

# STILL WALKING THE LIFELONG TIGHTROPE:

## TECHNOLOGY, INSECURITY AND THE FUTURE OF WORK

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# EXECUTIVE SUMMARY

The economic insecurity fueling our current political climate underscores one of the key challenges of the complex economic restructuring the United States is experiencing. Despite low unemployment and more than nine years of unbroken economic growth, the majority of Americans remain anxious about their economic conditions and futures.

The problem has not just emerged since our last great recession, but is linked to a much longer term, slow-moving but increasingly urgent crisis. The crisis is evidenced by a combination of sluggish job growth, stagnating and fluctuating earnings, growing inequality, and widespread economic insecurity. These symptoms are rooted in a process of economic restructuring associated with the rise of information technology as an economic force, coupled with the expansion of multi-national corporations and global trading relationships. The combination has given rise to a deep sense of economic anxiety—and a bit of nostalgia for a more secure economic past—that has fed into rising social and political polarization.

Silicon Valley is at the heart of these global economic changes and has been for decades. As the home to successive rounds of cutting-edge innovation in information technology industries, Silicon Valley has not only led the information revolution, but has also experienced the economic changes associated with these technological developments earlier and more deeply than most regions of the country. Though the concentration of technology industries here makes it unique, in many ways the region represents just a more intense version of trends that are being experienced throughout the U.S. economy, and indeed the whole world.

Current debates about the future of work, often underpinned by a fear of massive technology-induced job loss, are presented as the result of a dramatic ‘new economy’ associated with intelligent machines, big-data driven algorithms and the gig economy. Yet this new economy has roots that are at least 50 years old (as well as resurrecting ideas like piecework that go back centuries), and many of the most worrying trends we’re experiencing today have been apparent since the early 1990s.

In the midst of those 1990s debates around the ‘new economy’, Working Partnerships USA published a report called *Walking the Lifelong Tightrope: Negotiating Work in the New Economy*. In it, we argued that the dramatic economic restructuring associated with the rise of high-tech industries was resulting in increased economic insecurity for most workers, and that given the heightened instability and rapid change inherent in our rapidly growing technology sectors, even working families who were doing well in the moment faced uncertainty about their economic futures.

We argued these economic and social problems *were not due to technology itself*, but rather due to failings of our social and public institutions to adapt to changing business models and shifts in relations of power. We argued that government, business and labor organizations had to develop new institutions and policies to empower the working poor to raise their wages, provide effective bridges from low-paid to high-paid occupations and industries, and provide life-long learning opportunities that help people find rewarding work, even in the face of economic volatility.

While we believe the fundamental analysis and broad recommendations we made twenty years ago remain valid and as relevant today as they were then, what we didn’t fully anticipate was the emergence of the kind of populist, angry movement embodied in President Trump and many of his supporters.

Many Americans have experienced severe, persistent economic insecurity and displacement across the country over the last twenty years, and the anger is understandable. Yet the persistent failure of public policy to address the broad structural changes in our economy can't be blamed on immigrants or Muslims, and the rhetoric and policy coming from the current administration, far from addressing economic insecurity, are actually designed to increase inequality and lower wages for the vast majority of working Americans—such as the Administration's signature legislative achievement, a tax plan that redistributes income upward.

Developing real solutions first requires understanding the causes behind this long-term malaise. It also requires acknowledging that the insecurity faced by most working Americans today is real, and cannot be fixed by platitudes asserting that "net benefits from trade" or "disruptive innovation" will eventually trickle down to ordinary Americans. We need intentional public policy that, rather than shaping markets in order to ensure the highest returns to investment, considers how to balance profits with fair returns to workers.

The recommendations we laid out 20 years ago still make sense as public policy, but calling for national change in labor market institutions and policies is no longer sufficient. Especially in the current political climate, we need to also be exploring local, regional and state level solutions to these problems. Such innovations, in addition to supporting workers in Silicon Valley and California, can serve as a model for national policies in the future.

The purpose of this report is to update our analysis of the prevalence and causes of economic insecurity and inequality in our information economy. We focus on Silicon Valley, the epicenter of economic restructuring, but we think the lessons learned here have implications far beyond the region.

We also outline a range of solutions to insecurity and inequality—solutions that can be implemented at a local or state level, with an eye to widespread replication by communities across the country and/or eventual scaling up to the national level. For these solutions to be effective, however, they have to be built on an understanding of the rules and dynamics of our information economy—that is, able to ensure continued economic prosperity while addressing key structural features driving insecurity and inequality—and thus we spend some time discussing what we see as the key causes of economic challenges.

## OUR KEY FINDINGS AND RECOMMENDATIONS INCLUDE THE FOLLOWING:

### *Ongoing Challenges of the Silicon Valley Economy*

Over the past 20 years, the Silicon Valley labor market has continued to be characterized by stagnating wages for many, growing inequality, and continued insecurity (though there are also signs that California's minimum wage laws, alongside related state and local policies empowering lower-wage workers, have helped provide some protection for wages at the very bottom of the income distribution). A few key indicators of these problems include the following:

- Business owners are keeping more of the gains from growth, at workers' expense, especially in high-tech industries: Labor's share of total output in the region declined from 64% in 2001 to 60% in 2016, with striking declines in key information technology industries, including a decline from 76% to 58% in hardware manufacturing overall, and from 77% to 53% in computer and electronic products.
- Despite economic growth, workers' wages are being pushed down: Wages are lower than 20 years ago for nearly 90 percent of income earners, despite overall per capita economic output increasing by 74% between 2001 and 2017 (in inflation adjusted terms).

- The economy is shifting towards low-wage job growth: Net job growth in the last 20 years has been disproportionately in low-wage jobs, with the proportion of workers in low wage jobs increasing by 25%, while the proportion of workers in middle and upper wage jobs declined.
- Older high-tech workers are experiencing underemployment and lower wages: Challenges for older workers in the industry have accelerated in the region. In the mid-1990s, the highest paid workers in high tech had an average age of 51; today, that average age has crept down to 48. High-tech workers older than 48, on average, earn less than younger workers.

### ***The Structural Causes of an Economy that Leaves Working Families Behind***

The inability of Silicon Valley to provide broad based prosperity, despite more than forty years of dynamic technology-led growth, is a clear sign of deep structural flaws in links between economic growth and people's livelihoods.

The lack of improvement appears to be neither the result of temporary shortcomings nor an effect of downturns in the business cycle. Rather it is rooted in the rules, incentives and relationships that have been created over time to form the business models underlying the information economy.

Several fundamental characteristics of markets in which information and knowledge are key sources of business competitiveness themselves create inequality, volatility and insecurity. These include:

- 1) **High 'sunk costs' of product development are often combined with low marginal costs of production.** Building a new semiconductor fab or designing a new operating system is expensive. These upfront costs are attributed to either capital or R&D, and often justified to investors, lenders, or shareholders by expectations of high rates of returns once the product goes to market. Yet once the facility is in place or the new OS is designed, the windfall from being first to market quickly dries up as competitors emerge, and the price that the product can command drops quickly. To maintain the promised profit margin, the per-unit costs of production – including labor costs for production, distribution, maintenance of buildings and physical plant, and other functions not regarded as “creative” – are pushed as low as possible. The result is that the firm's revenues are disconnected from the ongoing costs of production once the initial investment is repaid. Investors, top executives, and shareholders can reap enormous profits without necessarily sharing that with direct employees, much less sub-contracted workers.
- 2) **Technology firms operate in markets that are prone to monopolies or near-monopolies – meaning that the companies can derive their profits from charging monopoly rents with little relationship to worker productivity or wages.** There are two distinct types of near-monopolies that are prevalent. The first is rooted in technological advances. While technological innovation generally should be encouraged, high tech firms achieve economic rents (defined as excess revenues due to a lack of competition) made possible by technologically created monopolies. These monopolies are sometimes protected by patents but can also be just temporary technological monopolies for companies that are first to market with new innovations. For successful companies, this results in excess profits beyond those required to motivate the technological innovations in the first place. This encourages firms to highly reward the relatively small number of employees (and top level management) who create the rent-generating innovation, but leaves behind other workers, while the company continues to accumulate rent-generated wealth.

A second distinct type of near-monopoly is rooted in winner-take-all markets, which are typically linked with network or platform economies, such as social media-networks or search engines. In these markets, a large portion of the value of companies is not created by the activities of the company itself, but rather by the size of the network and the contributions of people using the network. These markets are typically 'winner-take-all' markets in which an initial slight advantage or market lead results in one or at most a few firms dominating an en-

tire market. That is one of the reasons that Amazon has gained such an outsize role in online retail, or why Google has been able to take nearly the entire search query marketplace despite the continued competition from Yahoo! and Microsoft. Again, companies earn outsized rewards from these winner-take-all markets, with little incentive to compensate either their employees or network participants with a share of the revenue that the size of the network makes available.

- 3) **Public contributions – from governments and universities, and even more so, from the unpaid labor of millions of users – create much of the value that is captured by the tech industry.** Large amounts of economic value are rooted not solely in private risk-taking investment and individual labor productivity but rather in technological development and network dynamics, which are fundamentally *social* processes.

Silicon Valley businesses depends on the collective inheritance of science and technological progress, supported by decades of public sector investment in research and development. Firms in the information and communication technology (ICT) sector —particularly social media platforms, ‘big data’ applications, and the large and increasing number of businesses using machine learning algorithms—also reap economic value from consumers’ personal data and their digitally-based social networks. Stated simply, if you increase your Facebook network by 200 people, you benefit Facebook. Firms benefit from these socially produced sources of economic value in ways that are disconnected from returns to labor.

- 4) **Growing inequalities between global and local industries:** Globally integrated high-tech industries are able to generate enormous revenues from these dynamics we’ve described above. Yet these resources are not available to local service industries, which face highly competitive markets and high price elasticities (if they raise prices, they lose customers). In this large, low-margin sector of the economy, wages and benefits lag far behind the compensation levels provided to high tech personnel. One result is rapidly expanding inequality, often compounded when high tech salaries increase the cost of living by driving up prices for goods and services with a locally constrained supply, such as housing.

While the Silicon Valley region has experienced impressive economic growth and innovation, these structural dynamics of volatility and inequality are key features of the current structures, dynamics and incentives in its information economy.

These features are not the result of market failures, but rather the expected and predicted result of competitive dynamics in Silicon Valley’s information economy, and as such, will require significant intervention in the public interest to resolve.

### Strategies for Moving Forward

The proposals we identify to move the economy towards greater inclusiveness have three characteristics. First, they call for action at the state or local level rather than for national policy. This approach is based both on an appreciation of the traditional roles of state and local government as “laboratories of democracy” and on a recognition that partisan gridlock in Congress and reactionary leadership in the White House make federal initiatives highly unlikely, at least in the near future. Second, we explicitly seek solutions that are compatible with the continuing growth of the high-tech economy; our goal is to increase and spread prosperity, not reduce it. Third, our proposals are designed to both improve wages and to address rising costs of living, especially for basic needs such as housing, health care, childcare and education. This approach recognizes that during our lifespans, nearly everyone will at some point be dependent on non-work incomes--while in school, providing unpaid caregiving, dealing with serious health issues, transitioning between jobs, or in retirement--and a strong public safety net system is critical for these periods.

## Improvements to the Labor Market

As noted above, the needed changes in the labor market will not emerge automatically through market dynamics or through even the best-intentioned behaviors of private-sector decision-makers; rather, they will require significant interventions to promote the broader public interest and ensure greater inclusion. These interventions are designed to grow more middle-income jobs, raise incomes at the bottom, and build stronger connections between high-tech industries and jobs in the rest of the labor market.

- *Grow and retain more middle-income jobs:* This includes a range of public policies and investment strategies to promote economic sectors that have a large number of middle wage jobs, such as education, health care and the construction industry, while building strong public policies to maintain wages and job quality in those sectors and avoid incentivizing a “race to the bottom.” Increased investment in education, including expanding early childhood education, could increase middle wage jobs, contribute significantly to economic growth, and fill a vital social need. Expanded investment in infrastructure, such as roads, bridges, schools, and water treatment plants, can generate well-paid construction careers and address our serious infrastructure backlog. An aging population will require greater investment in long-term care and health care, while moving towards universal health coverage would greatly expand employment opportunities. Finally, increased investment in workforce development and “pipeline” programs are important to expand access to these jobs for disadvantaged constituencies, although their limitation must be recognized; training alone does not create jobs.
- *Raise incomes and career opportunities in low-wage jobs:* In low-wage industries, public policies can both set wage floors and encourage transformation of low-wage, dead-end jobs into career advancement opportunities. Higher minimum wage laws are essential to enable low-wage workers to better provide their families with the necessities of life. But to move beyond bare survival to transformation requires strategies to promote creation of internal career ladders and professionalization of low-wage occupations – in short, restructuring the employment model to prioritize long-term investment in a more productive, stable workforce. Workforce training programs can be a valuable component of this strategy, if they are linked to real opportunities for advancement.
- *Strengthen connections between high-wage industries and the rest of the labor market:* In high-wage, high-margin industries, businesses need to take greater responsibility for the ecosystem of other companies upon which they depend and support: suppliers, manufacturers, service providers, and other functions. Businesses should be expected to engage in practices that encourage sustainable employment models in supply chain firms and service contractors, not just their direct employees. Large firms can use their buying power to support living wage standards, family supporting benefits, retention of employees when contractors change, and neutrality or acceptance of worker organizing campaigns. In addition, access to high-wage jobs must be opened to the full diversity of people in the region.

Some of these practices can be achieved through public policies and regulations. This includes ensuring enforcement of existing laws intended to protect the most vulnerable workers – such as minimum wage, overtime, and even allowing workers to take breaks – which currently lack adequate enforcement.

Some can be achieved through companies voluntarily adopting improved business practices, including responsible contracting policies, reduced out-sourcing, and strengthening internal career ladders.

However, neither public policies nor private initiatives will be successful unless they are designed by listening to the voices of workers in the labor market – and by empowering those workers to have a collective role and representation in decisions that affect them.

The decline of union membership and collective bargaining has reduced workers’ access to one of the most effective mechanisms to create and sustain middle class employment. Rebuilding worker empowerment, both in the workplace and in the broader labor market, will be a critical part of a success-

ful agenda. New models are being advanced at the local level that build on stronger community-labor partnerships and create regional-scale organizations that help ensure the concerns of workers are adequately represented within occupations, industries, and broader public decision-making.

