OECD Economic Survey of the United States: Key Research Findings

Edited by Douglas Sutherland

United States

OECD Economic Survey of the United States: Key Research Findings

OECD

BETTER POLICIES FOR BETTER LIVES

This document, as well as any data and any map included herein, are without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.

The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

Photo credits: Cover © mbell/Flickr/Getty Images.

Corrigenda to OECD publications may be found on line at: *www.oecd.org/publishing/corrigenda*.

© OECD 2019

Table of contents

Tables

Figures

Boxes

Acknowledgements

Follow OECD Publications on:

http://twitter.com/OECD_Pubs

http://www.facebook.com/OECDPublications

http://www.linkedin.com/groups/OECD-Publications-4645871

http://www.youtube.com/oecdilibrary

http://www.oecd.org/oecddirect/

Editorial

OECD Economic Survey of the United States:

I am delighted to introduce this book which provides the research findings underpinning the 2018 OECD Economic Survey of the United States. It collects studies focusing on developments in the labour market. These studies were jointly prepared by a team bringing together members of the OECD Secretariat and consultants. Their work underpins policy recommendations put forward by the 2018 Survey with respect to the labour market and addressing household financial vulnerability.

The dynamism of the United States' labour market has long been a strength, creating new job opportunities and contributing to high standards of living in comparison with other OECD countries, albeit with large disparities. The current economic expansion in the United States is now one of the longest on record, sustained by supportive fiscal policy, and although it has been sluggish in comparison with previous recoveries, sustained job growth has reduced the unemployment rate to historically low levels, pushing up household incomes and beginning to lift households out of poverty.

Notwithstanding the strengths of the labour market, the recent history of adaption to trade and technology shocks and the impact of the financial crisis have revealed some weaknesses, leaving some household financially vulnerable. Globalisation and automation have displaced workers, especially in the industrial heartland, and many of these workers experienced difficulties in finding new employment. As some locations adjusted only slowly to these shocks they have experienced high unemployment, low participation and poverty. More recently, labour force participation fell sharply during the financial crisis and has recovered only slowly.

In order to understand these developments it is important to take into account geography and household vulnerabilities. While the sluggishness in adjustment is partly explained by the limited amount of support provided to workers in the United States to find new jobs, compared to other OECD countries, other factors are at play. The interstate migration response to employment shocks, which contributed to workers moving to places with strong job growth, appears to have diminished. Furthermore, migration patterns show less of a population shift to urban agglomerations than elsewhere in the OECD.

One factor contributing to the decline in mobility is that changing jobs has become more difficult over time, partly due to developments in the housing market and the growing prevalence of occupational licensing. Interstate migration has been constrained by the availability of affordable housing, particularly in booming areas partly as a result of restrictive zoning policies. The second factor restraining migration has been the growing prevalence of occupational licensing, making it more difficult for workers to seek new job opportunities in other States.

A buoyant labour market helps households reduce financial vulnerability through increasing employment. However, financial vulnerability is multifaceted and other policy levers, such as increasing educational attainment, may also mitigate household risks.

This book brings together analyses from the regional, sectoral and household levels to shed new light on the vulnerabilities workers and households face on the labour market and in securing their finances. With this information, policy advice can be better tailored to ensure better lives.

18 December 2018

Laurence Boone
OECD Chief Economist

1. Addressing labour-market disruptions from trade and automation

Douglas Sutherland

The US labour market has been exposed to repeated disruptions in the past two decades, and a wave of change stemming from the rise of automation is looming large. Although unemployment is at an historical low, many displaced workers remain inactive and wages have been stagnant for occupation affected by these disruptions. The upcoming automation of tasks with robots, artificial intelligence and machine learning will bring many benefits, but it will also lead to employment losses and wage pressures for workers whose tasks will be automated. While the US labour market had traditionally the capacity to absorb these shocks, labour market fluidity has slowed in the past two decades, hindering the reallocation of labour and contributing to high unemployment and weak participation, with some locations particularly affected by these social troubles. Lessons from these past trends are helpful to formulate future policies helping improving opportunities for displaced workers.

Introduction

OECD labour markets normally experience considerable dynamism. On average each year, one-fifth of jobs are created and/or destroyed and one third of workers are hired or separate from employers (OECD, 2018). This is part of the normal reallocation of resources to their most productive uses in response to shocks. It also allows workers to improve their incomes by moving to new higher-paying jobs.

Despite this dynamism of creating new jobs, workers who have become unemployed have often struggled to find employment quickly and can experience a significant earnings loss. While the substantial globalisation shock during the 2000s has largely run its course, the prospect of greater automation and novel applications of artificial intelligence to a wider array of jobs - including in services - create a need to strengthen policies that can mitigate the negative consequences for affected workers.

The potential for further automation and artificial intelligence applications has given rise to dystopian outlooks with technological unemployment arising as workers lose their jobs. For example, some authors estimate that up to one half of jobs in the United States may be vulnerable to computing innovations (Frey and Osborne, 2017[1]). However, the outcomes are likely to be more nuanced due to various complementarities between workers and machines and the consequence of rising productivity making widespread redundancy unlikely (Nedelkoska and Quintini, 2018[2]). What seems more likely is that the nature and type of job will change.

Against this background, continuing technological innovation - with further automation and the impact of artificial intelligence on the horizon - is not necessarily grounds for pessimism about labour market opportunities. But there will be disruption requiring workers to move in reaction to technological change and acquire different skills. The experience of the U.S. economy during the global trade shock suggests that some workers experienced greater difficulties in making the transition and were left behind even though on aggregate the labour market was resilient and has created significant numbers of new jobs. This chapter discusses issues that may help mitigate similar difficulties in adapting to future shocks.

Labour market impacts of technological change and globalisation

Technological change brings benefits through the introduction of new and better products, increased variety and gains from higher productivity raising living standards. With the spread of information communication technologies in recent decades, labour markets have been profoundly affected. Particular types of jobs - often routine ones - are increasingly performed by machines and workers have needed to acquire new skills. For other workers however, the introduction of new technologies has complemented their existing skills and made them more productive.

Trade remains essential for underpinning productivity and economic well-being. Gains from trade accrue from the ability to allocate resources to the sectors and locations where they can be most efficient. In particular, global trade integration has facilitated the efficient production of intermediate goods thanks to the organisation of fragmented supply chains. More open economies tend to grow faster and participation in global value chains is associated with better knowledge diffusion and stronger productivity growth. In the United States, more than 40% of imports are intermediate goods. These inputs can be essential to global value chains and ensuring the competitiveness of exports (OECD, 2017[3]). The structure of the economy is affected by trade, notably the demand for different types of skills, which imply a reallocation of workers across sectors.

Discerning the relative impacts from technological change and trade on labour markets is hard due to their inter-relation. The deeper integration of labour and product markets that has marked globalisation has accompanied and facilitated the introduction of new technology. Empirical work tends to suggest that technological change has had bigger measurable impacts than international trade (Goos, Manning and Salomons, 2014[3]). The impact of technology shocks on the wage premium, labour shares, job polarisation and deindustrialisation have been found in a range of studies (e.g., Schwellnus et al, 2018). That is not to deny the impact of trade, particularly for a local labour market where the employment and earning impacts can be substantial and persistent.

Technological change and globalisation

Technological progress and globalisation are having impacts on OECD labour markets through de-industrialisation of employment and polarisation of jobs (OECD, 2017[5]). Technology complements "non-routine" cognitive tasks and substitutes for the routine cognitive tasks, while having little effect on manual labour (Autor, Katz and Kearney, 2006[6]). In part, the dynamic is driven by technologies being able to perform tasks that are easy to codify - the routine cognitive tasks.

The impacts of technological change, along with changes in demand, have contributed to a shift in employment from manufacturing towards services in OECD economies. Real

manufacturing output has continued to increase, driven by significant productivity gains, but its share in value added and total employment has fallen (Figure 1.1). There is some variation across countries in the extent of the decline. Notably, Germany has managed to buck the relative fall in output experienced elsewhere, but even there the employment share has still fallen.

Figure 1.1. Manufacturing is a smaller share of the economy
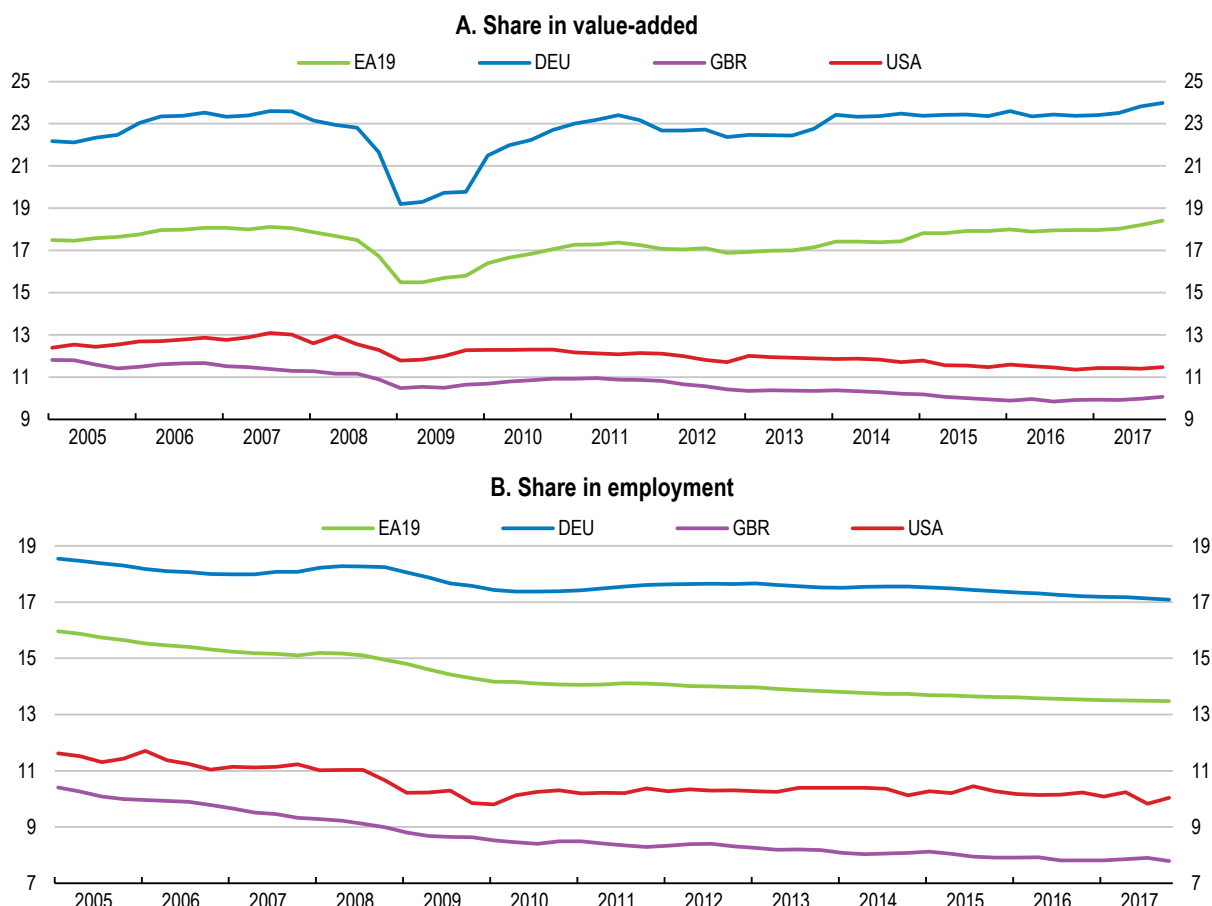
Source: OECD National Accounts Statistics, OECD Main Economic Indicators (MEI) database, and Thomson Reuters.

The share of employment in the middle of the skill distribution has declined since the early 1980s across most of the OECD (OECD, 2017[5]). On average across the OECD, the share of workers in low-skilled and high-skilled occupations rose by 2.5 and 4.3 percentage points respectively between 1995 and 2015. In North America, the polarisation has seen high-skilled jobs largely absorb the losses experienced in the middle of the distribution.

While polarisation holds overall, within particular sectors the picture can be slightly different. For example, in the United States, the share of university graduates has been rising in manufacturing and the share of workers with at most high school attainment shrinking. This is largely a result of production in this sector shifting away from physical work in the production process, which is increasingly automated. Empirical work by Acemoglu and Restrepo (2017[7]) suggests that an additional robot can reduce employment

in a local labour market by around six workers. Despite the shift in employment towards higher skilled workers, wages in the manufacturing sector have been declining relative to the economy-wide average since the early 1980s (Figure 1.2).

Figure 1.2. Manufacturing wages have been falling relative to the rest of the economy

Manufacturing average hourly earnings ratio to private sector average hourly earnings

Source: OECD Main Economic Indicators (MEI) database.

The second major influence on the labour market in OECD economies has been the rise of emerging economies as major players in international trade flows. China's successful development strategy and accession to the WTO created a significant shock to other economies. Increasing trade openness adversely affected employment in competing sectors in other counties. Standard trade theory predicts that the less-abundant factor of production is harmed by openness to international trade, which in most OECD countries concerns lower-skilled employment.

Recent evidence has emerged suggesting that globalisation through import competition had direct and persistent negative employment effects in some parts of the United States, whereas increasing exports have boosted employment elsewhere. Some evidence points to the globalisation shock mainly having its effect by inducing plant closure, rather than downscaling (Asquith et al., 2017[8]). Acemoglu *et al*., (2016) estimate that around 16% of manufacturing job losses between 1991 and 2011 (almost 1 million out of around 6 million) can be attributed to China's rising importance in international trade. Knock-on effects from the initial shock to manufacturing though upstream and downstream linkages had an adverse employment effect of a similar magnitude. In total, this globalisation shock accounts for almost 2 million job losses. To put this into perspective, aggregate payroll employment rose by around 30 million over the same period.

Globalisation has not been all bad news for workers. A complementary approach to the globalisation shock has looked at the consequences of increasing the size of the export market. The United States remains a key partner country in global trade and increased opportunities for its exporters support new job creation. Empirical estimates based on impacts in local labour markets suggest that the number of new jobs created (2.2 million between 1991 and 2011) offset a similar number of jobs lost due to the globalisation shock (Feenstra, Ma and Xu, 2017[9]). Since 2005, trade in value added statistics suggest that

employment embedded in export activities outstripped employment embodied in domestic demand by some margin (Figure 1.3).

Figure 1.3. Export-related employment has been growing strongly in the United States

U.S. employment embodied in exports and domestic demand, accumulated growth
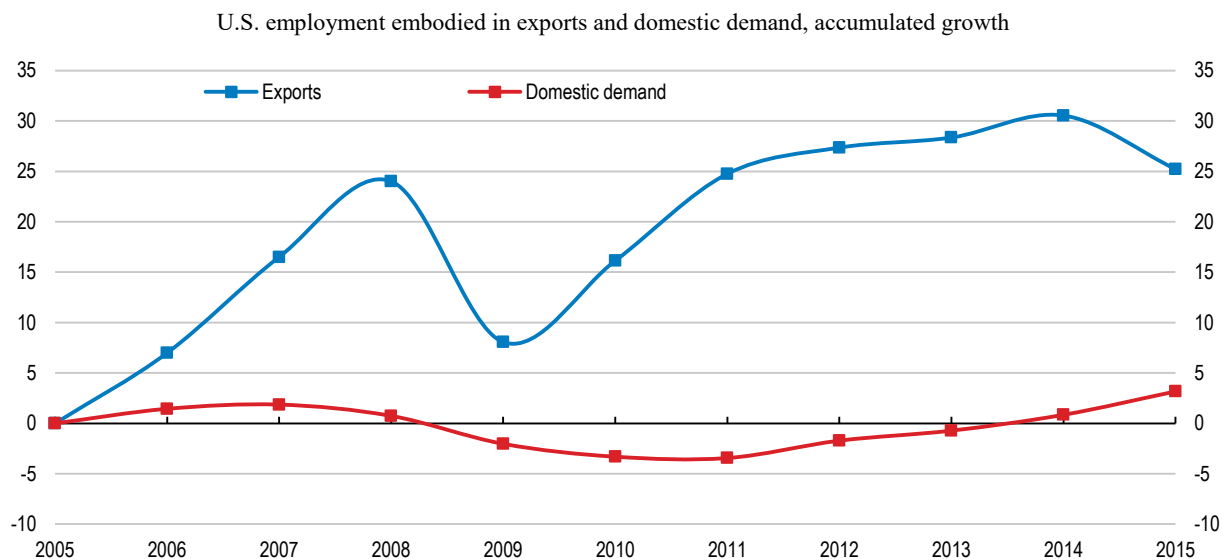
Source: OECD Inter-Country Input-Output (ICIO) tables.

While jobs were created, local labour market developments suggest employment adjustment has been weak in the most adversely affected areas (Autor, Dorn and Hanson, 2016[10]). Workers displaced from employment in commuting zones most exposed to the China trade shock have found re-employment relatively slowly with knock-on effects on other segments of the local labour market. The spatial correlation between export-related job gains and import job losses declined over time (Feenstra, Ma and Xu, 2017[9]), suggesting it become harder for displaced workers to find new employment opportunities. The adjustment frictions to reallocation have played a role in creating localised pockets of unemployment and ultimately, when persistent, to heightened inequality.

In the past, pockets of unemployment dissipated relatively quickly with inter-State migration being an important adjustment mechanism to asymmetric regional shocks. However more recent empirical evidence suggests that workers in industries exposed to import competition suffered significant losses in earning capacity subsequently in comparison with similar workers in other industries (Autor et al., 2014[11]). Losing firm-specific skills account for some of the earnings declining, but churning between employment and in some cases movement onto disability rolls also play a role, especially for those with weaker labour force attachment. Higher-skilled workers tend to move out of manufacturing and subsequent earnings losses are smaller. On the other hand, low-income workers appear to suffer more frequent job losses, greater subsequent earning losses, and more cycling between precarious manufacturing employment and spells out of unemployment.

Possible shocks in the future

The globalisation shock appears to have largely run its course and future impacts on labour markets are likely to be more modest than experienced during the rapid integration of China

into international trade and global value chains. On the other hand, technological change is likely to continue impacting labour markets. While technological change is difficult to predict, possible shocks on the horizon are related to automation.

One way to assess the future dangers of technological change to various jobs is to consider their task content and the proportion of jobs that are potentially automatable. By this metric, the share of jobs most at risk from automation account for around about one-tenth for the United States and very close to the OECD average (Figure 1.4). The threat of automation is most keenly felt by workers with the least education, whose job tasks are often the most repetitive. Another 25% of jobs have a substantial share of tasks that are potentially automatable, implying that the nature of these jobs may change dramatically. Nonetheless, job losses for this group will be smaller than the more exposed jobs. Even though the number of jobs threatened is potentially limited, the effects on particular industries are likely to be dramatic. Road transport is one example where technologies making automation feasible are on the cusp of widespread adoption, although current concerns are about truck driver shortages (Box 1.2).

Figure 1.4. The risk of automation in OECD countries
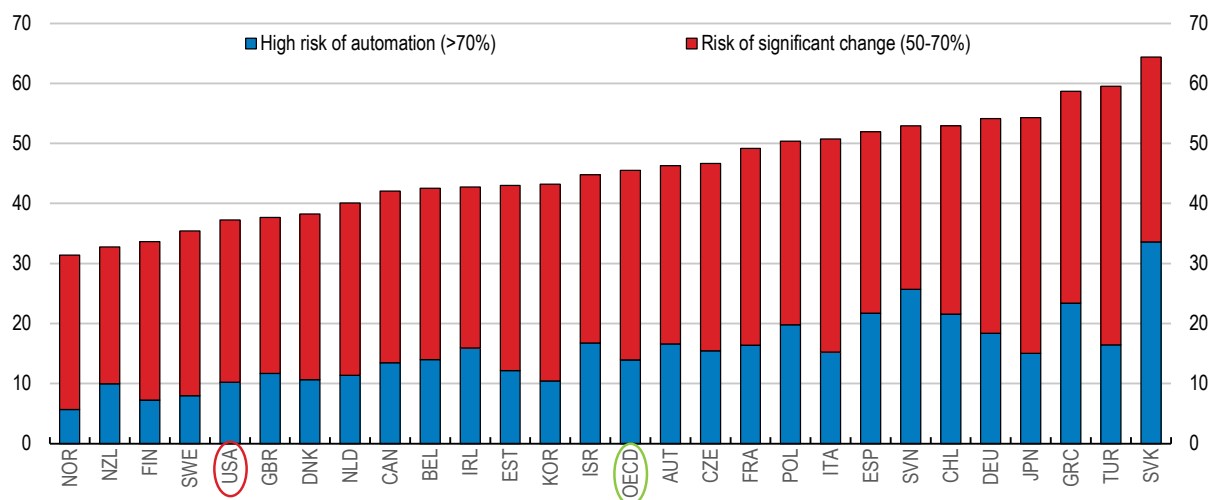
Note: Jobs are at high risk of automation if the likelihood of their job being automated is at least 70%. Jobs at risk of significant change are those with the likelihood of their job being automated estimated at between 50 and 70%.
Source: OECD calculations based on the Survey of Adult Skills (PIAAC) 2012, 2015; Nedelkoska and Quintini (2018).

Box 1.1. Automation in trucking

Automated inter-urban trucking is approaching feasible implementation once remaining technological and regulatory issues are resolved (ITF, 2017). Driving within urban areas is more complex and as a result automated transport is further from implementation. The expected operational savings for inter-urban transport are estimated to be substantial, reducing costs by around 30%. Such savings will grant tremendous cost advantages to early movers and is thus likely to see the industry rapidly converting to driverless trucks.

In the European Union and the United States, drivers of heavy trucks (mainly middle-aged men) account for 1½-1¾ per cent of total employment. To some extent, automation's effects on employment will be mitigated because future driver numbers are already projected to fall short of expected demand. Furthermore, automation will alter the nature of the job, such as creating new remotely-located drivers, who would take control of trucks when on-board systems encounter difficulties. Nonetheless, in some disruptive scenarios - when new technology is rolled out rapidly - job losses could account for around one half of potential drivers in Europe. On the other hand, if automation is introduced gradually, allowing for potential drivers to be dissuaded from a driving career choice, job losses could be relatively small. In this context, issuing permits for introducing driverless vehicles would offer one approach to controlling the pace of adoption if the negative externalities on drivers were judged to be excessive. These externalities will need to be balanced with wider societal benefits of automated trucking, stemming from fewer crashes reducing loss of life and injury, and environmental benefits from lower emissions.

Automation affects employment directly though worker displacement, when the introduction of a robot or machine replaces a human performing a specific task. On the other hand the introduction of automation can have positive consequences by boosting demand for labour (Acemoglu and Retrepo, 2018[12]). For example, improving productivity of existing automated tasks will feed through to increasing demand for non-automated tasks. In addition, as with past technological innovations the nature of work changes, including through the creation of new jobs. Even within a sector that is automating, task reorganisation could enhance complementarities between machines and tasks that are less easy to automate, increasing the complexity of the human task. Some jobs may become more attractive to a wider range of people. As such the overall effect on employment depends on the direct and more subtle indirect effects of automation on the labour market.

The rapid pace of technological change displacing workers from automatable tasks has given rise to calls to slow or halt the process. This has given rise to calls to remove regulatory and tax biases that give incentives to replace workers by machines, or even to tax robots (Box 1.3).

Box 1.2. Taxing robots

Concerns about how robots can displace workers and lead to heightened inequality have given rise to calls to slow the pace of technological progress. In addition to the direct effect on employment, others have worried about the ability of the government to raise revenue and the scope it can give for tax avoidance (Abbott and Bogenschneider, 2018[13]). For example, Bill Gates has raised concern about taxation shortfalls when robots replace workers. The South Korean government has recently reacted by removing tax incentives for businesses investing in automation.

Examining these issues in a simplified model (Daubanes and Yanni, 2018) shed some light on mechanisms and possible outcomes. Standard economic models would argue against taxing an intermediate input, such as a robot, and use the tax and transfer system to address inequality. In a model with "routine" workers, who are at risk of being replaced by robots, and "non-routine" workers, who are not (Guerreiro, Rebelo and Teles, 2017[14]), a fall in the price of robots will raise tax revenue (Figure 1.5). As such, concerns about tax erosion appear misplaced. A further consequence of the results of this stylised model economy is that the threat of job loss can be mitigated by improving the skills of workers so that robots are complements rather than substitutes for workers. In this context, efforts to boost the skills of workers can help ensure everyone is better off from the rise of robots.

Figure 1.5. The rise of robots
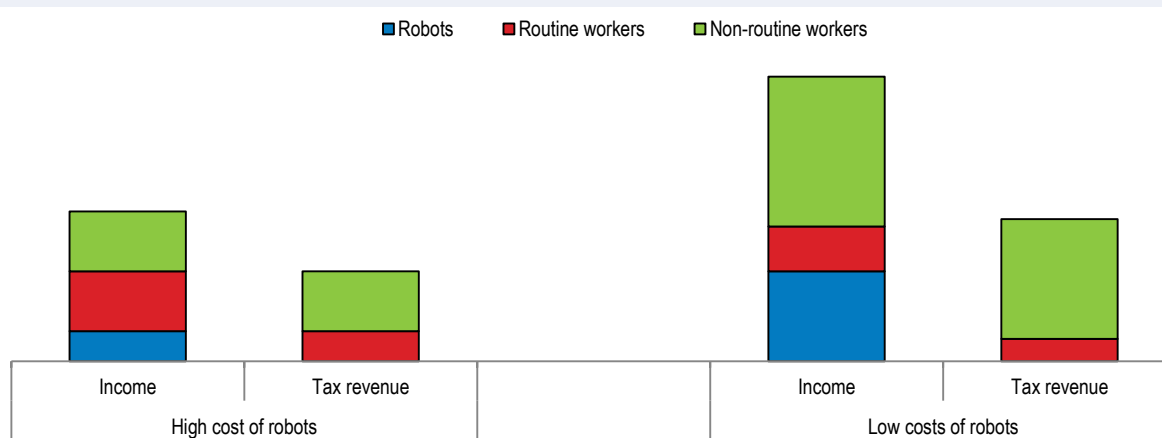
Source: Daubanes and Yanni, 2018.

Helping workers into employment

Economic growth is a primary engine of job creation. Indeed, during the current upswing in employment payroll growth has averaged almost 200,000 per month. But not everyone and not all locations have seen their prospects improve during the general recovery. A number of structural impediments appear to be at play. Even before the crisis, employment prospects and participation in the labour force differed noticeably across groups and the country.

Examining transition rates from unemployment to employment using data from the Current Population Survey reveals a few differences across the population. Males have had less success in making the transition from unemployment to employment, whereas following the recession, married women have been more successful in finding employment. Age and education have expected relationships, with older individuals experiencing greater difficulties in finding employment, while persons with higher levels of education attainment are more likely to move back into employment. The duration of unemployment has a statistically significant relationship with the likelihood of moving into employment, highlighting the importance of helping the unemployed back into employment quickly.

At the bottom end of the wage distribution in employment, jobs tend to become more precarious, including more temporary work. This is linked to lower earnings and higher job strain and can reduce opportunities for on-the-job training and learning. Workers in this type of employment are also the most likely to experience job losses in a downturn. Declining traditional employment in manufacturing appears to affect low-skilled men particularly badly. While the labour force participation of those with the lowest level of education attainment is lower than other groups it has increased somewhat, whereas other groups appear to have followed a secular decline in participation (Figure 1.6).

Figure 1.6. Participation rates are lower for those with less educational attainment
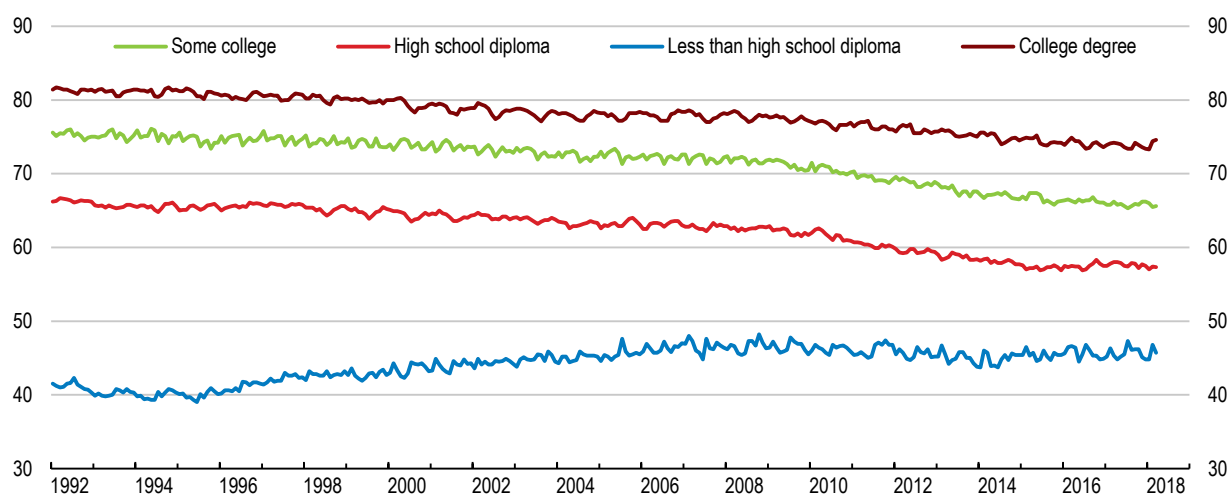
Source: Bureau of Labor Statistics.

One of the lessons many OECD countries have learnt is that early interventions can be important in preventing job displacement leading to persistent employment or income loss. Income losses in the United States are relatively large in comparison with other OECD countries. Early interventions include acting before workers become unemployed as job-to-job transitions can be easier to facilitate. In this context, public employment services may create a temporary office in a firm where mass lay-offs have been announced. Some of the initial contact with the workers is to document their skills and assessing how they match local and national employment opportunities and to provide counselling about opportunities and possible needs for reskilling.

A final way countries have tried to preserve employment is using short-term working schemes. When well designed, such schemes can preserve viable jobs without imposing large efficiency costs as shown by the experience of Germany and Japan during the global financial crisis. The evidence from Finland on the other hand suggests that when schemes

are poorly targeted jobs are subsidised for the duration of the scheme but then end with the finish of the programme (OECD, 2018).

In the United States, the policy environment for job displacement relies largely on unemployment insurance and a set of smaller specific programmes, many of which are provided by the States. Income loss associated with losing employment is relatively large (Figure 1.7). The operation of unemployment insurance has a counter-cyclical aspect in that the duration of unemployment benefits is typically extended when the labour market is performing poorly. On the other hand, the job search requirement targets full-time employment. As this can lead to extended breaks when employment opportunities are limited, this has led to calls for the requirement to be relaxed to allow part-time work or self-employment (Alden and Taylor-Kale, 2018[17]).

Figure 1.7. Income loss on becoming unemployed is quite large

Labour market insecurity: Expected earnings loss associated with unemployment, percentage, 2013
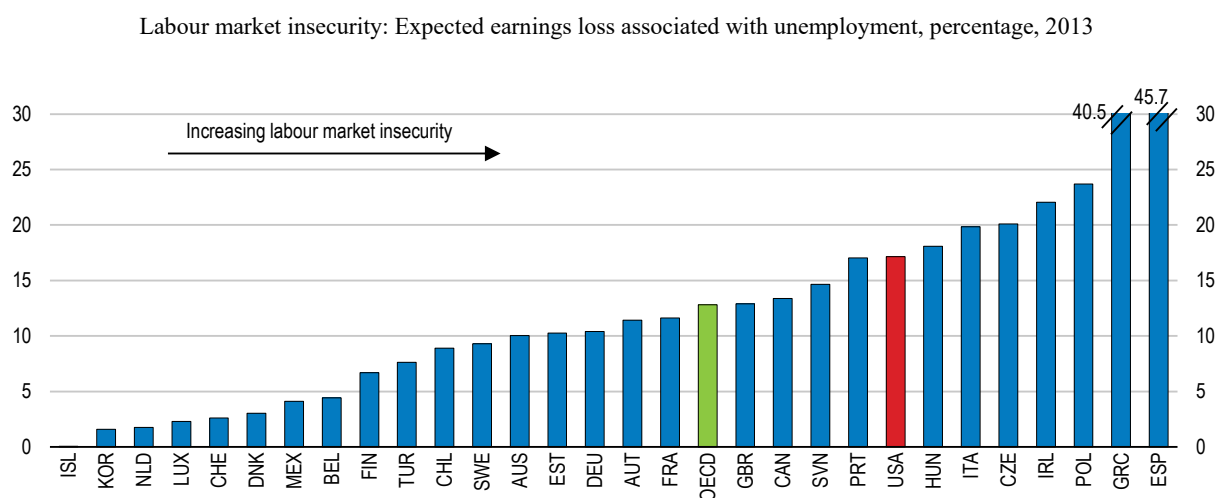
Note: 2012 for Australia, Korea, Mexico, the Netherlands, Turkey and the United States. 2011 for Chile. "Labour market insecurity" consists of unemployment risk and unemployment insurance. "Unemployment risk" is defined as the proportion of time that a worker is expected to spend on average in unemployment and calculated by the monthly probability of becoming unemployed multiplied by the average expected duration of unemployment spells in months. "Unemployment insurance" is measured by the coverage of the unemployment insurance and replacement rates of public transfers received by the unemployed.
Source: OECD (2017), "Job quality", OECD Employment and Labour Market Statistics (database).

