequality created by the AKE has troubling implications for gender and racial inequality as well. Though the picture has improved, women remain underrepresented in engineering. The Society of Women Engineers produces annual reports documenting the obstacles that dissuade women from pursuing a degree in engineering. But even if we (falsely) assume that the substantial gender disparities in technical education reflect personal or group preferences, those women who do acquire the education and skills needed to compete for employment with IP producers still encounter deeply entrenched cultures of sexism and gender discrimination in the workplace (O'Mara, 2019; Chang, 2019). Unsurprisingly, some empirical evidence supports the view that IP producers also discriminate against

women when determining compensation. Kline *et al.* (2017) found, for example, that while startups share on average 29 percent of patent-induced operating surplus with their employees, virtually all that surplus accrues to male employees. Even when limiting the analysis to those firms that employ both genders, the authors found that patent allowances exacerbate existing gender earnings gaps. (Bell *et al.*, 2016) also found that only 15 percent of inventors born in the 1980s were women, and that the large gender disparity cannot be explained by differences in education or human capital. They also found substantial racial disparities in patent inventorship that cannot be explained by differences in education or human capital.

The analysis above suggests only some of the ways that the AKE produces income inequality and exacerbates gender and racial differences, but it also points to important limitations in the prevailing framework for understanding the connection between technology development and economic inequality. According to the theory of skill-biased technological change, exogenous changes in technology, like the emergence of personal computers, allowed some more skilled workers to become much more productive (those who could use computers to work more efficiently) while it simultaneously made other less skilled workers obsolete (clerical workers whose routine tasks could now be handled by computers). This in turn caused an increasing skill premium reflected in a widening gap between the average wages earned by college graduates and the average wages earned by non-college graduates. Accordingly, technology induces higher demand for skilled labor and if educational investments do not supply higher levels of college educated workers, inequality will increase (Goldin and Katz, 2008; Autor, 2014).

The theory has its skeptics (Galbraith, 1998, Ch. 2). But the theory's biggest shortcoming, when it comes to understanding the inequality that the AKE produces, is that it misleadingly suggests that education alone is the answer. Part of the solution may lie in not only increasing the supply of college educated workers but making access to high quality education more equitable, and the analysis above suggests ways in which the structure of the AKE shackles the government when it comes to equalizing educational investment. The analysis also suggests that many other institutional and structural

characteristics of the AKE inhibit equitable participation in (and benefits from) the knowledge economy, from antitrust, labor, and tax policy to theories of firm governance and organization. In this sense, it is reasonable to expect that, even if the supply of educated workers could be increased, the AKE will most likely continue to generate substantial inequalities so long as it puts the interests of IP producers over the interests of commodity producers in global trade agreements (see below), so long as IP ownership remains concentrated in the hands of a few elite firms and universities with no institutions providing counter-vailing power, and so long as IP is used in ways that enable tax avoidance on highly unequal forms of employee compensation.

#### **4 Political Inequality**

IP producers have exercised substantial influence over the legal regimes that govern international and domestic economic relations (Short, 2021). The fact that representatives from both political parties in the United States went to such great lengths to indulge their demands suggests several different kinds of political inequality rooted in fundamental economic cleavages. Foremost, it suggests a growing inequality between the interests of domestic commodity producers and of IP producers—in other words, an economic and political cleavage among business interests. When trade negotiators agreed to subsidize competition in commodity markets through the Generalized System of Preferences if developing nations adopted stronger patent laws, they deliberately put the interests of IP producers and their investors over the interests of domestic commodity producers (Short, 2021). The political consensus behind this form of globalization suggests yet another form of political inequality: American consumers enjoy lower prices in commodity markets while American workers in those markets—the blue-collar workers in the “smokestack” industries that drew so much derision from New Democrats—lost their jobs. The AKE is a therefore a form of political economy that amplifies the voices of IP producers and American commodity consumers and suppresses the voices of American commodity producers and their employees.

Other political tensions within the AKE spring from the fact that, for whatever reason, IP consumers have little if any political representation. IP consumers are not just conventional customers. Rather, they include any person or organization or government that consumes IP in the legal, technical sense, including those who wish to make, sell, or import products in which IP is embedded. The unspoken and poorly represented needs of IP consumers arise in myriad debates about the AKE. Leaders of developing nations find themselves at odds with IP producers in acquiring textbooks or addressing public health emergencies. Taxpayers question why they pay once for federal research and then pay a monopoly price later when the fruit of that research becomes part of a new consumer product. Blue collar workers question why their tax dollars support so much of the innovative process, from basic research to venture financing, but the firms that acquire IP from those investments do not have to commit to manufacturing new products in the United States. Drug consumers blanch at the power inherent in “pharma bros” who can increase the cost of essential medications by 5,000 percent overnight. The political dilemma at the root of these and many other debates in the American political economy is that with rare exceptions—generic drug makers being the most notable one—IP consumers are a broad and inchoate group that have no organized political representation.