### ***Stabilizing Livelihoods Beyond the Labor Market***

To complement the above labor market strategies, we also need to be pursuing policies and strategies for stabilizing people's livelihoods outside of their earned income. This is important in part for helping to minimize the traumatic experience of unemployment and technological displacement, as well as for ensuring that individuals who are not in the labor force (such as seniors, students, full-time parents/caregivers, or people with disabilities that prevent them from working) can sustain a decent standard of living. It is also important to acknowledge and compensate people for their unpaid contributions to overall economic growth.

This can take two different forms: lowering the costs of basic family expenditures for low and middle-income families; and supporting diverse sources of income, including for people who are not in the paid labor force, as well as for workers facing the more frequent periods of unemployment generated by many of the business models most closely associated with the information economy.

- *Lowering costs of basic needs:* The major expenditures of typical families include housing, transportation, food, utilities (including energy), health care, and dependent care. The costs of all of these can be reduced for low- and moderate-income families through a range of local and state strategies. Families can be assisted in securing decent, affordable shelter through coordinated strategies that incorporate the “three Ps”: increasing housing production at all levels of affordability; preserving existing affordable housing; and protecting residents and communities from displacement. Health care costs can be reduced for many families by increasing funding for premium subsidies and for the public health care safety net, implementing rate regulation, addressing consolidation in the health care industry and encouraging innovative county health programs for those who are ineligible for state or federal coverage. Transportation costs can be reduced through greater investment in public transit, including expanding transit operations, and densifying housing near major transit corridors. Utility and energy costs can be reduced for low-income families through more progressive tiered pricing structures that help cross-subsidize from wealthy to lower income families.
- *Diversifying Income Supports:* Households depend on more than just wage and salary income to survive. Unemployment insurance is critical for when people go through periods of unemployment, and needs to be significantly reformed, since currently fewer than 40% of people who are unemployed are able to collect benefits. Retirees also depend on non-work income, as may people who are unable to work due to serious health issues, or are performing unpaid work as primary caregiver for a family member. Employer-paid retirement plans need to be made more portable and accessible, particularly to low-income earners. There are opportunities to create “baby bonds” or “Kindergarten to College” programs that establish savings accounts for children to help pay for higher education or other major expenses in adult life.

Beyond these broad policy ideas, we also believe there is an important public interest in more accountable governance of technological development, shaping which technologies are developed towards what end, how they are incorporated into the workplace and how the resulting productivity gains are reinvested to benefit society.

Neither historical experience nor current research supports the prognostication that technological development inevitably leads to mass unemployment. But we do think that innovations in technology or business practices are likely to be deployed in ways that generate industry-specific shifts in the types, locations, and quality of jobs available of a scale sufficient to cause considerable hardship, which can contribute to deteriorating wages and job quality and the kind of reactionary national political response currently evident. Better and more inclusive systems for evaluating, planning for, and shaping techno-

logical development for beneficial purposes—ideally through multi-stakeholder initiatives that bring workers, businesses, communities and policymakers together, coupled with more effective regulations—are crucial for ensuring a more prosperous and inclusive information economy.

The central message of this report is that insecurity and inequality are structural features of our current information economy, a result of the business models and market structures we have allowed to flourish. But the social and economic polarization we're experiencing is not inevitable. With the kinds of policies and strategies broadly outlined here, we can reshape these markets to more evenly share the benefits of the information and technology sector to stabilize employment and create more secure livelihoods. Only then can we realize the full potential of the new economy.

# INTRODUCTION

The economic insecurity that is one of the factors fueling our current political climate underscores one of the key challenges of the complex economic restructuring the United States is experiencing. Despite low unemployment and more than nine years of unbroken economic growth, the majority of Americans remain anxious about their economic conditions and futures.

The problem has not just emerged since our last great recession, but is linked to a much longer term, slow-moving but increasingly urgent crisis. The crisis is evident in a combination of sluggish job growth, stagnating and fluctuating earnings, growing inequality, and widespread economic insecurity, but is more deeply rooted in a process of economic restructuring associated with rapid technological change and increasing globalization. The combination has given rise to a deep sense of economic anxiety—and a bit of nostalgia for a more secure economic past—that has fed into rising social and political polarization.

Silicon Valley is at the heart of these economic changes, and has been for decades. As the global home to successive rounds of cutting edge innovation in information technology industries—from development of semiconductors and integrated circuits in the 1950s and 1960s, to the personal computer in the 1970s and 1980s, to the internet and world-wide web in the 1990s, to social media and related software industries in the 2000s, to smartphones and mobile apps in the last decade—Silicon Valley has not only led the information revolution, but has also experienced the economic changes associated with these industries earlier and more deeply than most regions of the country.

Though the concentration of technology firms may be unique to Silicon Valley, in many ways it represents just a more intense version of trends that are being experienced throughout the United States economy, and indeed the whole world.

Current national and international debates about the future of work, often underpinned by a fear of massive technology-induced job loss, are presented as the result of a dramatic ‘new economy’ associated with intelligent machines, big data driven algorithms and the gig economy. Yet this ‘new economy’ in Silicon Valley has roots that are at least 50 years old, and many of the most worrying trends we’re experiencing today have been apparent since the early 1990s.

In the midst of the 1990s debates around the ‘new economy’, Working Partnerships USA published a report called *Walking the Lifelong Tightrope: Negotiating Work in the New Economy*. In it, we argued that California was experiencing dramatic economic restructuring that was resulting in increased economic insecurity for most workers, and that given the heightened instability and rapid change inherent in our rapidly growing technology sectors, even many working families who were (at the time) doing well faced uncertainty about their economic futures. We argued that causes of the problems were not due to technology itself, but rather due to failings of our social and public institutions to adapt to changing business models and economic power structures. We argued that government, business and labor organizations had to develop new institutions and policies to “protect the working poor and raise their wages, provide effective bridges from low-paid to high-paid occupations and industries, and provide life-long learning opportunities that help people find rewarding work, even in the face of economic volatility” (Benner, Brownstein, and Dean 1999, 1).

While we believe the fundamental analysis and broad recommendations we made twenty years ago remain valid and as relevant today as they were then, what we didn’t fully anticipate was the emergence of the kind of populist, angry movement embodied in President Trump and many of his supporters. We have been deeply aware of the economic insecurity and displacement that many people have experienced across the country over the last twenty years, and the anger is understandable. Yet the persistent failure of public policy to address the broad structural changes in our economy can’t be blamed on immigrants and Muslims, and the rhetoric and policy coming from the current administration and its supporters – such as the Administration’s signature legislative achievement, a tax plan that redistributes

income upward – far from addressing economic insecurity, are designed to increase inequality and lower wages for the vast majority of working Americans.

The recommendations we laid out 20 years ago still make sense as public policy, but we recognize that calling for fundamental national change in labor market institutions and policies is no longer sufficient. Especially in the current political climate, we need to also be exploring local, regional and state level solutions to these problems. Such innovations, in addition to supporting workers in Silicon Valley and California, can serve as a model for national policies in the future.

The purpose of this report is to update our analysis of the prevalence and causes of economic insecurity and inequality in the Silicon Valley economy and to outline a range of solutions that can be implemented at a local, regional and/or state level to address these problems. To be effective, we argue, these solutions have to be built on an understanding of the structures and dynamics of our information economy—that is, able to ensure continued economic prosperity while addressing drivers of insecurity and inequality—and thus we spend some time discussing what we see as the key causes of economic challenges. While the region has obviously experienced impressive economic growth and innovation, there are also structural dynamics of volatility and inequality that are key features of the current model of an information economy. These features are not the result of market failures, but rather the expected and predicted result of competitive dynamics within the current market structures, and as such, will require significant intervention in the public interest to resolve.

The case for addressing these problems is strengthened, we argue, by recognizing that large amounts of economic value in the region's information economy are created fundamentally in *social processes* of knowledge generation and network dynamics, underpinned by our collective inheritance of science and technological progress, rather than being solely the result of individualistic contributions to production processes or output. These social sources of value creation are poorly recognized in our current policies and institutions. With this analysis as a base, we then explore economic and labor market policies that might help to raise wage floors, increase workers' bargaining power and grow more middle wage jobs. These policies should be complemented by solutions rooted in stabilizing diverse sources of family livelihoods, especially in ways that recognize the broad social processes helping to produce economic wealth.

In what follows, we start by analyzing data on the experience of workers in the labor market since the mid-1990s, focused on patterns of work, employment and livelihoods. We turn to an analysis of patterns of economic growth in the region, emphasizing the structural challenges contributing to inequality and insecurity, and the social processes of knowledge generation that have been so important for the generation of economic growth and wealth in Silicon Valley in the last 20 years. We then explore innovative local, regional and state-level solutions that might help link economic growth to increased security for working families, including strategies designed to grow middle-wage jobs, promote worker voice and stabilize family livelihoods. We conclude with some discussion about the importance of developing processes for directing technological and economic development in ways that more effectively address the challenges of technological change in our economy.

# SECTION 1.

## WORKER OUTCOMES: DECLINING RETURNS TO LABOR, INEQUALITY AND INSECURITY

Over the past twenty years, Silicon Valley has continued to innovate and change, and in the process has remained at the cutting edge of development in many global high-tech industries. Despite periods of ups and downs, the economy overall has grown dramatically. Yet the experience for many people employed in the regional economy has continued to be one of stagnant wages, growing inequality, and increasing insecurity.

### STAGNANT WAGES FOR NEARLY NINE-TENTHS OF THE WORKFORCE

There is now a widespread understanding in Silicon Valley of the problems of poverty and inequality. What is not so clearly understood is that problems of stagnant wages exist throughout most of the labor market, not just among low-income workers.

There is a growing disconnection between the region's economic growth and compensation for labor. From 2001 to 2016, in inflation adjusted terms, regional gross product per capita in the San Jose Metropolitan Statistical Area increased by 62%, growing from \$87,771 to \$142,071 (in 2016 dollars).<sup>1</sup> In contrast, employment during that time grew only 13%, from 1.24 million jobs to 1.40 million jobs.<sup>2</sup>

Some might theorize that the low job growth rate is due to an attraction of 'talent' or a 'creative class', whereby leading Silicon Valley companies hired fewer, but more skilled and productive employees, and paid them higher wages. However, the data do not bear this out. Average wages also fell far behind productivity growth. Over the same 15-year period in which productivity per capita shot up 62%, average compensation only grew by 25% (in inflation adjusted dollars).<sup>3</sup>

This means that a decreasing share of total output is going to employees. Overall in the regional economy, labor's share of total output declined from 63.8% in 2001 to 57.7% in 2009. In the last couple of years of tightening labor markets, labor's share rose slightly to 60.0% in 2016: still nearly 4 percentage points below the 2001 level. In 2016, this represented a shift of \$9.6 billion away from employee pay going instead to increase rewards to investors. If labor's share of production in 2016 had been the same as in 2001, every employed Silicon Valley worker would have received, on average, an additional \$8,480.<sup>4</sup>

Certain sectors have seen a particularly striking decline in returns to labor. In durable goods manufacturing firms in the Valley, which is primarily in computer, semi-conductor, and related components manufacturing, labor's share of total output declined from 76% in 2001 to 58% in 2016, even as total durable goods manufacturing output rose from \$34.3 billion to \$59.2 billion (in current dollars). In the computer and electronic product manufacturing sector, labor's share declined from 77% in 2001 to 53% in 2015, the latest year of available data.<sup>5</sup>

The patterns of growing disconnection between economic growth and labor means that over the past 20 years, wages have been declining in real (inflation adjusted) terms for nearly all sectors of the labor force. It is only at the very highest levels that wages have increased in that time.

To examine wage trends in different segments of the Silicon Valley labor force, we combined Current

1. Bureau of Economic Analysis, "Real GDP by Metropolitan area (millions of chained 2009 dollars)" Interactive Table. [https://www.bea.gov/iTable/index\\_regional.acfm](https://www.bea.gov/iTable/index_regional.acfm) adjusting to 2016 using CPI-all urban consumers for the San Francisco Bay Area.

2. Bureau of Economic Analysis, "Table CA25N Total Full-Time and Part-Time Employment by NAICS Industry" Interactive Table. [https://www.bea.gov/iTable/index\\_regional.cfm](https://www.bea.gov/iTable/index_regional.cfm)

3. Bureau of Economic Analysis, "Table CA6N Compensation of Employees by NAICS Industry" Interactive Table. [https://www.bea.gov/iTable/index\\_regional.cfm](https://www.bea.gov/iTable/index_regional.cfm)

4. Authors calculations based on the BEA GDP Employment data cited above

5. All data in this paragraph is from authors' analysis of Bureau of Economic Analysis data on regional output and compensation by industry, from [https://www.bea.gov/iTable/index\\_regional.cfm](https://www.bea.gov/iTable/index_regional.cfm)

Population Survey data for Santa Clara and San Mateo counties across three-year intervals to create a large enough sample for meaningful analysis.<sup>6</sup> We looked at wages starting from the mid-1990s (1995/97) and how they have changed across three time periods: to the peak of the dot-com bubble (1999/01) representing a period of rapid economic growth and tight labor markets; from that peak to the trough of the great recession (2007/09); and from the trough to the most recent years with available data (2015/17), which reflects growth during the current recovery. The results for each time period and the cumulative totals over the past twenty years are shown in Figure 1 below.

During the period of economic growth from the mid-1990s to the peak of the dot-com bubble, real wages rose across all wage levels. They rose the most at the 90<sup>th</sup> percentile, rising 7% over the four-year period (in inflation adjusted terms), but they also rose at the bottom of the income distribution, with the 10<sup>th</sup> percentile wage growing by 5.1%, and at every income decile in between.

From that peak to the trough of the great recession, wages declined across the entire labor market. Declines were particularly steep in the middle of the wage distribution, with the real median wage falling nearly 10%. Earnings for the very lowest paid workers (those at the 10<sup>th</sup> percentile) declined the least during this period, with the 10<sup>th</sup> percentile wage dropping 3.3%. This is likely due in large part to the stabilizing influence of California's minimum wage, which rose from \$6.25 in 2001 to \$8.00 by 2008, slightly outpacing inflation.<sup>7</sup>

In the post-2008 period, economic growth resumed--yet across most of the labor market, wages did not recover the ground lost during the great recession. On the contrary: the economic recovery following the great recession, despite marking one of the longest continuous periods of economic growth, not only failed to lift wages, but for nearly 90 percent of jobs, the recovery pushed real wages further down.