The main federal government programme to address worker dislocation specifically is the Trade Adjustment Assistance programme. Workers who are certified as being displaced are eligible for training, job-search assistance, salary subsidy for older workers and modest relocation support. Delays in determining whether job losses are eligible for support have undermined the programme's effectiveness. This programme is narrowly defined to address the specific challenges faced by those losing their jobs as a consequence of international trade and will play a limited role in addressing dislocations arising from technological change.

Finally, the Workforce Innovation and Opportunity Act of 2014 introduced reforms to assisting job seekers by better matching them to growing sectors. The initiative aimed to build regional partnerships, between employers, education and training providers and public stakeholders in providing training and job placement in high-demand sectors. Overall, the United States spends relatively little on active labour market programmes that

target getting persons into employment whether through helping with job search and placement or through providing training (Figure 1.8).

Figure 1.8. The United States spends relatively little on helping workers find new jobs

Public spending on Active labour market policies (ALMPs), 2015
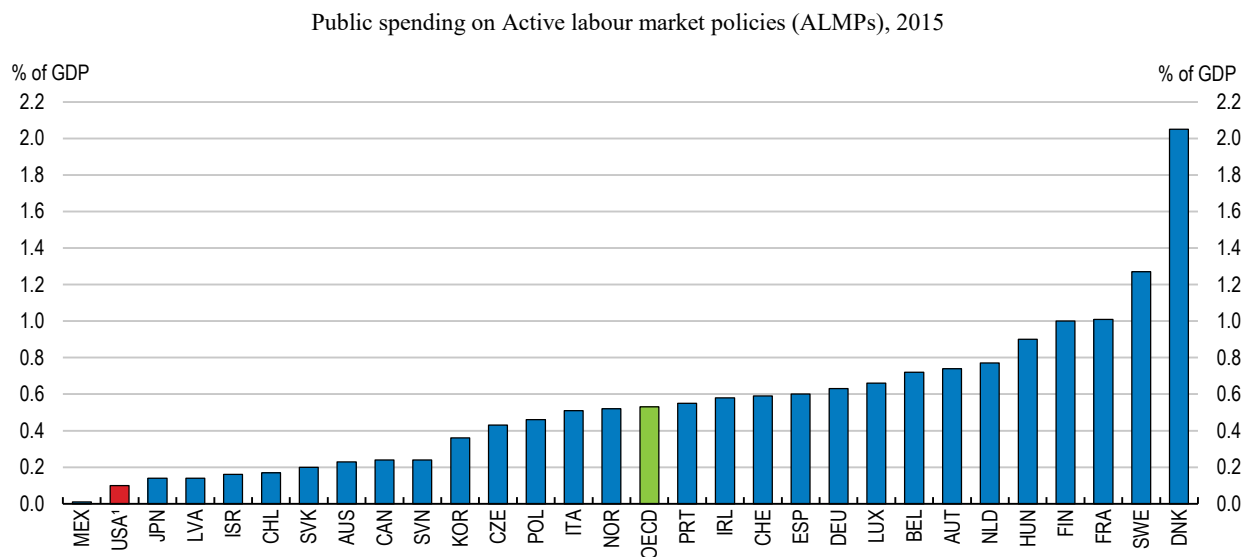
1. Includes Temporary Assistance for Needy Families (TANF) work-related activities. Other TANF expenditure (0.20% of GDP) is not included.
Source: OECD Labour Market Programme Database.

Differential impacts across the country

The combined consequences of technological change and globalisation on local labour markets have led to job losses and growing divergences between large metropolitan areas and smaller ones and non-metropolitan areas. Job growth has become more concentrated than in the past as many smaller cities have struggled in the wake of the decline of manufacturing employment. Larger cities, on the other hand, appear to be more resilient and have attracted more high-skilled workers, widening the disparities between large urban areas and the rest of the country. In part, the different experiences of workers in urban and more rural settings appear to be linked to agglomeration benefits. Thicker labour markets in urban areas allow workers to find new jobs more easily. On the other hand, finding employers in less dense areas may mean specific skills fall into disuse when other suitable matches are few (Bleakley and Lin, 2012[14]).

These dynamics have been compounded by the impact of the financial crisis. The aftermath of the crisis saw large increases in unemployment rates across the United States. In comparison with previous expansions, subsequent job creation has been more concentrated in the larger urban areas (Brainard, 2017[15]). Furthermore, labour force participation is stronger in the larger metropolitan areas as well. After 2015, further disparities have emerged between large metropolitan areas, where unemployment rates have continued to decline, and other parts of the country. These dynamics create special problems for crafting appropriate policy responses as quite different labour market conditions can coexist across relatively short distances.

There are sizeable differences across the United States in labour force participation rates (Figure 1.9). At the State level in December 2017, the participation rate ranged from just

53% in West Virginia to over 71% in North Dakota. Similar differences hold for unemployment, ranging from just 1.7% in Hawaii to 7.3% in Alaska. At the metropolitan area level the rates vary from 1.5% in Ames, Iowa to almost 18% in El Centro in California (where the State-wide rate is close to the national average at 4.2%).

Figure 1.9. Labour force participation varies substantially across the United States

State-level participation rates, December 2017
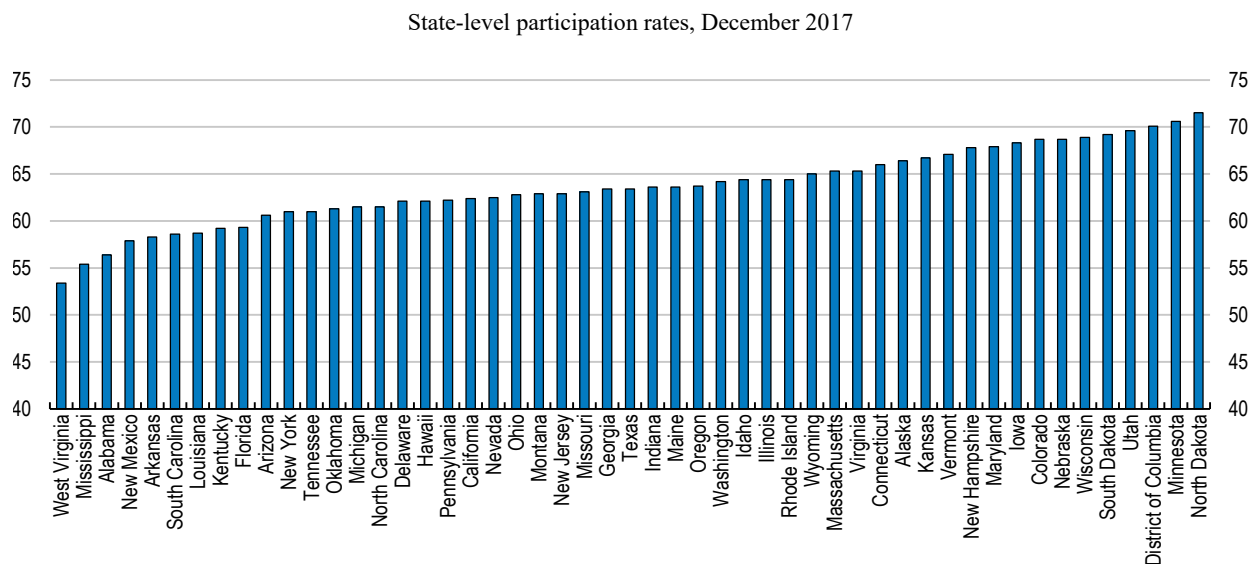
Source: BLS.

The decline in labour force participation rates outside metropolitan areas was marked after 2007 and whilst recovering remained over three percentage points lower at the end of 2017. By contrast participation rates in metropolitan areas were only around one percentage point lower than before the crisis and there is a correlation with local labour market participation and the measured productivity of cities (both in the United States and across other OECD cities) (Figure 1.10). Differences in productivity across regions and cities are sizeable in the United States. Partly as a result of declining participation outside larger metropolitan areas, some local labour markets are becoming tighter, despite employment growth remaining relatively sluggish. Thus while wage acceleration has been quiescent during the recovery, more recently these development have begun to push up wages and to narrow the wage premia enjoyed by urban workers (Weingarden, 2017[16]). However, large numbers of individuals remain on the fringes of the labour market.

Figure 1.10. Productivity varies widely with participation higher in more productive cities

A. Regional dispersion in gross value added per worker
% of national average, 2016 or latest year available

B. Dispersion of gross value added per worker across countries
Latest year available in USD PPP 2016

C. Metropolitan participation rates and output per worker
In thousand USD, (2012)

Note: Panels A and B: Data refer to 2016 for USA, CAN, FRA; 2015 for AUS, SWE, DNK, AUT, ITA, FIN, ESP, GBR, KOR; 2014 for NZL, 2013 for CHE, and 2012 for JPN.
Source: OECD Regional and Metropolitan areas databases.

One approach to assessing local economic conditions on the basis of several labour market indicators suggests that 52 million Americans live in distressed communities (Economic Innovation Group, 2017[17]). These are areas where the number of jobs and businesses has continued to fall during the national recovery from the crisis. Unemployment duration tends

to be longer when there are concurrent job losses or when they are more localised, with smaller metropolitan and non-metropolitan areas being more vulnerable. These areas also have low participation rates and also a large share of the population has only limited educational attainment. Most of these communities are in the South or Midwest.

Regions with stronger productivity growth across the OECD tend to be better integrated into global value chains, particularly in tradeable services. Integrating urban areas, which attract more knowledge-intensive firms, into global value chains presents opportunities to boost productivity. Promoting interactions between manufacturing and services and building up forward and backward linkages boosts productivity within the sector. Furthermore increasing the accessibility of urban centres can have positive spillovers to surrounding areas, boosting economic growth (Ahrend and Schumann, 2014[18]). A case in point is Chattanooga, a mid-sized city that is growing rapidly. The area is developing on the back of successfully attracting foreign direct investment coupled with the installation of ultra-fast broadband infrastructure. This in turn has induced the development of a tech sector in the city, which further helps in propelling local economic growth (CFR, 2018[13]).

The 2017 tax reform introduced tax credits for regional development. The tax benefits aim to encourage long-term investment in Opportunity Zones, which are low-income urban and rural communities. Other approaches to addressing the particular location specific problems facing communities includes tailoring federal support (Austin, Glaeser and Summers, 2018[19]). For example, in the spirit of unemployment insurance, earned income tax credits could be boosted in particularly distressed areas for a limited period of time with the aim of maintaining labour market attachment. The implementation of such a scheme by the Federal government poses considerable administrative difficulties for the Internal Revenue Service, which may be difficult to overcome. As such State-level initiatives may be preferable.

Improving access to fixed broadband, particularly in rural areas, is a potentially important means of helping distressed areas (OECD, 2018b). Rolling out modern technology that can better integrate localities into wider economic networks and expand the job finding and education opportunities for rural residents. Better broadband coverage can also provide access to healthcare and education in the most remote locations. The Federal Communications Commission (FCC) has allocated $2 billion in 2018 to use in competitive bidding auctions to expand access to nearly 1 million homes, which should minimise the risk of the infrastructure investment having little impact. Municipal networks have also been created in some cities, often using existing infrastructure to cut costs. These initiatives have been supported by the FCC, which is also identifying unreasonable regulatory barriers to broadband deployment. The Administration has also acted with the Rural Broadband Executive Order to support deployment.

Improving job accessibility

Cities in the United States often suffer from poor integration that hinders productivity gains that can arise by making better matches. Poor co-ordination of spatial planning and service delivery across administrative boundaries can contribute to this outcome. Making cities more accessible, both for residents within the city and the surrounding commuting zones offers a way to increase the chances for displaced workers and others to find employment. Particularly in sprawling cities, access to jobs by public transport is often very limited. For example, in Atlanta just 3% of jobs accessible by car within one hour are accessible by public transport within the same time. This can be a considerable barrier to low-income groups of potential workers. In San Diego county, the workforce development agency

considers transport availability and expense as a major barrier for the young in accessing employment and training (Guichard, 2018). Large house price disparities can lead to trade-offs emerging between housing and access to jobs. In this regard, better provision of mass transit where appropriate is one possible solution, though in the longer run better integration of spatial and transport planning is desirable to improve the functioning of urban and surrounding labour markets.

A second way to enhance urban mobility is to address spatial segregation that blights some cities and may contribute to persistent inequality (Fogli and Guerrieri, 2017[20]). Even in very prosperous cities, pockets of the population can struggle (Glaeser, Resseger and Tobio, 2009[21]). For example, in Minneapolis the unemployment rate gap between the black and white populations is amongst the highest in the country despite the local labour market being very tight. In some cases, such problems can reflect information asymmetries and actions such as promoting local populations with limited labour force attachment to surrounding employers can help raise employment possibilities. In other cases, addressing spatial segregation may require action to improve opportunity by strengthening non-cognitive skills and raising educational attainment of the population as well as to improve access to important public services.

Inter-State migration in response to shocks

One finding of recent studies looking at technological and trade change is that local labour market shocks appear to be quite persistent. In part this is related to vulnerable regions being repeatedly buffeted by adverse shocks. There is an inter-State migration response with people leaving areas with high unemployment rates, particularly higher-skilled workers, but this outflow of workers is not in large enough numbers to return local labour markets to equilibrium quickly enough to prevent persistent unemployment and workers dropping out of the labour force altogether.

Migration has played an important role in reaction to economic shocks in the past. For example, Blanchard and Katz (1992[22]) found that States experiencing negative shocks tended to adjust by workers leaving the State in response to rising unemployment rates, rather than falling wages. However, migration rates have been slowing since the early 1980s and in particular around the early 2000s until the financial crisis. The slowdown affects migration between States, between counties in the same State and even within counties in the same State (Figure 1.11). Household mobility is now at an all-time low, with the mover rate 11% of the population in 2017.

Figure 1.11. Migration rates have slowed

Annual mobility rates, per cent
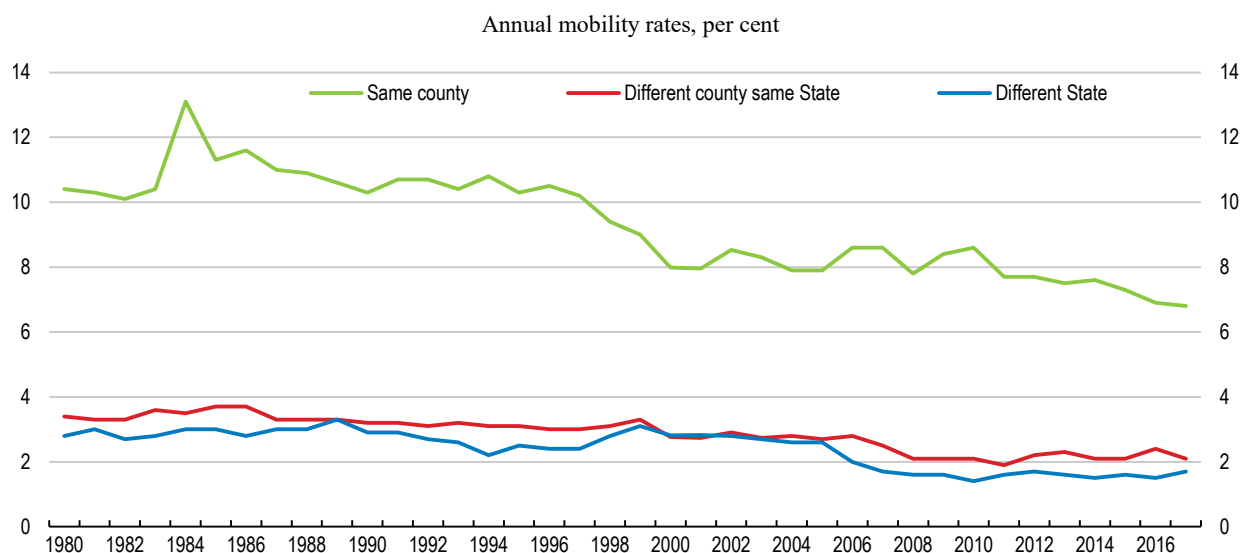
Source: Census Bureau.

The factors underlying declining U.S. migration trends are not well understood. Past strong inter-regional migration flows have declined, partly due to ageing as older people typically move residence less frequently. Declining willingness of workers to undertake job transitions is another factor inhibiting this adjustment mechanism (Molloy, Smith and Wozniak, 2014[23]). This underlines the importance of boosting business dynamism and reducing barriers to job transitions as complements to efforts to boost employment.

Other factors are at play in slowing moving rates. As more households have two main earners than in the past, migration becomes more complicated in ensuring matches. This affected migration choices of younger people (who are more likely to migrate than more established families). Young couples are more likely to move to larger cities, which offer greater employment opportunities. As a consequence, the structure of American urban areas has been changing with younger college-educated individuals concentrating in large urban centres since the early 2000s. Over the same period the suburbanisation of cities continues with other groups moving to the peripheries. Part of this is due to the presence of amenities, as measured by the concentration of non-tradeable services in larger cities (Couture and Handbury, 2017[24]). One consequence of this dynamic is increasing spatial segregation.

Besides these factors, migration may also have fallen as smaller differences in local labour markets across the United States provide weaker push and pull incentives. For example, the variation of State unemployment rates fell dramatically in the lead up to the great recession, but spiked up sharply and remained pronounced for several years (Figure 1.12). The secular decline in migration did abate around the time of the crisis but low migration rates arguably hindered adjustment to heterogeneous spatial employment shocks.

Figure 1.12. Differences in unemployment rates have declined outside crisis periods

Standard deviation of State-level unemployment rates
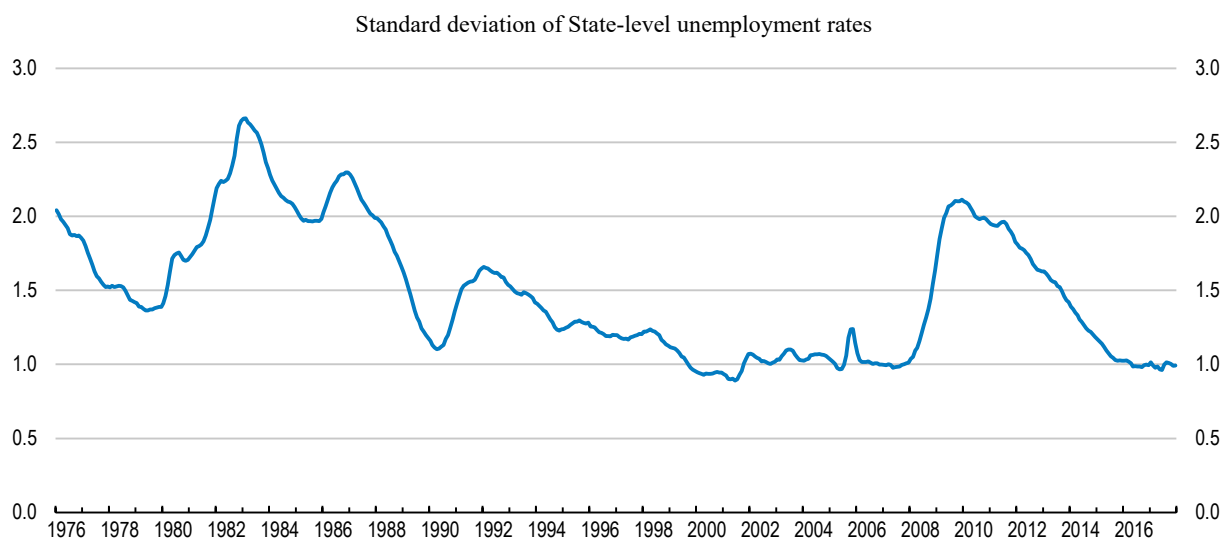
Source: Bureau of Labor Statistics

While inter-State migration patterns tend to be less responsive to labour market conditions in the United States, in other OECD countries migration appears to be increasingly responsive. Some evidence suggests that migration patterns in the European Union are becoming more reactive to local labour market conditions than in the United States (Jauer et al., 2014[25]). Mover rates remain higher in the United States - at around 11% of the population - than those in the European Union, where annual mover rates affects around 6% and are within the same country. Although gross flows appear larger, net migration flows are relatively small (Figure 1.13). Elsewhere in the OECD, underlying migration patterns tend to be from rural and intermediate regions to urban agglomerations, particularly from rural regions with poor accessibility to cities. A similar pattern is less obvious for the United States (OECD, 2016[26]). In part, this may reflect muted income differentials between households in metropolitan and non-metropolitan areas when compared with other OECD economies (Boulant, Brezzi and Veneri, 2016[27]). But it may also reflect housing market frictions can make finding affordable housing a challenge, particularly in booming cities. In addition, occupational licensing can increase the costs of moving. These are addressed in the next sections.

Figure 1.13. Net migration flows are modest

Flows across territorial units, % of total population, average 2011-13
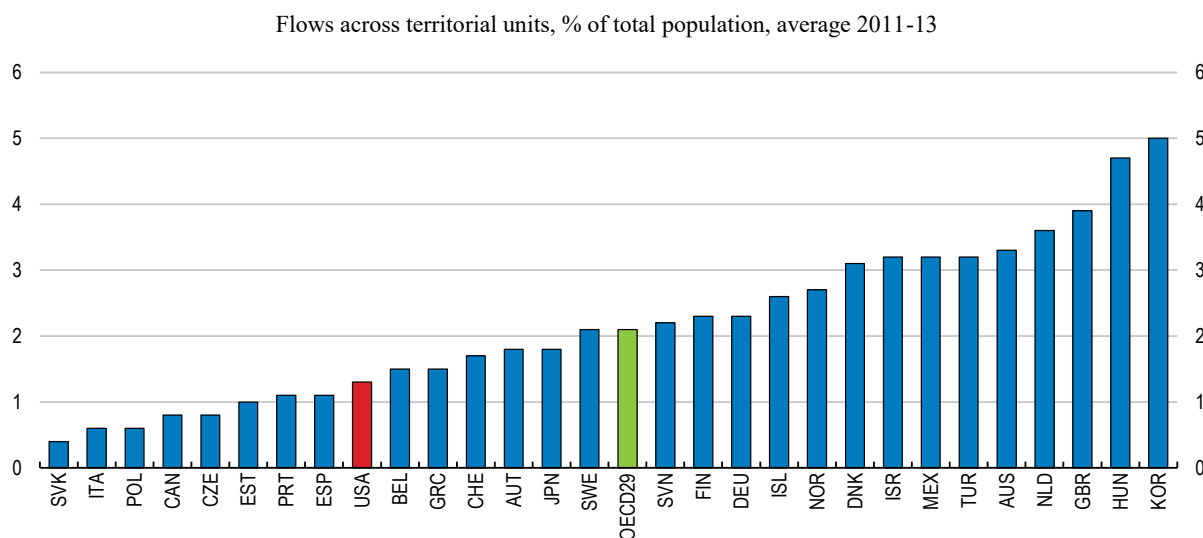
Note: The territorial units are the TL3 units used for international comparison. The data for the United States are based on aggregates of counties that are smaller than States.
Source: OECD (2015), OECD Regional Statistics database.

Housing market frictions

Changes in the housing market have contributed to lower labour market fluidity, but also to the functioning of the housing market creating barriers to migration (Ganong and Shoag, 2016[28]). As a result, workers and families hit by adverse shocks from technological change or globalisation arguably face greater difficulties in moving to areas where employment opportunities are better.

The barriers to mobility do not appear to be related to rising homeownership, which does not appear to have made a material difference on labour market flows. Empirical evidence points to negative equity leading to lock in and higher homeownership rates being associated with higher unemployment, but these findings are either economically small or contested in other studies (Goodman and Mayer, 2018[29]). Interestingly, homeownership is not a barrier to inter-metropolitan moves, though the moves tend to be in pairs of cities with co-varying home prices (Sinai and Souleles, 2013[30]). As such, migration between declining areas and more prosperous metropolitan areas is likely damped, and contribute to the low net-migration rates. In any case, the recent decline in household mobility appears to be related to lower mover rates for renters. In 2017, just over one-fifth of renters moved whereas in the late 1980s almost one third of renters moved accommodation. Difficulties in finding suitable accommodation in more prosperous cities may be related to this dynamic.

In comparison with other OECD countries, housing is expensive for low-income households in the United States (Figure 1.14). Housing cost burdens are large for private renters and low income private house owners with a mortgage. Furthermore, rental housing affordability has deteriorated. Social housing accounts for only a small fraction of the housing stock (4.5%). In comparison with many other OECD countries, the amounts spent on social housing are modest. The main Federal programme is administered by Housing and Urban Development using vouchers, which are distributed by lottery, that cover part of the cost. However, these are undersupplied given demand. Cities can support social

housing by requiring new developments include affordable housing units (or by levying a fine when affordable housing units are not included in the development).

Figure 1.14. Housing is expensive for lower income households

A. Rent (private): share of population in the bottom quintile of the income distribution spending more than 40% of disposable income

B. Mortgages: share of population in the bottom quintile of the income distribution spending more than 40% of disposable income
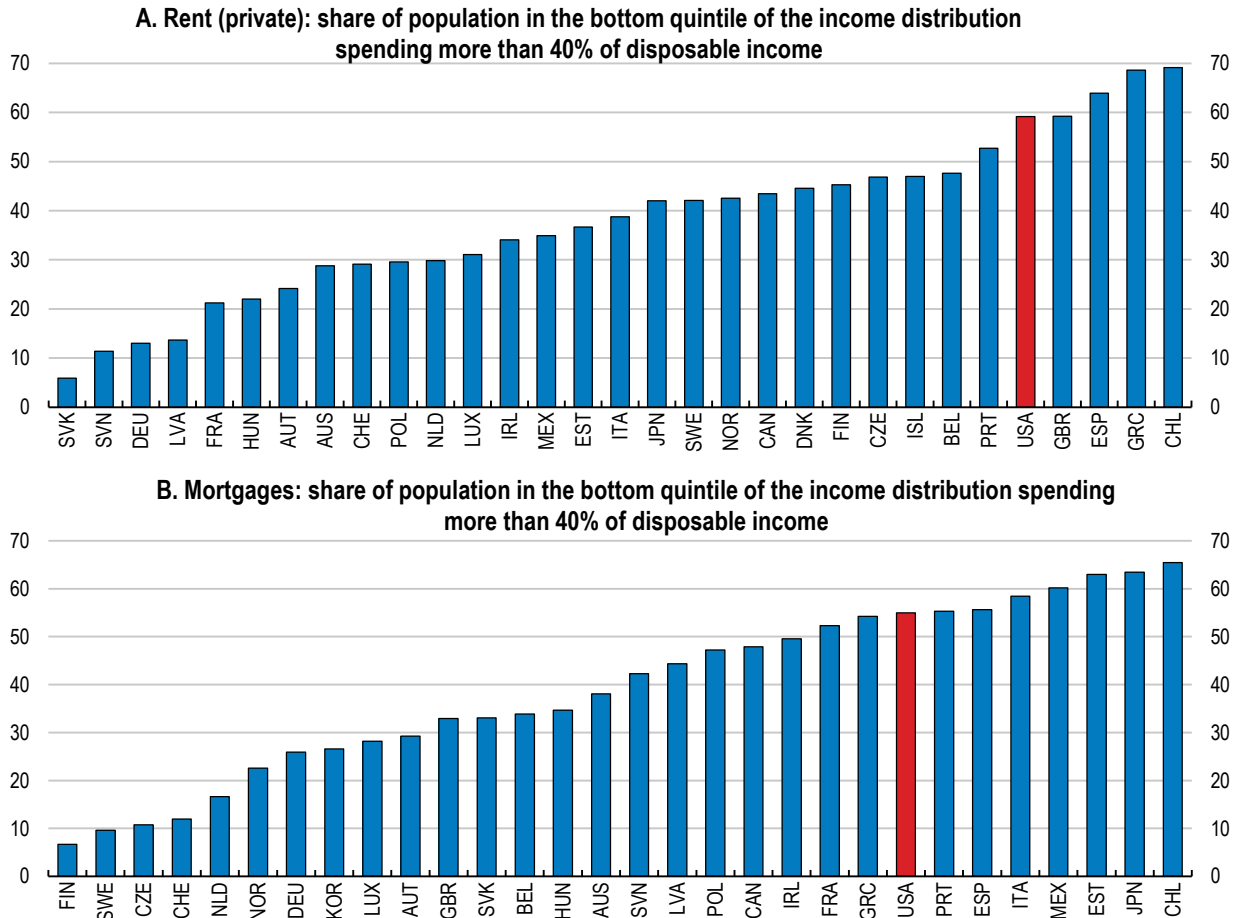
Source: OECD Housing Affordability Database.

Part of the different dynamics in house prices across the country relates to housing supply. The housing supply response in the United States has been amongst the strongest in the OECD. Over the past few decades the higher elasticity of housing supply in the South has enabled the relative shift of the population to more temperate locations (the Sun Belt) from the Frost Belt in the North East and Midwest.

However, it appears that the supply elasticity has been more muted following the crisis (Box 1.4). Whereas the supply response helped move the housing market back to equilibrium in the pre-crisis period, since the crisis the supply response has been muted, but the price response has continued to move to equilibrium, putting upward pressure on housing prices. Coastal areas where the economy is booming, such as San Francisco and Seattle, have limited topological scope to expand horizontally. This is compounded by zoning regulations that hinder the densification of cities.

Box 1.3. Housing supply estimates

In comparison with other OECD countries the price responsiveness of new housing supply in the United States is one of the strongest (Caldera Sanchez and Johansson, 2011[33]). The long-run price elasticity of around 2 was strong (Figure 1.15).

Figure 1.15. Price responsiveness of housing supply is high in the United States

Long-term price elasticity
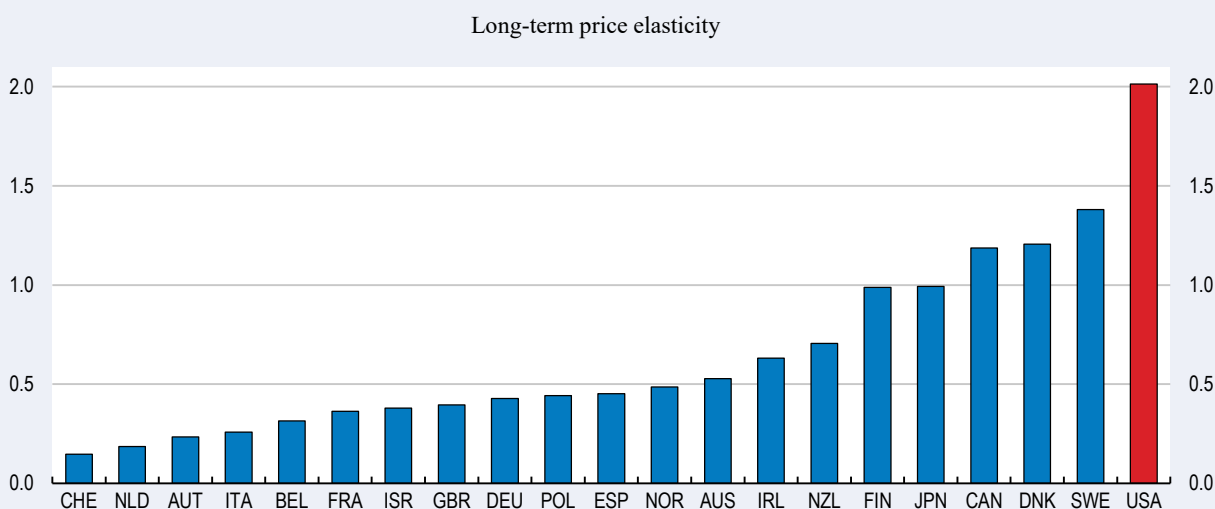
Source: (Caldera Sanchez and Johansson, 2011[33]).

Over time however the price responsiveness to supply appears to have weakened, but the link to prices of income demand remains. Re-estimating the equations yields similar elasticities for a sample from 1970 to 2015. Splitting the sample in half suggests that supply was more responsive in the first half but not the second, when the coefficient was statistically insignificant and economically less powerful. These estimates need to be taken with caution since the second half of the sample included the global financial crisis and developments in local housing markets across the United States exhibit very different dynamics.

One source of housing market friction arises from local regulation. Furman (2015) and Gyourko and Molloy (2014[31]) note that land use regulation adversely impacts economic activity. Estimates of how land use regulation hinder productivity in major cities suggests that it may reduce GDP by up to 2 percentage points in some calculation (Glaeser and Gyourko, 2018[32])and rising to as much as 9 percentage points in others (Hsieh and Moretti, 2015[33]). There is only limited information on the nature of regulation with the Wharton Land Regulation Index providing a detailed snapshot for 2007. The index reveals that minimum lot sizes are common and that "development fee extraction programs" are also very common. The approval process can vary markedly across localities from around 3 months to 10 months and that more groups are involved in project approval in the more regulated areas.

Housing regulation can help correct externalities, which may reflect different local preferences. Such preferences appear markedly different between California and Texas, for example, but are generally not enough to justify the large differences between prices and

construction costs. Additional factors contributing to house price differentials across cities include amenity values, with certain cities being far more attractive to live in due to for example higher cultural and environmental quality. In some cases, the tightness of some local zoning requirements reflects house owners' desire to protect house prices to the detriment of potential movers to these areas.