Because patents are government sponsored tools for generating economic rents, conventional theories of political economy suggest that patent ownership should induce rent-seeking not just in the marketplace but in political arenas as well. Some case studies support this view. Lazonick and Mazzucato (2013) contend, for example, that the managers of IP producers lobbied heavily for two major changes in SEC regulations governing stock options in 1982 and 1991 (Lazonick and Mazzucato, 2013, pp. 1115-6). Hacker and Pierson (2010, pp. 190-91) similarly contend that IP producers were responsible for defeating the Financial Accounting Standards Board’s first attempt to impose stricter accounting standards on stock options in 1995. O’Mara (2019, pp. 161-71) argues that the managers of venture capital firms, organized under the auspices of the National Venture Capital Association, played a significant role in obtaining the

capital gains cut at the heart of Carter's tax reform and the abandonment of the "prudent man" rule for managing pension funds which unleashed massive sources of venture capital. And Miles (2001) shows that, in the mid to late 1990s, IP producers were deeply engaged in many areas of political combat including teacher's unions, class action lawsuits, and stock options, and that they enjoyed surprising success in some of these areas.

But the AKE's most pernicious political outcome may be the way it isolates the working class. Because of the way the AKE developed, both political parties currently support policies that require sacrifices from the working class to pursue the interests of IP producers. The Democratic Party did so because a political realignment brought affluent lawyers and knowledge economy professionals into the party coalition while marginalizing organized labor, which the former largely viewed as corrupt. The result has been decades of political debates between one party that represents business interests and another that represents IP producers and the legal and financial service workers they rely upon. On economic issues at least, the working class seems to face a Hobbesian choice. The Republican Party categorically opposes unions and pursues economic development with deficit financed tax cuts that heavily favor the wealthy and may create jobs but will certainly disadvantage exports and favor imports. The Democratic Party nominally supports unions but mostly pursues economic development through policies that will only create jobs for a small slice of relatively affluent and educated workers. Before the election of Donald Trump, neither party gave any thought to rectifying the massive trade imbalances that leave the working class in a precarious economic position. That a Republican has chosen to attack that problem may reflect the fact that the AKE has left the working class politically adrift for more than twenty years. We can only speculate as to whether the AKE is in some ways connected to rising populism in the United States (Iversen and Soskice, 2019). But if any such connection exists, it arguably flows from the AKE's institutional form, and not from a collective failure to acquire the skills needed to participate in the AKE.

## 5 Financialization and the American Knowledge Economy

The knowledge economy transition in the United States unfolded simultaneously with increasing financialization, and it is logical to suspect that these two transformations might mutually reinforce one another or that the institutions underlying these transformations might intersect in ways that make the American political economy more unequal. Schwartz (2017, 2022) suggests one way in which this has occurred, as the institutions of the AKE have intersected with strategies of corporate governance and theories of firm organization to exacerbate income inequality. But there are other reasons to suspect that these trends are mutually constitutive. A key insight from Krippner (2005) is that financialization emerges only when we shift our focus from changes in the occupational structure to changes in “where profits are generated” in the macro-economy. Krippner (2005) was advocating for more focus on the role of financial assets and instruments, in lieu of productive investment, in generating business profits. But the knowledge economy transition has made IP an equally (if not more) important asset class, and one that is similarly amenable to speculative behavior and rent-seeking. If we assume that financialization exacerbates inequality in the ways described in the Introduction (Davis and Kim, 2015), the AKE may also exacerbate inequality through the same channels by diverting resources to forms of financial rent seeking that do not generate productive investment, like patent litigation, or by multiplying the resources that IP producers have to engage in mergers and acquisitions and other kinds of financial behavior. Simultaneously, the dramatic expansion of financial markets might also intensify the AKE’s dependence on IP.

Consider, for example, the strengthening connection between IP production and equity finance. Though it is somewhat well known that the knowledge economy transition in the United States reversed a two-decade long decline in per capita patent grants to domestic firms (Short, 2021, Fig. 1), it is perhaps less well known that generating IP has also become a much more valuable mechanism for publicly traded firms to raise equity capital. Figure 3 illustrates this trend. Because the U.S. Patent and Trademark Office makes public its decisions to issue domestic patents, event study techniques can be used to estimate the

stock market's response to these decisions and therefore attribute an economic value, in terms of equity capital raised, associated with each firm's patents (Kogan *et al.*, 2017). Utilizing that data, I first aggregated the stock market response to new patent announcements for each publicly traded firm in each month from 1965 to 2010, and then charted the average firm-level stock market response in each month in constant (1980) dollars. As shown, even after the opening of the NASDAQ securities market in 1971, the average publicly traded firm could expect new IP announcements to generate about \$20 million in new capitalization in 1979. Only 16 years later in 1995, with the knowledge economy transition well under way, the average publicly traded firm could expect to generate almost five times that amount, or about \$100 million in new capitalization. Another 15 years later in 2010, despite the deflation of multiple IP asset bubbles, the average firm could still expect to generate about \$200 million in new capitalization, a ten-fold increase since 1979. American corporations therefore face increasingly strong financial incentives to produce IP. In this way, as more resources flow through financial markets, those resources not only reward speculative non-productive investment but also IP production, and the market incentives to produce IP in many ways abet the AKE's intense reliance on IP as a primary vehicle for technological development.