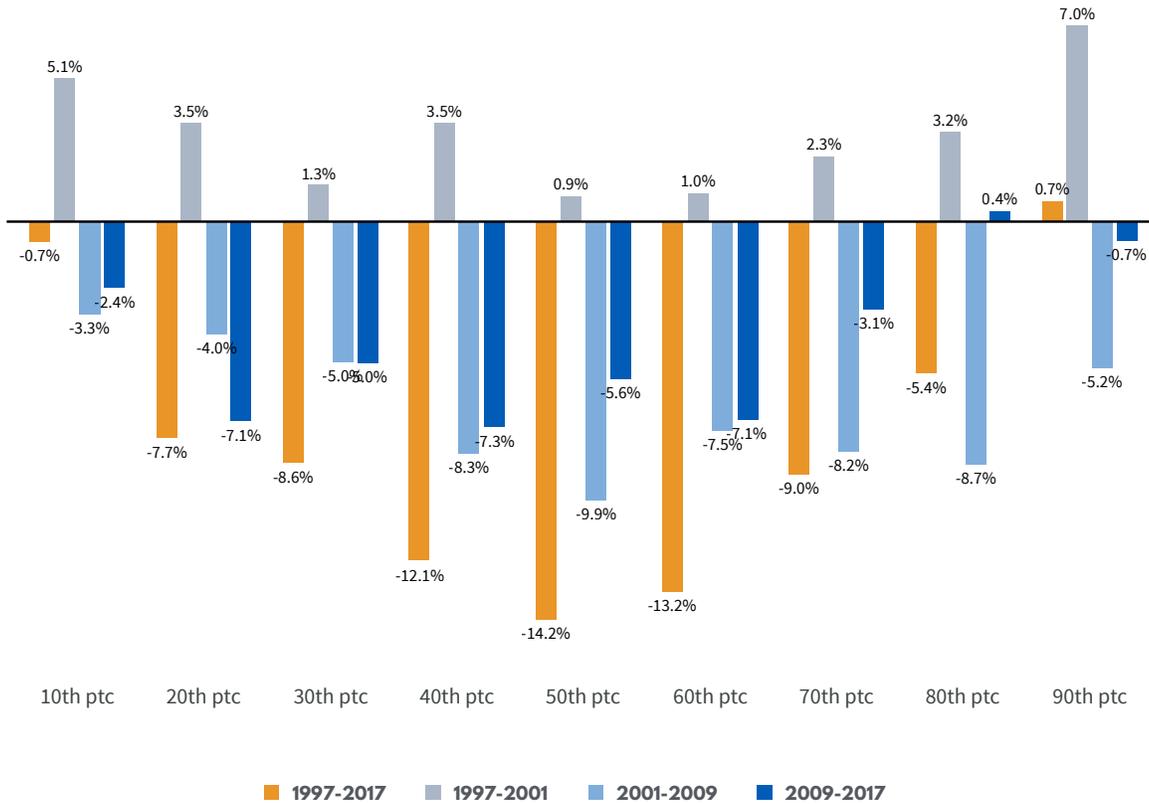
For nearly all but the highest paid workers (those at the 80<sup>th</sup> percentile), earnings continued to decline from 2007/9 to 2015/17. For workers at the middle of the wage distribution (median), wages declined 5.6% in the current economic recovery; by 2015/17, the median wage was a full 14% less than in 1995/97 (in inflation adjusted terms). Wages at the bottom (10<sup>th</sup> percentile) also fell, but less sharply than did the median wage, as rising minimum wages both at the state level and in many cities helped to soften the impact of declining real wages for the lowest paying jobs.

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6. All wage data is from the U.S. Census Current Population Survey Out-Going Rotation Group (ORG), the primary source of data on individuals' demographic characteristics, education and labor-market status, including hourly earnings. We used (and are deeply grateful for) the Uniform Extracts of this data prepared by the Center for Economic and Policy Research in DC, which provides calculations of equivalent hourly wages for salaried workers, based on reported earnings and usual hours worked. (Center for Economic Policy Research. (2017), CPS ORG Uniform Extracts, Version 2.1.1, Washington, DC). We adjusted wage data for local cost of living using the Consumer Price Index-All Urban Consumers for the San Francisco-Oakland-San Jose, CA area (BLS series id: CUURA422SA0

7. <http://www.dir.ca.gov/iwc/minimumwagehistory.htm>

**Figure 1: Cumulative change in hourly wage levels since 1995/97, by percentile, for wage/salary earners, Santa Clara and San Mateo Counties.**



From 2010 to 2017, Silicon Valley’s regional economy, as measured by per capita GDP, grew faster than almost any other metro region in the nation.<sup>8</sup> Yet the vast majority of Silicon Valley residents saw no benefit from that extra growth. Although the top 10% of households had higher income growth in Silicon Valley than in any other major metropolitan area in the country, the average income growth for the remaining 90% in Silicon Valley was lower than in 24 metros.<sup>9</sup> For purpose of comparison, the bottom 90% of Silicon Valley households fared almost exact the same as the bottom 90% of households in San Antonio or in Grand Rapids – even though per capita economic growth in Silicon Valley was 85% higher than in San Antonio and twice as high as in Grand Rapids. Despite Silicon Valley’s extraordinary growth, the vast majority of households here would have done just as well living in the much slower-growing San Antonio or Grand Rapids.

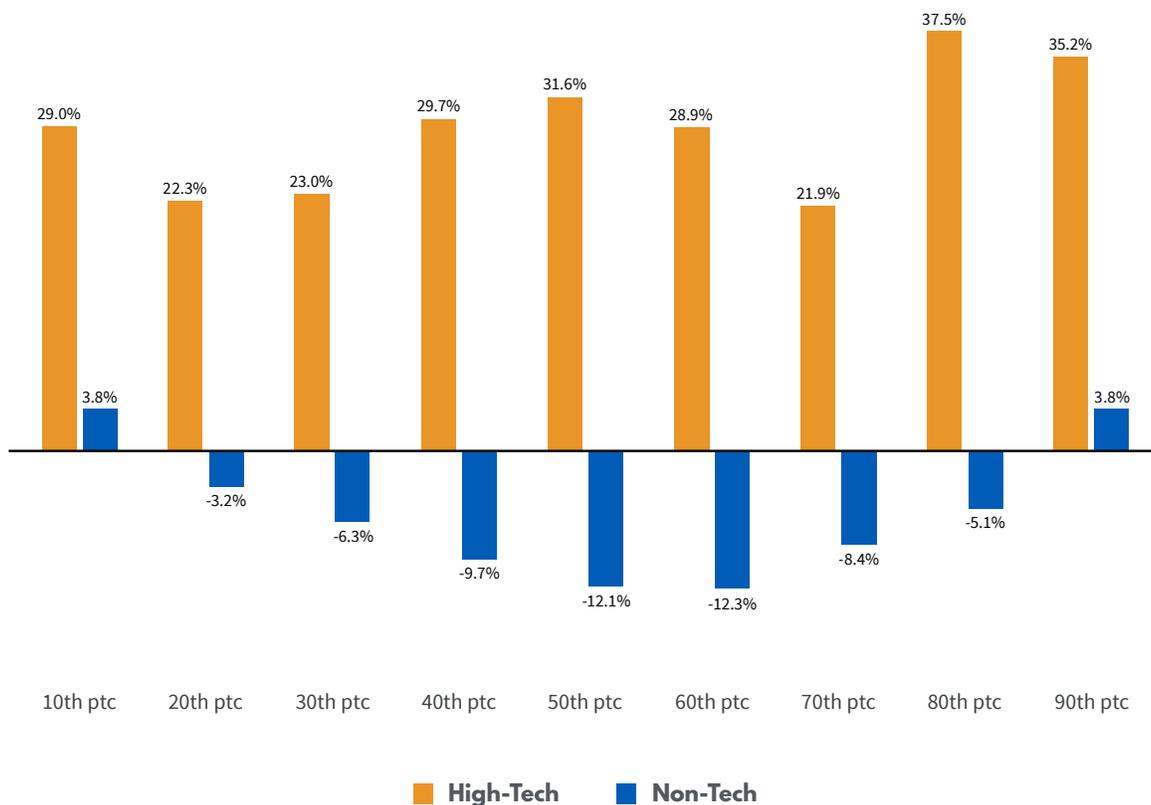
8. Bureau of Economic Analysis, “Per capita real GDP by metropolitan area (millions of chained 2009 dollars)” Interactive Table. <https://apps.bea.gov/itable/itable.cfm?ReqID=70&step=1>  
 9. Estelle Sommeiller and Mark Price, The New Gilded Age: Income inequality in the U.S. by state, metropolitan area, and county (2018) . Economic Policy Institute. Additional data analysis for 90% provided by Sommeiler and Price.

## ROLES OF SUBCONTRACTING AND DOMESTIC OUTSOURCING IN WAGE INEQUALITY

In addition to stagnant wages across most of the labor force, Silicon Valley has also experienced growing income inequality. In 1980, the ratio of household earnings at the 95<sup>th</sup> percentile to the 20<sup>th</sup> percentile was 5.29, making Silicon Valley one of the most equal regions in the country by this metric (ranking 144<sup>th</sup> most unequal out of the 150 largest metropolitan regions).<sup>10</sup> By 2015, this ratio had nearly doubled to 10.03, and Silicon Valley's household income distribution had been transformed from one of the most equal metro regions in the nation to become the 15<sup>th</sup> most unequal.<sup>11</sup>

One of the factors driving this inequality is the differential in wage levels between high-tech industries and wage levels in other industries. As shown in Figure 2 below, between 1995/07 and 2015/17, wages rose across all deciles in high-tech industries; when adjusted for inflation, high-tech wages rose 32% for the median earners, and 35% for those at the highest earnings levels (90<sup>th</sup> percentile). In all other industries, in contrast, wages declined at nearly all earnings levels, particularly those in the middle of the earnings distribution, where earnings declined by 12% in real terms.

**Figure 2: Change in wages by percentile, 1995/7 to 2015/17, High Tech versus All Other Industries, Santa Clara and San Mateo Counties**



This disparity between high-tech and all other industries is not only caused by differences between industries, but by a shift in which jobs that serve or support tech companies are no longer employed directly by those companies, and instead are subcontracted to companies in other industries – that is, outsourcing. While the majority of jobs in the “All Other Industries” category (see Figure 2) are not

10. [http://nationalequityatlas.org/indicators/Income\\_inequality\\_95-20\\_ratio/Ranking:33446/San\\_Jose-Sunnyvale-Santa\\_Clara,\\_CA\\_Metro\\_Area/false/Year\(s\):1980/](http://nationalequityatlas.org/indicators/Income_inequality_95-20_ratio/Ranking:33446/San_Jose-Sunnyvale-Santa_Clara,_CA_Metro_Area/false/Year(s):1980/)

11. [http://nationalequityatlas.org/indicators/Income\\_inequality\\_95-20\\_ratio/Ranking:33446/San\\_Jose-Sunnyvale-Santa\\_Clara,\\_CA\\_Metro\\_Area/United\\_States/Year\(s\):2014/](http://nationalequityatlas.org/indicators/Income_inequality_95-20_ratio/Ranking:33446/San_Jose-Sunnyvale-Santa_Clara,_CA_Metro_Area/United_States/Year(s):2014/)

directly linked to high tech industries, in today's Silicon Valley, a substantial portion of them are in fact directly serving or supporting tech. Particularly in occupations such as building services (e.g. janitorial and security), landscaping, private transportation, data entry, and food service, people who 20 years ago would have been direct employees of high-tech firms are now employed by contractors to those firms (and therefor classified as "non-tech" employees), but still working to fulfil the needs of their high-tech client companies, frequently on the same campuses as the coders and engineers.

The phenomenon of worker outsourcing by large, investor-driven companies has been widely noted in the United States over the last several decades. Dr. David Weil, former Administrator of the Wage and Hour Division of the U.S. Department of Labor, refers to it as "the fissured workplace". This fissuring has two effects: it creates layers of separation between the workers who perform the services and the driving-industry, typically high-margin companies that pay for them, and it reduces the portion of that pay that is available for worker's wages and benefits since each new subcontractor at every tier takes its own cut of profits. The result is rising pressure on subcontractors to cut short-term labor costs, rather than investing in employees and internal career ladders to create a more stable and productive workforce over the long term.<sup>12</sup>

As shown in Table 1 below, in 1990 22.5% of all workers in Silicon Valley were in high-tech; within that group, 4.6% of all people working in low-wage service occupations in the Valley were employed in high-tech industries. By 2016, even though high-tech industries had increased their total employment in the region to 25.3%, the percentage of people employed in low-wage service occupations that were in high-tech industries had dropped to 2%. In other words, given that there has been little to suggest a decline in labor demand in these low-wage service occupations in high-tech industries, over half of the expected jobs in this kind of work have been outsourced since 1990. These data reflect only selected service occupations; other tech-serving lower-wage jobs are harder to disaggregate, but are likely to have followed a similar trajectory.

**Table 1: Service Occupations by Industry Category, Santa Clara and San Mateo Counties, 1990 and 2016**

Service Occupations by Industry Category				
	Percentage within Occupational Grouping			
	High-Tech	Other	High-Tech	Other
Low-Wage Service Occupations	4.6%	95.4%	2.0%	98.0%
<u>Other Occupations</u>	<u>23.6%</u>	<u>76.4%</u>	<u>27.0%</u>	<u>73.0%</u>
All Occupations	22.5%	77.5%	25.3%	74.7%

Source: IPUMS (1990 Census, 2016 5-year ACS)

As we showed in more detail in a report released in 2016,<sup>13</sup> people employed in outsourced positions, or who are influenced by the wage dynamics in these outsourced positions (what we called potential contract employees) have significantly lower earnings, have lower access to health insurance, have higher poverty levels and have a greater reliance on food stamps than people employed in similar positions that are not at threat of being outsourced.