Restrictive land use regulation raising housing prices may undermine cities in the longer run. Limiting housing supply can reduce population density and thus potential agglomeration effects (complementarities between population density and productivity). Existing property owners, typically older people, enjoy wealth gains from higher housing prices, but at the cost of making housing less affordable for younger adults and people wanting to relocate to the cities where employment probabilities are higher.

Other OECD countries do not experience the same degree of local-level land-use regulation, mainly because land-use authority resides at a higher level of government, which mitigates co-ordination problems. Nonetheless, many OECD countries confront similar challenges. Restrictive land use regulations have limited sufficient new housing construction and hindered densification, particularly in low density areas close to city centres and along mass transit routes. Densification in these areas is typically needed to keep housing affordable for low- and middle-income households.

Options to make land-use regulation more flexible include moving from single use zoning to zoning based on the nuisance externalities. In this context, local preferences can be respected in core planning objectives while at the same time allowing mixed-use developments. Spatial planning for housing should not occur in isolation and take into account transport, network utilities and other land uses. These are important to encourage city form that allows greater accessibility, reduces congestion and local air pollution, as well as mitigating climate change. These considerations call for metropolitan bodies that can co-ordinate policies across the metropolitan area (and foster links outside) and avoid potential undersupply or supply in inappropriate areas (Ahrend et al., 2014[34]).

A related feature of metropolitan governance fragmentation contributing to housing undersupply can occur with business and sales taxation. In cases where local governments within a metropolitan area retain this tax base, an undersupply of housing can occur as localities chase revenue sources. An exception is the Minneapolis metropolitan area which pools sales tax revenues and then redistributes on a per capita basis (Metcalf, 2018[35]).

Licensing barriers to employment and migration

Occupational licensing is used to ensure public health and safety amongst other policy objectives. As such there are good reasons, particularly in the medical sector and in occupations such as civil engineering. This is reflected in the coverage of licensing of the workforce. Licensing is most common in education and health services and is also widespread in government, particularly for local government where teaching is likely an important employer (Figure 1.16). However, there is also licensing which is harder to justify on public policy grounds and rather appears to have morphed from its original purpose to protect local rents (Kleiner and Vorotnikov, 2017[36]). Ultimately, from the perspective of workers in regions being hit by negative technological or globalisation shocks, the spread of occupational licensing creates additional frictions. As households have increasingly multiple breadwinners the growth of occupational licensing affects a growing share of households. In this context, the costs of moving to make a better employment match is made more complex if other members of the household need to

acquire new licences to continue their employment. This is also likely to contribute to problems of mismatch if workers are constrained to search in local labour markets.

The impact of occupational licensing on income appears to be most pronounced for workers with relatively low educational attainment. Wages are approximately one-fifth higher for workers that did not finish high school who also hold a certification or an occupational licence. There is essentially no wage difference for workers who completed college and hold an occupational licence. Licensed workers tend to earn higher wages in transportation, construction and legal services.

Figure 1.16. The share of workers with certification or licences is high

% of employed with a certification or licence
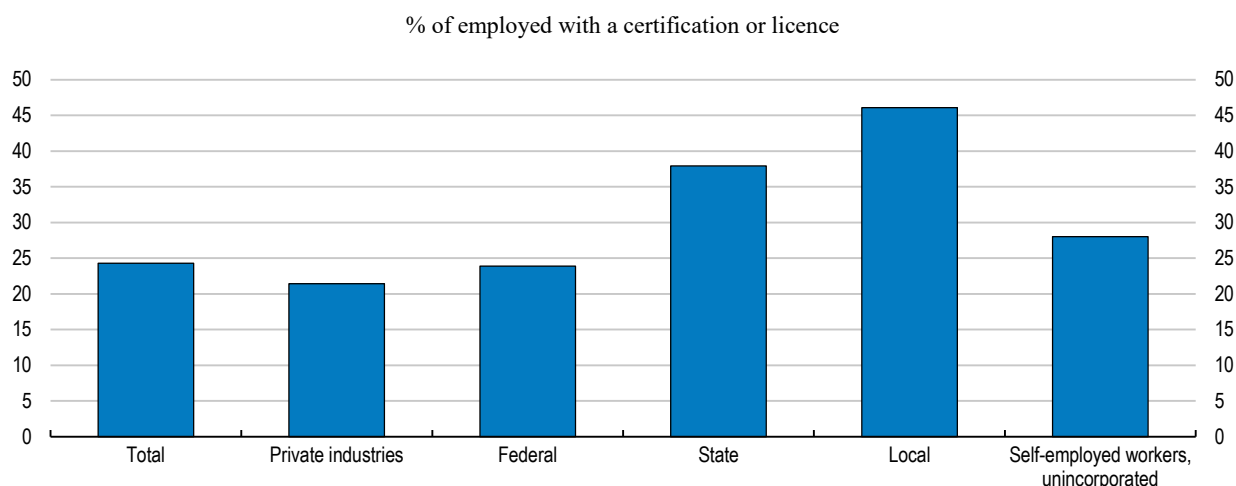
Source: Bureau of Labor Statistics.

Occupational licensing can have negative effects on employment by hindering job movements. Job-to-job flows in the U.S. have exhibited a net decline over the past decade, which is a source of concern given that job transitions is a source of opportunity for workers (OECD, 2016). One factor that has been attributed to this decline is the prevalence of regulatory barriers, notably occupational licensing. State-level licensing can result in requirements that are heterogeneous across states. Workers, therefore, are obliged to obtain separate licences with varying levels of requirements for each state, which can imply significant commitments in terms of time, effort and financial resources when relocating. This hinders workers from reaping the advantages of career opportunities elsewhere and can subsequently result in a mismatch between the demand and supply of talents. Nevertheless, the extent to which licensing contributes to the decline in labour market fluidity remains quantitatively unclear. Recent evidence does suggest it has played a role in reducing inter-state migration (Johnson and Kleiner, 2017[37]).

A consequence of licensing is that it can block access to particular jobs for a large share of the population. This arises through requirements to pass a criminal background check in order to obtain a State licence. There are an estimated 27,254 State occupational licensing restrictions for those with a criminal record. Estimates of the size of the population with a criminal record suggests that a sizeable share of the population may be affected by these restrictions and due to the over-representation of black and African American men with criminal records, these background checks effectively constrain their employment opportunities (Figure 1.17).

Figure 1.17. The share of felony convictions in the population has increased
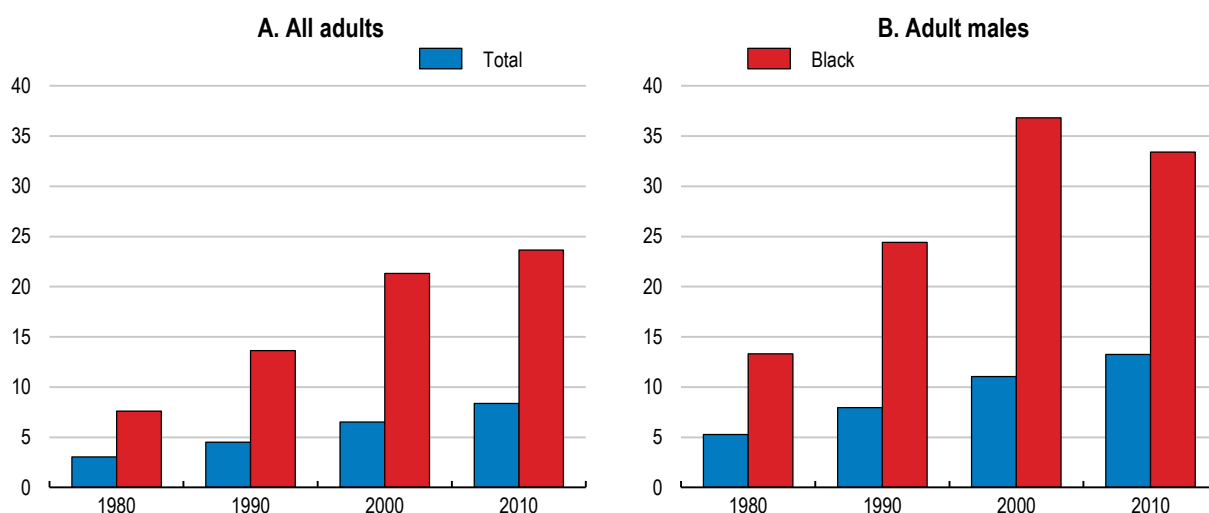
Source: (Shannon et al., 2017[38]).

Occupational licensing is also an important issue elsewhere in the OECD. Surveys in the European Union show that the share of regulated professions in the total labour force is a little over 20% on average, but with substantial variation across countries. For example, the share in Denmark is under 15%, whereas in Germany it rises to over 35%. The variation in the number of regulated professions is substantial ranging from just 76 occupations in Lithuania to 545 in Hungary. Economic analysis of the impact across Europe suggests that employment in these professions could be up to 9% higher and that the aggregate wage premium in these sectors is 4%. Furthermore, related analysis suggests that making barriers less onerous resulted in improved business dynamism, encouraging new firm creation and the development of innovative services.

There are a number of strategies to minimising the costs of licensing, although successful experience in the United States is scarce. One study only uncovered 8 instances of States de-licensing an occupation over 40 years (Thornton and Timmons, 2015[39]). The approaches include sunset clauses, reviews, switching to voluntary registration or certification, and mutual recognition:

- Sunset clauses have proven largely ineffectual in reducing unnecessary licensing. While 36 States since the 1970s have introduced sunset laws that require periodic "performance audit" of occupational licensing schemes to determine whether they should be maintained around one half of the States subsequently repealed or suspended the laws. Furthermore, most audits recommended continuing the licensing and in the few cases where de-licensing was proposed the State legislature ignored the recommendation.
- When the public interest objective is not well served by occupational licensing, switching to a voluntary scheme is one way to minimise the economic burden of the law. For example, Texas switched its scheme for interior designers to a voluntary scheme in 2009. An alternative approach to reform is to reduce the scope of licensing. For example a number of states have exempted hair braiding from barber of cosmetologists occupational licensing.

- Another approach is to pursue mutual recognition to reduce barriers to inter-state migration. New evidence for this survey suggests that this approach does appear to relax some of the constraints on inter-State migration (Box 1.5). Incentives for States to pursue reciprocal recognition were contained in the Administration's infrastructure initiative.

The European Union has been grappling with similar issues for the movement of professionals. Given the diversity of regulatory approaches across the European Union, the 2013 Professional Qualifications Directive introduced a mutual evaluation exercise which required member countries to review all regulated professions. This process garnered information on the regulation in place and how the level of regulation varied across countries, notwithstanding the same underlying rationale. On the basis of this information, countries then were required to produce National Action Plans that would justify when regulations were maintained or amended. The European Commission is working to improve mobility for specific professions by creating "services passports" and introduce a proportionality test which provides a framework for countries to assess the extent to which their occupational licensing induces harmful economic consequences.

Technological change also has the potential to modify regulation. For example, the Productivity Commission in Australia note that online rating of companies could potentially reduce the need for government regulation to ensure consumer protection.

Box 1.4. Mutual recognition of State-level licensing

The Nurse Licensure Compact (NLC) whereby States recognise the licences of other States that join the Compact offers a way to study its impact on interstate job mobility within the relevant sector. Membership of the NLC has gradually expanded over time since its creation in 1999 and now covers 26 States.

This expansion of coverage can be used to help understand whether the adoption of the Nurse Licensure Compact increases job-to-job flows in the healthcare and social assistance industry from a given Compact state. The econometric approach adopted to study this was estimating difference-in-differences regressions. The empirical work done for this Survey exploits a relatively new dataset of job-to-job flows released by the U.S. Census Bureau that has not yet been used to study the effects of occupational licensing and job mobility.

The results of the difference-in-differences estimation suggest an approximately 11% increase in job outflows within the health and social assistance industry (significant at the 1% level) following the implementation of the NLC (see Table 1.1, column 1). By contrast the empirical specifications examining whether the result is potentially spurious by checking job-to-job flows that are not between Compact States do not show any meaningful increase in inter-regional migration between States on joining the Compact.

Table 1.1. Regression results of impact of mutual recognition on migration

	Compact to compact states	Compact to non-compact states	Compact to an states
VARIABLES	(1) logj2j	(2) logj2j	(3) logj2j
Treat	-0.0326	0.442***	0.00907
	(0.0255)	(0.0543)	(0.0292)
Post	0.00883	0.0112	0.00952
	(0.00813)	(0.00814)	(0.00824)
Treat X Post	0.111***	-0.108*	0.0205
	(0.0342)	(0.0612)	(0.0330)
Observations	439,672	439,672	439,673
R-squared	0.142	0.143	0.142
Outcome mean	0.978***	0.979***	0.978***
	(27.93)	(0.0349)	(0.0350)

Robust standard errors in parentheses
***p<0.01, **p<0.05, *p<0.1
Source: Abdul Ghani (2019).

Skills and labour market opportunities

Beyond the importance of ensuring high quality pre-primary and compulsory (K12) education to provide strong foundations, workers acquire needed skills in preparation for

joining the labour force or when moving between jobs and occupations from 2 and 4 year colleges and on-the-job training.

Over time, the proportion of students attending colleges has been rising from around one quarter of 18-24 year olds in the 1980s to almost two-fifths in the mid-2000s. Most students attend four year colleges, where the individual returns to investment in education have been substantial. Furthermore, unemployment rates amongst those with bachelor degrees are typically noticeably lower than those finishing two year programmes or those with high school graduation (Figure 1.18). Enrolment in post-secondary career and technical education has also been rising. This part of the system is highly decentralised and has strengths in its diversity and flexibility in meeting the needs (OECD, 2015[40]).

Figure 1.18. Unemployment rates amongst those with college education are lower
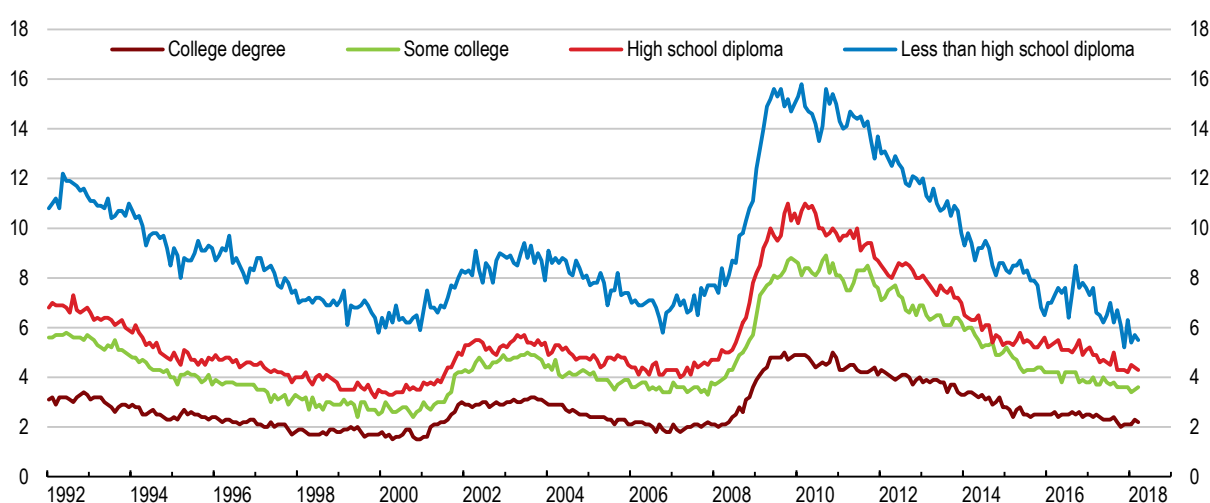
Source: Bureau of Labor Statistics.

While formal education settings can play a major role in providing workers with requisite skills, experience across the OECD also suggests that work-based learning opportunities are valuable complements. This is probably particularly appropriate for students who are less suited to continuing in formal education but would benefit from acquiring additional skills to enhance their employability.

As work-based training is linked directly to employers' needs it can provide needed skills and build the soft skills valued in the work environment (OECD, 2017[5]). There are three conditions that help boost the effectiveness of work-based learning. First, quality needs to be assured and employers engaged in the programmes. Second, the courses need to be affordable and attractive to workers. Third, the competencies gained need to be recognised. In achieving the first two criteria, support for businesses and students likely entail a fiscal cost. The recognition of skills has created obstacles to movement in some professions (either due to occupational licensing or qualifications not being portable from one State to another, either due to differences in curricula or lack of understanding in what the qualification signifies). In this context, the Credential Transparency Initiative is a potentially useful approach to helping prospective students understand what different courses are offering and what employers are demanding (CFR, 2018[13]). Instituting a voluntary hallmark scheme would be another approach to clarifying the bewildering array of options.

The Economic Report of the President recommends allocating resources to promoting apprenticeships and building partnerships between education institutions and employers as a means to promote greater labour force participation among younger cohorts (CEA, 2018[41]). Apprenticeships play a relatively small role in the workplace in comparison with other countries. Data for 2011 reveals that in the United States there were fewer than 15 apprenticeships per 1000 workers. In Canada this figure was closer to 30, whereas in Switzerland it was around 45 (OECD/ILO, 2017[42]).

Apprenticeship programmes can help facilitate the transition to work. This is important as young people who disengage from the labour market subsequently tend to experience more difficulties in finding stable employment in the future (OECD, 2010[43]). The share of young adults not in employment, education and training is around the average of the OECD, and noticeably higher than in Germany and Japan (Figure 1.19). Building basic and transferable skills into these types of education facilitates workers moving between jobs, particularly when the economy reacts to technological change or other shocks. A variety of models exist with different focus, such as ones targeting the school to work transition, as in Germany, to designs that take into account location such as apprenticeship hubs in cities in the United Kingdom to apprenticeships serving rural areas in Norway (OECD/ILO, 2017[42]). Successful apprenticeship training programmes, such as those in Australia, Austria, Germany and Switzerland, are founded on strong collaboration between employers and other stakeholders combining on-the-job and off-the-job training. The strong role of the employers helps ensure the training provides relevant skills.

Figure 1.19. Young adults face difficulties in entering the workforce

20-24 year-olds not in employment, education or training (NEET), 2016 or latest year available
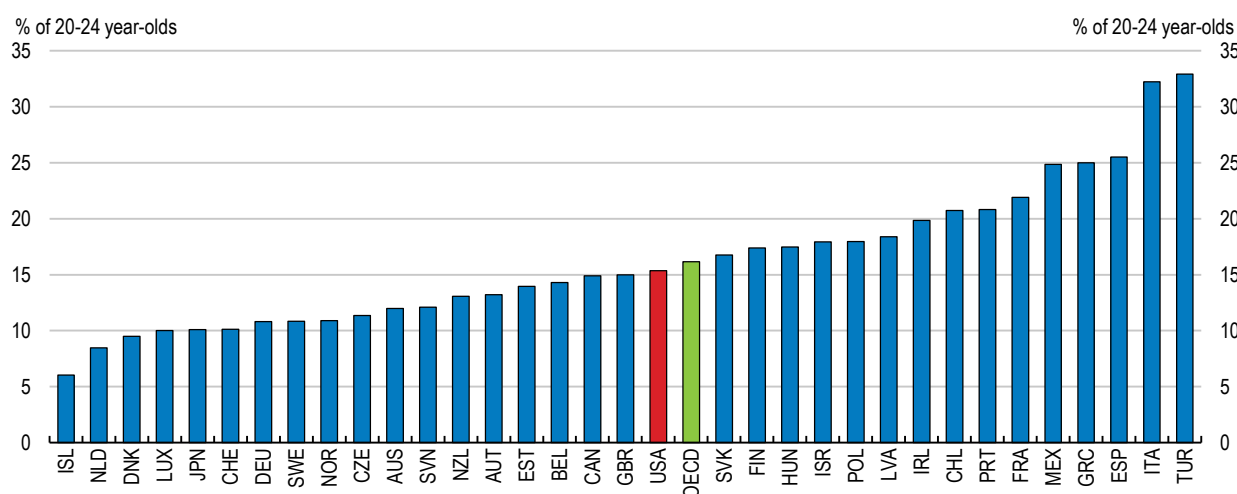
Source: OECD Education at a Glance: Transition from school to work database.

The traditional education system and expansion of work-based training, such as apprenticeships, meet an important part of education needs, mainly targeting those entering the labour market. For those already working, the prospects of structural shocks implies that workers need to become more resilient and able to adapt to changing demands for skills. With respect to the increasing use of technology, improving digital skills possessed by the adult population in the United States suggests one way life-long learning could boost employment opportunities. Older cohorts of workers already possess greater aptitude than

older workers in many other OECD countries, but the younger population appears to be less equipped with digital skills in comparison with other OECD countries (Figure 1.20).

Figure 1.20. Digital skills are relatively less developed amongst younger cohorts

Share of 25-34 and 55-64 year-olds performing at Level 2 or 3 in problem solving in technology-rich environments
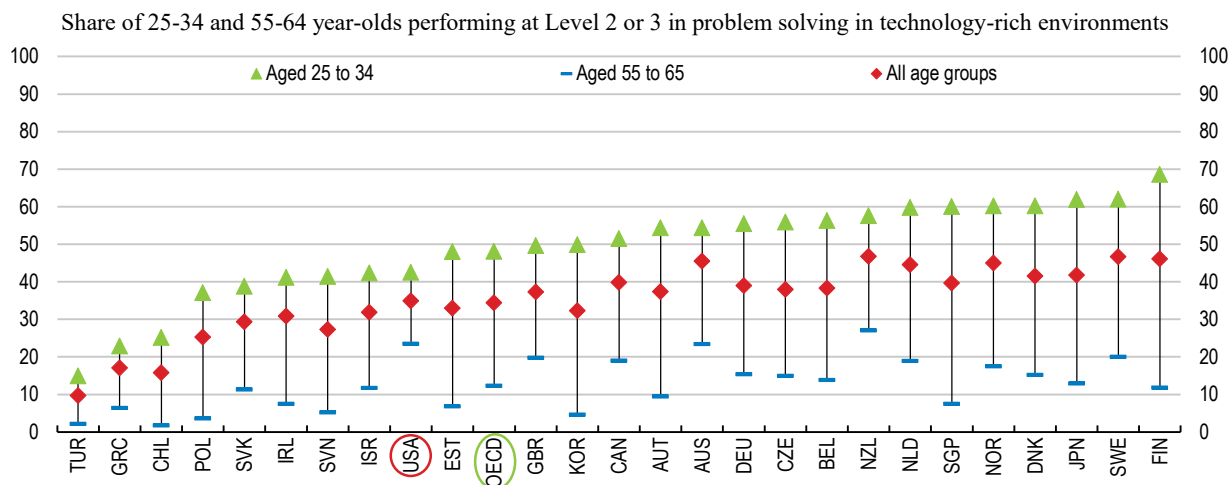
Note: Individuals in Level 2 or Level 3 have more advanced ICT and cognitive skills to evaluate problems and solutions than those in Level 1 or below. The OECD average is the simple unweighted average across countries.
Source: Survey of Adult Skills (PIAAC) 2015.

In comparison with other OECD countries, adult Americans are more willing to participate in further education (both formal and non-formal learning activities). Survey evidence suggests that over one third of American adults want to participate, whereas the unweighted OECD average is about one quarter (OECD, 2017[44]). Barriers to participation include caregiving responsibilities and the pressure of work, which are cited in about the same frequency as in other counties. On the other hand, the expense of adult education creating a barrier to participation was cited more frequently in the United States than the OECD on average, 24% and 15% of respondents, respectively.

Educational spending tends to be pro-cyclical at the State and local level, which is the main source of financing. As such, when labour markets experience large negative shocks, current education spending has been restrained (Figure 1.21). This can limit opportunities for displaced workers, including through programmes offered by community colleges, which have felt the squeeze in the recent downturn. Furthermore, public investment in education has stalled since the beginning of the century (Figure 1.20). This has occurred at both the Federal and the State and local levels especially after the financial crisis. Current spending and investment has only begun to recover somewhat after 2013. More spending does not necessarily translate into better outcomes, yet the past experience of education spending raises concerns about whether training provision will be sufficient to address skills challenges during periods when workers most need retraining.

Figure 1.21. Current spending and investment in education has slowed

A. Current education spending

B. Education capital stock
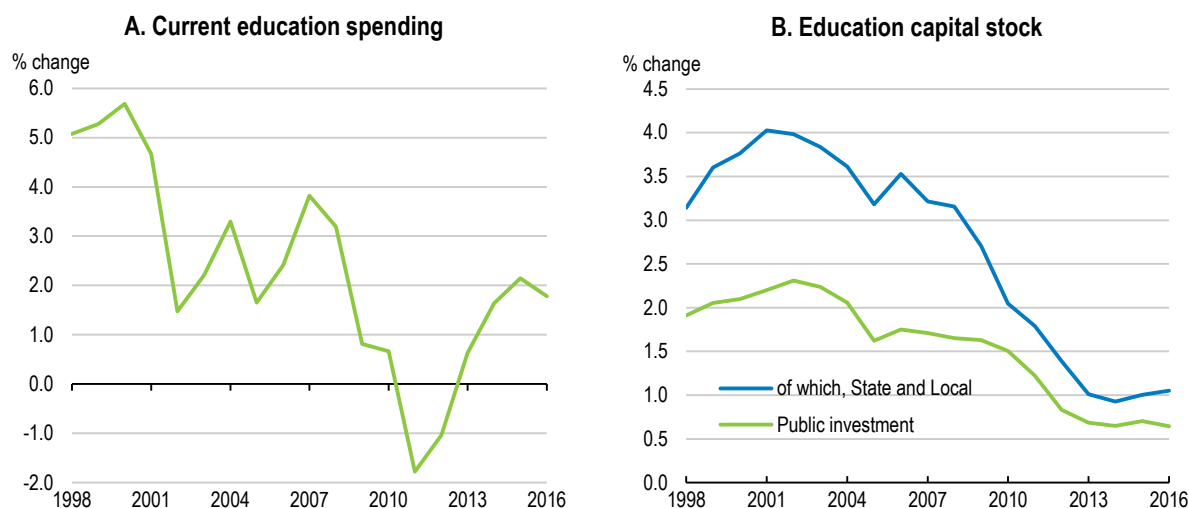
Source: Bureau of Economic Analysis.

With some - often low-skilled - workers on more precarious types of contracts or participating in the gig economy that preclude on-the-job training opportunities, enhancing skills becomes difficult. However, reaching these groups has proven difficult, including due to the cost of the training. The low-skilled, in particular, are often not well prepared for further learning (OECD, 2016[45]).

The prospects of harnessing technology through the use of massive open online courses and open education resources potentially offers a means to reduce costs and increase accessibility. Efforts are needed to ensure quality and qualification recognition to become an effective complement to other educational approaches. In addition, as these resources require familiarity with digital technologies, the continued rollout of broadband infrastructure (as recommended in the previous *Economic Survey* and the current Administration) and helping students and workers acquire these skills acquires considerable importance (OECD, 2017[5]).

Finally, ensuring workers are well prepared for work also requires that they learn appropriate skills. As technological change continues apace, the types of skills required on the labour market are likely to change. The duration of courses means that reactivity to current demands can only be met with some lag. In this light, education and training need to anticipate demands for skills. Forecasting the demand for particular types of skills is inherently difficult. However, using big data (from online job openings) may help signal where changes in demand for skills are emerging. Ultimately, however, all stakeholders need to co-operate to ensure that changes in curricula are responding to actual needs.

Health, drug addiction and re-employment prospects

Improving employment prospects has a link with health, including mental health. The relationship is complex, though there is some evidence that job loss can incur considerable physical and psychic costs and raise the risk of suicide. On the other hand, employment appears to improve life outcomes, including by reducing the need for medical treatment, as well as by raising household income. The work of Case and Deaton (2017[46]) highlighted

increasing midlife mortality due to suicides and drug and alcohol abuse since the late 1990s, contributing to relatively modest gains in life expectancy in the United States. While causality is complicated, the importance of drawing workers into the labour force and employment is highlighted by the relationships between non-participation and disability and drug use.

Opioid use appears to be connected to labour market conditions (Figure 1.22). Prescription rates appear to be higher where labour force participation is lower. There is also a possible relationship between drug use and disability. This may arise after the definition of disability was extended to include chronic conditions. Krueger (2017[47]) found that around one-fifth of the non-participating prime age males were also regularly taking opioid painkillers. This would account for around 0.6 percentage point of the decline in the male prime age participation rate.

The link with participation may be overstated as areas where poor prescribing practice was prevalent before the opioid crisis gathered pace were also areas with relatively poorly performing labour markets. The correlation with disability and opioid prescriptions could suggest that non-participation is a consequence of workplace injury in areas where physical labour was more prevalent. Indeed, the incidence of disability is concentrated in the old industrial heartland (Figure 1.23). However, disability has acted as a social safety net, with the undesirable consequence that very few recipients re-enter the labour market. In this context, a lesson from recent experience is to preserve the labour force attachment of displaced workers or run the risk of persistent non-participation, which generate costs that the public authorities ultimately end up shouldering.

Figure 1.22. Disability is correlated with lower labour force participation and greater opioid use

A. Disability and participation by State

B. Prescription and participation rates by State
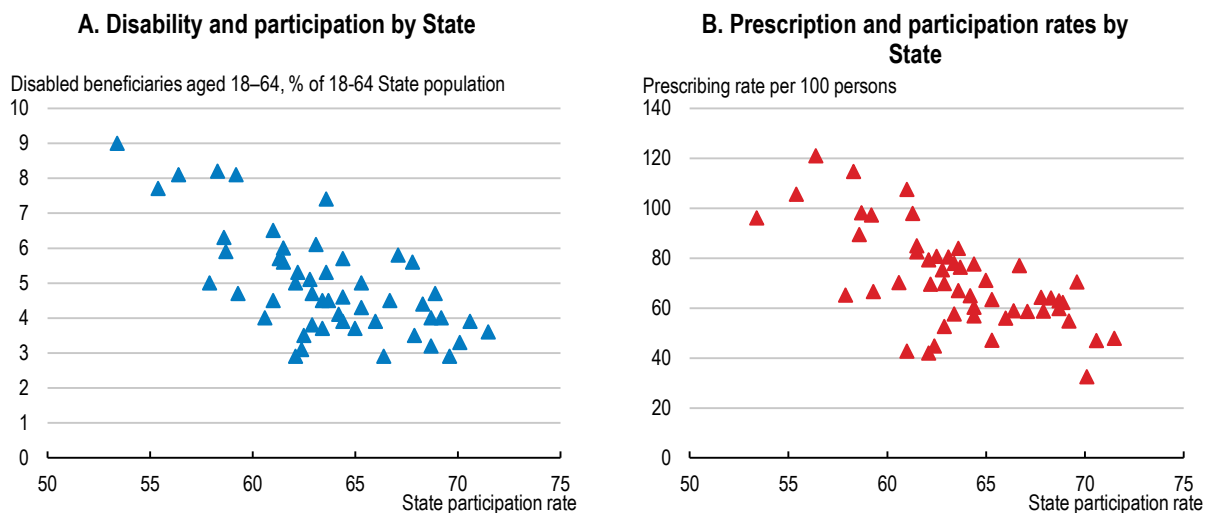
Source: OECD Labour force statistics; Centers for Disease Control and Prevention (CDC); and Social Security Administration (SSA).

Figure 1.23. Disability rates are higher in the South and eastern heartland

Disability insurance recipients as per cent of State population

(2.6,3.9]
(2,2.6]
(1.6,2]
[.9,1.6]
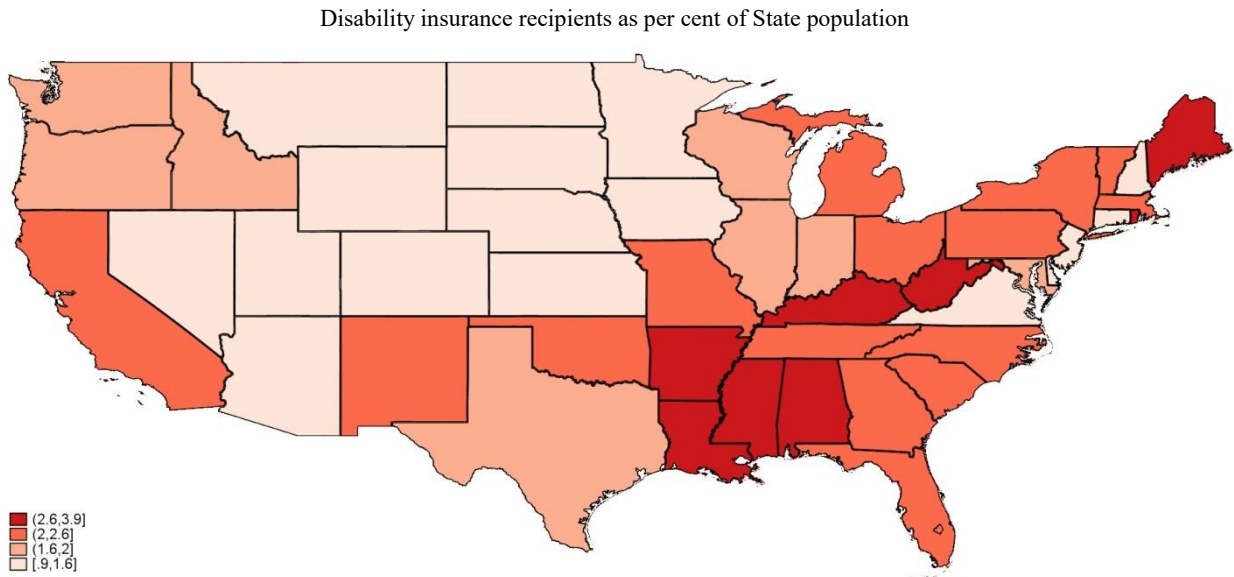
Source: Census Bureau and Social Security Administration.