[Figure 3 goes here]

On the other hand, the financialization of IP does not always benefit IP producers. For decades, many top technology firms have lamented that the fungibility of IP means that non-practicing entities, including law firms and private equity firms, can earn huge sums by buying overlooked patents and then suing prominent technology companies for patent infringement. Even if the lawsuits have little merit, many profitable firms find it cheaper to pay "nuisance settlements" to avoid the high legal costs of vindicating their claims in court. Bessen and Meurer (2008) estimate, for example, that total patent litigation costs approached \$16 billion in 1999 alone (Bessen and Meurer, 2008). And as the Covid pandemic took root in the United States in March of 2020, one follower of patent litigation trends warned that, as the pandemic slowed global economic growth, we should "expect the chatter around [patent] litigation finance as a

‘recession-proof asset class’ to grow louder” as the industry was flush with new capital (Insight, 2020). In these ways, financialization imposes risks and unpredictable costs on IP production. On the other hand, many IP producers have adapted and escalated their strategic acquisitions of valuable IP to neutralize this threat (Schwartz, 2017, pp. 201–2).

Similarly, to the extent that valuable IP generates lucrative rents and creates market power, IP producers engage in much of the same financial behavior that other firms engage in, often to even more extreme degrees, all of which exacerbates inequality through known channels. For example, the nation’s largest IP producers are known to have enormous reserves of retained earnings, with Microsoft, Alphabet (Google), and Apple each holding more than \$100 billion in cash reserves as of the end of 2019 (Stevens, 2019). As shown in Panel A of Figure 4, the top five IP producers among the S&P 500 firms also consistently use the highest shares of their retained earnings to buy other firms through mergers and acquisitions. The same firms are also able to generate sales revenue two to three times the cost of goods sold, which we can use as a rough measure of firm-level market power (Loecker, Eeckhout, and Unger, 2020). Similar plots (not shown) show that in recent years, pre-tax foreign income has grown to more than 15 percent of total revenue for IP producers, far more than other large firms, a fact that is consistent with studies showing that IP producers frequently use their IP to implement global tax avoidance strategies (Schwartz, 2016). In these ways, the AKE’s reliance on IP fuels increasing financialization, with established concomitant effects on inequality (see the Introduction).

[Figure 4 goes here]

## **6 Conclusion**

The institutional basis of the AKE came into being between 1980 and 1994 when control over the federal government was, in most years, divided and in a setting where the two main political parties advocated for fundamentally different modes of macroeconomic management. Though Democratic Party leaders initially envisioned a major role for the state (often in partnership with businesses and universities),

Republican Party leaders categorically opposed any such expansion of state power and successfully resisted most if not all such efforts. As a result, the political consensus for hastening knowledge economy development centered on market-oriented reforms, like stronger IP laws with broader global reach, that organized business interests championed but sidelined reforms, like increasing investment in higher education or research or more robust industrial policy, that had broader public support (Short, 2021).

Perhaps predictably, this form of knowledge economy development has allowed those regions with good IP infrastructure and those firms with valuable IP portfolios to play an increasingly important role in the nation's economic transformation. Other aspects of the nation's hidden developmental state have only exacerbated these trends, like the federal government's preference for matching state investments and its meritocratic system of federal awards, both of which tend to compound existing advantages; its unwillingness to increase investments in or equalize access to higher education thereby reducing capacity and making a college education more expensive; its regressive commitment to financing primary and secondary education through local property taxes in a setting of increasing economic segregation which all but guarantees access to higher education to the children of the affluent; and its unwillingness to use antitrust enforcement or other institutions to check the power of the nation's earliest winners in knowledge economy development. In these and many other ways described above, the institutions and policies of the American knowledge economy have plausibly contributed to and exacerbated the troubling socio-economic symptoms listed at the very beginning of this article.

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<sup>1</sup> Before it became clear that software was patentable under U.S. law, copyright was a popular alternative form of legal protection and, to some degree, copyrights on science and engineering textbooks could also be seen as relevant to the knowledge economy development. But by and large, copyrights cover works of artistic expression and have little to do with the knowledge economy even though copyright interests have been quite successful in leveraging the AKE transition to obtain significant policy concessions.

<sup>2</sup> This is not to say that the observations around which these theories are organized are in some way false or incorrect or that they do not shed light on the relationship between the AKE and inequality. It is only to say that they are not constitutive of the American knowledge economy. The shift from a Fordist economy rooted in manufacturing to a knowledge economy rooted in intellectual property (IP) production almost certainly played some role in inducing these and other important changes in our modern political economy. But the key institutional shifts that separate Fordist from the AKE approach to technological innovation in the United States all involve strengthening the legal enforceability and increasing the global reach of certain forms of intellectual property, especially patents (Short, 2021).

<sup>3</sup> See Figure 2, herein, showing increasing firm-level concentration in patent ownership.