The outsourcing of low-wage service jobs has contributed to declining wages in those positions, and overall has been contributing to the declining wages across much of Silicon Valley's economy. This can be seen, for example, by taking the wage levels at the 33<sup>rd</sup> and 67<sup>th</sup> percentile in 1997 (with 33% of the

12. Weil, David, "The Fissured Workplace: The Problem." <http://www.fissuredworkplace.net/the-problem.php>

13. Benner, Chris, and Kyle Neering. 2016. "Silicon Valley Technology Industries Contract Workforce Assessment." Santa Cruz, CA: Everett Program, UC Santa Cruz. <http://www.everettprogram.org/main/wp-content/uploads/Contract-Workforce-Assessment.pdf>

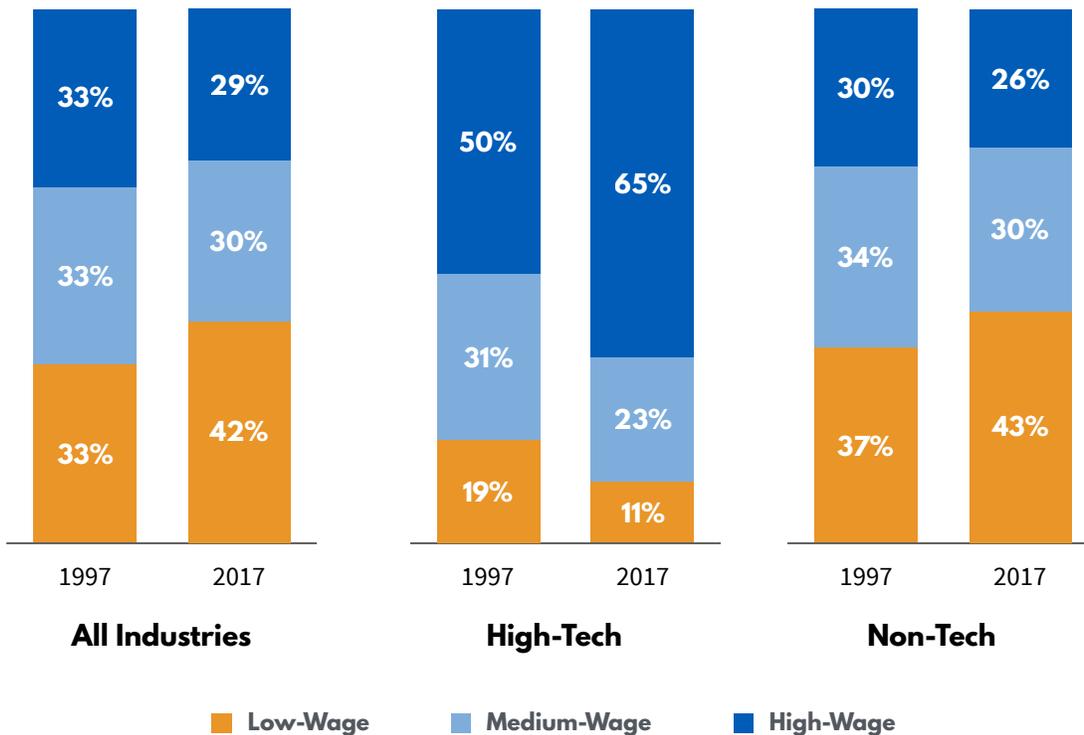
population falling into each of the low, medium and high wage categories), adjusting those wage levels for inflation to 2017 and then seeing what portion of the workforce falls into the three wage categories 20 years later.

Figure 3 below shows this analysis for the overall economy, and then separate calculations for high tech industries and for all other industries besides high tech.

Overall, the proportion of workers in the low wage category increased by 25% (8.3 percentage points) in this 20-year period, growing from the baseline of one-third of all jobs to 41.6% of all jobs. Meanwhile, the proportion of workers in the middle and upper thirds declined.

When disaggregating by industry, industries outside high-tech follow a similar pattern of a lower overall wage structure, with low-wage jobs rising from 36.5% of all jobs outside of high-tech to 43.4% of those jobs. But high-tech industries show an opposite trend, with the proportion of workers in the lowest and middle categories declining by 7.9 percentage points and 7.6 percentage points respectively, while the proportion of high-tech workers in the highest wage category increased by 15.4 percentage points. This suggests again the increasing disconnect between Silicon Valley’s high-tech firms and the rest of the region’s workforce.

**Figure 3: Change in Percent of Workforce in Low, Medium and High Wage Categories, San Jose MSA, 1997-2017**



## INCOME INSECURITY, VOLATILITY, AND SKILLS OBSOLESCENCE

In addition to stagnant wages and growing wage inequality, many workers are experiencing increasing financial insecurity associated with income volatility: substantial swings in income, often caused by jobs that are characterized by temporary, contingent, or seasonal work; unpredictable work schedules and hours; frequent layoffs; ‘gig’ jobs where the pay per hour of work can fluctuate wildly; as well as personal, health, or family issues. Research by the Pew Trusts found that between 2014 and 2015, just over a third of all American households experienced income volatility (defined as a household income swing of more than 25%). Those who experience income volatility in a given year “report lower financial well-being and less savings than those with stable income.”<sup>14</sup>

For many people insecurity may also be rooted in concerns about career paths and related issues of future earnings and retirement security. With frequent job changes, and the highest wages no longer accruing to the workers with the most years of experience, today’s workforce may face extensive challenges to achieving steadily increasing earnings over a lifetime – an expectation so strong that most financial planning, retirement savings vehicles, and even the concept of going into debt for one’s education and first house are all premised on the assumption that hard work will lead to rising pay over time.

In Figure 4 below, the solid lines show the patterns of earnings related to years of work experience for workers in all industries at two points in time: 1997 and 2017.<sup>15</sup> As would be expected, in general, the more years of work experience, the higher earnings. Comparing 2017 to 1997, however, shows that the earnings returns to work experience have declined somewhat in the last twenty years.

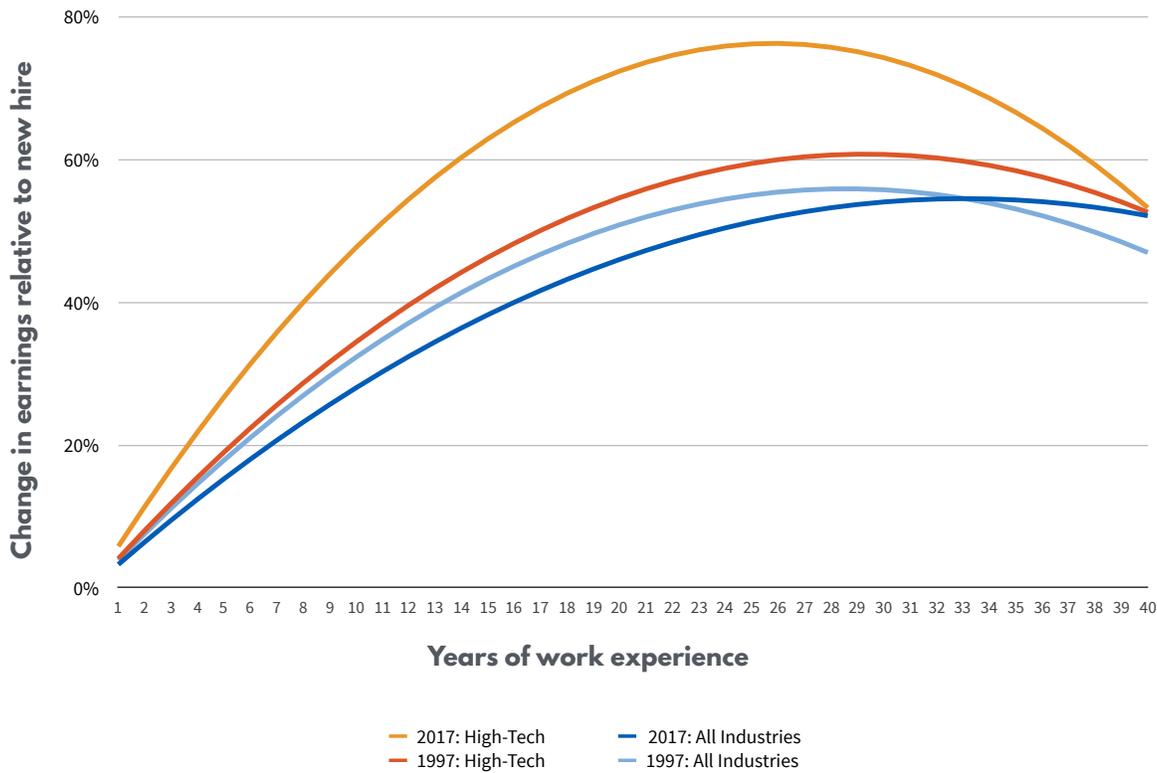
In high-tech industries the pattern has shifted somewhat more in the past 20 years. In 1997, the returns to experience were somewhat higher in high tech industries than the economy overall, which might be expected in an information and knowledge rich industry with rapidly changing technologies, though the age for peak earnings at this point in time was younger for tech industries relative to non-tech industries. In 1997, peak earnings were at 29 years of work experience; for a person who started work in their field at age 22 and worked continuously in the same field, this would equate to 51 years old. By 2017, however, peak earnings in the high-tech industries were people with 26 years of experience, which under the same assumptions would equate to 48 years old. Earnings dropped off significantly for workers with longer experience in the labor market.

It is important to note that these data represent the existing labor force at two points in time, and that the composition of the labor force was, of course, different in 1997 than in 2017. These findings do not, therefore, reflect how individual workers’ earnings may have changed over time. Rather they show us how industries have changed their pay patterns. In the case of the high-tech industry, it now awards the highest pay to employees with significantly fewer years of experience (or perhaps, simply younger employees) compared to those awarded the highest pay in 1997.

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14. Sheida Elmi, Erin Currier, and Clinton Key, *How Income Volatility Interacts With American Families’ Financial Security: An examination of gains, losses, and household economic experiences*. March 9, 2017 Pew Charitable Trusts. <http://www.pewtrusts.org/en/research-and-analysis/issue-briefs/2017/03/how-income-volatility-interacts-with-american-families-financial-security>

15. These are three-year datasets ending in the year indicated.

**Figure 4: Skills Obsolescence 1997-2017, San Jose MSA**

Twenty years ago, in our report *Walking the Lifelong Tightrope*, we identified employment insecurity, declining wages, and growing inequality as key features of the labor market then. Our review of changes since then makes clear that conditions have only worsened. Wages have continued to stagnate or decline across the majority of the labor market, inequality has increased, and concerns about employment and earnings stability have intensified.

In the 1990s, many commentators thought that the ‘new economy’ of global innovation and technological dynamism would solve most of these problems. Some analysts even speculated about the ‘end of the business cycle’, arguing that improved information sources, policy intervention, and globalization of production and consumption was turning “the waves of business cycles [into] more like ripples” (Weber 1997, 65). If anything has changed in the last twenty years, it is the growing skepticism of the narrative that the new economy will solve our economic problems, and the spread of mainstream recognition that inequality and insecurity of employment have grown to problematic levels.

While the increased recognition of these problems is encouraging, the solutions many are now proposing are less encouraging. The ascendancy of the Trump presidential campaign and administration is an obvious example. The narrow nationalism, protectionism, anti-immigrant sentiments and outright racism of President Trump and his supporters not only undermine fundamental democratic values, but represent a threat to the future of Silicon Valley’s high-tech economy.

Silicon Valley thrives on global connections and immigrant workers. In Santa Clara County, some 37% of all residents and more than 57% of technology workers with a Bachelor’s Degree or higher are foreign-born, over half of people age 5 and older speak a language other than English at home, and the most dynamic companies in the region all depend on global consumption and production markets.<sup>16</sup>

16. U.S. Census and Silicon Valley Competitiveness and Innovation Project 2017 Report, [http://svcip.com/files/SVCIP\\_2017.pdf](http://svcip.com/files/SVCIP_2017.pdf)

Implementing the protectionist and anti-immigrant solutions proposed by President Trump and his supporters would dramatically harm the economic dynamism of Silicon Valley and threaten a large portion of the workforce.

Another somewhat more subtle example of disturbing solutions being proposed to these problems is coming from those who see an inevitable trajectory of improved artificial intelligence and advanced robotics causing large-scale automation, job displacement and mass unemployment. While some job loss is likely to occur in specific industries and occupations, we disagree that mass job loss is inevitable, for reasons we elaborate below.

New technologies are not likely to have large net impacts on the total demand for human workers. But the deployment of automation, artificial intelligence, and other currently popular technologies is very likely to impact the nature and dynamics of employment, and without intervention, could easily lead to significant losses in job quality. Focus on policies for an imagined future without jobs could be counter-productive when the real threat of new technologies may be the creation of even more low-wage jobs where workers lack any real voice or bargaining power in the workplace. A meaningful policy response to technology change should include improving labor market policies, middle wage job creation and new frameworks to ensure technological development promotes the public interest.

Solutions to the wage declines, inequality and insecurity of the region's labor markets have to be rooted in a clear analysis of the underlying causes of these problems. They also have to be structured in a way that maintains and hopefully strengthens the economic dynamism of the region, as they work to expand inclusion and opportunity. Thus, before we discuss our proposed solutions to these problems, we turn to our analysis of structural features of Silicon Valley's model for an information economy that help to explain these labor market challenges and point to solutions.

## SECTION 2.

# INFORMATION ECONOMIES: STRUCTURAL INEQUALITIES AND COLLECTIVE VALUE

Today's information markets, designed largely by the companies and investors that dominate those markets, have developed unique tools to increase profitability by breaking what classical economics considers a fundamental relationship: the connection between the value produced by individual workers and the returns that those workers receive for their labor.

In classical economic theory, at least in perfectly competitive markets, the wages people are paid are proportional to the marginal profit of their labor. If an additional worker enables a company to build 10 more cars an hour, or make \$1000 more in sales, the additional worker would be paid an appropriate (as determined by labor market conditions) proportion of the associated profit. In this theoretical world, if an engineer at Facebook is paid a high six-figure income while a fast food worker at McDonald's is paid less than the cost of a burger, it's because their respective firms are able to gain that much more revenue (proportionally) from their additional contribution to the firm's product or service. The difference in their wages is simply the result of reasonable compensation for the skills, knowledge, capacities and contributions they bring to their respective jobs. This is an extreme comparison, but the fundamental belief underpins most mainstream thinking about labor market inequality, whether within the economics profession or the broader public. The logic is simple: we live in a market economy, however imperfect the markets are; skill demands are shifting rapidly along with rapid technological change; therefore it's no wonder that some people—those with the right skills—are getting paid dramatically more than those with less worthy skills.

The logic may be simple, but it is also wrong. Leaving aside for a moment the critiques of this theory based on the ways that institutions and power relations create unequal labor market outcomes, or the ways distortions rooted in imperfect markets can reinforce inequality, the logic is also wrong because it neglects the ways that markets in information products and services are different in a few but fundamentally important ways from markets in material products and services. High sunk costs with near zero marginal costs, technological rents, network effects, and winner-take-all dynamics are all prevalent in market dynamics for information products and services, leading to employment insecurity and inequalities in outcomes that are not *distortions* of perfect markets, but rather the *logical structural outcomes* of the way those markets work. In other words, these forms of labor market challenges cannot be solved through market mechanisms, but will require interventions in the public interest to address.