The rise in drug-related deaths has been particularly dramatic (Figure 1.24). While opioid abuse is a problem in other countries, opioid use and death rates are considerably higher in the United States. For example, the age-adjusted death rate from opioid (all drugs) overdoses was 13.3 (19.8) per 100,000 in 2016. For comparison, in Australia, the age-standardised death rate for all drugs was 7.5 per 100,000. In Europe, drug-induced mortality rates were around 2 per 100,000 for the population aged 15 to 64, but were elevated in Estonia and Sweden, where they were closer to 10 per 100,000 (EMCDDA, 2017[48]).

Figure 1.24. Deaths from alcohol and drug induced causes have been rising sharply

Deaths by underlying causes per 100 000, 1999-2016

A. Non-drug induced causes

- - - - Alcohol
——— Suicides
– – – Motor vehicles accidents
——— Homicides

B. Drug-poisoning causes
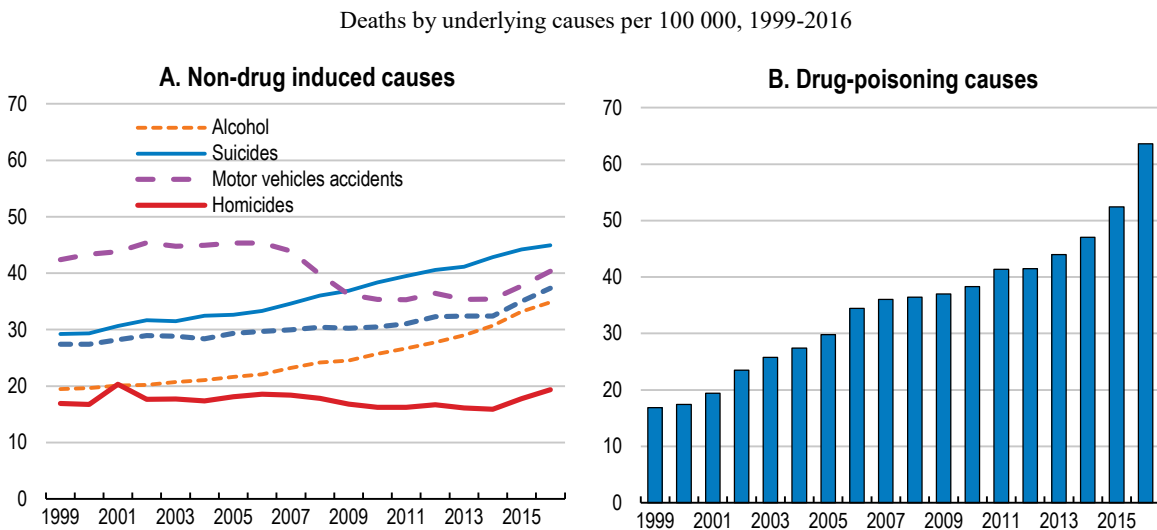
Source: CDC Wonder database.

Costs of the crisis

The consequences of the opioid epidemic are not only felt through deaths but also through the impact on livelihoods and breaking up homes. For example, parental neglect or incapacity to care is forcing public authorities to take children into care. The effects on livelihoods can also be dramatic. While possible to remain in employment, the correlation with non-participation in areas most beset by opioid addiction suggests that addiction ultimately impairs participation. In addition, when addiction leads to criminality, the consequences of a felony record can drastically reduce employment possibilities. The spread of opioid addiction and the growth of the illicit drug market have adverse social consequences with the growth of criminality and the consequences for communities as households who can move leave the areas most affected.

Standard measures of the cost of opioid addiction and deaths include the effects from lost wages and productivity as a result of death, incarceration and decreased productivity associated with drug addiction. Estimates suggest that this could amount to around $40 billion (Table 1.2). Significant costs arise from providing health care. Other costs arise with spending on policing and criminal justice system and child and family assistance spending.

Table 1.2. The costs of the opioid crisis are substantial

Estimates of the costs of the opioid crisis in $ billion

	2013	2016
Lost wages and productivity	$41	$40
Health care costs	$26	$21
Substance abuse treatment	$3	
Policing and criminal justice	$8	$8
Child care and family assistance		$6
Tax revenue foregone		$16

Note: The estimates for 2013 are from (Florence et al., 2016[49]) and 2016 are from (Rhyan, 2017[50]).
Source: (Florence et al., 2016[49]), (Rhyan, 2017[50]).

Drug misuse and abuse puts considerable pressure on public services. In 2014, there were over 400,000 emergency room visits and over a quarter of a million hospitalisations for drug poisonings. Opioid overdoses accounted for around one-fifth of these hospitalisations and one-quarter of these emergency room visits. Medicare and Medicaid are the primary payers in around two-thirds of opioid poisoning cases. Public outlays are also incurred through costs for policing, law enforcement and other public services in dealing with drug overdoses. In addition, the treatment of addiction represents another cost often borne by public authorities. On the other side of the ledger, lost productivity also has effects on tax revenue. Estimates of this suggest that in 2016 the combined impact would reduce Federal, State and local tax revenue by almost $16 billion, or around ¾ percentage point of current receipts. As many of the costs are borne by State and Local governments the impact will vary significantly across the country depending on the intensity of the problem locally.

The consequences of the opioid epidemic are even more profound if rather than just the effects on wage and productivity, estimates also account for the value individuals put on their own lives. The Council of Economic Advisors estimated that the cost rises to over $500 billion when taking into account deaths (based on age-adjusted estimates of the value of statistical lives) (CEA, 2017[51]).

The opioid epidemic and drug use

The opioid epidemic emerged relatively unnoticed until death rates surged in the past decade. In part, the scale of the problem confronting the United States is the sheer prevalence of opioids. The prescription of opioids per capita is significantly higher than elsewhere in the OECD (Figure 1.25). The pharmaceutical industry and healthcare sector appear to have played a role in the genesis, and to which they are now reacting. As pain management philosophies changed, particularly with respect to treating chronic pain, pharmaceutical companies and medical doctors increasingly advocated opioids for a wider range of conditions. Between 1999 and 2014, opioid prescriptions quadrupled. This was compounded by relatively liberal policies on the number of opioids being prescribed, the duration of treatment and aggressive marketing. Anecdotal evidence also suggests that medical practitioners prescribed more drugs to reduce co-payments patients would need to make for repeat prescriptions. Prescription rates also varied considerably across the country, suggesting that prescription practice is poorer in some areas. Ultimately millions of individuals were exposed to addictive substances, either the intended patient or through unused drugs being taken by family members or others. By 2014, one in four patients receiving opioids for non-cancer chronic pain was struggling with opioid dependence. The amount of opioids available also facilitated drug misuse and abuse.

Figure 1.25. Opioid prescriptions are widespread in the United States

Per million
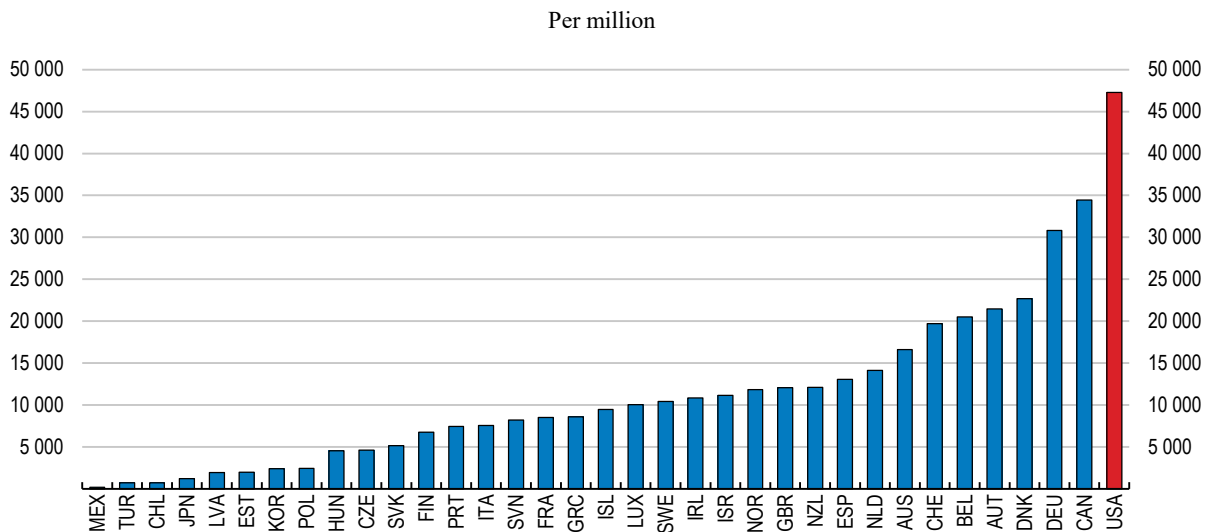
Source: INCB.

More recently, prescribing practice appears to be changing as the associated risks are becoming better appreciated, but opioid supply is still considerable. The prescription rate peaked in 2012 at around 80 per 100 persons and has subsequently declined in 2016 to under 67 per 100 persons and the average daily dosage has also been falling gradually. The decline in prescriptions is mainly accounted for by declines in supplies of less than 30 days. On the other hand, prescription rate for longer durations have remained relatively constant since the beginning of the decade, such that the average days of supply per prescription has increased from around 13 days in 2006 to 18 days in 2016.

With opioid use rising, intentional and unintentional deaths from drug overdoses have also been rising (Figure 1.26). There have been demographic differences with the death rates

for non-Hispanic whites (hereafter whites) significantly higher than other groups. In smaller metropolitan areas the likelihood of abuse or misuse of prescription pain killers is higher. Death rates are not surprisingly also higher in these areas, though there are some differences in the nature of the overdoses. Prescription opioid overdoses are a much more common cause of death in smaller cities and urban areas. In larger cities, particularly the large fringe metropolitan areas, heroin and synthetic opioids (such as fentanyl) are responsible for a large share of overdoses. Given the differences across places, improving prescribing practice (as recommended by the Administration's opioid imitative) and controlling the flow of opioids in smaller metropolitan and rural areas promises to regain control over opioid use. However, without addressing underlying addiction, tightening access to prescription opioids can push individuals with opioid dependence onto the illicit market for drugs.

Figure 1.26. Overdose death rates vary considerably across States

Drug-induced deaths per 100 000 in selected States, 1999-2016
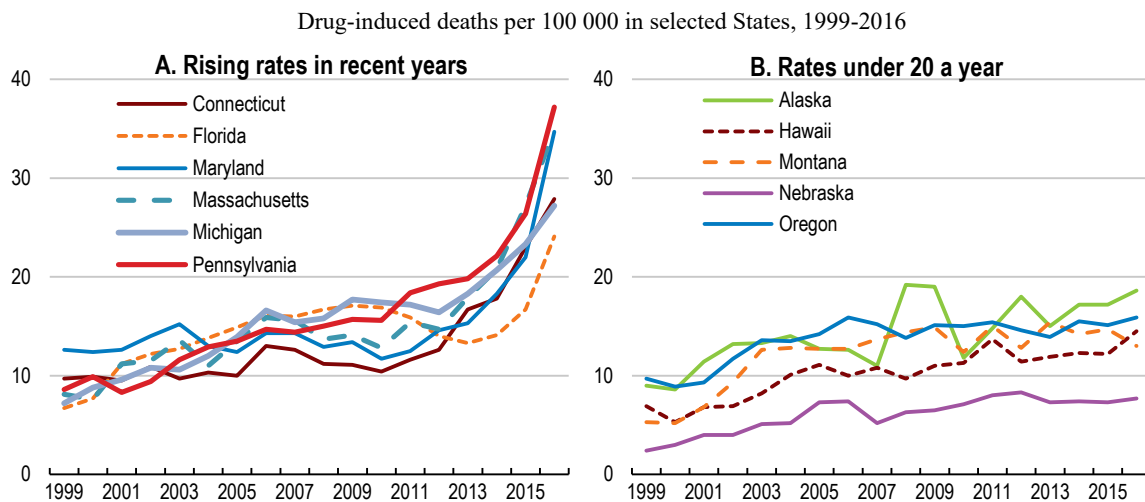
Source: NCHS, National Vital Statistics System Mortality, CDC WONDER database.

More recently, the use of illicit and extremely potent substitutes for prescription pain killers has grown rapidly and contributed to marked jumps in deaths from overdoses since the beginning of this decade. Death rates due to heroin overdoses spiked first from 2010 for whites and then subsequently for other groups with the exception of Asian or Pacific Islanders (Figure 1.27). Death rates from synthetic opioid overdoses (e.g. Fentanyl) began to spike up from 2013. Fentanyl and related drugs are orders of magnitudes more potent than heroin, which helps account for why overdose deaths have risen so dramatically. The dose of illegally supplied fentanyl can vary enormously depending on how the drug is mixed with other compounds and can be fatal. Indeed intravenous abusers have died before fully injecting the syringe. The potency of these drugs also presents mortality risk to family members and first responders if they are exposed to the remaining drug.

Figure 1.27. Deaths from drug overdoses

Selected drugs involved in overdose deaths in the United States (1999-2016) and by Race
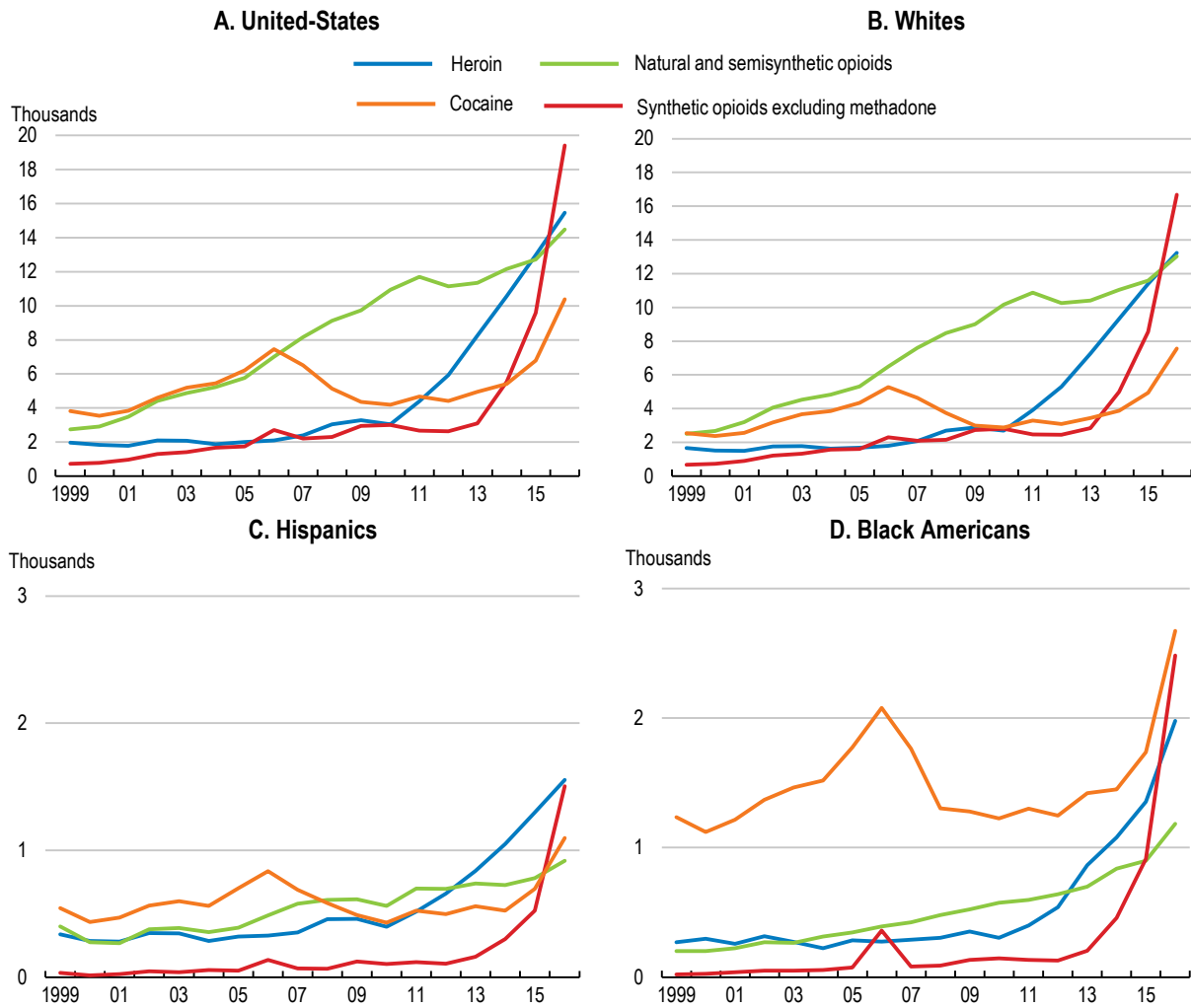
Note: Natural and semisynthetic opioids include morphine, codeine, hydrocodone and oxycodone. Synthetic opioids excluding methadone include fentanyl, fentanyl analogs and tramadol.
Source: NCHS, National Vital Statistics System Mortality, CDC WONDER database.

There is some experience elsewhere in the OECD with the use of synthetic opioids. In Estonia, overdose rates surged in the early 2000s largely due to supply disruptions for heroin inducing switching to substitutes, notably fentanyl. Death rates are now falling, in part due to subsequent cohorts avoiding the drug as well as the government's programmes, such as drug-replacement therapies. In part, the death rates are also falling because so many of the initial drug users are now dead. In Germany, where fentanyl prescription rates are higher than elsewhere in the OECD, overdoses have risen (partly due to the diversion of legally acquired drugs). Given the potency of the drugs and the small amounts that need to be transported, combatting illicit supply is extremely difficult, though with some success recently. U.S. Custom and Border statistics reveal that discovery of fentanyl has increased considerably in the past couple of years from essentially none in 2015 (US CBP, 2018[52]). These statistics also show a marked increase in seizures of methamphetamine (which tripled between 2012 and 2017).

Policy responses

Public policies can adapt to limit the emergence of new opioid abuse, by addressing the potential for creating opioid dependence. Adopting best practice in prescription practice and removing unused drugs from circulation would be important steps in reducing the scale of the problem. Design is important as some empirical studies fail to identify policies that make a significant difference in outcomes. Nonetheless, differences in the trajectory of drug-related deaths in States, such as the stabilising of elevated death rates in Nevada and New Mexico rather than continually rising, suggests that there are factors that can constrain misuse and abuse.

A number of initiatives appear to have an effect in addressing the use of prescription opioid painkillers. For example, in Minnesota health authorities introduced electronic monitoring to identify doctors who overprescribe and patients who are trying to source painkillers from different healthcare providers. This has led to a one-fifth reduction in prescriptions of the most common painkillers (hydrocodone) between December 2014 and December 2016. This does not mean that pain management is ignored as non-opioid painkillers are available and used to a greater extent in other countries.

At the national level, the FDA is considering introducing extra hurdles for doctors wishing to prescribe more than a limited supply of opioids. Not only may this prevent patients developing addiction by continued use, but prevent experimentation by others in the household, which is another pathway to developing addiction. This approach to limiting misuse can be complemented by creating drop off places where excess drugs can be disposed of safely. And information programmes documenting the risks may help reduce some of the demand.

A different set of policies are needed to help people with opioid dependence. One of the most immediate concerns is preventing avoidable deaths. Naloxone and similar drugs have proven efficacy in reversing the effects of opioid overdoses and thereby saving lives. Making these drugs more widely available would help reduce deaths from overdose. Some European countries have schemes allowing naloxone to be taken home by the drug user (EMCDDA, 2017[48]). A few countries have drug consumption rooms, where death from overdose is much less likely. Almost all countries have needle and syringe programmes, which can prevent the spread of infectious diseases, which can be very expensive to treat (such as hepatitis C).

An additional problem for policymakers arises when limiting accessibility to prescribed painkillers induces switching to alternatives, such as heroin or fentanyl, on the illegal market. Such alternatives are likely to be more closely linked to poisoning given that dosages may vary dramatically between sources or when illegal drugs are contaminated with other chemicals. Notwithstanding these complications, actions to prevent addiction from arising should eventually feed through to a diminishing problem of addicts seeking illegal substitutes. Successes in reducing the circulation of illegal drugs will also help in this regard.

A second set of policies to address opioid dependence would work to wean addicts off opioids. Medically-assisted treatments using methadone and in some cases abstinence programmes are used across the country. Programmes dealing with addiction should consider methadone and related drugs as part of the treatment regime (as is the case in many other countries where supervised injection has reduced overdose rates). But the numbers treated this way are relatively limited in comparison to the scale of the problem (currently licensed medical staff could cope with 1.5 million people being treated (AAFP, 2016[53])).

Against this background relaxing some of the current administrative restrictions - where medically appropriate - would help reach a larger group of the population. For example, removing restrictions on treatment facilities (such as requirements on the number of rooms they must have) and broadening the number of doctors who can administer medically assisted programmes, particularly in rural areas where coverage by medical practitioners is limited, would help expand the reach of addiction treatments.

Past estimates suggest many individuals with drug abuse disorders - around 60% - do not undergo medically-assisted treatment, despite their existence (Compton et al., 2007[54]). Increasing treatment rates will require action to reduce the stigma associated with drug dependence and increase awareness of treatments options amongst drug users and medical practitioners. Efforts to develop new drugs to reduce cravings are underway though these drugs are not yet clinically proven to augment possible treatment options.

Successfully treating addiction will require complementary policies to reap the full benefits. These will need to address underlying problems linked to addiction and efforts to re-integrate addicts into work and housing to minimise the risks of relapse and recidivism. Finally, given the problems people with criminal records face in finding employment, the authorities should consider removing barriers to expunging criminal records of those who have undergone treatment successfully.

Box 1.5. Recommendations

Labour market policies

- **Increase spending on effective active labour market policies, such as job placement services and support to geographic mobility.**
- **Expand the use of apprenticeships and on-the-job training to ease the school-to-work transition.**
- Relax the full-time employment job search requirement in the unemployment insurance system.

Infrastructure and mass transit

- **Roll out initiatives to invest more in infrastructure, making use of greater private-sector financing, user fees and flexible risk-sharing arrangements**.
- **Improve mass transit systems.**
- Continue current policies to improve access to broadband in poorly served areas.

Housing market

- **Reform housing finance, including the government sponsored enterprises, to better target housing affordability measures to the rental market.**
- **Support the provision of affordable housing for low-income families.**
- **Use seed money to encourage States and localities to remove zoning restrictions and move to multi-use zoning.**
- **Encourage state and local governments to deregulate occupational licensing and recognise credentials granted by other States.**

The opioid crisis

- **Ease administrative barriers to the treatment of opioid addiction.**
- Make drugs that can reverse opioid overdoses more readily available.
- **Promote and expand medically assisted treatment options.**
- **Help reintegrate into employment, including by expunging criminal records, those who have successfully completed treatment for addiction.**

References

AAFP (2016), *Chronic Pain Management and Opioid Misuse: A Public Health Concern (Position Paper)*, American Academy of Family Physicians, https://www.aafp.org/about/policies/all/pain-management-opioid.html (accessed on 16 April 2018).

Abbott, R. and B. Bogenschneider (2018), "Should Robots Pay Taxes? Tax Policy in the Age of Automation", *Harvard Law & Policy Review*, Vol. 12, http://dx.doi.org/10.2139/ssrn.2932483.

Abdul Ghani, A. (2019), "The Impact of the Nurse Licensing Compact on interstate Job Mobility in the United States"*, OECD Economic Survey of the United States: Key Research Findings*, OECD Publishng, Paris.

Acemoglu, D. et al. (2016), "Import competition and the great US employment sag of the 2000s", *Journal of Labor Economics*, Vol. 34/S1, pp. S141-S198, http://dx.doi.org/10.1086/682384.

Acemoglu, D. and P. Restrepo (2017), "Robots and Jobs: Evidence from US Labor Markets"*, NBER Working Papers*, No. 23285, NBER, http://www.nber.org/papers/w23285 (accessed on 13 April 2018).

Acemoglu, D. and P. Retrepo (2018), *Artificial Intelligence, Automation and Work*, NBER, http://www.nber.org/papers/w24196 (accessed on 16 January 2018).

Ahrend, R. et al. (2014), "What Makes Cities More Productive? Evidence on the Role of Urban Governance from Five OECD Countries"*, OECD Regional Development Working Papers*, No. 2014/5, OECD Publishing, Paris, http://dx.doi.org/10.1787/5jz432cf2d8p-en.

Ahrend, R. and A. Schumann (2014), "Does Regional Economic Growth Depend on Proximity to Urban Centres?"*, OECD Regional Development Working Papers*, No. 2014/7, OECD Publishing, Paris, http://dx.doi.org/10.1787/5jz0t7fxh7wc-en.

Alden, E. and L. Taylor-Kale (2018), "The work ahead: Machines, skills, and U.S. leadership in the twenty-first century"*, Independent Task Force Report*, No. 76, Council on Foreign Relations, https://www.cfr.org/report/the-work-ahead/.

Asquith, B. et al. (2017), "U.S. Job Flows and the China Shock", No. 24080, National Bureau of Economic Research, Cambridge, MA, http://dx.doi.org/10.3386/w24080.

Austin, B., E. Glaeser and L. Summers (2018), "Saving the heartland: Place-based policies in 21st century America", *Brookings Papers on Economic Activity*, https://www.brookings.edu/wp-content/uploads/2018/03/3_austinetal.pdf (accessed on 08 March 2018).

Autor, D.(2015), "Why Are There Still So Many Jobs? The History and Future of Workplace Automation", *Journal of Economic Perspectives—Volume*, Vol. 29/3, pp. 2015-3, http://dx.doi.org/10.1257/jep.29.3.3.

Autor, D., D. Dorn and G. Hanson (2016), "The China Shock: Learning from Labor-Market Adjustment to Large Changes in Trade", *Annu. Rev. Econ*, Vol. 8, pp. 205-40, http://dx.doi.org/10.1146/annurev-economics-080315-015041.

Autor, D. et al. (2014), "Trade adjustment: Worker-level evidence", *Quarterly Journal of Economics*, Vol. 129/4, pp. 1799-1860, http://dx.doi.org/10.1093/qje/qju026.

Autor, D., L. Katz and M. Kearney (2006), "The Polarization of the U.S. Labor Market", *American Economic Review*, Vol. 96/2, https://pubs.aeaweb.org/doi/pdf/10.1257/000282806777212620 (accessed on 13 April 2018), pp. 189-194.

Blanchard, O. and L. Katz (1992), "Regional Evolutions", *Brookings Papers on Economic Activity* 1, https://scholar.harvard.edu/files/lkatz/files/regional_evolutions.pdf (accessed on 08 February 2018), pp. 1-75.

Bleakley, H. and J. Lin (2012), "Thick-market effects and churning in the labor market: Evidence from US cities", *Journal of Urban Economics*, Vol. 72/2-3, pp. 87-103, http://dx.doi.org/10.1016/J.JUE.2012.04.003.

Boulant, J., M. Brezzi and P. Veneri (2016), "Income Levels And Inequality in Metropolitan Areas: A Comparative Approach in OECD Countries", *OECD Regional Development Working Papers*, No. 2016/6, OECD Publishing, Paris, http://dx.doi.org/10.1787/5jlwj02zz4mr-en.

Brainard, L. (2017), *Why Persistent Employment Disparities Matter for the Economy's Health*, https://www.federalreserve.gov/newsevents/speech/brainard20170926a.htm (accessed on 23 November 2017).

Caldera Sanchez, A. and A. Johansson (2011), "The Price Responsiveness of Housing Supply in OECD Counties", *OECD Economics Department Working Paper*, No. 837, OECD, Paris, https://www.oecd-ilibrary.org/docserver/5kgk9qhrnn33-en.pdf?expires=1523873524&id=id&accname=ocid84004878&checksum=FD784B5EFE803F77E0709AD1D2FF57E8 (accessed on 16 April 2018).

Case, A. and A. Deaton (2017), "Mortality and Morbidity in the 21st Century", *Brookings Papers on Economic Activity*, https://www.brookings.edu/wp-content/uploads/2017/08/casetextsp17bpea.pdf (accessed on 12 March 2018).

CEA (2018), *Economic Report of the President*, Council of Economic Advisers, https://www.whitehouse.gov/wp-content/uploads/2018/02/ERP_2018_Final-FINAL.pdf (accessed on 19 March 2018).

CEA (2017), *The Underestimated Cost of the Opioid Crisis*, The Council of Economic Advisers, Washington, D.C.,

https://www.whitehouse.gov/sites/whitehouse.gov/files/images/The%20Underestimated%20Cost%20of%20the%20Opioid%20Crisis.pdf (accessed on 23 November 2017).

CFR (2018), *The Work Ahead: Machines, Skills, and U.S. Leadership in the Twenty-First Century*, Council on Foreign Relations, https://www.cfr.org/report/the-work-ahead/report/ (accessed on 13 April 2018).

Compton, W. et al. (2007), "Prevalence, Correlates, Disability, and Comorbidity of DSM-IV Drug Abuse and Dependence in the United States", *Archives of General Psychiatry*, Vol. 64/5, p. 566, http://dx.doi.org/10.1001/archpsyc.64.5.566.

Couture, V. and J. Handbury (2017), *Urban Revival in America, 2000 to 2010*, National Bureau of Economic Research, Cambridge, MA, http://dx.doi.org/10.3386/w24084.

Economic Innovation Group (2017), *The 2017 Distressed Communities Index*, Economic Innovation Group, http://eig.org/wp-content/uploads/2017/09/2017-Distressed-Communities-Index.pdf (accessed on 13 April 2018).

EMCDDA (2017), *European Drug Report*, European Monitoring Centre for Drugs and Drug Addiction, http://www.emcdda.europa.eu/system/files/publications/4541/TDAT17001ENN.pdf (accessed on 12 April 2018).

Feenstra, R., H. Ma and Y. Xu (2017), "US Exports and Employment", No. 24056, NBER, http://www.nber.org/papers/w24056 (accessed on 06 February 2018).

Florence, C. et al. (2016), "The Economic Burden of Prescription Opioid Overdose, Abuse, and Dependence in the United States, 2013", *Medical Care*, Vol. 54/10, pp. 901-906, http://dx.doi.org/10.1097/MLR.0000000000000625.

Fogli, A. and V. Guerrieri (2017), *The End of the American Dream? Inequality and Segregation in US cities*, https://economicdynamics.org/meetpapers/2017/paper_1309.pdf (accessed on 15 March 2018).

Frey, C. and M. Osborne (2017), "The future of employment: How susceptible are jobs to computerisation? ", *Technological Forecasting & Social Change*, Vol. 114, pp. 254-280, http://dx.doi.org/10.1016/j.techfore.2016.08.019.

Ganong, P. and D. Shoag (2016), "Why has regional income convergence declined?", https://www.brookings.edu/wp-content/uploads/2016/08/wp21_ganong-shoag_final.pdf (accessed on 23 November 2017).

Glaeser, E. and J. Gyourko (2018), "The Economic Implications of Housing Supply", *Journal of Economic Perspectives*, Vol. 32/1, pp. 2018-3, http://dx.doi.org/10.1257/jep.32.1.3.

Glaeser, E., M. Resseger and K. Tobio (2009), "Inequality in Cities", *Journal of Regional Science*, Vol. 49/4, pp. 617-646, http://dx.doi.org/10.1111/j.1467-9787.2009.00627.x.

Goodman, L. and C. Mayer (2018), "Homeownership and the American Dream", *Journal of Economic Perspectives—Volume*, Vol. 32/1—Winter, pp. 31-58, http://dx.doi.org/10.1257/jep.32.1.31.

Guerreiro, J., S. Rebelo and P. Teles (2017), "Should Robots be Taxed?"*, NBER Working Papers*, No. 23806, NBER, http://www.nber.org/papers/w23806.pdf (accessed on 10 April 2018).

Gyourko, J. and R. Molloy (2014), "Regulation and housing supply"*, NBER Working Paper*, No. 20536, National Bureau of Economic Research, Cambridge, MA, http://dx.doi.org/10.3386/w20536.

Helpman, E. (2016), "Globalization and Wage Inequality", No. 22944, National Bureau of Economic Research, Cambridge, MA, http://dx.doi.org/10.3386/w22944.

Hsieh, C. and E. Moretti (2015), "Housing constraints and spatial misallocation"*, NBER Working Paper*, No. 21154, National Bureau of Economic Research, Cambridge, MA, http://dx.doi.org/10.3386/w21154.

ITF (2017), "Managing the Transition to Driverless Road Freight Transport"*, International Transport Forum Policy Papers*, No. 32, OECD Publishing, Paris, http://dx.doi.org/10.1787/0f240722-en.

Jauer, J. et al. (2014), "Migration as an Adjustment Mechanism in the Crisis? A Comparison of Europe and the United States", No. 7921, IZA, http://ftp.iza.org/dp7921.pdf (accessed on 07 February 2018).

Johnson, J. and M. Kleiner (2017), "Is Occupational Licensing a Barrier to Interstate Migration?", http://www.nber.org/papers/w24107 (accessed on 15 December 2017).

Kleiner, M. and E. Vorotnikov (2017), "Analyzing occupational licensing among the states", *J Regul Econ*, Vol. 52, pp. 132-158, http://dx.doi.org/10.1007/s11149-017-9333-y.

Krueger, A. (2017), "Where Have All the Workers Gone? An Inquiry into the Decline of the U.S. Labor Force Participation Rate", *Brookings Papers on Economic Activity*, https://www.brookings.edu/wp-content/uploads/2017/09/1_krueger.pdf (accessed on 26 March 2018).

Maarten Goos, B. et al. (1993), "Explaining Job Polarization: Routine-Biased Technological Change and Offshoring", *American Economic Review*, Vol. 104/8, pp. 2509-2526, http://dx.doi.org/10.1257/aer.104.8.2509.

Metcalf, G. (2018), "Sand Castles Before the Tide? Affordable Housing in Expensive Cities", *Journal of Economic Perspectives—Volume*, Vol. 32/1—Winter, pp. 59-80, http://dx.doi.org/10.1257/jep.32.1.59.

Molloy, R., C. Smith and A. Wozniak (2014), "Declining Migration within the U.S.: The Role of the Labor Market", No. 20065, NBER, http://www.nber.org/papers/w20065 (accessed on 25 January 2018).

Nedelkoska, L. and G. Quintini (2018), "Automation, skills use and training"*, OECD Social, Employment and Migration Working papers*, No. 202, OECD, https://read.oecd-ilibrary.org/employment/automation-skills-use-and-training_2e2f4eea-en#page1 (accessed on 17 April 2018).

OECD (2018), "Chapter 4. Back to Work: Lessons from Nine Country Case Studies of Policies to Assist Displaced Workers", in *OECD Employment Outlook 2018*, OECD Publishing, Paris.

OECD (2017), *Education at a Glance 2017: OECD Indicators*, OECD Publishing, Paris, http://dx.doi.org/10.1787/eag-2017-en.

OECD (2017), "Making Trade Work for All"*, Trade Policy Papers*, No. 202, OECD, http://www.oecd.org/tad/making-trade-work-for-all.pdf (accessed on 29 January 2018).

OECD (2017), *OECD Employment Outlook 2017*, OECD Publishing, Paris, https://www.oecd-ilibrary.org/docserver/empl_outlook-2017-7-en.pdf?expires=1523368964&id=id&accname=ocid84004878&checksum=0CA82D29F1BF78B3D549E782E10DC327 (accessed on 10 April 2018).

OECD (2016), *Education at a Glance 2016: OECD Indicators*, OECD Publishing, Paris, https://www.oecd-ilibrary.org/docserver/eag-2016-en.pdf?expires=1523546194&id=id&accname=ocid84004878&checksum=20324E6687043B9C6B458B8798FB22CC (accessed on 12 April 2018).

OECD (2016), *OECD Economic Surveys: United States 2016*, OECD Publishing, Paris, http://dx.doi.org/10.1787/eco_surveys-usa-2016-en.

OECD (2016), *OECD Regional Outlook 2016: Productive Regions for Inclusive Societies*, OECD Publishing, Paris, http://dx.doi.org/10.1787/9789264260245-en.

OECD (2015), *OECD Reviews of Vocational Education and Training: Key Messages and Country Summaries*, OECD Publishing, Paris, http://www.oecd.org/education/skills-beyond-school/OECD_VET_Key_Messages_and_Country_Summaries_2015.pdf.

OECD (2010), *OECD Reviews of Vocational Education and Training : Learning for Jobs*, OECD Publishing, Paris, http://www.sourceoecd.org/education/9789264082236 (accessed on 13 April 2018).

OECD/ILO (2017), *Engaging Employers in Apprenticeship Opportunities: Making It Happen Locally*, OECD Publishing, Paris, http://dx.doi.org/10.1787/9789264266681-en.

Rhyan, C. (2017), *The potential societal benefit of eliminating opioid overdoses, deaths, and substance use disorders exceeds $95 billion per year*, Altarum Center for Value in Health Care, https://altarum.org/sites/default/files/uploaded-publication-files/Research-Brief_Opioid-Epidemic-Economic-Burden.pdf.

Shannon, S. et al. (2017), "The Growth, Scope, and Spatial Distribution of People With Felony Records in the United States, 1948–2010", *Demography*, Vol. 54/5, pp. 1795-1818, http://dx.doi.org/10.1007/s13524-017-0611-1.

Sinai, T. and N. Souleles (2013), "Can Owning a Home Hedge the Risk of Moving?", *American Economic Journal: Economic Policy*, Vol. 5/2, http://dx.doi.org/10.1257/pol.5.2.282.

Thornton, R. and E. Timmons (2015), "The de-licensing of occupations in the United States", *Monthly Labor Review*, http://dx.doi.org/10.21916/mlr.2015.13.

US CBP (2018), *CBP Enforcement Statistics FY2018*, U.S. Customs and Border Protection, https://www.cbp.gov/print/148141 (accessed on 23 April 2018).

Weingarden, A. (2017), "Labor Market Outcomes in Metropolitan and Non-Metropolitan Areas: Signs of Growing Disparities", *FEDS Notes*, Vol. 2017/2063, http://dx.doi.org/10.17016/2380-7172.2063.

2. The decline of US labour force participation: some insights from regional divergence

Stephanie Guichard

The U.S. labour market has continued a long expansion following the great recession. While unemployment has fallen to very low levels and income is starting to pick up, other signs point to a less rosy picture. Labour force participation, including those of prime age, has declined. Facing possible future shocks from automation taking stock of factors that help workers find jobs and remain in employment can help improve labour market performance. There are a number of economy-wide features, including providing workers with adequate skills, easing barriers to taking jobs arising from child and elderly care responsibilities, and addressing the problems of felony records and drug abuse can pose for job search. But there is also a geographical dimension. Facilitating the return to employment can be complicated when there are barriers to migration in search of new jobs, such as those created by idiosyncratic occupational licensing requirements varying across states. Barriers can also emerge when mobility within shorter distances is low, due to lack of mass transit, which can limit job opportunities and also access to retraining. Due to the heterogeneity of challenges across States and localities, policy tailored to the local level is needed, but co-ordination is also required to ensure policy effectiveness.

Introduction - What's wrong with US labour force participation?

The US economy exited the Great Recession 9 years ago and activity has strengthened gradually. Unemployment, which had jumped to 10% of the labour force at the worst of the crisis, has receded to close to 4%, slightly below its pre-crisis level. Moreover, employers find it increasingly difficult to hire the workers they need and the long overdue pick-up in wages has started to materialize.

However, the Great Recession may have left persisting, but less visible, scars in the US labour market. In particular, it has been followed initially by an acceleration in the long-term decline in male labour force participation, especially those of prime-age (25−54), although participation rates have subsequently recovered. Women's participation in the labour force has also started to decline after plateauing at 60% in the first half of the 2000s (Figure 2.1). The US is the only OECD country where women participation in the labour force was lower in 2016 than in 2006; as a result, the United States fell from the top 5 of

advanced countries in terms of women participation in the labour force in 2000 to the bottom third in 2017.[1]

Most analysts consider that only about half of decline in labour force participation can be explained by demographics (especially aging) as illustrated in Figure 2.2 by the estimates from the Federal Reserve Bank of Atlanta and findings by the Council of Economic Advisers (2014) and Aaronson et al. (2014). The increase in the length of education has also been shown to play a small role.

Figure 2.1. Labour force participation has declined following the great recession
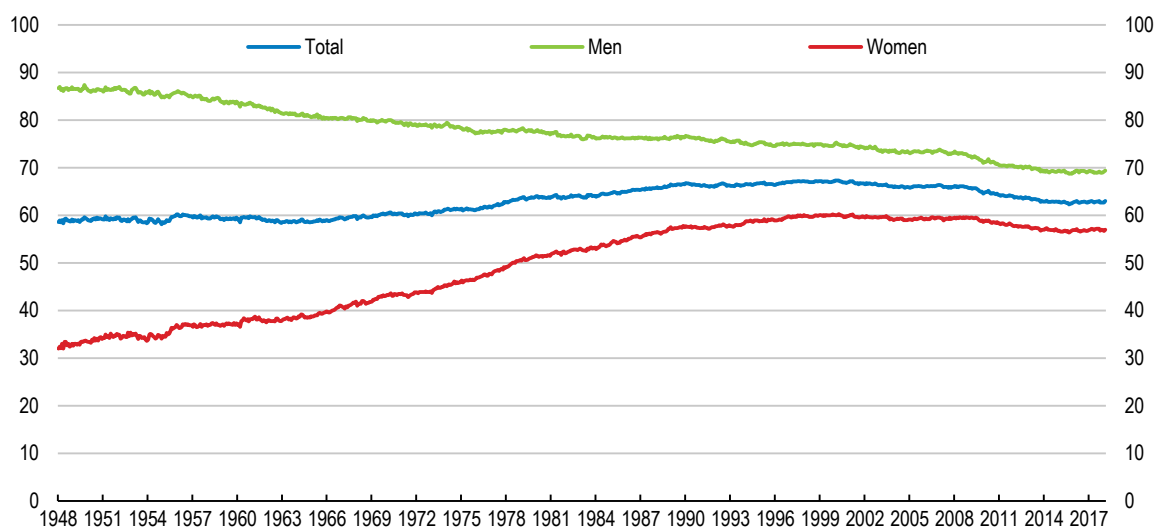
Note: Civilian Labor Force Participation Rate, Percent, Monthly, Seasonally Adjusted, Population over 15 years old.
Source: U.S. Bureau of Labor Statistics

---

[1] For more details on the decline in women labour force participation, see Black *et al.* (2017); for details on changes since early 2000s by age groups, gender and race see Hipple (2016) and CBO (2018).

Figure 2.2. Demographics is only part of the story

Source: Federal Reserve Bank of Atlanta -https://www.frbatlanta.org/chcs/labor-force-participation-dynamics.aspx#SectionFour
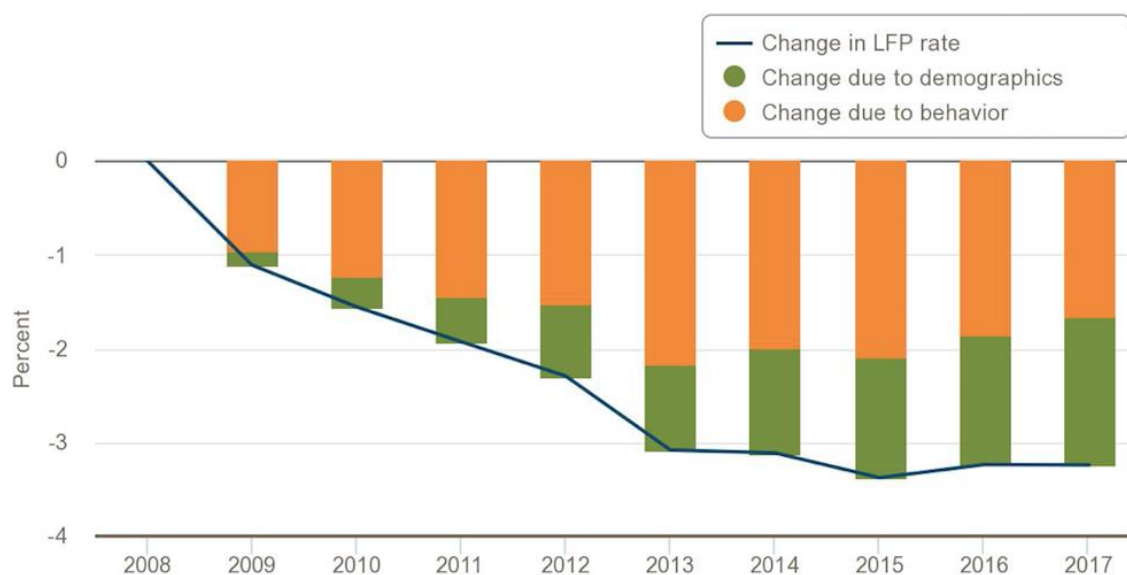
The faster decline in labour force participation following the Great Recession is at odds with previous analyses suggesting an only moderate pro-cyclical effect of the economic cycle on participation (Barnes *et al.*, 2013). On the other hand, Vanzandweghe (2017) found that, since the mid-80s, the participation rate of prime-age workers may have become more cyclical, reflecting a stronger discouraged worker effect, while the participation rate of older workers may have become countercyclical. Supporting these findings, Erceg and Levin (2013) found evidence that the cyclical effects may have been larger during the Great Recession.

Moreover, labour force participation has recovered only slightly despite the labour market tightening in recent years. Previous estimates expected a positive impact of the state of the cycle as early as 2011 (CEA, 2014). In March 2018, civilian labour force participation (over 15 years old) stood at 62.9% - 56.9% for women and 69.3% for men - barely changed from a year before (respectively 63%, 57.2% and 69.2% in March 2017). This raises the question of whether inactive workers face more obstacles to return to employment than in the past cycles. Identifying and understanding these potential obstacles is essential to assess to which extent rising participation could help sustain the recovery.

The decline in labour force participation has not been homogenous, affecting some groups (prime age workers, Black or African American males, low educated) more than others (see CBO, 2018) and hence leading to widening gaps in participation rates. For instance, the participation gap between those who have a graduate degree and those who have just completed high school increased from 13% in 1997 to 16% in 2017 (Figure 2.3).

Figure 2.3. Labour force participation gaps by educational attainment have increased
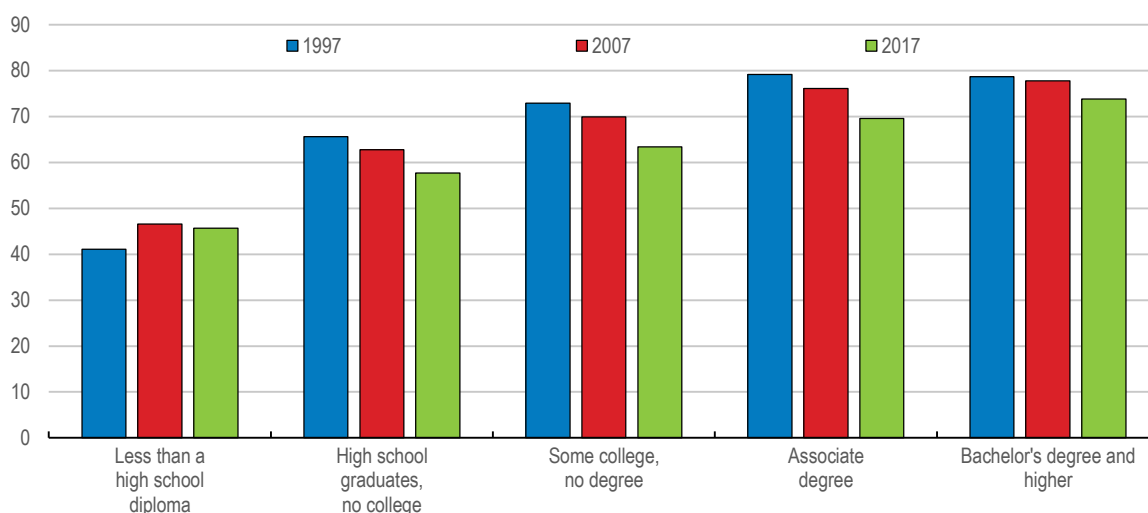
Declining labour force participation, especially of prime-age workers, is a major socioeconomic concern. It harms the US growth potential (via a lower labour input from those that are supposed to be the most productive), fuels poverty and inequality and potentially harms individual well-being. In particular, inactivity does not only mean foregone revenues but also poorer health, and lower social engagement and even reduced marriage prospects for men.[2] Lower prime-age adult labour force participation also means that an increasing number of children are growing in poverty, with higher risks of developing health issues later on, higher risks of school failure and ultimately lower employment and income prospects (OECD, 2016a).

Moreover, major structural changes are likely to continue to disrupt the US labour market. Artificial intelligence, automation and the take-up of robots are expected to trigger further job dislocations (see for instance Arntz *et al.,* (2016) for an estimate of the share of jobs threatened by automation) and may push more workers out of labour force.

Going forward, the size of the working-age population is set to decline because of aging and immigration restraint, further denting labour input and potential growth and worsening further long-term fiscal challenges. According to OECD projections, demographics alone could push down US labour force participation to below 55% by 2055-60. This makes it all the more important to prevent further withdrawal of prime-age workers from the labour force and to help and incentivise those that have withdrawn to return. A better understanding of why prime age men, and women, have withdrawn durably from the labour force or have never joined it is therefore essential.

Against this background, this paper reviews the potential obstacles to labour force participation and how they interact with the economic cycle and changes in labour demand.

---

[2] Case and Deaton (2015) have documented the increase in the mortality rate of middle-aged white non-Hispanic men and women in the United States between 1999 and 2013 (and in particular the increasing role of suicide and poisoning as death causes) and shown that it affects in particular those without a high school degree. More on the link between income, job situation and marriage can be found in Greenstone and Looney (2012) and Sawhill and Venator (2016).

Taking stock of the widening gaps in labour force participation between the U.S. states, and the concomitant reduction in geographical mobility, it explores how states differences on a series of structural and institutional features that have been identified by the literature as possible obstacles to participation may be associated with participation gaps. This paper also exploits evidence collected through discussions with local actors in San Diego, Atlanta and Minneapolis.

The main findings of this paper can be summarised as follows:

- The recent literature has identified a series of obstacles to labour force participation that may have amplified the impact of the cycle and of changes in labour demand. Most of these obstacles have increased over time (e.g. occupational licensing, heath issues) or become more relevant given demographic changes (elder care) or reflect long-standing barriers to labour force participation (child care). Most not only affect access to jobs but also to training (child care, transport, health or criminal records) and tend to cumulate and reinforce each other for the low-income groups. They also appear to differ widely from one state to the other.

- There has been a growing geographic divergence in participation between states and interstate migration has declined.

- The aging of the population is estimated to account for between one third and half of the decline in labour force participation since 2000, while between 40 and 60% can be related to a discouraged worker effect captured by the incidence of long-term unemployment. States where long-term unemployment increased the most following the Great Recession have seen the larger declines in participation.

- Lower participation rates at the state level are typically associated with lower educational attainment. Lower educational attainment of the labour force also seems to make labour force participation changes more persistent and discouraged worker effects stronger.

- Lower state participation rates are also associated with a higher share of the state population receiving disability benefits, higher rates of opioid prescriptions, lower health outcomes or a higher share of inactive workers stating they are too sick or disabled to work. While causality likely goes both ways, there is some evidence that higher reliance on disability and opioids as well as bad health may make labour market withdrawal more persistent and amplify discouraged worker effects.

These findings have important implications. First, they suggest that addressing obstacles to participation goes well beyond labour market policy and training *stricto sensu* but also include health and social policies. Moreover, these policies involve a broad series of actors at all levels, raising some coordination challenges and risking further increasing heterogeneity and harming geographical mobility. Second, they suggest that a non-negligible share of inactive workers that is either receiving benefits that are conditional to inactivity, or is too sick, too addicted, too uneducated to work or disconnected from the labour market or even just "too poor" to access available jobs, will not easily join the labour force despite the tight labour market.

The paper is organized as follows: the first section puts the decline in labour force participation in the broader context of the structural trends affecting the US labour market. The second section reviews the obstacles to labour force participation and geographical mobility that have been identified by the recent literature and provides some illustrations

of how they differ across the country while section 3 exploits these differences using panel data analysis to identify the most relevant factors. Section 4 concludes.

The US labour market has undergone major structural changes over the past decades

Regional gaps have widened

Regional gaps in labour force participation between rural and urban areas and more broadly between counties and between states have widened in recent decades (Figure 2.4) (OECD, 2016c; OECD, 2018). Several measures of regional dispersion applied to OECD data on participation by states and counties show an increase over past three decades, especially for men. For instance, the gap in participation between the bottom 10% counties and the top 10% has increased by about 3 percentage points on average since 1990; the gap in participation between the bottom 5 states and the top 5 has increased by about 2 percentage points on average and by 3 percentage points for males. Moreover, the change in state-level participation over the past three decades cannot not be linked to participation in 1990 (Figure 2.5) and there is no tendency of state level participation rates to converge towards US average.[3]

---

[3] Statistical tests show that the state gap to average participation is not stationary for the vast majority of states.

Figure 2.4. Regional gaps in participation have increased

A. Total

B. Male

C. Female
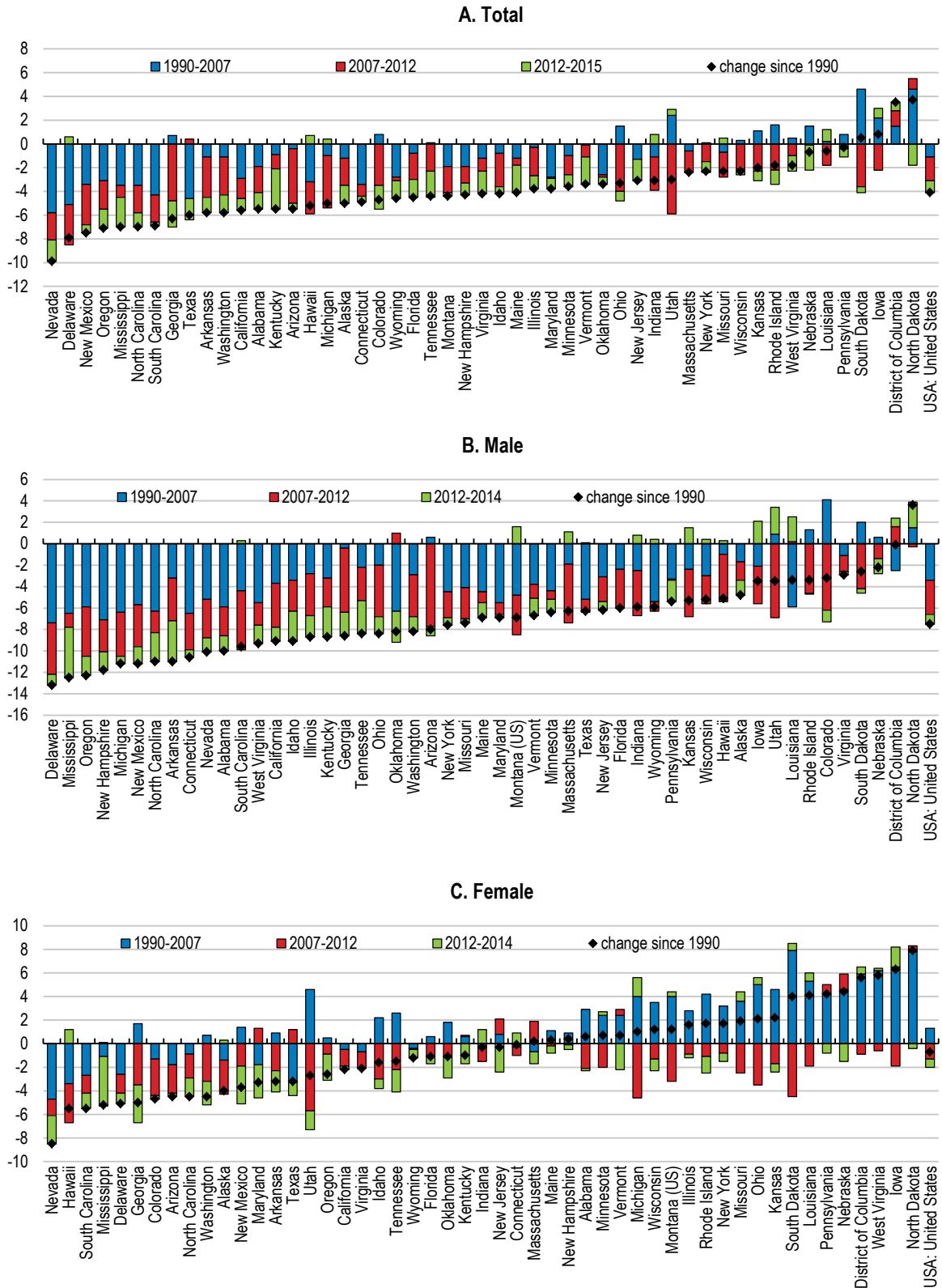
Source: OECD Regional database

Figure 2.5. The evolution of participation rates is not linked to their 1990 levels
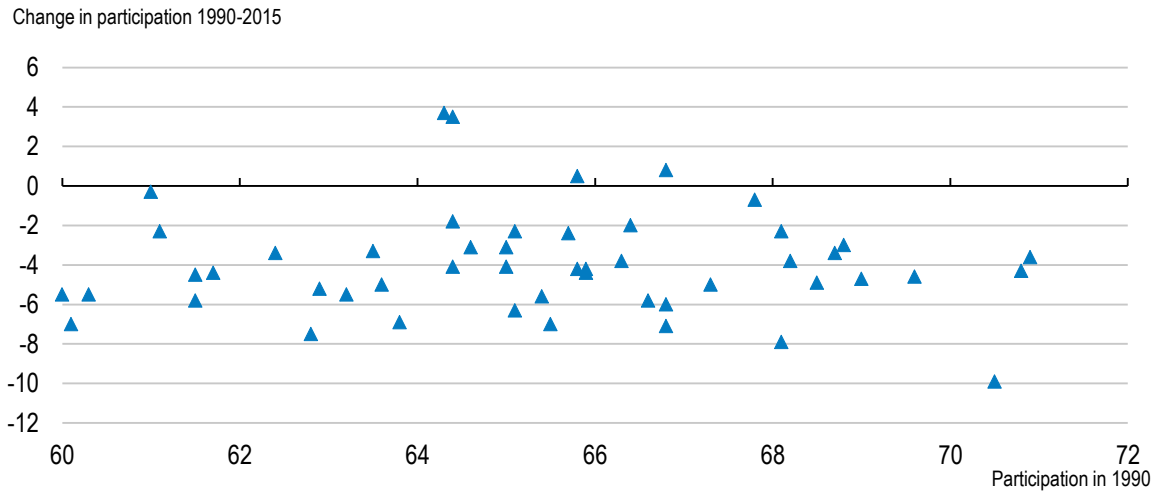
Source: OECD Regional database

It is also difficult to link state differences to differences in growth performance. GDP growth in the United States has not been homogenous across the states, with notably some states being more affected and for longer by the crisis. As shown in Figure 2.6, a few states have been relatively spared by the crisis, and others are on a long declining or growing path. Even if the majority has been hit by the crisis and has recovered since then, the pace of growth has been quite heterogeneous. However, there is no obvious relation between the evolution of participation since 2007 and economic growth, besides the fact that states which have faced the stronger decline in output in the wake of the crisis have suffered the strongest declines in labour force participation since then. Figure 2.7 suggests in particular that changes in state-level participation is less linked to state GDP growth since 2007 than to GDP growth during the crisis (2007-2009).

Last, there also seems to be a tighter relation between female and men participation across states. Since the crisis, states where the participation of men has declined the most have also seen below-average increase or even declines in women participation (Figure 2.8).

Figure 2.6. Regional real GDP growth during and after the crisis
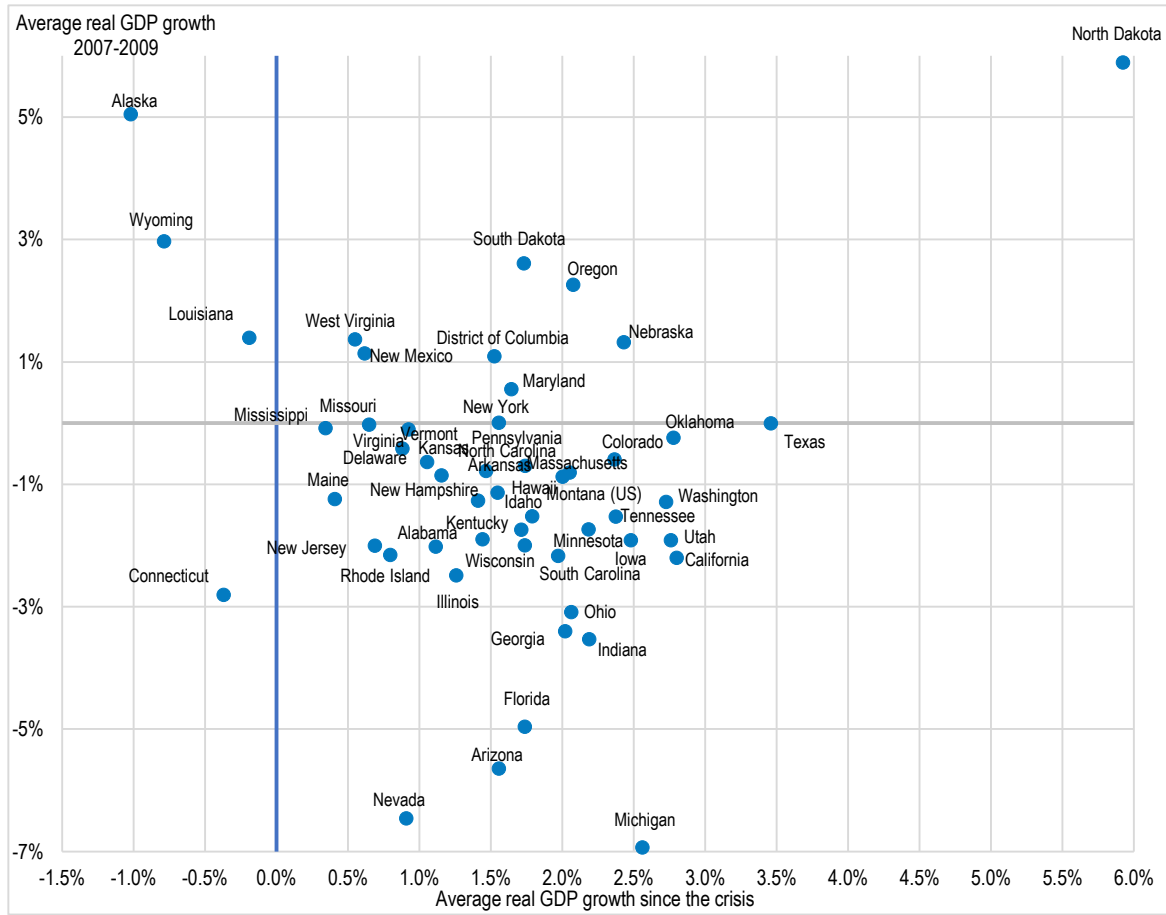
Source: OECD Regional database

Figure 2.7. States GDP growth and changes in labour force participation
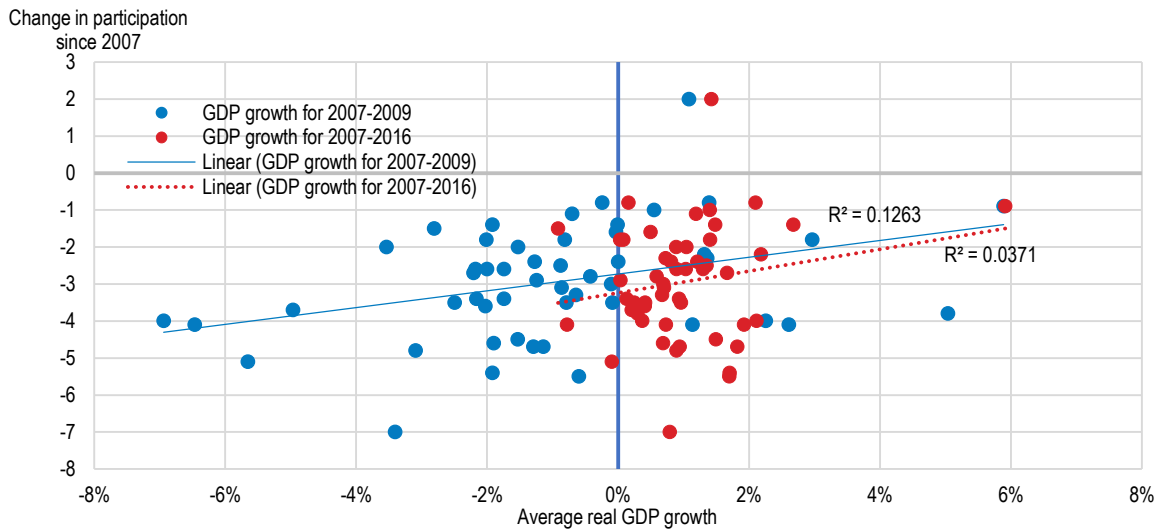
Source: OECD Regional database

Figure 2.8. Male and female participation rates have moved more closely since the crisis
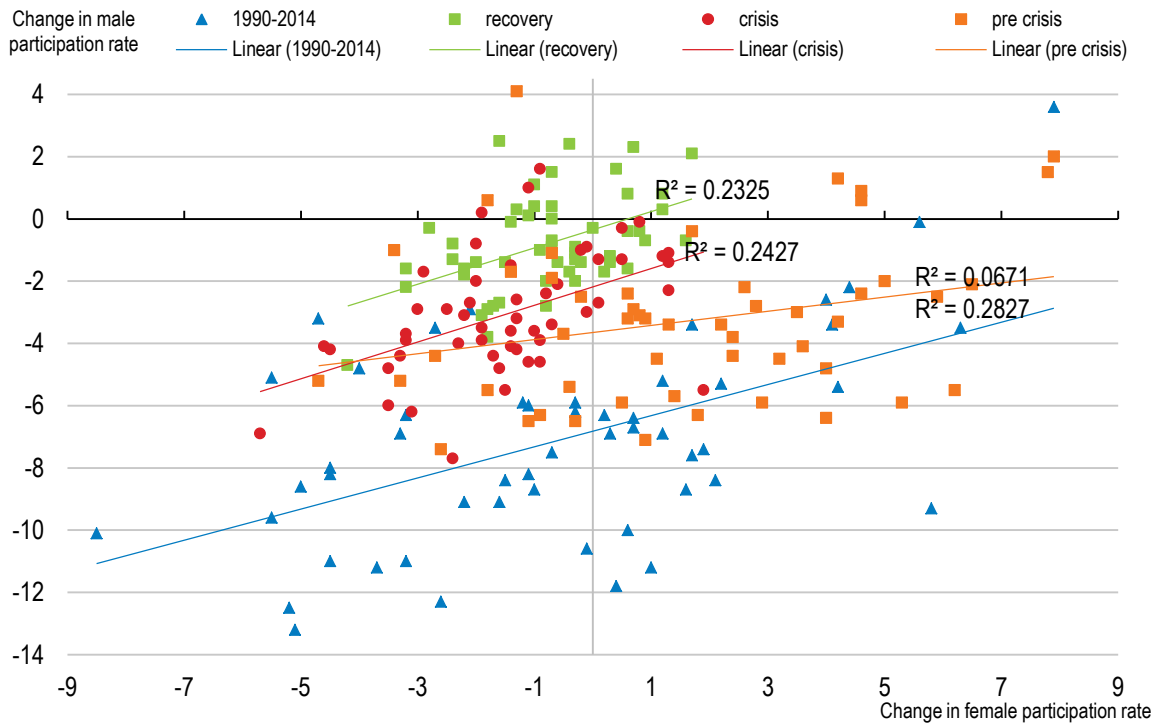
Source: OECD Regional database

An overall decline in the fluidity of the US labour market

The decline in labour force participation is not the only major change characterising the US labour market over the past decades. This decline needs to be seen in the broader context of a well-documented decline in the overall fluidity of the US labour market. The ease with which workers change job or geographical location, move in and out of unemployment and inactivity has indeed declined, especially for younger and less educated workers.[4] Several explanations have been put forward to explain this decline, including some improvement in worker–firm matching, changes in worker–firm relationships, labour market regulations and housing market regulations; but there is no clear consensus on their respective roles.