## HIGH SUNK COSTS AND LOW MARGINAL COSTS

Many information and knowledge intensive products have high sunk costs and low marginal costs of production (or a market separation between the entities that invest the sunk costs and the entities that incur the costs of production), with increasing inequality and predictably volatile competitive conditions as one result. To understand this, let's compare the process of producing an automobile, a largely material good, and producing a feature film, a largely information good. Both have high initial costs that have to be incurred before the product can be developed and are not recoverable—the definition of sunk costs. For the automobile, this includes building the factory where it will be produced and all the costs incurred to develop and design the car, whereas for the film, it involves all the costs associated with script-writing, filming, editing and producing the film. The automobile, however, continues to have high marginal costs of production which are largely paid by the same company that designed the automobile; the costs of parts and materials that go into the car, the energy needed to run the factory, the labor needed to assemble the car. The price the automobile maker will charge for the final car will be related to these marginal costs of production, with auto companies typically operating at roughly a 5%

operating profit rate, which is used to pay off the sunk costs over an extended period of time. The marginal costs for the film in contrast are extremely low—simply the digital reproduction of the completed film. The difference in marginal costs to the film producers between releasing the film in one theater or in or tens of thousands of theaters, or between allowing the film to be streamed by hundreds of people or by millions, are trivial compared to the sunk costs. (Of course, for a theatrical release, the costs to the theaters are considerable, but the film company does not directly experience those costs – an example of a way in which choices in how an information industry is structured can result in a disconnection between the initial investors and producers, and the broader workforce that is needed to make the product available to consumers.) Thus, decisions about the price charged to watch the film in a theater or to stream it online are completely unrelated to production costs—the price in theaters is typically the same, regardless of the production costs of the movie, and the cost to stream online depends more on consumer demand than production costs.

A movie is an example of an information good. Many high-tech products exhibit very similar dynamics. In the semiconductor industry, for example, the sunk costs of producing the first version of a new semiconductor are extremely high. New semiconductor fabs now cost on the order of \$8-10 billion or more<sup>17</sup>, and even the design phase for each new semiconductor model alone can cost millions of dollars in research and development time, yet the marginal costs of producing each additional semiconductor may be on the order of a few dollars – in large part because markets in this industry have been structured to incentivize manufacturers to drive down costs for manufacturing by every possible means, while research and development has different incentive structures that can reward investment in “talent”. Semiconductor companies can charge higher costs when the new products are first introduced to the market. But as competition enters the market, the price quickly drops. A new semiconductor entering the market with a sale price of \$600-\$1000 may exit the market a year or two later with a sale price of a \$100 or less (Aizcorbe 2005). As long as the sale price is less than the marginal costs of production, the semiconductor company is still making a profit, but its overall profitability will be determined by whether the higher introductory prices can be maintained long enough to pay off the high sunk costs.

This system of funding and rewarding innovation through encouraging rent-seeking – a system driven in large part by the current structure of our patent system and intellectual property laws -- is a key reason why shortening time-to-market is such a critical factor in high-tech company success; competition emerging too soon can force a drop in the price curve before the company receives adequate revenue to pay off their sunk costs. In essence what companies are trying to do is achieve temporary product monopolies, based on their technological developments—a form of economic rent. A number of economists have argued that this system of intellectual property law, which artificially creates what economists term “innovator rents”, actually reduces useful innovation and may drag down shared productivity growth.<sup>18</sup>

Incentivizing firms to race for the rent-generating edge is not the only way to encourage innovation. Another way to do this is to strengthen public support for research and development (which can be done through a variety of means such as direct government funding for basic research; indirect funding via tax credits for R&D; support for university research, or tax deductions for charitable contributions to universities; or “prize” funding of innovation competitions), while simultaneously reducing the ability of companies to extract rents via patent monopolies. As has been argued by Joseph Stiglitz, Dean Baker and other economists, rethinking the current patent regime has potential to reduce inequalities, increase the free flow of ideas and information, and increase productive innovation over the long term.<sup>19</sup> Although recommending specific models for economic reform at this high level is beyond the scope of this paper, there is a need for creative exploration of other models to support innovation that do not generate the harmful “side effects” of this current model, perhaps through a combination of public investment and appropriate market structures and incentives.

17. [http://www.eetimes.com/document.asp?doc\\_id=1326565](http://www.eetimes.com/document.asp?doc_id=1326565)

18. See e.g., Mark Paul, *Don't Fear the Robots: Why Automation Doesn't Mean the End of Work*. Roosevelt Institute, June 6, 2018. <http://rooseveltinstitute.org/dont-fear-robots/>

19. See e.g., Dean Baker, Arjun Jayadev and Joseph Stiglitz, “Innovation, Intellectual Property, and Development,” *Access/BSA*, July 2017. <http://cepr.net/images/stories/reports/baker-jayadev-stiglitz-innovation-ip-development-2017-07.pdf> and Dean Baker, “It’s Not the Technology,” *Democracy*, December 6, 2017. <https://democracyjournal.org/arguments/its-not-the-technology/>

## TECHNOLOGICAL RENTS

Many information technology firms depend on technological and economic rents for a significant portion of their revenue. An economic rent is somewhat different from the common understanding associated with renting an apartment or leasing a car, in which someone simply pays the owner for the right to use a product. An economic rent is defined as an *excess* payment made to or for a factor of production over and above the amount required by the property owner to proceed with the deal. Economic rents can exist in conditions of artificial scarcity or otherwise imperfect markets. Land rent is perhaps the most classical form of economic rents, since the supply of land cannot easily expand. But rents can also exist in any market where there is some form of monopoly or monopsony power. Well known economist Joseph Stiglitz (and others) argue that there is good reason to believe that there has been a substantial increase in economic rents, and that much of this increase arises from changes in technology that give rise to oligopoly power, and from the role of intellectual property control over new technologies and scientific advancements (Stiglitz 2015, 2016a, 2016b)

In Silicon Valley, we have a particularly high concentration of firms that are able to charge these technology-linked economic rents. Sometimes this is possible because of our patent system, which provides formal legal protection, which can have tremendous value. For example, Google purchased Motorola Mobility for \$12.5 billion in 2011, and sold it for \$2.9 billion a couple of years later, yet in the process acquired Motorola's vast patent portfolio. Most analysts have assessed this deal as positive for Google and an important part of its success in the mobile phone market (Chiu, Chung, and Yang 2016). But many times it is not the legal protections that matter, but rather the temporary technological barriers that exist when a company is first-to-market with some incremental technological improvement. This advantage can be reinforced in a market with strong network effects.

## ECONOMICS OF NETWORKS

In 2012, Facebook acquired Instagram, along with its 13 employees, for approximately \$1 billion in cash and stock (on average \$76 million per employee). The 13 employees were undoubtedly very smart, and Instagram had 'lots of buzz', but it also had no revenue and barely a business model. What it did have, though, was 100 million users. Two years later in 2014, Facebook acquired WhatsApp, this time for \$19 billion, or the equivalent of \$345 million for each of its 55 employees. Again, WhatsApp's revenue was minimal<sup>20</sup>, but it had 420 million users sending 34 *billion* messages every day.

What made these acquisitions valuable in Facebook's eyes was not so much the software platforms or intellectual property developed by Instagram and WhatsApp. What Facebook found enticing was the *people using those platforms*. Access to the social networks of the millions of users of those sites was an asset for which Facebook was willing to pay billions of dollars.

What Facebook, Google, Apple, Amazon and other successful companies in the information economy have learned to harness is *economies of networks*. The ability to build networks and take advantage of network economics has become a defining feature of the information economy. Nobel Prize winning economist Jean Tirole has identified *platforms* that build networks—enabling interactions, collaborations and social connections in new and unusual ways—as a critical feature of today's economy (Rochet and Tirole 2014).

There are many examples. Google, Facebook and Twitter are digital platforms providing search and social media, while also creating platforms for other products, and thus providing network links between users and advertisers. Amazon, Etsy and eBay are platform marketplaces, building networks between product sellers and consumers. Airbnb, HomeAway, and Thumbtack bring together networks of consumers and sellers.

20. Its revenues were an estimated \$10.2 million in 2013. <https://www.bloomberg.com/news/articles/2014-10-28/facebook-s-22-billion-whatsapp-deal-buys-10-million-in-sales>

There are a number of key economic features of network economies (Shapiro and Varian 1998). First, the value of connecting to a network depends on the number of *other* people already connected to it. Other things being equal, it is better to be connected to a bigger network than a smaller one. This has been true for many decades in industries such as transportation, electricity distribution and communications, but now applies to a much broader array of products and services.

Second, there are very strong *positive feedback* dynamics in network economies that tend to lead to extreme outcomes, with the strong getting stronger and the weak getting weaker. When firms compete in a market with strong positive feedback dynamics, frequently only one will emerge as a winner, and even if more than one emerges as competitive, it is likely that many will not survive at all. For workers, this “winner-take-all” dynamic contributes to what is known as the monopsony effect – when a small number of companies dominate a labor market, workers in that market have very limited choices of where to sell their labor, resulting in outsized power for the employers. .

## WINNER-TAKE-ALL MARKETS

To understand how network effects can lead to winner-take-all markets, first think about the market for restaurants. There are literally thousands of restaurants in Silicon Valley—nearly 4,000 in the San Jose Metropolitan Area<sup>21</sup>. This is the opposite of a winner-take-all market. The number of customers is limited by the need to be there in person to purchase the service, and customers choosing one restaurant don’t in any way affect the quality of the service in other restaurants.

Now think about a market for a ride hailing company like Uber or Lyft, or even traditional taxi companies, which operate in a classic winner-take-all market. The value of the service platform is fundamentally dependent on the size and quality of the network that uses it—both number of drivers and customers. If there were thousands of different ride hailing companies or taxi companies all competing for the same customers in Silicon Valley, the quality of their service would be horrible since only a handful of drivers would be offering rides in each one, and it would take them a long time to get to most customers who were calling for service. Uber and Lyft dominate the ride hailing industry in part because of the strong network effects, which are reinforced in the online marketplace of Uber and Lyft. For ride-hailing companies, once they have developed large enough networks of users, especially business and tourist travelers who use the service in multiple places, the barriers for new entrants to the market become prohibitively high and so further competition becomes extremely unlikely.

Very few markets have truly only one winner, and so they are more accurately called “those-near-the-top-get-a-disproportionate-share markets” (Frank and Cook 1995, 3). Such markets exist where there are strong network effects, including not just social media platforms and ‘sharing economy’ services, but also computer operating systems (Windows, Mac), smartphone operating systems (iOS, Android), financial markets (NASDAQ, New York Stock Exchange), and many other information-based platforms. These dynamics also operate in many sports and entertainment industries with media audiences. In some ways, similar dynamics have existed in markets with natural monopolies or public goods (railroads, water/sewer provision), or with high barriers to entry such as large required upfront capital costs (steel, automobiles). But the growth of the information economy has increased the scale and diversity of winner take all markets.

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21. U.S. Census Bureau, County Business Patterns, 2015, San Jose Metropolitan Area. Accessed via American Factfinder: <https://factfinder.census.gov/>

This has obvious unequal outcomes for firms, but it also translates into unequal outcomes for workers. There is new evidence, for example, that between-firm inequality is an important and growing source of overall economic inequality in the U.S. Speltzer, for instance, found that on average 50.3% of earnings inequality is across firms rather than within firms, and that over 93% of the growth in earnings variance from 1996 to 2013 was the result of increasing between-firm inequality, rather than within-firms (Speltzer 2014). Another study looking at data over a longer time-period concluded that over two-thirds of the increase in earnings inequality from 1983 to 2013 can be accounted for by the rising variance in earnings between firms, and only one-third by the rising variance within firms (Song et al. 2015)

Overall, high sunk costs with near zero marginal costs, technological rents, network effects, and winner-take-all dynamics all create competitive dynamics in which successful firms can capture inordinate revenue. This revenue is not directly related to costs of production and only indirectly related to the quality of the technological innovations developed by these companies. Incremental technological improvements, first-mover advantages, and slight market leads quite predictably will translate into disproportionate returns for a few firms, and failure for many. This is clearly understood in the world of venture capital and start-ups, where investors have a rule of thumb that only one out of ten investments is likely to be successful, but the returns in that one investment will be enough to outweigh the losses in all the others. But the dynamics are quite similar in many information markets, and while they are an integral part of the region's economic dynamics, they also result in significant inequality in outcomes, along with volatility and unpredictability in livelihoods. As mentioned above, inequality is also evident in the different dynamics of high-tech and locally serving industries.

## DIVISION OF LABOR AND SERVICE INDUSTRIES

Economies are made of a wide range of different markets. In addition to industries developing information-based products and services or digital goods, we also still require human services, including child care, health care, education and consumer services, as well as industries producing material goods, including buildings, roads, and consumer durables. We also need food, and indeed one out of seven jobs in the private sector are in the food system, from production, to processing, to distribution, to retail food outlets, including grocery stores and restaurants.

Profit margins and supply/demand dynamics are very different for many service and production industries than for information industries. This is most clearly evident in comparing revenue per employee in different companies (see adjacent table). Some information technology companies such as Google, Facebook and Apple generate more than one million dollars of revenue per each employee, while companies in retail or restaurants generate only 1/10<sup>th</sup> as much per employee (Pistono 2014). In Silicon Valley in 2012 for example, the total sales per employee in the software publishing, and computer hardware manufacturing industries, were both over \$400,000, while in the restaurant industry it was under \$60,000.<sup>22</sup>

Company	Year Founded	Employees	Revenue per employee
McDonald's	1940	400,000	\$60,000
Walmart	1962	2,100,000	\$200,000
Intel	1968	100,000	\$540,000
Microsoft	1975	90,000	\$767,000
Google	1998	32,000	\$1,170,000
Facebook	2004	3,000	\$1,423,000

Source: Pistono, Federico (2014)

22. Author's analysis of U.S. Economic Census data for San Jose Metropolitan Statistical Area, from <https://factfinder.census.gov/>.

These inequalities are structurally rooted in the way markets have been designed for these different industries. Companies whose products and services are primarily information can sell to global markets with extremely low production costs for each additional consumer unit (what economists call marginal costs). Locally serving industries, in contrast, have high relative costs for each additional consumer and are often highly constrained in their ability to raise prices, particularly if they are business-serving firms that are part of the value chain for technology firms or other multinationals, or if they are consumer-serving firms whose core market are working families who themselves are suffering from stagnant wages and financial insecurity. In industries that have low revenue per employee, the problem of low-wage work can only partially be addressed through within-industry strategies like improving efficiencies and investing in the workforce. This is because they are rooted in the fundamentally different dynamics between globally serving information-products and locally rooted service industries. And yet those locally rooted service industries are essential components of all regional economies.