This decline in US labour market fluidity also coincides with a decline in business dynamism as documented for instance in Hathaway and Litan (2014) and Haltiwanger (2015).

Changes in labour demand

Technological shocks (automation) and trade shocks (such as globalisation and competition from China) have affected labour demand,[5] with major changes not only in the skills and types of workers that are needed, but also where in the United States and in which sectors these workers are needed. For instance, there has been a major decline in demand for low-

---

[4] See in particular analysis by Molloy et al., 2016 and Davis and Haltiwanger, 2014.

[5] See in particular OECD (2017) and the literature review by Abraham and Kearney (2018).

skilled workers in the manufacturing sector, while low-skilled jobs were being created in the service sector. The location of manufacturing jobs itself has changed. Manufacturing jobs tended to move from the Northeast and Midwest to the West and South up to the late 1990s. This was followed by a contraction in manufacturing jobs everywhere but hitting more profoundly the Midwest and the Southern states between 2000 and 2010.[6]

Automation, technological progress and offshoring have also been associated with a polarisation of the job market and a hollowing out of medium-skilled, medium-wage jobs (OECD, 2018). Some of the affected workers were able to move to the higher-end of the job distribution, but many had to take up jobs in the lower-wage service sector, potentially displacing lower-skilled workers. According to the OECD (OECD, 2016b) between 2002 and 2014, the share of high-skilled and low-skilled jobs increased by respectively 7 and 3 percentage points while the share medium-skilled routine jobs fell by nearly ten percentage points.[7] In addition, there is evidence that middle-skilled jobs are more difficult to access, as employers tend to require workers with bachelor's degree for positions where this was not the case in the past, as documented by Wardrip el al (2015).[8] This "upcredentialing" trend seems however to have reversed somewhat with the labour market recovery.

The global financial crisis has also brought major changes to labour demand with the collapse of the construction sector, which lost 2 million jobs between January 2008 and January 2010 and has still not recovered those losses. This shock was especially strong in the Western states, which lost about 8% of construction jobs between 2007 and 2008.

While there have always been profound changes in labour demand (e.g. when agriculture contracted and manufacturing expanded), the fact that these recent changes have been associated with a decline in labour force participation may reflect the difficulty for workers losing their job to adapt to changing demand and remain in the labour force. There are several, possibly interacting, channels by which shocks to labour demand may affect participation (i.e. labour supply).

First, the decline in labour supply following labour demand shocks may reflect a discouraged worker effect. CEA (2014) found supporting evidence that the high rate of long-term unemployment following the crisis may have contributed to the decline in the participation rate. Indeed, Figure 2.9 suggests a negative relation between the level of long-term unemployment reached during the crisis in the different states and the magnitude of the decline in participation at the state level since the crisis.

---

[6] See Helper *et al.* (2012).

[7] Further evidence regarding prime age men occupations can be found in Tüzemen (2018) which also estimates that if job polarisation had not changed the demand for skills in the labor market, almost 80 percent of the 2.5 million prime age men that have left the labour force since 1996 could have been employed in 2016.

[8] For instance, in San Diego county, two third of middle-skilled jobs require applicants to have a bachelor degree while only 15% of the current middle-skilled workers have one.

Figure 2.9. Peak in long-term unemployment during the crisis and change in labour force participation
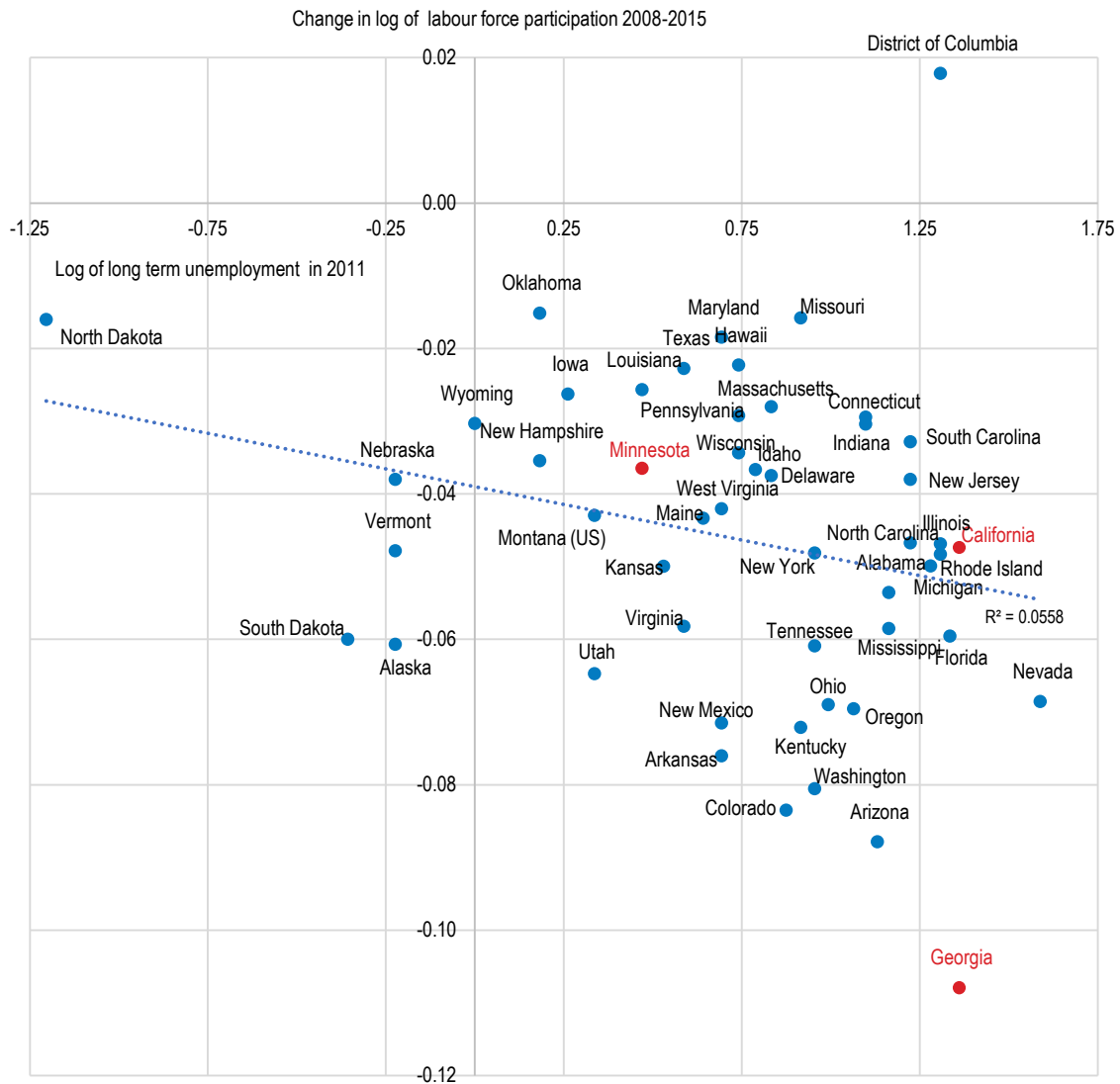
Source: OECD regional database

Second, displaced workers may not have the skills that are in demand nor the ability to acquire them in a country where training of the unemployed is limited compared with other OECD countries (0.1% of GDP is spent on active labour market programmes *versus* 0.5% on average in the OECD). As suggested by Figure 2.10, labour force participation is higher in states where the educational attainment of the labour force is higher. As a response, more and more initiatives focus on workforce development, starting with the 2014 Workforce innovation and opportunity Act.

Figure 2.10. Participation and education
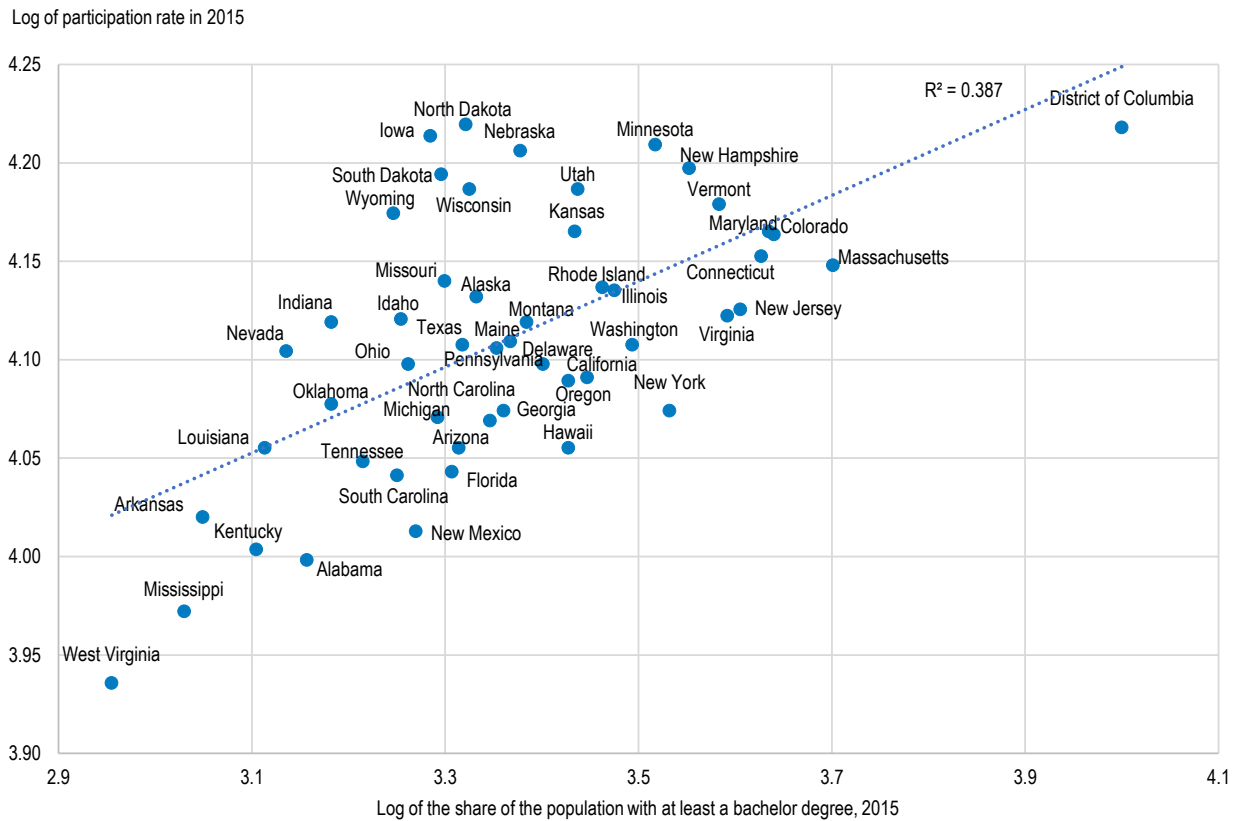
Source: OECD and US Census

In addition, as skill-biased technological progress reduces demand for medium-skilled/medium-pay jobs, the new low-paid service jobs may not be attractive or paid enough for displaced workers.[9] There is indeed evidence that reservation wages of displaced workers may be too high.[10]

Mounting obstacles to mobility out of inactivity or unemployment

While skills play a key role in how workers can adapt to changing labour demand, the recent literature has identified a series of other structural impediments to participation that may increasingly weigh on labour supply and amplify the impact of changes in labour demand on labour force participation.

These obstacles tend to increase the cost of working relative to inactivity, hence potentially inflating reservation wages and reducing the desirability of new jobs (inactivity benefits; cost of transports; cost of living where new jobs are created) or the ability to work (health;

---

[9] According to OECD (2016b) On average displaced workers suffer 6% wage losses, with losses higher for workers with longer job tenure.

[10] See evidence collected by Eberstadt (2016).

addictions; licensing; criminal background). Some may affect both the relative cost of working and the ability to work (e.g. limited supply of child care).

These obstacles are listed below and, when data availability makes it possible, states differences are reviewed and related to differences in labour force participation. There are very few time series at the state level that could help assess whether structural differences have widened over time. Clearly housing costs and licensing requirements have increased more in some states than others. Moreover, even when state heterogeneity has not increased, the impact of some potential obstacles may have become more important because of demographic changes (e.g. increased women labour force participation, aging, etc).

Disincentives to work

Social benefits

Social benefits that require recipients to be inactive act as a strong disincentive to participate in the labour force. A case in point is the disability benefits. The increase in the number of disability insurance beneficiaries is often mentioned as a possible explanation to the decline in the participation. While the trend has started to reverse in recent years, disabled workers amount to the equivalent of 6% of workers with a taxable income, almost three times more than in the mid-1980s (Figure 2.11). The increase has been stronger for least educated people. This may reflect the fact that they are typically employed in more physically demanding jobs with a higher likelihood of accident or injury leading to disability (CBO, 2018) but also that implied loss in labour income is less than for skilled workers. Given the limited other supports available for the long-term unemployed, disability benefits may also have acted as a substitute. Social security data shows for instance that the number of disability applicants sharply increases following recessions, with a peak in 2010.[11] Disability benefits, which are difficult to qualify for, may act as a barrier to work as recipients may lose their disabled status if they returned to or joined the labour force.[12]

As illustrated by Figure 2.12, there is a wide dispersion in the share of the recipients in the population across the different states and a high share of recipients in a given state is usually associated with lower labour force participation. This does not mean however that that there is a causal effect.

There is some evidence that many recipients of disability benefits would have worked if they had not been granted disability benefits (Abraham and Kearney (2018)). However, the evidence of a significant role of disability benefits in the decline in labour force

---

[11] https://www.ssa.gov/oact/STATS/dibGraphs.html

[12] They are a few incentives to work: once eligible for the SSDI benefits, recipients can work for about three and a half years without losing their disabled status as long as they do not make more than 1180 USD, net of some expenses related to their disability, of monthly income. They also keep access to MEDICARE under certain conditions. Those who lose their disabled status because their earnings are above the thresholds are granted some reinstatement if they lose their jobs, as long as they can still be considered as disabled. Qualifying for disability benefits also requires that earnings and hours worked do not exceed a certain limit. Workers who with earnings average more than 1180 USD a month in 2018 are unlikely be considered disabled.

participation is mixed with for instance Aaronson *et al.* (2014) finding supportive evidence while CEA (2014) could not find any.

Figure 2.11. The share of people receiving disability benefits has increased

Number of disabled workers as a ratio of the number of workers with taxable earnings
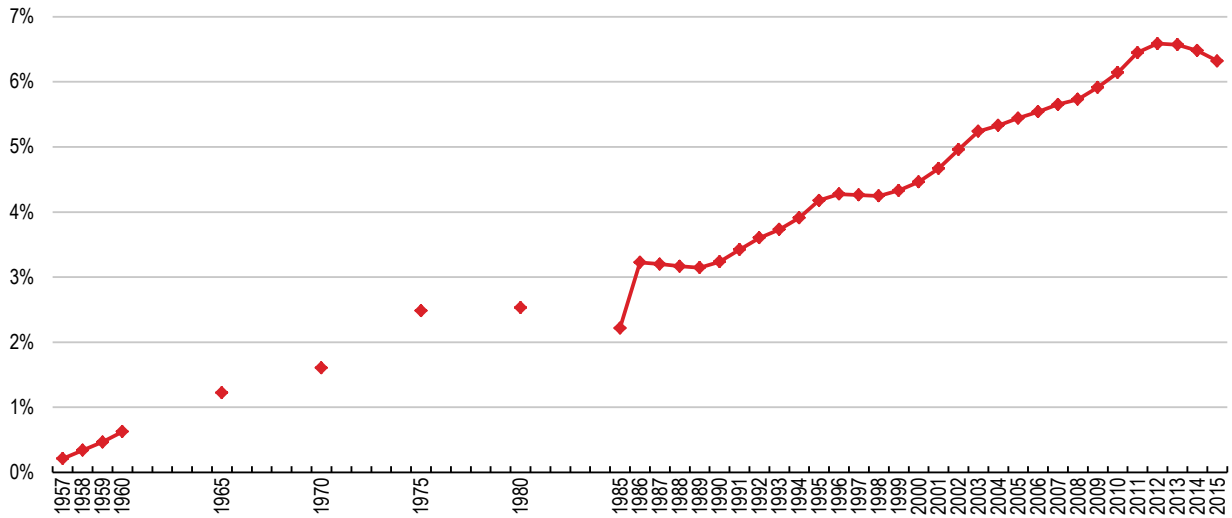
Source: United States Social Security, Annual Statistical Supplement, 2016

Figure 2.12. Participation in 2015 and share of the population receiving disability benefits
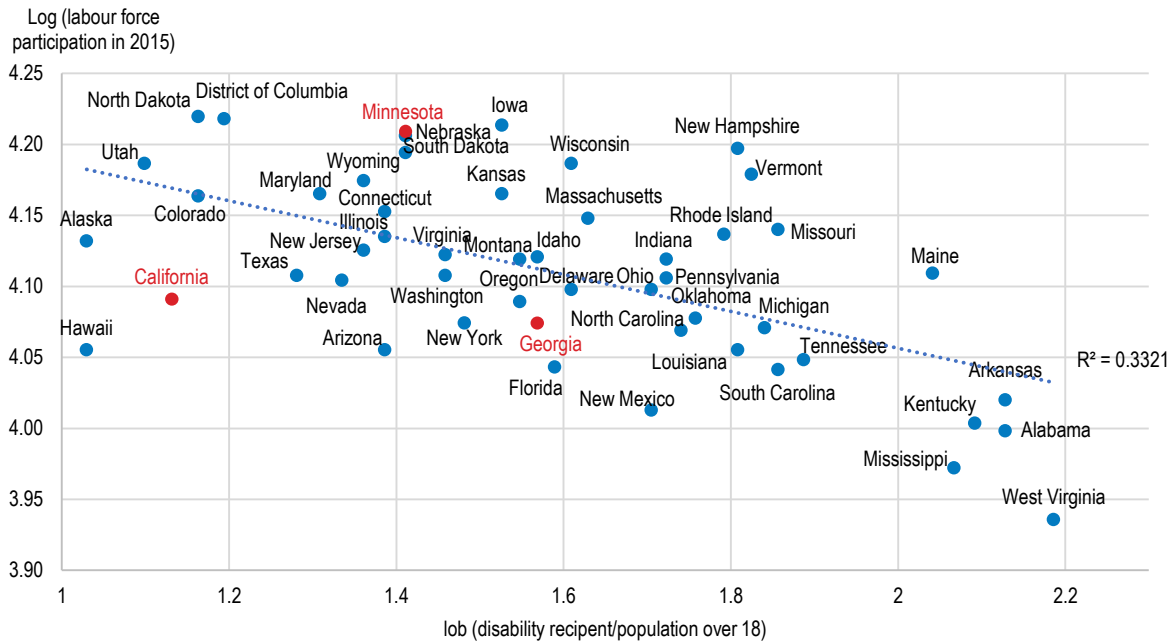
Source: OECD and United States Social Security

Unemployment benefits are by definition conditional to inactivity but in most advanced economies there are also conditional to active job search. The US unemployment benefit system is not generous in comparison with other OECD countries. In particular, the duration of unemployment benefits is one of the shortest in the OECD (6 months versus an OECD average of 10 months).[13] However, it is among the weakest in terms of promoting and monitoring active job search of the unemployed.[14] As a result, job seekers may be less incentivised to look for a job as soon as they become unemployed and keep some links with the labour market. They hence get more easily disconnected than in other OECD countries.

Work requirements associated to social transfers is another issue. Welfare reforms in the mid-1990 have made access to some social benefits dependent on activity. This has been notably the case of the programme for supporting low-income families with children: the Temporary Assistance for Needy Families (TANF) programme was established in 1996 by the Personal Responsibility and Work Opportunity Act (PRWOA) which made benefits conditional on a minimum number of hours of work per week, job search effort or participation in a training programme. While some research has found that this reform has raised labour force participation (for instance Moffitt, 2003; Blank, 2002), others affected beneficiaries did not necessarily find stable work opportunities that increased substantially their income and help avoid raising their children in poverty (Mitchell *et al.* 2018).

An ongoing debate is whether access to Medicaid should be conditional on activity. The federal government has begun to approve states requests to include work or community service requirements to Medicaid eligibility criteria, starting with Indiana, Arkansas, Kentucky and New Hampshire. This paper provides no answers to this debate. While there is a clear relation between inactivity and health, it stresses that the relation may go both ways. Moreover, it points to the numerous obstacles to employment faced by the inactive, including lack of affordable child and elderly care, the lack of transportation, the lack of skills and bad health.

Increasing costs associated to activity

Not only most of the new jobs available to medium- or low-skilled displaced workers are less paid that previous manufacturing jobs, but the costs associated to taking up a new job or joining the labour force may have increased. These costs are even higher if taking up a new job involves relocation (see section below).

Commuting time and transit costs

Commuting time is on the rise with sprawling, urbanisation and a lack of affordable transportation and housing. This is especially the case in large metropolitan areas in the West and the North-East coasts where high housing prices tend to push workers far away from available jobs (see Figure 2.13 for illustration in the case of Californian cities). There is local evidence that the cost of transportation affects both access to jobs and to training. For instance, in San Diego county, the workforce development agency has identified

---

[13] The duration of unemployment benefits was extended during the recession, but has been cut back since then.

[14] Using a synthetic indicator of job-search requirements, suitable-work criteria and sanctions, OECD (2016b) shows that the United States is among countries with the most leniently administered unemployment benefit scheme.

transport availability and costs as one of the major obstacle for youth access to employment and training (San Diego Workforce Partnership, 2017).[15]

Figure 2.13. Costs of housing and transport add up

Housing and transportation costs as percentage of total income
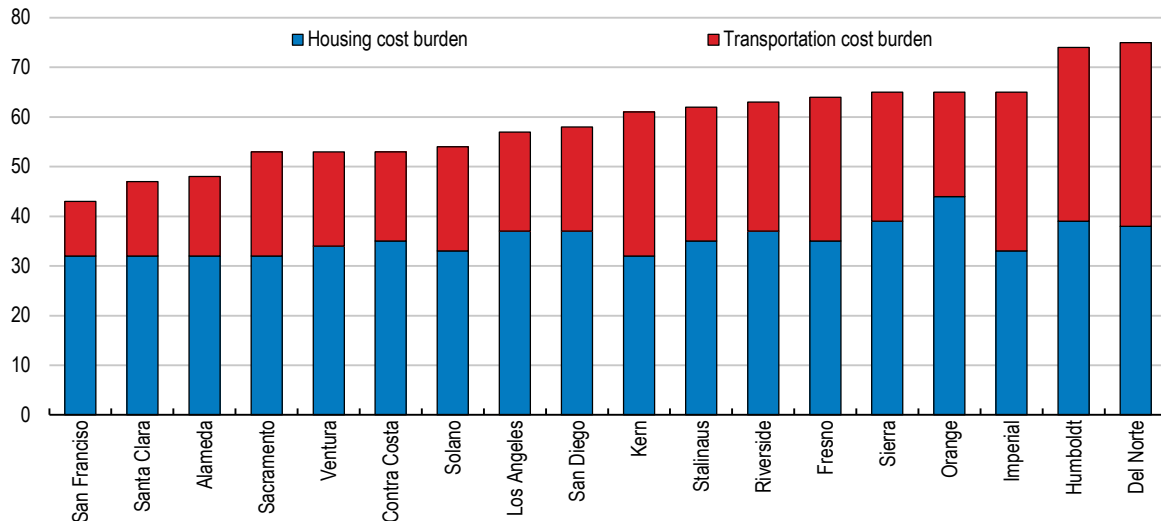
Source: California's Housing Future: Challenges and Opportunities Public Draft

Even where house prices are less of an issue, the lengthening of commuting times may be an obstacle to work. In Atlanta, for instance sprawling and congestion mean that only 17% of jobs within one-hour reach can be reached in 20 minutes (to be compared with a third in San Diego or Minneapolis) and only 3 % of jobs accessible in less than one hour by car can be reached within one hour of public transport; to be compared with 7-8% San Diego and Minneapolis, and over 20% in New York City.[16]

While there are important state differences in the cost of housing and transport, these differences are difficult to relate to differences in participation (Figure 2.14). If any, the relation seems to suggest that lower participation tends to be associated with lower housing costs (whether measured by the average listed price or the Warthon index measuring the restrictiveness of zoning regulations). Other housing indicators such as the housing costs relative to median income, the percentage of crowded homes and measures of commuting time do not seem related to differences in participation. It is however likely that housing conditions play a more significant role at the within states between the different counties and metropolitan areas.

---

[15] As a result of high housing and transportation costs in San Diego or New York, not only most low-skilled jobs, but also most middle-skilled jobs pay below national average once the cost of living taken is into account. In metropolitan areas such Atlanta and Minneapolis most middle-skilled jobs offer above national average pay once the cost of living is taken into account. https://www.frbatlanta.org/cweo/data-tools/opportunity-occupations-monitor.aspx

[16] The Accessibility Observatory - Center for Transportation Studies. University of Minnesota

Figure 2.14. Labour force participation and housing

A. Average listed price as a ratio of median state income

B. Rent as a ratio of median income

C. Share of crowed housing units

Log of participation rates in 2015
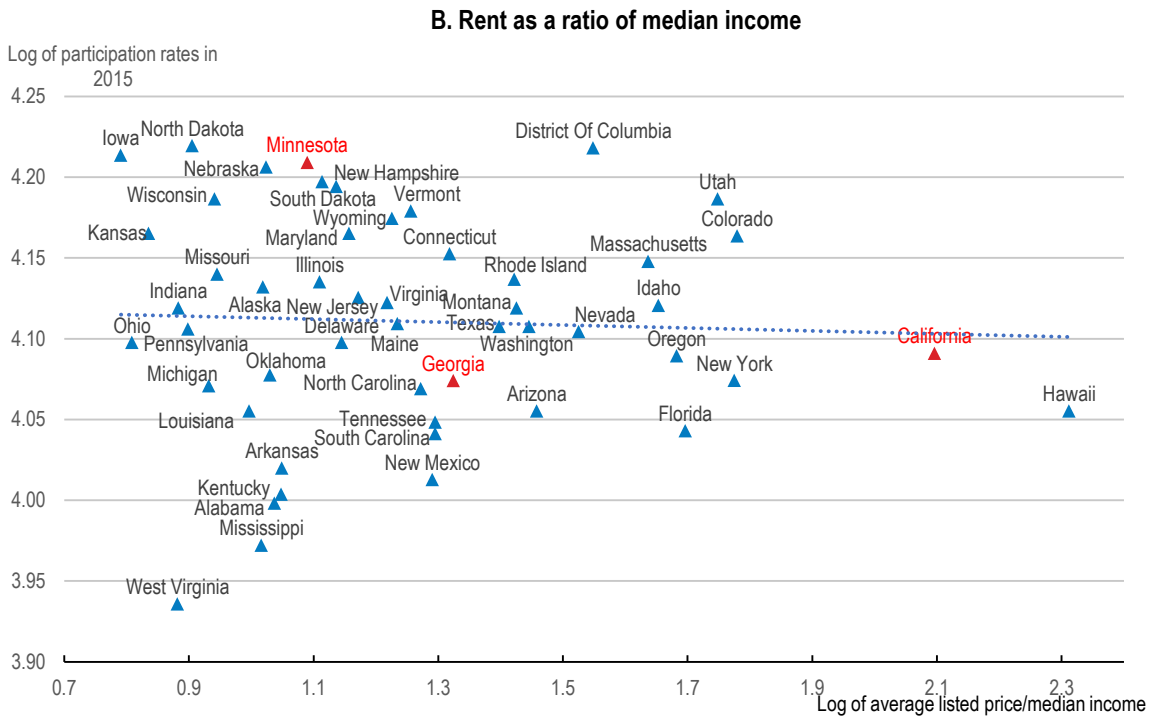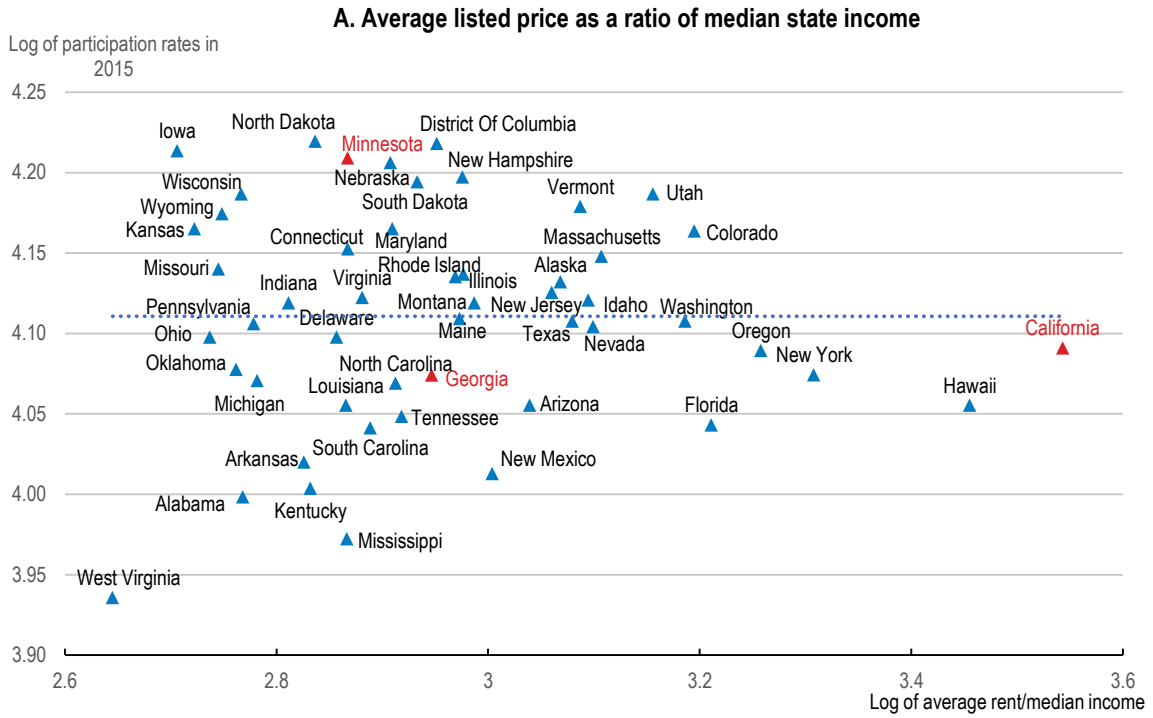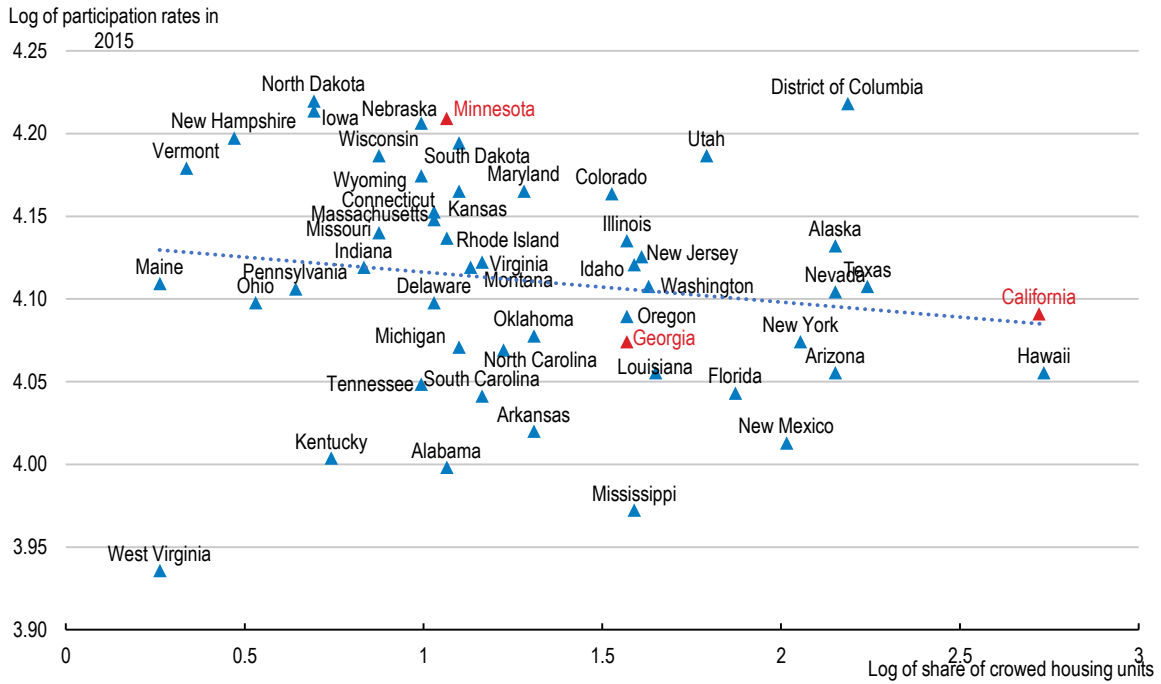
Note: Crowded housing units are defined as housing units occupied by more than one person per room.
Source: US Census beau, Trulia, Zillow.

Figure 2.15. Participation and commuting time
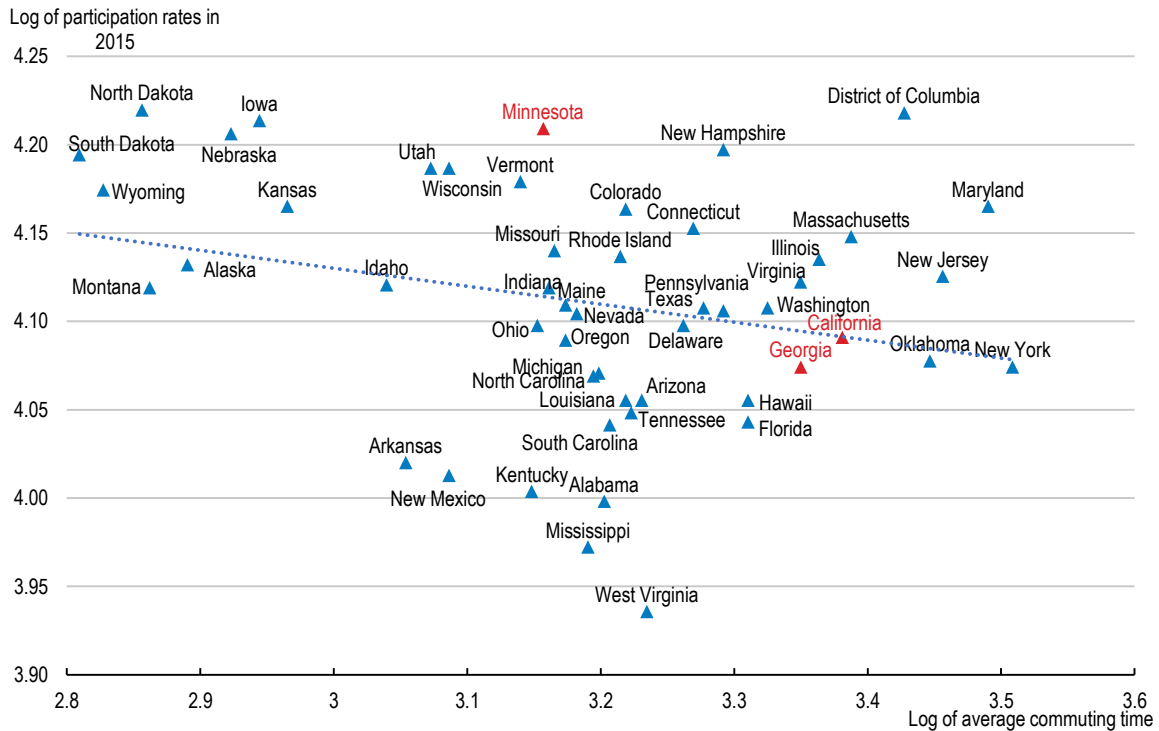
Source: OECD and American Community Survey (US Census Bureau)

Lack of affordable child care/elder care may harm participation

The decline in female labour force participation is a worrying trend that has not been observed in other advanced economies. Given that the first cause of women non-participation is family responsibility, the lack of child care or elder care may play role. For instance, the lack of child care facility has been identified as contributing to the importance of the NEETS in San Diego. Moreover, longer longevity means that a large cohort of older parents is now in need for long-term care; according to Kaye *et al.* (2014) over 50% of the daily care for those over 75 is provided by their children.

The availability and cost of child care varies greatly from one state to the other (Figure 2.16). Figure 2.16 also suggests a positive relationship between the cost of child care and female labour force participation. This could be interpreted as reflecting more expensive childcare where there is more demand. Lower participation when childcare is less expensive may also indicate that women tend to stay in states where childcare is less expensive, even if there are fewer jobs opportunity, rather than moving to states where there are more jobs but where the cost of child care is too expensive (see below).

Figure 2.16. Participation in 2015 and child care

A. Female participation and child care availability

B. Total participation and child care availability

C. Female participation and costs of child care

Source: OECD and Child Care Aware of America

Factors affecting the ability to work

Health related issues

Krueger (2017) has pointed to the role of physical, mental and emotional health conditions and pain as a barrier to work for many prime-age men. Census data shows indeed that disability or illness is the most common stated reason for prime-age non-participation in the labour market. Moreover, several studies have shown that the physical and mental health status of the working age non-active population is deteriorating and is much worse that the health status of the active population. According to the BLS population Survey, 1 out of 6 men out of labour force reports poor health status, 10 times more than those in labour force. Pierce and Scott (2016) have also shown that counties most exposed to the effect of trade liberalisation shocks saw faster increases in mortality due to suicide and related causes, particularly among whites.

Estimates by Terry (2017) suggest that after controlling for demographic changes, the share of inactive people declaring they are too sick or disabled to work has increased by 1½ percentage points over the past two decades. This analysis also shows that cross-state variations in the share of inactive reporting to be too sick to work are highly correlated with the prevalence of high blood pressure and diabetes, which are on an upward trend in the US, as well as metal health issues.

Whether bad health leads to labour force withdrawal or results from inactivity (including via the loss of affordable health care insurance options) is unclear. In some cases, bad health may have precipitated the withdrawal from the labour force while in others bad health may have developed later on. In any case, bad health has become an obstacle for many outside the labour force to take up a job or even look for one.

A related issued is the addiction to opioids. Not only the death toll from opioid overdoses has become a major public health issue but Krueger (2017) found some link between the increase in opioid prescriptions and the decline in labour force participation. Again, the causality may go both ways but whether it is non-activity that led to opioid addiction or opioid addiction that led to inactivity in the first place, the chance of those addicted to opioids to re-enter the labour force are reduced.

As illustrated by Figures 2.17 and 2.18, the health status of the population, as well as the addiction to opioid varies greatly across states. For instance, in 2015 the prescription rates ranged from 125 per 100 inhabitants for Alabama to 36 in the District of Columbia or 45 in New York State. Labour force participation tends to be lower where the share of the inactive population declaring it is too sick to work is higher, where the overall health outcomes are lower or where a larger of share of the population potentially suffers from opioid addiction.

Figure 2.17. Participation and health
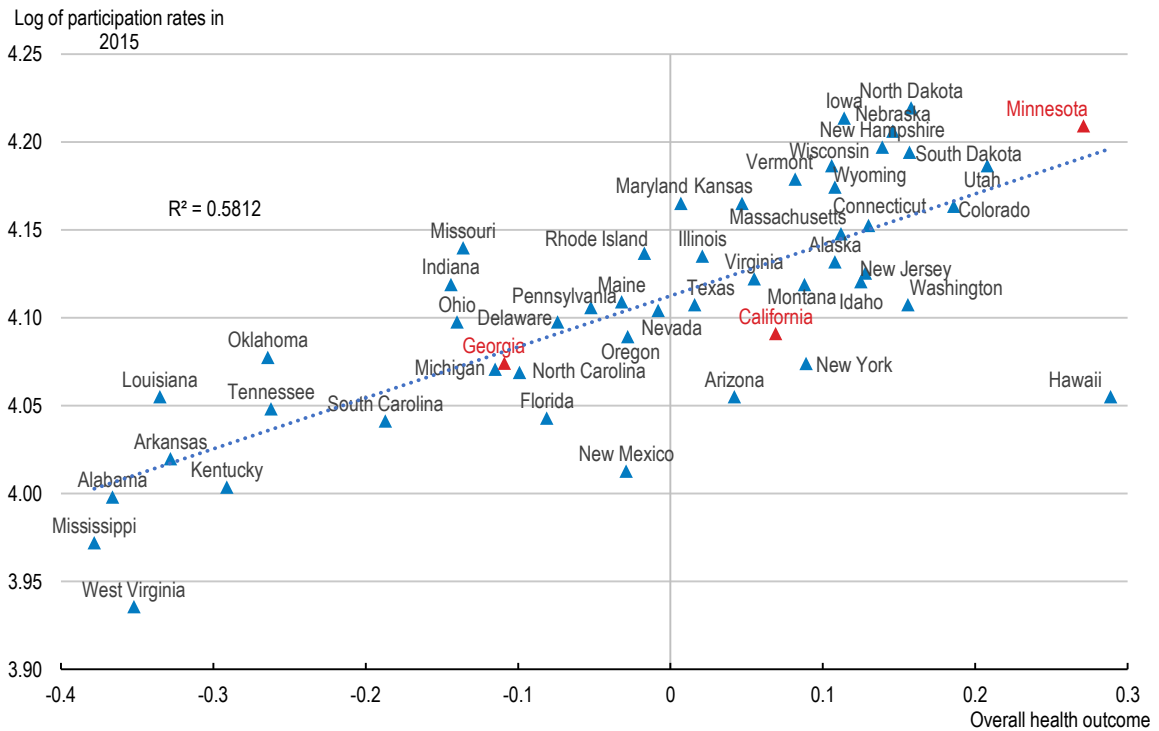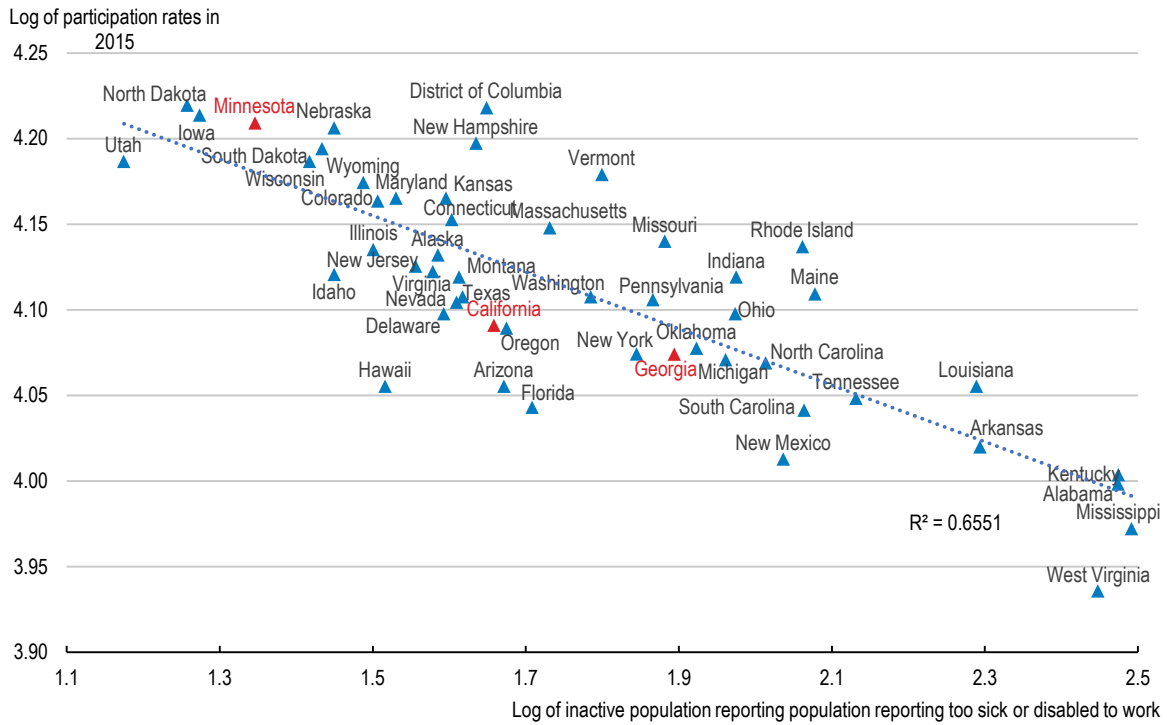
Source: OECD, US Census, America's Health Rankings Annual report

Figure 2.18. Participation and opioids
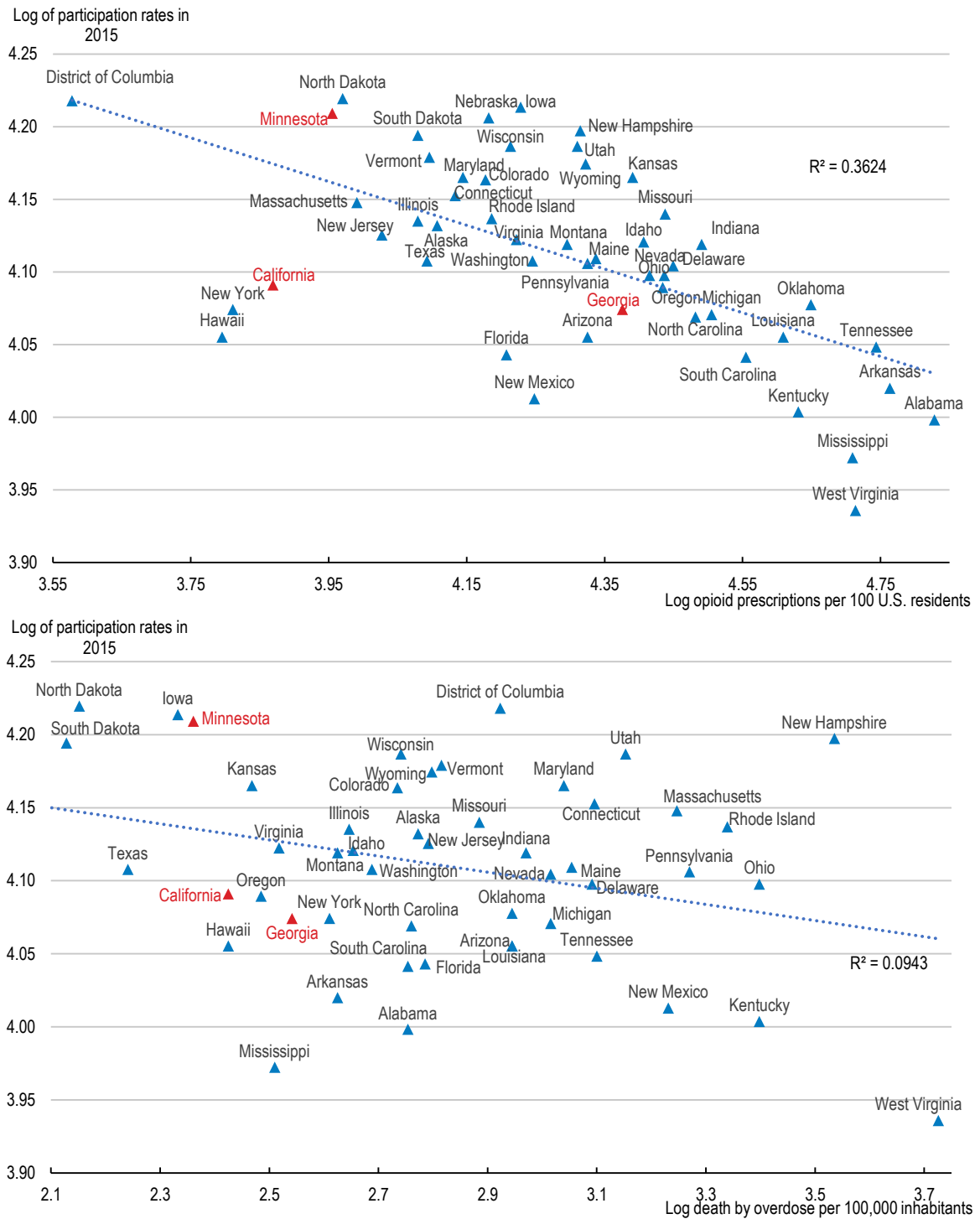
Source: Source OECD and CDC.

Criminal records

The share of the population with criminal records has increased over time. Shannon *et al* (2017) have estimated that about 8% of the US adult population (13% of the male population, 33 % of the African American adult male population) was a felon or ex-felon in 2010 up from 3% in 1980 (5% for the male population). State differences are large: people with felony convictions account for 2-3 % of the population in West Virginia but up to 12-15% in Georgia. Moreover, and more broadly, according to the NELP (National Employment Law Project), almost 1/3 of adults have a criminal record that will show up in a routine criminal background check, almost double the share in the late 80s.

There are 26,000 state occupational licensing restrictions for people with criminal records, including about 20,000 permanent restrictions. Moreover, beyond these legal restrictions, most employers conduct criminal background checks for employment, even though there are been some easing recently given the increasing difficulties to hire. The Little Hoover Commission (2016) has found for instance that 90% of employers do so in California.

Criminal records are hence likely to be major obstacle to labour mobility in general and affect in particular the ability of dislocated workers to find a new job. Pager (2003) found that ex-offenders are only one-half to one-third as likely as non-offenders to be considered by employers. As a response, over 150 cities and counties as well as several states have passed "*ban the box*" laws to require criminal backgrounds checks to be done only at final stage of the hiring process.

Moreover, the impact of criminal records goes beyond restrictions to work: they may lead to restrictions to the eligibility for drivers' licenses (sometimes based on convictions unrelated to a person's ability to drive safely) indirectly further harming the ability of people to access training and jobs where public transports are scarce. However, there does not seem to be any simple relation between the measure of the population with felony record at the state level from Shannon *et al*. (2017) and participation (Figure 2.19).

Figure 2.19. Participation 2015 and felony conviction 2010
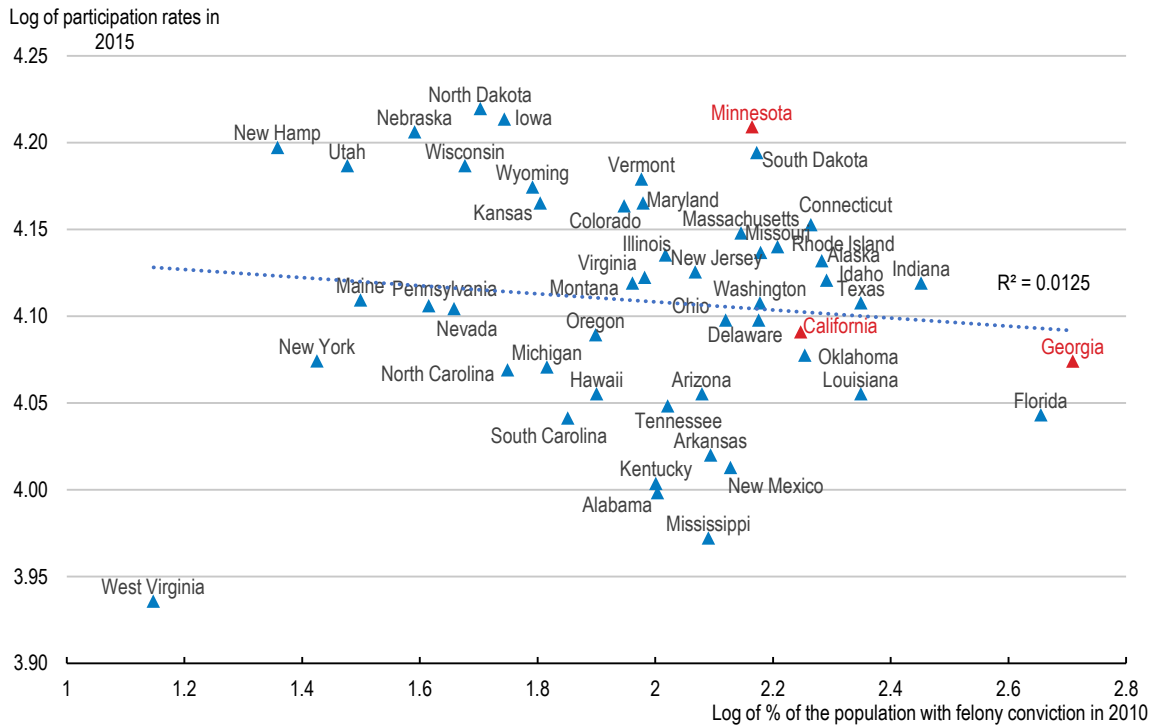
Source: Shannon *et al.* 2017 and OECD

Licensing requirements

Professional licensing requirements have also been on the rise. The share of the licensed workforce increased from 5% of the workforce in the 50s to almost a quarter. There are also major states differences in the licensing requirements (Figure 2.17), which make relocation more difficult. Several examples of costs and time to get a license in the case of California can be found in Little Hoover Commission (2016) or more broadly in the US in Nunn (2016). Figure 20 suggests that labour force participation tends to be lower where licensing requirements are the most important, especially regarding low income occupations.

Figure 2.20. Participation in 2015 and licensing

A. Number of lower income occupations licensed
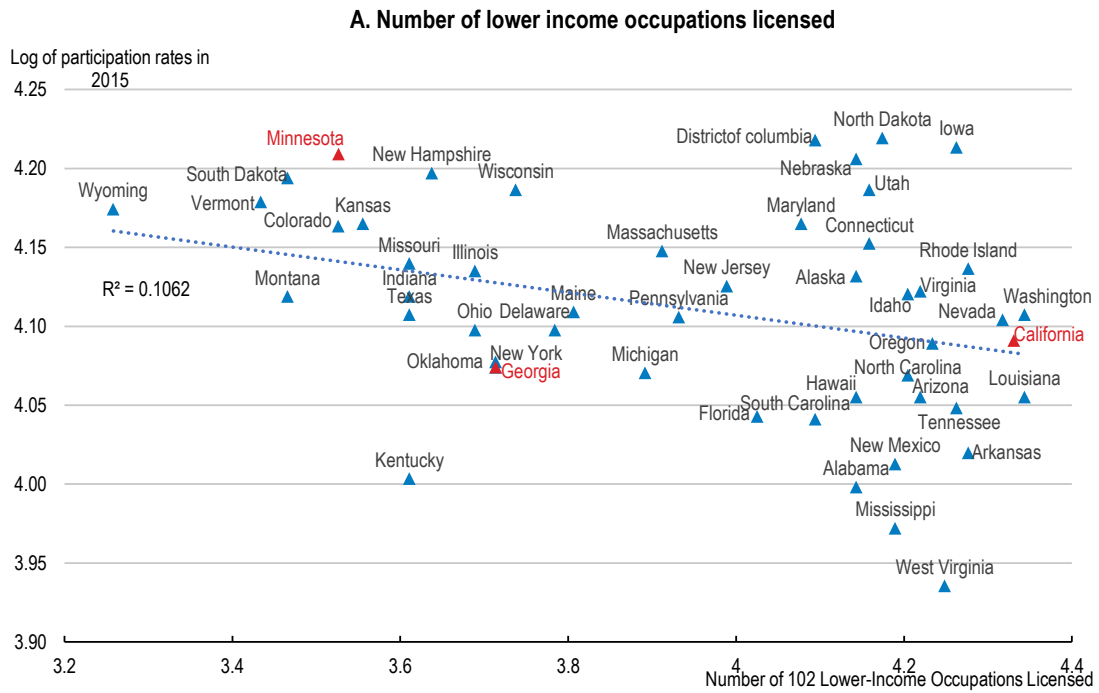
B. Average licensing fees
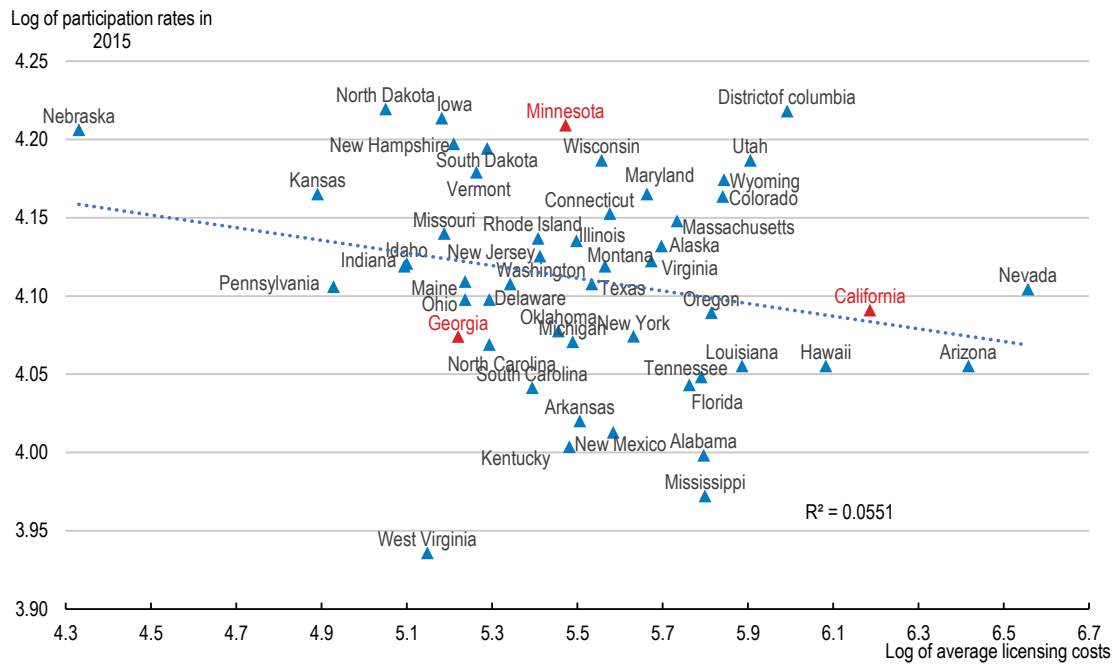
C. Average estimated calendar days lost
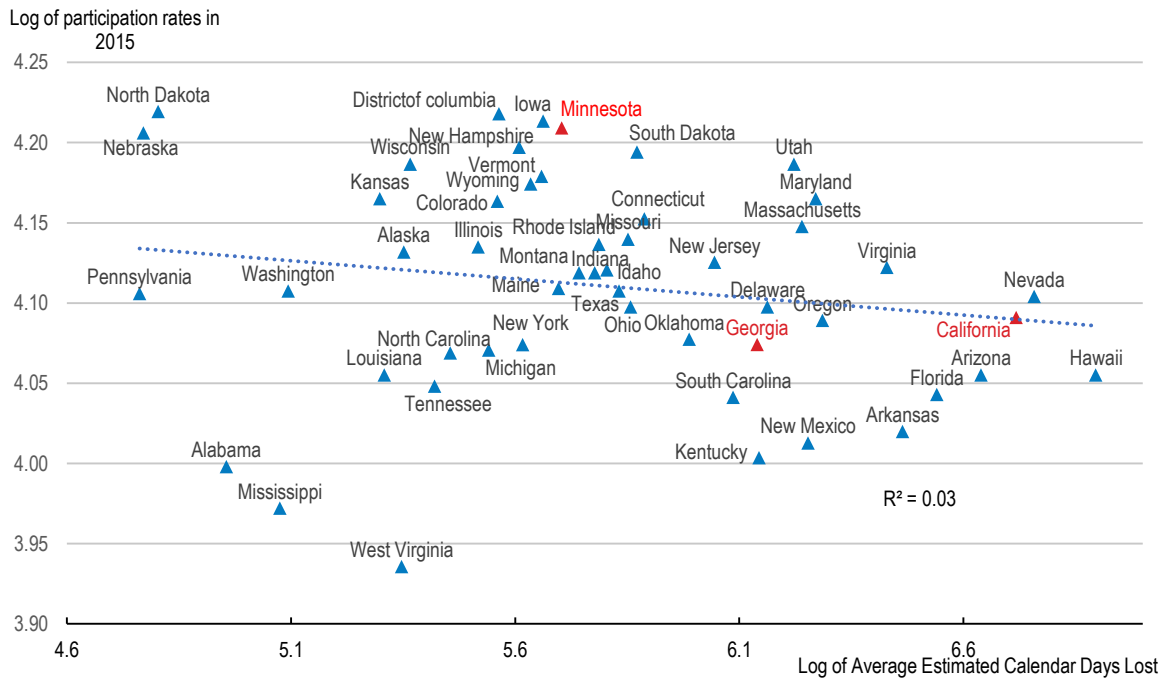
Source: OECD and Institute for justice.

Obstacles to participation tend to cumulate and amplify each other

Most of the obstacles to labour force participation listed above tend to cumulate for the least advantaged groups that are also the most affected by negative demand shocks. This

potentially leads to social exclusion, homelessness and negative feedback loops that not only stuck people outside the labour force but also affect the future of their children.

For instance, the lack of affordable transportation not only limits access to jobs and training but also to fresh food with implications for health of low income groups. "Food deserts" are defined as parts of the US lacking easy access to fresh fruit, vegetables, and other healthy food (generally measures as low-income neighbourhoods where the closest supermarket is at least a mile away for urban and at least 10 miles away for rural areas). According to the CDC, these are areas that lack large retail food markets and have a higher number of convenience stores, where healthy foods are less available, potentially affecting health outcomes, with feedback loop effects on the ability to work and earn higher incomes. [17]

Growing obstacles to geographic mobility

Not only it is difficult for displaced workers to remain on the job market, but the challenge is even worse when taking up a new job implies a relocation. As noted above, long trends affecting the labour market, as well as the global financial crisis, have implied some important changes in the geographical location of jobs. However, while job opportunities remain the main reason for geographical mobility within the United States, geographical mobility has declined both within states and between states as showed by Figure 2.21 (as well as more formally by Molloy et al. 2016; Molloy, Smith, and Wozniak (2014), Kaplan and Schulhofer-Wohl (2015). Hence one of the main source of labour market adjustment has weakened right at the same time the need for such adjustment increased.

Figure 2.21. Internal mobility has declined
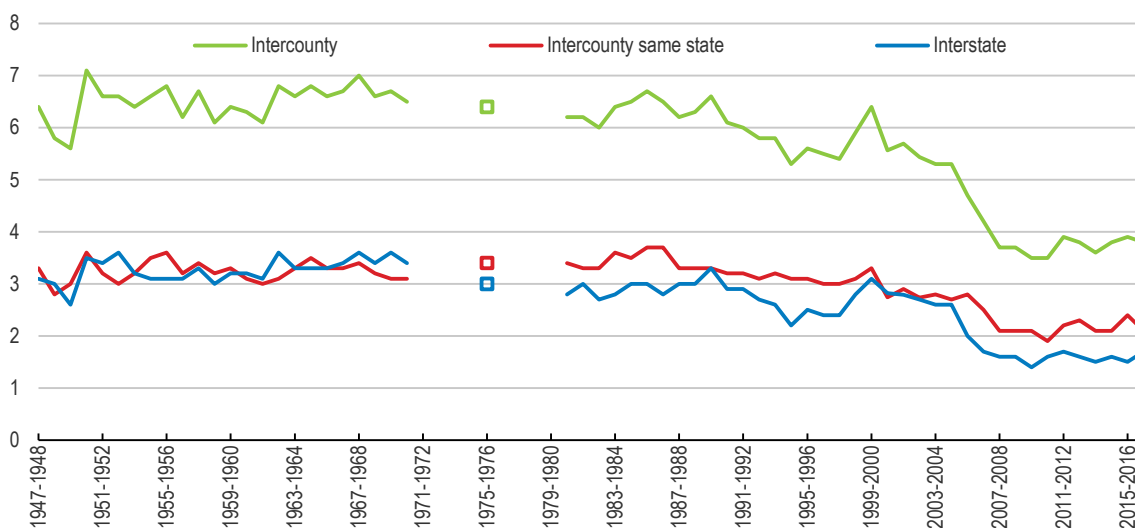
Source: U.S. Census Bureau, Current Population Survey

---

[17] Some recent findings by Allcott et al. (2018) suggest however that food preferences that depend on income are a more important determinant of diet than the availability of health food.