Rather than seeing these different industries as separate, it is important to recognize them as part of an integrated and interdependent economy. Recognizing this interdependence, as well as the socially produced sources of economic value in the economy, are important prerequisites for developing appropriate solutions to the problems of declining wages, insecurity and inequality.

## THE ECONOMIC ECOSYSTEM

Regional, national, and international economies are constantly growing and changing and require the active participation of many people and businesses in a complex division of labor. One useful metaphor for the complex interdynamics involved is a garden.

Healthy gardens are made up of a wide diversity of plant and insect species that interact in complex and interdependent ways, just like the wide diversity of businesses, workers, consumers, non-profits and public entities that make up our economy. Healthy gardens also depend on broad infrastructure—fertile soil, irrigation systems, a mix of appropriate pollinators—like our economy depends on roads, telecommunications, electricity networks and other critical infrastructure. Gardens need appropriate and timely inputs, such as water, sunshine, nutrients and growth-inducing temperatures, just like all businesses need inputs of appropriately skilled labor, available materials and supplies. Healthy gardens require people to tend them—to root out weeds, identify diseases, provide appropriate fertilizers—just like healthy market economies require robust governments to root out criminal behavior, identify pollution and unhealthy business practices, and provide appropriate growth stimuli.

The garden metaphor makes clear that while many portions of an economy's health are rooted in individual efforts, the health of the economy is also dependent on broadly shared inherited resources. Fertile soil, clean water, fresh air, sunshine are all inherited resources that underpin the growth of individual plants. All economies likewise depend on inherited natural resources, as well as the inherited infrastructure, capital, social and economic institutions that support our overall economy.

In the information economy, one collective inheritance is the general information, science and technology knowledge that underpins new innovations. Another critically important contribution comes from the many ways consumers and social networks, not just investors and employees, contribute to the value of information products and services. We'll look at each of these in turn.

## INFORMATION, TECHNOLOGY AND ECONOMIC VALUE

Economic innovation – the development of new products, services, or processes – has been critical to economic growth and development since long before the advent of computers or mobile communications. The well-known economist Joseph Schumpeter was writing as early as the 1930s about 'creative destruction' in which the economy can only be understood as an evolutionary process of continuous innovation (Schumpeter 1987). But over the past several decades, Silicon Valley companies have led two

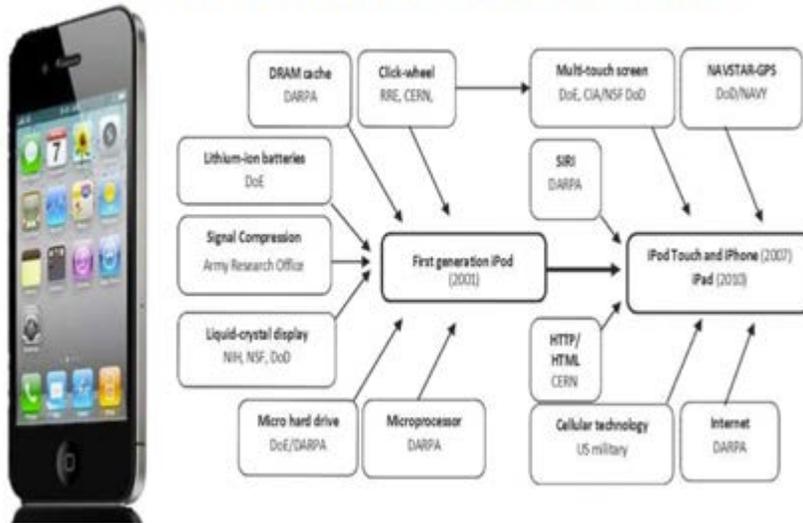
qualitative shifts in the nature of business innovation. First, the universality of digital code along with global telecommunications infrastructure means that technological innovations are globally integrated from their earliest stages. Second, the focus of technological innovations is not just on transforming the physical world, but on transforming digital information. Social media, transaction platforms, search engines, consumer data mining, and complex machine learning algorithms are just a few examples of the application of new information technologies to information itself. Since information and knowledge is produced by people in constantly changing social and cultural processes (in contrast to the characteristics of physical materials and processes which is either unchanging or changes slowly) this creates a cumulative, expanding and constantly changing feedback loop between innovation and the uses of that innovation in a global system of socio-technological evolution. More than 20 years ago, the pre-eminent sociologist of the information age Manuel Castells described it (albeit with a perhaps naïve optimism) in this way:

*“New information technologies are not simply tools to be applied, but processes to be developed. User and doers may become the same. Thus users can take control of technology...[in] a close relationship between the social processes of creating and manipulating systems (the culture of society) and the capacity to produce and distribute goods and services (the productive forces). For the first time in history, the human mind is a direct productive force, not just a decisive element of the productive system....What we think, and how we think, become expressed in goods, services, material and intellectual output, be it food, shelter, transportation and communications systems, computers, missiles, health, education or images....”*  
(Castells 1996, 32)

At the core of this increasingly ubiquitous socio-technical system is information (Prades 2002; Solow 1957, 1970). There are two broad types of knowledge and information that are particularly important in the production of economic value. First *scientific knowledge* is critical for the development of material products and technologies—in the context of the information and communication sectors, everything from digital electronic to artificial intelligence. Second, harnessing *social information*—rooted in understanding human interactions and aesthetic preferences—also drives economic value. Social information is harnessed (in part) to produce media of all types (e.g. movies, TV, news, videos), to design products and services, and most significantly for many tech companies, to enable advertisers to persuade more customers to part with their money, attention, and/or data.

Both scientific and social knowledge are not created by individuals alone but rather by collective processes. Much of the private sector’s innovation builds on foundational research and development conducted by the public sector. The Apple iPhone is an iconic example. As Mariana Mazzucato has documented in *The Entrepreneurial State*, nearly every aspect of the technology in the iPhone has its origins in major public sector supported research. Integrated circuits, liquid crystal displays and multi-touch screens, lithium-ion batteries, global positioning systems and even the voice recognition system SIRI were all substantially developed with public sector funding, and often conducted by researchers at major public universities (Mazzucato 2013).

## What makes the iPhone so 'smart'?



source: Mazzucato (2013), p. 109, Fig. 13

In addition to dependence on public investment, processes of innovation are also highly dependent on shared knowledge and communication networks. As an abundance of academic research has shown, processes of economic innovation rarely take place within isolated research units or labs (Acs 2000; Autio et al. 2014; Block and Keller 2009; de la Mothe and Paquet 1998). Rather they are rooted in complex networks of relationships that cut across company boundaries, and involve high levels of social ties and communication that have no direct monetary value—so-called ‘untraded interdependencies’<sup>23</sup>—not simply market based contracts or legal joint ventures.

These “network effects” have two key implications for how information technology companies generate and distribute value. First, a substantial portion of scientific and technological development is dependent on public investment. Second, another major portion of the value generated by technology companies is contributed by consumers and users.

Under Silicon Valley’s current industry structures and public policy framework, the benefits of public investment in R&D are disproportionately captured by a small number of successful firms and workers. Furthermore, users’ and workers’ contributions to these firms’ growth are not rewarded through current market mechanisms.

With this in mind, we now turn to our analysis of potential solutions to the problems of declining wages, inequality and insecurity we’ve described.

23. The term comes from Storper, Michael (1997) *The Regional World: Territorial Development in a Global Economy* (Guilford Press)

## SECTION 3.

# BUILDING THE PATH FORWARD

The characteristics of economic growth and restructuring in Silicon Valley over the past 20 years have reinforced patterns that were already apparent in the mid-1990s. Inequality has increased, wages even in middle and upper-middle tiers of the labor market have stagnated or declined, and economic insecurity is widespread. The persistence of these trends underscores that they have structural roots in the region's economy; these problems are neither temporary nor self-correcting, and they will not be solved by market mechanisms alone.

Just as public sector investments, government-established rules for markets, trade, and intellectual property, and collaborative processes have been critical for the economic dynamism of the region, so too must public sector policies and collaborative processes be developed to solve the problems created by this economic system. The consequences of not acting are clear—growing inequality and insecurity, along with a dangerous politics characterized by xenophobia, racism, and intolerance that has spread across our country.

While these are daunting challenges, the solutions to them are also quite possible, and build on many initiatives already underway. What we try to lay out in the remainder of this report are a set of ideas for addressing these challenges that we believe could mobilize sufficient public support to be achievable at a local, regional or state level in a reasonable time-frame. We divide our solutions into two broad categories, and look at policy approaches within each category. First, we look at practices and strategies that are designed to improve work and employment, focusing on growing more middle-wage jobs, connecting more people to those jobs, and raising stagnant wages across much of the labor market. Second, we explore policies that could help stabilize family livelihoods independently of work.

## IMPROVING WORK AND EMPLOYMENT

To improve work and employment, there are essentially four things we need to do:

- Grow and retain more middle income jobs;
- Raise incomes and improve career ladders in low-wage jobs;
- Strengthen connections between high-wage industries and the rest of the labor market; and
- Ensure worker voice in the workplace and in the broader labor market.

### *Grow and Retain More Middle Income Jobs*

One important strategy is to promote economic sectors that have more middle wage jobs, and to promote more middle-skill occupations across all industries. Examples of industries that currently have a high proportion of middle-wage jobs include health care, education and portions of the construction industry, especially related to infrastructure development. Well targeted government action could help accelerate growth in all these sectors. In addition, investment in workforce development, explicitly targeted towards high-demand, middle-wage jobs with long-term career potential, could both expand access to these jobs and promote overall economic growth.

The health care industry has over 30% of jobs that are in occupations that have median wage levels in the San Jose MSA of between \$20 and \$30 an hour and tend to employ people without a Bachelor's

Degree (and only 14% of low-wage occupations, those with a median wage less than \$20/hour).<sup>24</sup> Middle-wage occupations includes various types of technicians<sup>25</sup>, Licensed Practical and Licensed Vocational nurses, and even some healthcare support occupations, such as Medical Transcriptionists, Dental Assistants, and Occupational and Physical Therapy Assistants.

Demand for health care and related services is already outpacing overall labor demand. While overall employment in the San Jose Metropolitan Area grew 27% between 1995 and 2016, employment in health care and social assistance more than doubled (104% growth) during this time.<sup>26</sup> With an aging population, the demand for health services, including long-term care services, is likely to dramatically increase in coming years. Silicon Valley has a somewhat younger age structure than California as a whole, but still, in 2016 12.2% of the population was 65 years old or older, up from 8.6% in 1990.<sup>27</sup> By 2040, Santa Clara County is projected to have 23% of its population over 65, and San Mateo a full 25%.<sup>28</sup> Thus, even without concerted action, employment in health services and long-term care is likely to expand. Protecting good employment in this sector requires first and foremost defending against the threats to the Affordable Care Act, thus ensuring access to health insurance for the vast majority of the population. Accelerating employment in this industry could be achieved through further expanding access to health insurance and to health care services, especially preventive and primary care. There will also be a need to expand health care related workforce development initiatives and access to affordable, effective skills training for lower-income jobseekers, especially as the aging population increases demand for certain health services. Many of the jobs in the long-term care industry are low-paying at the moment, but could be improved with appropriate public investment, training, and certification.

The education sector is another sector with significant opportunities for expanding middle-wage jobs. Similarly to health care, employment in education more than doubled over the past two decades, with payroll jobs in Santa Clara County in educational services increasing 105% from 1995 to 2016. Most of the occupations in educational services tend to employ people with a Bachelor's degree or higher, while most of the occupations that tend to employ people without a Bachelor's degree are low-wage jobs.

One place where there is a critical need to expand the workforce is in childcare and early childhood education, where there are opportunities for increasing middle-wage jobs – but also pressures pushing wages downward. In the San Jose metro area, entry-level (25<sup>th</sup> percentile) wage for preschool teachers is just \$15.87; the median wage is \$17.90; and the 75<sup>th</sup> percentile is \$21.84.<sup>29</sup> The low wages at the bottom of this scale represent a severe impediment to recruiting and retaining quality early childhood educators. Research has shown that investment in high-quality childcare and early childhood education have some of the best returns in long-term educational outcomes. California has a long way to go in providing access to preschool and other early education and care opportunities. In fact, 62% of all children under age 5 in California live in areas considered “child care deserts” with no child care options or so few providers that there are more than three children for every licensed child care slot.<sup>30</sup> Expanding access to preschool, while also raising wages for early childhood teachers, would not only help expand middle-wage jobs, but also provide significant economic development boosts by improving educational outcomes with a more stable and better trained workforce. Expanding jobs in education and health care industries has a stabilizing effect on the economy as well, since these industries have been largely recession resistant, showing continued employment growth during both the early 2000s and 2008-09 recessions.

24. California Employment Development Department, Labor Market Information Division, OES Employment and Wages, 2016 1<sup>st</sup> Quarter: <http://www.labormarketinfo.edd.ca.gov/data/oes-employment-and-wages.html> Note that the median occupational wage represents only the 50<sup>th</sup> percentile wage in the occupation; there may be considerable wage variation around the median.

25. e.g. Ophthalmic Medical Technician, Pharmacy Technicians, Emergency Medical Technician, Clinical Laboratory Technicians, Medical Records and Health Information Technicians

26. California Employment Development Department, Labor Market Information Division, Employment by Industry Data, <http://www.labormarketinfo.edd.ca.gov/data/employment-by-industry.html>

27. U.S. Census

28. California Department of Finance Demographic Research Unit, Report P-3, State and County Total Population Projections by Race/Ethnicity and Detailed Age.

29. California Employment Development Dept., OES Employment and Wages Data Tables for San Jose-Sunnyvale-Santa Clara MSA, 2018 Q1 (released June 2018). <http://www.labormarketinfo.edd.ca.gov/data/oes-employment-and-wages.html>

30. See <https://www.americanprogress.org/issues/early-childhood/reports/2017/08/30/437988/mapping-americas-child-care-deserts/>

Expanding investment in infrastructure is another way to grow middle wage jobs. The condition of roads, bridges, schools, water treatment plants and other physical infrastructure has a large influence on the economy, yet there has been a decline in infrastructure investments across the country, with federal infrastructure investment declining from 1 percent to 0.5 percent of GDP since the 1980s<sup>31</sup>. In its most recent report card on the conditions of United States infrastructure, the American Society of Civil Engineers (ASCE) gave U.S. infrastructure a D+ or poor rating, and estimated that \$3.6 trillion in spending by 2020 would be needed to address the most critical gaps.<sup>32</sup> State and local governments are the most important level of government for investment infrastructure. State and local governments own an estimated 90 percent of non-defense public infrastructure assets, and they pay 75 percent of the cost of maintaining and improving them.<sup>33</sup> Increasing public expenditures on infrastructure, from both a local and state level, would likely contribute to significant improvements in overall private sector productivity. While estimates of the impact differ, there is now a growing consensus in the academic literature that infrastructure spending contributes to overall economic growth (Heintz 2010; Romp and de Haan 2007). The impact is particularly significant in recessions, with the Congressional Budget Office finding that funding for state and local investment in infrastructure under the American Recovery and Reinvestment Act of 2009 had an output multiplier of from 0.4 to 2.2.<sup>34</sup>

Infrastructure spending in the United States disproportionately creates middle and high wage jobs. In a study looking at three different scenarios of investment in infrastructure, for instance, the Economic Policy Institute found that low-wage jobs accounted for only 9.4 to 11.2 percent of all jobs created through infrastructure spending, compared to an economy-wide average of 18.9 percent.<sup>35</sup>

Finally, public policy can help to support industry-specific needs to retain and attract middle-wage businesses. For example, many small-to-medium manufacturing businesses in the San Francisco Bay Area are being threatened with displacement due to rising land prices, redevelopment pressures, and zoning restrictions. At the same time, some hospitals – which provide both a concentration of middle-wage jobs, and a crucial service for the community – are facing financial challenges driven by multiple factors such as expensive seismic safety retrofits and uncertainty surrounding national healthcare policy.

In these and similar examples, carefully considered public policy, informed by both the business and the workers in that community, can help expand middle-wage jobs. In considering such policies, it is imperative to look at “jobs on the ground” rather than applying broad averages to make assumptions about wages and job generation. The past several decades of state and local economic development efforts are littered with examples of taxpayer subsidies given premised on the promise of jobs that never materialized, paid far less than anticipated (or even exerted downward pressure on existing wages), or merely shuffled the location of jobs without any net new job creation.

### *Raise Incomes and Expand Advancement Opportunities in Low-Wage Jobs*

In industries where labor costs are a major portion of expenses, individual firms can choose to pursue one of two workforce strategies: pushing hourly labor costs as low as possible, or investing in increasing workforce productivity through reduced turnover, increased training, internal career ladders to fill high-demand roles, and employee engagement in improving efficiency. Rahmandad and Ton (2018) describe the former approach as the “labor cost minimization” strategy, and the latter as an “employee productivity and involvement maximization” (EPIX) strategy.<sup>36</sup>

31. McNichol, Elizabeth (2016) *It's Time for States to Invest in Infrastructure* (Washington, DC: Center on Budget and Policy Priorities)

32. <http://www.infrastructurereportcard.org/>

33. McNichol, Elizabeth (2016) *It's Time for States to Invest in Infrastructure* (Washington, DC: Center on Budget and Policy Priorities)

34. Congressional Budget Office (2015), “Estimated Impact of the American Recovery and Reinvestment Act on Employment and Economic Output in 2014” <https://www.cbo.gov/sites/default/files/114th-congress-2015-2016/reports/49958-ARRA.pdf>

35. Bivens, Josh (2014) “The Short- and Long-Term Impact of Infrastructure Investments on Employment and Economic Activity in the U.S. Economy” (Washington, DC: Economic Policy Institute) <http://www.epi.org/publication/impact-of-infrastructure-investments/>

36. Maureen Conway, “Strategies to Advance Job Quality”, Investing in America’s Workforce: Improving Outcomes for Workers and Employers. (2018). <https://www.investinwork.org/>

However, in markets driven by demand for short-term profits and cost-cutting, individual firms may find it extremely difficult to pursue an EPIX strategy in the face of low-road competitors. Public policy is essential to align incentives and create a level playing field.

One of the patterns that was evident in our review of wage trends in the last 20 years is that state and local minimum wage policies clearly had an impact in raising wages at the bottom of the income distribution. As the experience of a growing number of cities and states throughout the country is showing, substantial increases in minimum wages are possible. These are resulting in substantially higher wages for low-income workers without discernible losses in overall number of jobs. In fact in a number of cities, including Seattle and San Francisco, there is some evidence of more rapid employment growth in places with higher minimum wages than in comparable or nearby cities with lower wages (Dube, Naidu, and Reich 2014; Reich, Allegretto, and Godoey 2017). The potential job loss associated with higher payroll costs is more than offset by job gains from increased productivity, reduced turnover, and higher consumer demand (Reich et al. 2016). California's minimum wage is currently scheduled to increase in increments to \$15/hour in 2022 for employers with 26 employees or more, and in 2023 for all employers, and will increase thereafter based on inflation as measured by the CPI-U. Given the high cost of living in the Bay Area, many local communities have recognized a need for a more rapid increase. Seventeen cities in the Bay Area have already enacted minimum wages that exceed the state's, including all of the region's "big three" cities: San Jose, Oakland and San Francisco.<sup>37</sup>

But even with higher minimum wage laws, there will still be a need to provide greater support for people to advance to middle-wage, family-supporting jobs, coupled with policy and systems changed to expand the number of middle-wage positions. With the decline in internal labor markets, there is a need for greater public and private investment in workforce development to meet this need. Except in rare circumstances, workforce training programs do not increase the number of middle income jobs available. However, they can be of substantial help to individuals who seek access to the quality jobs that do exist. At a minimum, workforce training strategies need to be carefully correlated with job growth projections – so that graduates are actually able to secure employment in their new field. This need calls for a regional or statewide coordinated approach to workforce training in order to make a reasonable attempt at matching supply to demand. In the absence of strong coordination, the workforce development system is likely to over-train for accessible high-demand positions, because every one of the multitude of training providers who rely on the same labor market information will be targeting the same positions.

Workforce training can contribute to improved job quality if programs are linked to efforts to create new career ladders and/or professional or certification levels associated with higher salaries. One best practice approach is exemplified by the Las Vegas hotel industry model in which training constitutes a deliberate part of a business model linking quality of service, business revenues, and worker compensation (Waddoups 2002). Such models, for example, might be of great value in senior care services which are currently characterized by low wages, high turnover, and staffing with limited experience.

### **Strengthen Connections With Tech Industries**

One hypothesis put forward to attempt to explain the decline of middle income jobs is the possibility of a change in job composition of the labor market – that is, the theory that lower-wage industries are adding jobs faster than higher-wage industries. But national data show that is not the case.<sup>38</sup> Rather, wages in existing jobs have grown slowly or not at all.

Over the longer term, large numbers of formerly middle-wage positions have transformed into low-paying jobs. Part of the reason for this shift is globalization and offshoring. But another significant cause is

37. Bay Area cities with local minimum wage include: Belmont, Berkeley, Cupertino, El Cerrito, Emeryville, Los Altos, Milpitas, Mountain View, Oakland, Palo Alto, Redwood City, Richmond, San Francisco, San Jose, San Leandro, Santa Clara, and Sunnyvale. Source: Economic Policy Institute Minimum Wage Tracker, accessed July 1, 2018. [https://www.epi.org/minimum-wage-tracker/#/min\\_wage/California](https://www.epi.org/minimum-wage-tracker/#/min_wage/California)

38. Heidi Shierholz and Elise Gould, "Why is wage growth so slow? It's not because low-wage jobs are being added disproportionately." Economic Policy Institute, July 20, 2018. <https://www.epi.org/blog/why-is-wage-growth-so-slow-its-not-because-low-wage-jobs-are-being-added-disproportionately/>

domestic outsourcing, which occurs when a firm contracts out for services that it used to provide internally with its own staff. Estimates vary widely, given definition issues and data limitations, but is clearly a significant portion of the U.S. economy (Bernhardt et al. 2016).

Domestic outsourcing is a wage and benefit suppressant. To secure business, service firms present low bids to contracting corporations, and then must lower wages to meet the bottom line. One Cornell University study determined that subcontracted call centers paid 40% less than comparable workers employed in-house. Similarly, compensation for workers who repair ATMs and office machines dropped 15% in ten years (adjusted for inflation) after widespread subcontracting occurred (Bernhardt et al. 2016).

In Silicon Valley, we have estimated that there are somewhere between 20-40,000 people in low and medium wage occupations who contract directly with high-tech firms in the valley, and up to 78,000 in the 'potentially contracted' workforce—which includes those whose wages and working conditions are affected by the contracting. This potentially contracted workforce are disproportionately people of color; their average wages are 30% less than those of comparable direct-hire employees of high-tech firms.

Blue-collar potential contract employees in Silicon Valley have particularly challenging socio-economic circumstances. 59% spend more than 30% of their household income on housing (including 30% who spend more than half), with 69% living with either more than one family in the household or in extended family households (3 generations or other extended family). Some 10% of them rely on food subsidies, despite working, and 30% of them completely lack health insurance (Benner and Neering 2016).

Negative effects of domestic outsourcing can be reduced by encouraging or requiring major firms to accept responsible contractor standards. In essence, businesses need to take greater responsibility for the ecosystem of companies upon which they depend, including suppliers, manufacturers, service providers, and staffing services. Businesses should be expected to engage in practices that encourage middle income employment in supply chain firms and service contractors, not just their direct employees. Large firms can use their buying power to support living wage standards, family supporting benefits, retention of employees when contractors change, and neutrality or acceptance of worker organizing campaigns.

Since 2015, when local community organizations and unions first formed Silicon Valley Rising, a campaign to address inequality in the tech sector, over 5,000 subcontracted service workers across Silicon Valley's biggest tech companies like Facebook, Apple and Twitter have organized into unions, winning move livable wages, improved working conditions, and a voice on the job.

In addition, access to high-wage jobs must be opened to the full diversity of people in the region. Latinos, African Americans and women still make up a disproportionately small fraction of high paid leadership and technology positions within Silicon Valley's largest technology companies. At Google, for instance, as of 2017 only 4 percent of its directly employed workforce was Latino or African American, compared to 28.4 percent of residents in Santa Clara County.

### **Build New Models of Worker Empowerment**

Some of the practices described above can be achieved through public policies and regulations. This includes ensuring enforcement of existing laws intended to protect the most vulnerable workers – such as minimum wage, overtime, and even allowing workers to take breaks – which currently lack adequate enforcement. Progress can also be made through companies voluntarily adopting improved business practices, including responsible contracting policies, reduced outsourcing, and strengthening internal career ladders. However, it is unlikely any of these changes will take purchase on a scale sufficient to effect structural change unless we succeed in strengthening the voice of workers in the labor market.

The decline of union membership and collective bargaining has removed what was probably the most effective mechanism in the history of the United States to create and sustain middle class employment.

Further deepening the imbalance of power between workers and corporations, the Supreme Court has recently issued two decisions that greatly reduce workers' voice and power in the labor market: first, in *Epic Systems v. Lewis*, by deciding that workers can be forced to sign away their rights through mandatory arbitration, and then, in *Janus v. State, County, and Municipal Employees*, by eliminating public sector workers' right to democratically choose union representation through a majority vote.

Furthermore, even existing laws intended to protect the most vulnerable workers – such as minimum wage, overtime, and even allowing workers to take breaks – lack adequate enforcement. In California, nearly one out of five low-wage workers experience wage theft.

Enforcing existing labor standards can also be approached through a worker engagement model that puts organizing and collective empowerment at the center of community-based enforcement efforts. This approach is likely to be both more effective and less costly than models which rely exclusively on a government body to identify and pursue violations of worker protection laws. One leading example is the City of Seattle, which created a city-based Office of Labor Standards to enforce local worker protection, and linked that office to a network of community organizations led by the Fair Work Center, which engages workers directly in understanding the laws and helps to pro-actively ensure that worker protections are consistently being applied in the workplace. The County of Santa Clara, in the heart of Silicon Valley, is now working to launch a similar Office of Labor Standards Enforcement with the goal of supporting and empowering workers to defend their rights.

In addition, innovative forms of worker organizing are currently being developed. There are at least 240 workers' centers across the country, and their number and strength has increased over the past two decades. Initially, these non-profit organizations supported higher wages and benefits for, and defended the rights of, those persons not eligible for union representation under existing law. More recently, worker centers act on behalf of employees who find securing union representation impractical due to legal loopholes or corporate resistance. In New York City, the City Council passed legislation to allow employees to make regular contributions to such non-profits through payroll deductions.<sup>39</sup>

Illustrating the variety of these innovations, another model benefits farmworkers. In Florida, the community organization Fair Food Standards Council established a program through which corporate purchasers of Florida tomatoes pay a premium price for that product, the higher price yields a higher wage for farmworkers, and industry members agree to a human rights Code of Conduct. Worker contributions help fund the organization.

Worker empowerment can be advanced by corporate social responsibility standards that include openness to the formation of worker centers and a willingness to partner with such organizations to set, monitor, and help administer employee rights standards for direct and subcontracted personnel.

Another important avenue for worker empowerment is developing new models to address worker misclassification. Misclassification occurs when companies control and supervise their workers like employees, but fill out paperwork classifying them as independent contractors. This is done in order to reduce workers' access to their legal rights as employees (independent contractors in the U.S. are generally not subject to minimum wage laws, wage and hour limitations, unemployment insurance, payroll tax deductions, employer contributions to Social Security, and many occupational health and safety provisions), as well as to prevent workers from being legally able to bargain collectively.

Worker misclassification is not new – it occurs in many industries, most of which are not considered high-tech – but it has emerged as a new, supposedly “innovative” business model for a number of emerging platform economy companies with major venture capital backing. While ride-hailing companies like Lyft or Uber and delivery services like Postmates, Doordash, and Amazon Flex claim to act as “digital marketplaces” for workers, the level of control they exert on how these workers deliver service and are compensated for that service more closely resembles the traditional employee-employer rela-

39. <https://www.nytimes.com/2018/01/09/business/economy/fast-food-labor.html>

tionship than a truly independent contractor. By using contractors instead of hiring employees, these companies are transferring much of the financial risks of driving or delivering onto workers, pushing down net incomes in the process, and at the same time disempowering workers by limiting their access to either claim their rights as employees under the law or to stand together and bargain collectively.

In a number of states, new laws, regulations and court rulings – driven by organizing and advocacy efforts spearheaded by gig workers themselves – have refined who qualifies as an employee versus as contractor. Policymakers should take steps to further refine who classifies as an employee versus an independent contract in their jurisdiction, adopting positions similar to the recent California Supreme Court Dynamex decision, which assumes workers to be employees unless an employer can prove the worker is free from control of the company in performing work under a contract; in fact performs work outside the companies' normal business; and is engaged in an independently established trade or occupation. Under such a standard, most of today's platform drivers and delivery workers whose pay rates and conditions are set by the platform company, and who are hired and dismissed ("deactivated") at the will of that company, would be employees and protected under labor laws.

Finally, more than half of employers in the tech sector utilize arbitration requirements hidden within employment contracts to stop workers from realizing their rights when faced with discrimination, harassment, stolen wages or other exploitation.<sup>40</sup> These agreements force workers to forfeit their rights and instead agree to individually go through arbitrators selected and paid by their employers, rather than being able to bring cases to public agencies or the court system where they could join with coworkers in bringing forward claims and lifting up systemic problems. Employers often use arbitration agreements to keep disputes out of the public eye. Policymakers should prohibit employment contracts that require the use of mandatory arbitration to enforce disputes over violations of labor laws.

## STABILIZING LIVELIHOODS BEYOND THE LABOR MARKET

Implementing the recommendations above for improving work and employment would go a long way towards solving the problems we've identified. In parallel with those efforts, we also need to be pursuing policies and strategies for stabilizing people's livelihoods outside of their earned income. This is important for addressing rising economic insecurity driven by unstable and unpredictable incomes, especially as the fissuring of the labor market has shifted financial risk increasingly onto the backs of individual workers and families. Good public policy can help to minimize the traumatic experience of unemployment and technological displacement, as well as for ensure that individuals who are not currently in the labor force (such as seniors, students, full-time parents/caregivers, or people with disabilities that prevent them from working) can sustain a decent standard of living. It is also important to acknowledge and compensate people for the collective contributions to overall economic growth as we discussed above.

### Lowering Cost of Basic Needs

The major expenditures of typical families include housing, transportation, food, utilities, and health care; depending on the family type and stage of life, childcare, education, and elder care may also be major expenses. The costs of all of these can be reduced for low and moderate income families through a range of local and state strategies, such as the following examples:

- **Housing:** The current Silicon Valley housing market demonstrates an acute inability to provide affordable housing. While low wage workers lack sufficient income to pay rents, higher income households, investors, and developers bid up the price of housing, leading the effects of wage stagnation to be particularly damaging. There are a wide range of state and local policies that could help here, both preserving existing affordable housing and funding new affordable units. Policies include: rent stabilization and eviction protections, increasing and diversifying revenue sources for affordable housing, expanding inclusionary housing policies, creating and expanding

40. <https://www.epi.org/publication/the-growing-use-of-mandatory-arbitration-access-to-the-courts-is-now-barred-for-more-than-60-million-american-workers/>

density bonuses or other policies for land value capture, establishing housing trust funds, making public lands available for affordable housing development, developing land trusts, reducing parking requirements, reducing barriers to second units (ADUs), and streamlining permitting for projects committing to anti-displacement protections, job quality standards for construction workers and stronger affordability requirements.

- **Health Care:** Health care costs can be reduced for many families through a variety of mechanisms. County safety net institutions such as public hospitals and community clinics should be funded adequately. Local health insurance products, such as Santa Clara County's Primary Care Access Program (PCAP) which provides health coverage to adults not covered by the Affordable Care Act or MediCal, can serve as models for innovation. In addition, efforts should be made to find ways that state and local governments can provide supplemental subsidies to households and small businesses unable to take advantage of federal programs because costs remain too high. A single-payer health system in California could reduce overall health care expenditures (by reducing administrative fees and increasing public bargaining power over prices) and help cover those who are currently without insurance.
- **Transportation:** Transportation costs could be reduced for many people by expanding investment in public transit to make it more accessible and functional for a larger number of people. This means getting transit closer to more people's houses and job opportunities, through more decentralized and grid based surface investments, like expanded operations funding, bus rapid transit and neighborhood shuttles, rather than solely the large-scale investments in trunk lines like the BART extension and high-speed rail. Ensuring adequate funding for transit operations will mean finding ways to diversify and stabilize revenue sources for transit. Finally, transportation costs are closely related to costs of housing and proximity of housing to jobs; a critical element of reducing transportation costs is increasing density of housing, and especially affordable housing, near transit corridors, which could involve innovative policies that change land use authority to enhance transit agencies' ability to leverage the value of properties they own to build high-density, affordable transit-oriented developments on their land.
- **Utility and energy costs:** These could be reduced for low-income families through more progressive tiered pricing structures that help cross-subsidize from wealthy to lower income families, as well as through broader access for households at all income levels to energy efficiency, water efficiency and renewables.

### **Broad Based Income Supports**

In addition to alleviating poverty, non-wage sources of income can provide important supplemental support for stay-at-home parents and caregivers, students, retirees, disabled populations and others who are disadvantaged in the labor market, as well as help minimize the impact of labor market disruptions. There are a variety of policies here that could be helpful:

- **Unemployment insurance reform:** Unemployment insurance (UI) is primarily targeted at short-term unemployment, not long-term unemployment, and yet even for short-term unemployment, only approximately 44 percent of recently unemployed Californians receive UI benefits (McHugh and Kimball 2015). We need to expand the eligibility requirements. We also need to increase the maximum UI weekly benefit level, which currently stands at \$450, and has not been increased since 2005. This maximum benefit ranks 26th nationwide, and as a percentage of the average wage in the state, we rank 46th in the nation (Hiltzik 2018).
- **Portable retirement benefits:** An economy that leaves a substantial part of its workforce trapped in low pay, dead end jobs can hardly expect those households to have sufficient resources to fund an adequate retirement. Only a major expansion of the Social Security program can fully respond to the widespread lack of retirement savings. However, programs like California's Secure Choice

model, which encourages workers without pensions to participate at least to a small degree in a retirement plan, are worth developing as foundations for potentially more robust public retirement options in the future. A critical element of any effective program will need to be an employer contribution.

- **Baby bonds and other child benefits:** The basic idea here is that every child receives a trust account that they would have access to once they turn 18. This could provide some modest level of assets to young adults that could be used to support education, home equity, or essential living expenses, helping to offset a small portion of the effects of wealth inequality. This approach could have particular impact on addressing the impacts of the racial wealth gap on children's opportunities, given the tremendous disparities in wealth by race (Nam et al. 2015), although a recent large-scale study of 20 million Americans showed that black boys had much lower rates of upward mobility than white boys even if their parents had comparable wealth, income, education, and lived in similar neighborhoods,<sup>41</sup> implying that money alone, while important, is not enough to overcome the effects of structural racism. One example of this approach is San Francisco's Kindergarten to College Program, which creates a college savings account for every child automatically when they enter kindergarten<sup>42</sup>. At the moment this is only funded with \$50 from the City and County of San Francisco, along with incentives for families to provide further contributions, but this could be significantly expanded if a major, long-term funding source could be identified.
- **Expanded State Earned Income Tax Credit:** In June 2015, California became the 26<sup>th</sup> state to enact its own Earned Income Tax Credit (EITC). At the current level, families can earn up to \$2,706 (depending on family size and income) to supplement the Federal EITC. The California EITC has a more limited reach than the federal credit, and a 2015 study estimated that only about one fifth of Californians who qualify for the federal credit will qualify for the state credit, with the average qualifying household expected to receive \$460 per year (Montialoux and Rothstein 2015). The recent 2018-19 State budget signed by Governor Brown strengthens the CA EITC by extending eligibility to young adults and seniors who were previously excluded and raised the income eligibility limit to account for the rising state minimum wage.<sup>43</sup> Increasing this credit and further expanding eligibility could help serve as a hedge for workers and families against fluctuating earnings – again, providing that a funding source of sufficient size and longevity could be identified.

There has also been a growing interest from a range of constituencies in exploring models of a universal basic income (UBI). We think some models of a universal income are worth supporting, but many of the debates around this proposal are highly problematic.

Though specific proposals differ, the basic notion in all universal income proposals is that it involves a periodic cash payment unconditionally delivered to all on an individual basis without means-test or work requirement.

Much of the recent debate about UBI has been dominated by prognostications of mass unemployment associated with rapid technological change. People espousing this view have included prominent Silicon Valley high tech industry leaders, such as Elon Musk and Mark Zuckerberg, and labor leader Andy Stern (Stern and Kravitz 2016). While we are concerned about the disruptive effects on work associated with rapid technological change, we think the arguments about mass unemployment as an argument for universal basic income are misleading for two key reasons.

First, though automation of some work will undoubtedly occur with technological change, it is unlikely to lead to any large-scale net reduction in labor market demand for human workers. Fears of technology and mass unemployment has existed for hundreds of years, and while some jobs have always been lost (e.g. lamplighters of the 1800s replaced by electric lamps, farmers of the early 1900s replaced by tractors), new jobs have been created, because increased productivity has reduced prices, stimulated demand, and led to job creation in other sectors. Decades of academic research has documented that the

41. "Race and Opportunity in the United States", The Equality of Opportunity Project, <http://www.equality-of-opportunity.org/>

42. <http://sfgov.org/ofe/k2c>

43. <https://calbudgetcenter.org/resources/2018-19-state-budget-invests-in-reserves-and-an-array-of-vital-services-sets-course-for-future-advances/>

specific relationship between technology and job loss at a micro-scale and on a firm-by-firm basis varies tremendously, depending on a range of institutional and governance factors, but on a macro scale, technology contributes significantly to job creation (Bauer and Bender 2004; Kaplinsky 1987; Michelacci and Lopez-Salido 2007; Mortensen and Pissarides 1998). There is even evidence that recent levels of job elimination in the U.S. are substantially lower than most of the 20<sup>th</sup> century (Atkinson and Wu 2017).

Perhaps, as some have argued, things are 'different this time', since advances in machine learning raises the prospect of machines taking on many creative and skilled tasks that have been impossible previously (Brynjolfsson and McAfee 2014). But we think this is unlikely, and certainly not inevitable. There is a substantial amount of caring work now and in the foreseeable future that needs to be done in the U.S. Chief among the categories of needed workers are the care giving occupations including senior care (with an emphasis on cognitive disabilities), child care, and early childhood education. There is also a potentially nearly unlimited scope for growth in creative, entertainment, and recreational jobs associated with the growing global middle class. There are certainly challenges associated with ensuring that the benefits of improved technological productivity are shared, if only to ensure sufficient consumer demand, and there are specific challenges associated with particular occupations that are likely to experience rapid decline. But we are optimistic about the potential for job creation in many occupations and industries that will compensate for overall job loss, and the challenge is how to ensure effective support for transitions and retraining.

There is a second reason why the link between UBI and fears of mass unemployment are misleading: *UBI is not in any sense a substitute for work.* No serious proposal for UBI suggests that it could provide anything beyond the most basic of survival level living costs. Work provides important meaning in people's lives beyond simply earning an income, including significant social connections and a sense of contribution. Indeed studies of various pilot basic income initiatives have shown only minimal impact on hours worked,<sup>44</sup> as people have continued to want to work, despite having a guaranteed minimal income (Hum and Simpson 1993). While UBI could conceivably provide substantial benefits *in combination with* strategies to improve job quality and increase returns to labor, suggesting that UBI is a potential solution for mass unemployment both considerably overestimates the potential scale of UBI and builds on a misleading assumption about the impacts of technology change.

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44. Mostly this has been due to higher percentages of people going to school or looking after children at home.

## CONCLUSION

We are in a time of rapid technological change with economic implications that are not easy to predict. Our new economy is also driven by significant changes in business models – such as firms that rely on gig employment (e.g. Uber, Lyft) or the potential use of self-driving vehicles – some but not all of which are associated with technological innovation. Many of these have the potential to cause serious negative consequences for large numbers of people – including job losses and threats to public safety.

Essentially, the innovators use the entire society as a laboratory, assuming that the socio-economic order will simply make whatever adjustments are required. This attitude is based on a number of illusions. The first of these is that markets will fix everything. As noted above, the market's inability to "correct" the host of difficulties linked to today's innovative economy provides little confidence that it can cope with tomorrow's. Secondly, it assumes the benefits of innovation that are successful for a corporation will always outweigh the costs to the broader public. This assumption ignores the reality of externalities: that economic actions lead to major consequences not captured by price mechanisms, such as the dissolution of families and economic hopelessness leading to opioid addiction. Professors Anne Case and Angus Deaton at Princeton have described the spiraling mortality rates for whites who lack a high school diploma (including "deaths of despair" such as drug overdoses, suicides, and liver ailments associated with alcoholism) in their seminal article, "Mortality and Morbidity in the 21<sup>st</sup> Century" (Proceedings of the National Academy of Sciences, November, 2015). Last, it fails to consider the relative costs of mitigating effects through preventive action rather than through corrective action.

We need better mechanisms of analyzing and assessing the benefits and costs of both new technological development and new business models. Performing cost-benefit analyses is not a strategy to prevent innovation. It is actually a strategy to *preserve and improve* innovation. Consider the case of global trade agreements. These measures were associated with clear failures to either carefully evaluate the negative effects they would have or to adequately prepare programs to prevent or mitigate those dislocations. The political consequence of not employing cost-benefit mechanisms is the rejection of the proposed Trans-Pacific Agreement and the likelihood that no new agreements will be adopted for decades. A more careful analysis of the benefits and costs of these new development will help us as a society better understand and better respond to these dramatic changes in our society.

Ultimately we need better governance over technological development. As Annette Bernhardt points out, we broadly accept that in the field of genetic engineering there is an important role for public debates about the impacts of these technologies and the government's right to regulate.<sup>45</sup> We need similar debates on appropriate forms of governance of technological development – with the voices of workers and impacted communities in a central role.

We can and need to do better. We are in the midst of a dramatic economic restructuring of historic proportions. The inequality and economic insecurity that has been a critical part of this restructuring has contributed to a politics of fear and anger that is currently threatening not just our economy, but our democracy as well. We need a genuine discussion about the future of people's livelihoods in this new economy in which the voices of the most marginalized are front and center, not forgotten or mere after thoughts. And we need a commitment to pursuing new policies and strategies that can ensure the benefits of the exciting new technological developments that have emerged and are on the horizon and shared with all. We hope this report can contribute to that process, and help us finally realize the full potential of the new economy.

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45. <https://medium.com/@a.d.bernhardt/can-we-imagine-governing-technology-eb4b58092b81>

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