Three series of potential explanations to mobility decline

Several complementary factors may explain the decline in mobility. First, there are several benign explanations including the reduction in "experimental migration" as people now have more information on new locations (Kaplan and Schulhofer-Wohl, 2015) and the increased diversification of the local economies that reduce the need for mobility. Second, reduced mobility may reflect other trends such as the broader reduction in labour market churn and gains from making a job switch since the 1980s. Third, reduced mobility may reflect obstacles to internal migration, especially from declining to booming areas so that people are more likely than before to stay in declining regions or regions where their skills are not in demand rather than moving where new jobs are created or their sills are in demand. This could widen of geographical gaps in participation and lower aggregate participation. These obstacles to mobility may take different forms affecting either the ability of people to leave declining areas or their ability to relocate to booming areas.

Factors limiting exit from declining areas:

There are several potential disincentives to leaving declining areas, even if it means reduced work opportunities.

- Some social benefits appear to be linked to residence. For instance, while Medicaid requires states to cover low-income families, qualified pregnant women and children, and individuals receiving Supplemental Security Income (SSI), under the Affordable Care Act of 2010 US states also have the possibility to cover other groups, such as individuals receiving home and community-based services. Moving from a state that covers such other groups to a state that does not hence implies a loss in coverage for those concerned.

- There are several obstacles to urban contraction (as summarised in Schleicher, 2017) that may limit incentivise people to remain in declining area.

- Declining house prices play role, as job seekers with negative equity on their home are less likely to move. For instance, Brown and Matsa (2017) found evidence that job seekers are less mobile when they own a home in a distressed housing market. The positive relation between housing prices and participation found above could reflect the impact of housing costs on mobility from cheap to expensive states. However there does not seem to be any clear relation between housing restrictions or house prices and state mobility.

- Finally, as mentioned above, insufficient access to elderly care may prevent the relocation of people that would otherwise move away from old parents.

Factors limiting entry in booming area:

Several factors may limit the ability to relocate to booming areas. The recent literature has notably stressed the role of low housing supply and high housing costs in booming areas, focusing on the role of zoning restrictions and "Not In My Backyard" sentiments in the most productive regions, especially the Bay area in California and New York City (Hsieh and Moretti, 2017; Glaeser and Gyourko, 2017; Herkenhoff *et al.* 2017). For instance, according to Beacon Economics analysis at least 200,000 new units per year would be needed in California to allow job growth to reach at least 2% a year. Moreover, transportation costs and commuting time in booming regions may also increase cost of relocating there.

In the same way, the lack of child care may have a more important impact on participation when mobility is required as relocation may imply losing a family network that helps with child care. The role of child care availability and costs in new locations in preventing workers to move away from their family network, especially as more women are working, could contribute to the positive relation between child care costs and participation observed above. It seems indeed that more expensive child care is also associated with lower in state migration (Figure 2.22).

Figure 2.22. Inward migration costs of child care
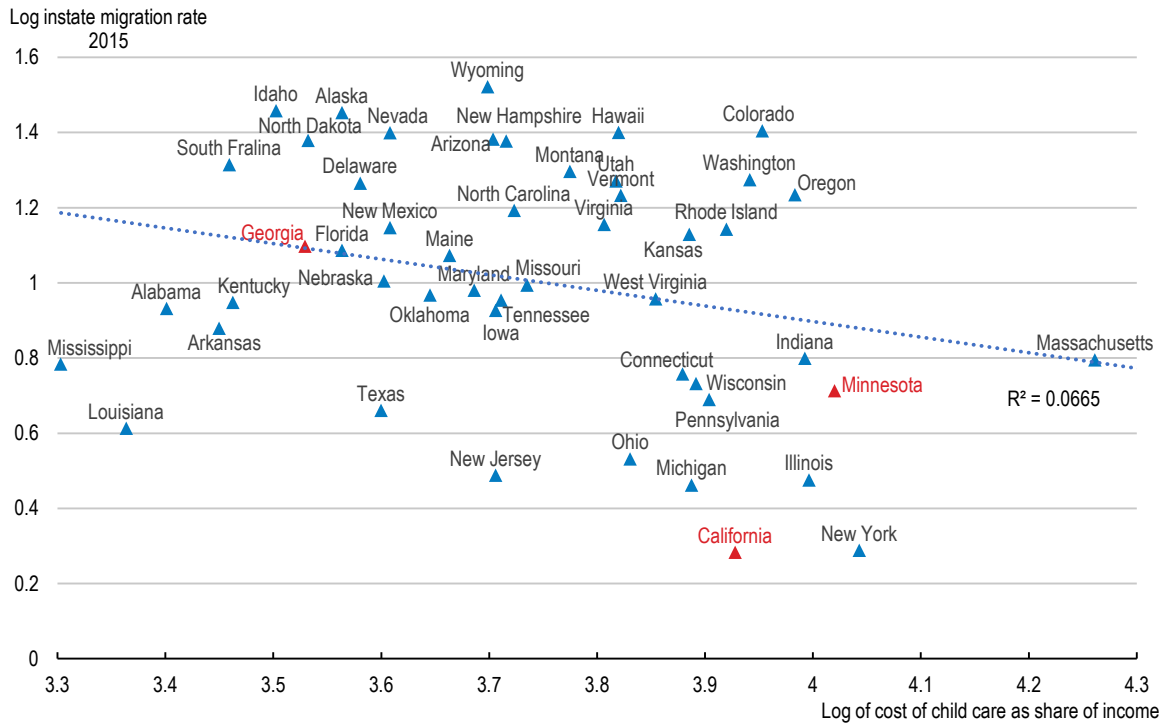
Source: OECD and Child Care Aware of America

Factors limiting mobility

Licensing heterogeneity affects labour movements more broadly. For example, high-school teachers licensed in a particular state will often have to re-apply for licensure to be able to teach in another state.[18] Nunn (2016) and Johnson and Kleiner (2017) have found evidence that licensed workers are less likely to change states than non-licensed workers.

The increased number of families with two income earners that followed the increase in women participation is also been seen as a potential factor reducing mobility but Molloy, Smith, and Wozniak (2014) find little evidence of such an impact.

How these obstacles to mobility interact with participation is difficult to assess, because their impact on participation via their effect on mobility may differ from their direct impact. For instance, while states with limited licensing requirements may have higher participation, everything else being equal, should a negative shock hit these states, affected

---

[18] Teachers mobility is also affected by states differences in seniority rules and pension structure. See for instance the analysis by Goldhaber (2015).

workers will be less likely to migrate to states where licensing requirements are more stringent but job opportunities more abundant. Licensing would hence potentially weigh on participation in the low licensing states by reducing the mobility of displaced workers to other states.

This suggests that it is not only the structural setting that matters but also how they interact with local labour market shocks.

Overview of geographical differences in potential obstacles to participation

As illustrated by the series of scattered plots above there are important state differences regarding the importance of possible obstacles to participation identified by the recent literature. It seems moreover that labour force participation tends to be lower where the skill level of the population is the lowest, a larger of share of the population potentially suffers from opioid addiction, is in bad health or receiving disability benefits, where licensing requirements are the most important especially regarding low income occupations and where child care is less available (especially for women participation). This could make the impact of common labour demand shocks on labour supply and participation vary across states.

It is also worth noting that the states with lowest rate of participation in the labour force (West Virginia, Alabama and Mississippi) share a few common features such as lower education attainment of the population, higher number of low income occupations requiring licensing, high disability and opioid prescription rates, poor health outcomes and high share of the inactive population declaring too sick or disabled to work, slightly above average commuting time, cheaper than average house prices. They however differ substantially on other features such as share of the population with felony conviction, housing conditions (measured by the share of crowded houses) or the relative costs of child care. On the other hand, high participation states (North Dakota, Iowa, Minnesota and DC) present very diverse positions on most indicators, but tend to have strong health outcomes and reported health indicators.

Looking at two large states with slightly below-average participation, California and Georgia, important cross-states differences are also evident. Both states share below average death by overdose as well as limited child care availability and long commuting time but differ on many other structural features. On the one hand, California is characterised by a low share of disability recipients and opioid prescriptions, but high licensing requirements, high cost of child care and very high costs of housing. Georgia features below average licensing requirements, relatively low costs of child care and housing but a high share of the population with previous felony conviction. While both states have close to average health outcomes and share of the population declaring too sick to work, these indicators are weaker in Georgia.

Even though these first findings are in line with anecdotal evidence and the recent literature, it is impossible to infer any causality from these charts; causality may indeed go both ways or apparent correlations may just reflect common causes.

Regression analysis of state participation differences

This section goes beyond the simple relations presented above and exploits the state differences further through panel estimations. The goal is to assess the role structural features, once other drivers of participation including aging and economic cycle are taken into account, and how these factors may interact with changes in labour demand and supply.

This state-level analysis builds on previous estimations by Aaronson *et al* (2014) and Erceg and Levin (2013) but with a focus on structural indicators rather than on the impact of the cycle.

A key limitation is the availability of data at the state level, both regarding participation and structural indicators (see Annex B for a full description of the indicators). Regional OECD data on participation for the US only includes participation of the population over 15 years old. This makes it impossible to estimate proper cohort models at the state level and assess how the different indicators affect differently the different age groups. A next step would be to build a more detailed database using Census data. The availability of structural indicators is another limit as time series do not exist for most of them, although these features do not tend to vary a lot over time. Therefore, the last available value of the indicators at the state level is used in the analysis below. Moreover, available indicators are often only a proxy of the considered structural settings.

How much of states differences in participation can structural features explain once the cycle and demographics are taken into?

As a first illustration of the potential role of institutional/structural factors in affecting the ability of people to participate to the labour force, a simple labour force participation equation (1) is estimated on a panel of US states.

$$LFPR_{t,s} = \alpha_s + \beta_t + \lambda LFPR_{t-1,s} + \gamma\, DEP_{t,s} + \Sigma\delta_k\, DEM_{t-k,s} + \eta E_{t,s} + \varepsilon_{t,s} \quad [19]$$

$LFPR_s$ is the log of labour force participation rate in state s.

DEP_s is the log of the share of the population over 65 is state s, to take into account the impact of aging and the age structure of the population in the different states.[20]

E_s measures educational attainment in state s (log of the share of the population over 25 that has at least a bachelor degree).

DEM_s measures shocks to labour markets in state s. It includes the real GDP growth in state s as well as the share of long term unemployment in total unemployment. Unemployment was also included in earlier formulations but proved non-significant when introduced together with GDP growth. Long-term unemployment incidence is also a better way to measure hysteresis than lags of unemployment rate as in Aaronson *et al* (2014). It can be interpreted as reflecting discouraged worker effects. Both variables were lagged to take into account delayed effect on participation.

Lagged participation is also introduced in one specification to take into account to persistence in participation change (as in Aaronson *et al.* (2014)) as decisions to leave/enter the labour force may be quasi irreversible.

In a second step, states fixed effects (α_s), which reflect the states differences once the impact of demographics, the cycle and hysteresis effects on unemployment taken into account, are regressed on structural indicators.

---

[19] Test supporting the presence of time fixed effects, states fixed effects and Hausmann tests are available upon request.

[20] As noted by Aaronson et al (2014), the age structure of the population may also affect how participation is affected by the cycle, as states with a larger share of older population, like Florida and Arizona, might be more prone to housing booms and busts and thus to more severe downturns.

The panel estimations first confirm the role of aging in the decline of labour participation. The different estimations suggest that for a representative state 1 point increase in the share of the population above 65 would lead to a decline in participation of between 0.5 and 0.7 percentage point depending on the specification. For instance, with the share of the population above 65 having increased by 2.75 percentage points between 2000 and 2016, this would mean that aging could account for between 1.4 and 1.8 percentage points of the 4 percentage points decline in labour force participation.

Participation is also found to decline when long-term unemployment increases, providing supporting evidence of a discouraged worker effect following important shocks to state labour markets whether these shocks are due to job dislocation or strong cyclical effects. The estimations suggest that a permanent increase of 10 percentage points in the share of long-term unemployment in total unemployment results in a decline in participation of 0.6 percentage point in the specification without persistence effects and up to the double in the specification with lagged participation. Applied to the profile of long-term unemployment, long-term unemployment increases over the past decade could explain between 1.6 and 2.3 percentage points of the decline in participation. With the share of long-term unemployed in unemployment still above its pre-crisis level this suggests some possible future recovery in participation, albeit at a slow pace. Moreover, given the different regional situations, the recovery is likely to be very uneven across the United States.

Participation also tends to increase with stronger economic growth; however, the estimated impact is very small with a 1 % increase in the GDP growth rate for 3 years only increasing participation by 0.1 percentage point, as most of the cyclical effect is captured by long-term unemployment.

Moreover, the estimations suggest some persisting effects over time. The evolution of educational attainment does not seem to play a role, although this may reflect two conflicting forces, with longer enrolment reducing labour force participation of the younger cohort while higher achievement increases participation later on.

The regressions of the state fixed effects on a series of indicators are only reproduced where a significant relation could be found. No significant relation could be found for child care or licensing indicators, possibly reflecting the different impact they can have on participation via migration on the one hand and local participation decisions on the other: low licensing and affordable child care options may support local participation but deter migration to states where licensing requirements are more stringent and child care less affordable. The number of ex-felons in the population was not found to play a role either. This may be due to the important differences in state policies regarding what is considered as an offense and how ex-offenders' records are dealt with. Moreover, they most likely affect some very specific groups of the population rather than the aggregate. Pager *et al.* (2009) show for instance that African American ex-offenders are less likely than white ex-offenders to get a job interview or be offered a job and that the gap is wider than for the population with no criminal records.

On the other hand, lower state participation (as measured by the State fixed effects) seems to be associated with lower average educational attainment, a high share of disability recipients in the working age population, a higher use of opioids, and a higher share those who give sickness as the reason for labour force inactivity. Given the correlation between health indicators or the share of the inactive population declaring too sick or disabled to work and disability recipients, they cannot be included simultaneously in the regressions. While confirming some of the relations suggested above these findings say little on the

causality of the relations. The main issue remains that once on disability benefits or sick the likelihood to re-enter the labour force is limited.

Lower participation seems also associated with worse housing conditions (measured by the share of crowded housing) and/or longer commuting time.[21] This may well reflect the difficulty of potential workers to access available jobs when the costs of housing near those jobs or commuting time are too high. But it may also just reflect the fact that inactive people have lower income, hence live in more crowded houses or in cheaper areas far away from job centres.

Could structural features affect the persistence of participation decisions?

To look further into the role of structural settings in potentially affecting participation, time invariant structural indicators are interacted with lagged participation.

$$(1') \ LFPR_{t,s} = \alpha_s + \beta_t + \lambda LFPR_{t-1,s} + \mu \ (X_s)^* \ LFPR_{t-1,s} + \gamma \ DEP_{t,s} + \delta \ U_{t,s} + \eta E_{t,s} + \varepsilon_{t,s}$$

X_s set of time unvarying structural indicators

Results displayed in Table 2.2 suggest that the persistence of participation is higher where the share of disability recipients or the health of the population is weaker (whether measured by the importance of opioid prescriptions, the share of the inactive who declare to be too sick or disabled to work or health outcomes) and where educational attainment is lower. This could be interpreted as suggesting that decisions to enter or leave the labour force tend to be more permanent under these circumstances. No significant relations could be found with the other variables. The difference on the lagged coefficient would imply that a 10 percentage points increase in the share long-term unemployment could lead to a decline in participation 0.6 percentage point lower in the healthiest state than in the least healthy state.

---

[21] The indicator of rent level was found to be negatively associated with participation in some intermediate estimates, but the effect disappears when housing conditions measured by the share of crowded homes are included.

Table 2.1. Summary of the two-step estimations- 1990-2015

Labour force participation (-1)	0.82 ***							
Share of over 65	-0.03*** (-3.7)				-0.14 *** (-2.9)			
Incidence of long term unemployment (ILTU)	-0.002 * (-1.9)				-0.006 *** (-3.0)			
I LTU(-1)	-0.002 ** (-2.0)				-0.007*** (-4.3)			
I LTU(-2)	-0.002 * (1.85)				-0.01 *** (6.6)			
Educ. Attainment	-0.004 (-0.83)				0.01 (0.54)			
DLog (GDP) (-1)	0.032 *** (3.34)				0.05 * (1.9)			
DLog (GDP) (-2)	0.037 *** (3.1)				0.07** (2.5)			
Adj. R-Squared	0.76				0.22			
NB observations	1173				1173			
Cst	0.95*** (13.9)	0.91*** (21.8)	0.81*** (14.5)	0.83*** (46)	4.9*** (15.0)	4.8*** (21.1)	4.3*** (16.2)	4.6*** (52.3)
Overdose death rate	-0.007** (-2.6)				-0.04*** (-2.8)			
Opioid prescription rate	-0.015** (-2.4)	-0.014** (-2.4)	0.003 (0.37)		-0.03 (-1.1)	-0.03 (-1.1)	0.03 (0.2)	
Inactive too sick or disabled to work			-0.02*** (-4.0)	-0.02*** (-5.4)			-0.11*** (-5.1)	-0.09*** (-6.2)
Education attainment	0.026*** (3.0)	0.2** (2.6)	0.018* (1.9)	0.024*** (1.9)	0.11** (2.4)	0.1** (2.4)	0.07 (1.6)	0.09*** (3.1)
Disability beneficiaries	-0.01** (2.1)	-0.01* (-1.7)			-0.07*** (-2.8)	-0.06** (-2.0)		
Cost of housing (rent)	-0.01 (-1.6)				-0.04 (-1)			
Share of crowded housing	-0.01*** (-6.5)	-0.01*** (-6.1)		-0.1*** (-7.3)	-0.07*** (-5.9)	-0.06*** (-5.2)		-0.05*** (-7.1)
Commuting time		-0.012* (-1.9)		-0.01 (-1.0)		-0.08** (-2.4)		-0.04 (-1.5)
Adjusted R-squared	0.79	0.63	0.43	0.80	0.69	0.69	0.52	0.80
NB observations	51	51	51	51	51	51	51	51

"***", "**", "*" denotes statistical significance at 1%, 5% and 10% levels, respectively.

Table 2.2. Main results on persistence of participation decisions

LFPR (-1)	0.82 ***	1.18 ***	0.71 ***	0.50 ***	0.80 ***	0.66 ***
	(62.3)	(6.2)	(15.2)	(3.4)	(51.3)	(14.1)
LFPR (-1)* Education (Edu)		-0.11*				
		(-1.9)				
LFPR (-1)* Disability (Di)			0.062**			
			(2.2)			
LFPR (-1)* Opiod				0.07**		
				(2.3)		
LFPR (-1)* Health outcome					-0.17***	
					(-3.3)	
LFPR (-1)* too sick to work						0.09***
						(3.7)
Share of pop over 65	-0.03***	-0.03***	-0.03***	-0.03***	-0.03***	-0.03***
	(-3.7)	(-3.7)	(-3.7)	(-3.7)	(-4.6)	(-3.7)
Incidence of LTU	-0.002 *	-0.002 *	-0.002 *	-0.002 *	-0.002 *	-0.002 *
	(-1.9)	(-1.9)	(-1.9)	(-1.9)	(-2.0)	(-1.9)
Incidence of LTU(-1)	-0.002 **	-0.002 **	-0.002 **	-0.002 **	-0.002 *	-0.002 **
	(-2.0)	(-2.0)	(-2.0)	(-2.0)	(-2.2)	(-2.0)
Incidence of LTU(-2)	-0.002 *	-0.002 *	-0.002 *	-0.002 *	-0.002 *	-0.002 *
	(1.9)	(1.9)	(1.9)	(1.9)	(2.0)	(2.1)
DLog (GDP) (-1)	0.032 ***	0.033 ***	0.033 ***	0.032 ***	0.027 ***	0.033 ***
	(3.3)	(3.2)	(3.3)	(3.3)	(3.3)	(3.5)
DLog (GDP) (-2)	0.037 ***	0.037 ***	0.037 ***	0.037 ***	0.035 ***	0.038 ***
	(3.1)	(3.0)	(3.1)	(3.0)	(2.8)	(3.1)
Adj. R-Squared	0.76	0.76	0.76	0.76	0.74	0.76
Implicit lagged participation coefficient range		0.74-0.86	0.73-0.82	0.75-0.84	0.75-0.86	0.76-0.79
NB observations	1173	1173	1173	1173	1150	1173

Note: "***", "**", "*" denotes statistical significance at 1%, 5% and 10% levels, respectively.

Could structural features affect the discouraged-worker effect?

The same analysis as above is replicated but interacting the incidence of long-term unemployment and structural indicators.

$$LFPR_{t,s} = \alpha_s + \beta t + \lambda LFPR_{t-1,s} + \gamma\, DEP_{t,s} + \delta_1(GDP_{t,s} - GDP_{t-1,s}) + \delta_2(LTU_{t,s}) + \mu\,(X_s)*(LTU_{t,s}) + \varepsilon_{t,s}$$

$* X_s$ set of time unvarying structural indicators

Results displayed in Table 2.3 show that long-term unemployment increases tend to lead to faster and stronger declines in participation where the share of disability recipients and the health of the population is weaker. [22] On the other hand, higher educational attainment of the labour force tends to reduce this discouraged worker effect.

More surprisingly the discouraged worker seems less important in states where housing costs and land use restrictions are high and more important where they are low. This could be linked to the impact of housing prices on mobility, if displaced workers tend to stay where housing costs are low rather than moving to look for job opportunities in more expensive states. No impact of licensing, child care or share of ex-felon in the population could be found.

---

[22] Similar results were optioned with the specification that omits the lagged dependent variable.

Table 2.3. Main results on discouraged worker effects

LFPR (-1)	0.82 *** (62.3)	0.80 *** (57.2)	0.81 *** (62.2)	0.81 *** (60.7)	0.81 *** (60.4)	0.81*** (61.4)	0.81 *** (60.8)	0.82 *** (59.6)
Share of over 65	-0.03*** (-3.7)	-0.03*** (-3.8)	-0.03*** (-3.8)	-0.03*** (-3.9)	-0.03*** (-4.2)	-0.03*** (-3.6)	-0.02*** (-4.1)	-0.03*** (-3.5)
Incidence of LTU	-0.002 * (-1.9)	-0.08 ** (4.5)	0.006 ** (2.0)	0.027 *** (4.1)	0.023 *** (2.7)	0.003 (1.4)	-0.002 ** (-2.0)	-0.002 ** (-2.1)
ILTU* Edu		0.01*** (4.5)						
ILTU* Di				-0.005*** (-3.4)		-0.005** (-2.2)		
ILTU* Opiod					-0.007*** (-4.3)	-0.002 (1.0)		
Too sick to work						-0.003** (-2.5)		
ILTU* Zoning regulation							0.001** 2.0	
ILTU* relative housing costs								0.005* 1.9
Incidence of LTU(-1)	-0.002 ** (-2.0)	-0.002 ** (-2.1)	-0.002 ** (-2.1)	-0.002 ** (-2.1)	-0.002 ** (-2.1)	-0.002 ** (-2.0)	-0.002** (-2.3)	-0.002 ** (-2.1)
Incidence of LTU(-2)	-0.002 * (-1.8)	-0.002 * (-1.9)	-0.002 * (-1.8)	-0.002 * (-1.8)	-0.002 * (-1.8)	-0.002* (-1.8)	-0.002 * (-1.9)	-0.002 * (-1.9)
DLog (GDP) (-1)	0.032 *** (3.34)	0.033 *** (3.4)	0.034 *** (3.5)	0.033 *** (3.4)	0.033 *** (3.4)	0.034*** (3.5)	0.028 *** (3.4)	0.034 *** (3.4)
DLog (GDP) (-2)	0.037 *** (3.1)	0.038 *** (3.1)	0.040 *** (3.3)	0.039 *** (3.2)	0.039 *** (3.2)	0.039*** (3.2)	0.037*** (3.1)	0.040 *** (3.2)
Adj. R-Squared	0.76	0.76	0.76	0.76	0.75	0.76	0.76	0.76
NB observations	1173	1173	1173	1173	1173	1173	1150	1173

Note: "***", "**", "*" denotes statistical significance at 1%, 5% and 10% levels, respectively.

Interactions of structural indicators with other variables such as dependency ratio or GDP growth were not significant.

Overall, a few structural/institutional indicators seem to be potentially associated with the differences in participation between the US states: educational attainment, disability benefits, opioid prescription and other health indicators can not only be associated with the differences in participation levels, but also potentially to the persistence of participation changes and its sensitivity to long-term unemployment.

The importance of educational attainment in driving participation is already recognised in local and federal initiatives to improve quality and access to quality education and support low-skilled workers and job seekers with training.

The results also suggest a possible complex relation between labour force participation and housing conditions, as overall participation is lower in States where houses are more crowded but less sensitive to the incidence of long-term unemployment where prices are relatively higher.

None of the results suggests a relation between participation levels or dynamics and licensing stringency or child care. In the case of licensing given the possible impact of licensing on relocation decisions, the analysis could be complemented with more investigation on the impact of licensing on internal migration. In the case of child care, it

would be worth it redoing the estimations considering only women participation to the labour force.

Conclusions: Implications for how to prepare for the forthcoming storms

As the labour market tightens, the population that remains outside the labour force includes men and women with the deepest obstacles to participation including lack of skills, limited access to child care, transportation issues, criminal records and health/drug addiction issues. Moreover, new shocks to labour demand (AI, robotisation) are forthcoming and will displace more workers, some of whom will likely leave the labour force.

This review of the literature and new empirical analysis suggest that reconnecting those that have withdrawn from the labour force and preventing future displaced workers from exiting it will require a wide set of policies that go well beyond labour market policies *stricto sensus*.

Supporting the skills of the current and future labour force via stronger education, on the job training and training of the unemployed/inactive men and women willing to join the labour force remains essential (OECD/ILO, 2017). Several states have launched programmes to support working adults that a lack of skills may push out of employment (including flexible online certificates or academic degrees). But the findings of this report also suggest that policies to support the health of the prime-age inactive groups, review incentives to work associated with social benefits, review the relevance of licensing requirements and facilitate the access of those with criminal records to the labour market have also a role to play. Removing obstacles to physical mobility and access to jobs and training such as the lack of affordable housing, transportation licensing heterogeneity or the availability of child care also need consideration, even if the empirical analysis above has not always provided support for earlier literature findings.

Addressing the variety of obstacles to participation is a challenge in a large federal country as the United States given the multiplicity of policy levels involved and the differences in local situations. Many states, counties and cities around the United States have launched initiatives to address some of the obstacles that appear to play a major role at the regional/local level. Workforce development agencies are also developing programmes targeted to the very needs of the local populations. For instance, the San Diego Workforce Partnership (SDWP) which funds job training programs to help meet local demand for qualified workers, focuses on sectors where there is high demand for workers as well as on the NEETS (estimated at over 40,000 in the county or 9 ½ % of the youth population (see Annex A)).

However, the coordination of the different initiatives is a challenge. Uncoordinated states and local policies may create even more heterogeneity between the local labour markets and prevent mobility. Moreover, a lack of coordination between the different actors is a potential source on inefficiency. In San Diego, this has been addressed by creating a community partnership including the City and the County of San Diego instead of separate institutions. It is however more challenging in metropolitan areas that include several counties. While the San Diego metropolitan area includes one county and 10 cities, Atlanta's metropolitan area with slightly less than double the population includes 28 counties and over 100 cities making the coordination of local authorities more difficult to organise. As a result, the workforce development system remains very fractioned (See Andreason and Carpenter, 2015). Examples of successful coordination studied in

Andreason and Carpenter (2015) include Chicago, Detroit, Boston, Cincinnati but as noted in the study they all rely on different approaches.

References

Aaronson S, T. Cajner, B. Fallick, F. Galbis-Reig, C. Smith, and W. Wascher (2014) "Labor Force Participation: Recent Developments and Future Prospects" Finance and Economics Discussion Series Divisions of Research & Statistics and Monetary Affairs Federal Reserve Board, 2014-64

Abraham K. and M. Kearney (2018) "Explaining the Decline in the U.S. Employment-to-Population Ratio: A Review of the Evidence" NBER Working Paper No. 24333

Allcott, H. R. Diamond, and J-P. Dubé, (2018) "The Geography of Poverty and Nutrition: Food Desserts and Food Choices Across the United States", Stanford University Graduate School of Business Research Paper No. 18-6

Andreason S. and Ann Carpenter (2015) "Fragmentation in Workforce Development and Efforts to Coordinate Regional Workforce Development Systems," Federal Reserve Bank of Atlanta, Community and Economic Development Department Discussion Paper 2015-2

Arntz, M., T. Gregory and U. Zierahn (2016), "The Risk of Automation for Jobs in OECD Countries: A Comparative Analysis", OECD Social, Employment and Migration Working Papers, No. 189, OECD Publishing, Paris

Barnes M., F. Gumbau-Brisa, and G. Olivei (2013) "Cyclical versus Secular: Decomposing the Recent Decline in U.S. Labor Force Participation" Federal Reserve Bank of Boston Research Department Public Policy Briefs No. 13–2

Black S. E., D. Whitmore Schanzenbach, and A. Breitwieser (2017) "The Recent Decline in Women's Labor Force Participation", Framing paper, the Hamilton project.

Blank, R. M. (2002), "Evaluating Welfare Reform in the United States", Journal of Economic Literature, 40(4), pp. 1105-1166.

Brown, J. and D. Matsa (2017) "Locked in by Leverage: Job Search during the Housing Crisis" NBER Working Paper No. 22929.

Burd-Sharps L. and K. Lewis (2018) "More Than A Million Reasons For Hope - Youth Disconnection in America", Measure of America, Social Science Research Council

Case A and A. Deaton (2015) "Rising midlife morbidity and mortality in midlife among white non-Hispanic Americans in the 21st century" Proceedings of the National Academy of Sciences Dec 2015, 112 (49)

CBO (2018) Factors Affecting the Labor Force Participation of People Ages 25 to 54, February

CEA (2014) The labor force participation rate since 2007: causes and policy implications.

Children and Families at Brookings Brief 56.

Davis S. and J. Haltiwanger (2014) "Labor Market Fluidity and Economic Performance" NBER Working Paper No. 20479

Eberstadt N. (2016) Men Without Work: America's Invisible Crisis

Erceg, C. and A. Levin (2013) "Labor Force Participation and Monetary Policy in the Wake of the Great Recession" IMF Working Paper 13/245

Glaeser E. and J. Gyourko (2017) "The Economic Implications of Housing Supply" Zell/Lurie Working Paper 802;

Goldhaber D., C. Grout, K. Holden and N. Brown "Crossing the Border? Exploring the Cross-State Mobility of the Teacher Workforce" CALDER Working Paper No. 143 September 2015

Greenstone M., A. Looney (2012), "The Marriage Gap: The Impact of Economic and Technological Change on Marriage Rates", Brookings Institution, February

Haltiwanger J. (2015) "Top Ten Signs of Declining Business Dynamism and Entrepreneurship in the U.S." Kauffman Foundation New Entrepreneurial Growth conference, June

Hathaway, I. and R. Litan (2014). "Declining Business Dynamism in the United States: A Look at States and Metro", Brookings Institution.

Helper S., T. Krueger, and H. Wial (2012) "Locating American Manufacturing: Trends in the Geography of Production" Brooking Metropolitan Policy Programme

Herkenhoff K., L. Ohanian, E. Prescott (2017) "Tarnishing the Golden and Empire States: Land-Use Restrictions and the U.S. Economic Slowdown" NBER Working Paper No. 23790.

Hipple S. (2016) "Labor force participation: what has happened since the peak?," Monthly Labor Review, U.S. Bureau of Labor Statistics, Sept. 2016.

Hsieh C-T., E. Moretti (2017) "Housing Constraints and Spatial Misallocation". NBER Working Paper No. 21154. Revised version.

Johnson J. and M. Kleiner (2017) "Is Occupational Licensing a Barrier to Interstate Migration?" Federal Reserve Bank of Minneapolis Staff Report 561

Kaye S., C. Harrington, and M. LaPlante (2014) "Advancing Long-Term Services & Supports Long-Term Care: Who Gets It, Who Provides It, Who Pays, And How Much?" Health Affairs Vol. 29, No. 1.

Krueger A. (2017) "Where have all the workers gone? An inquiry into the decline of the U.S. labor force participation rate" BPEA Conference Draft

Little Hoover Commission (2016) "Jobs for Californians: Strategies to Ease Occupational Licensing Barriers", Report No. 234

Mitchell T., L. Pavetti, and Y. Huang (2018) " Life After TANF in Kansas: For Most, Unsteady Work and Earnings Below Half the Poverty Line" Center on Budget and Policy Priorities. February

Moffitt, R. A. (2003), "The Temporary Assistance for Needy Families Program", in: Means-Tested Transfer Programs in the United States, ed. R. A. Moffitt, University of Chicago Press, Chicago.

Molloy, R., C. Smith, R. Trezzi, and A. Wozniak (2016). "Understanding Declining Fluidity in the U.S. Labor Market," Finance and Economics Discussion Series 2016-015. Board of Governors of the Federal Reserve System

Molloy, R., C.. Smith, A. Wozniak (2014) Declining Migration within the U.S.: The Role of the Labor Market NBER Working paper, 20065.

Nunn R. (2016) "Occupational Licensing and American Workers' The Hamilton project, Economic Analysis, June

OECD (2014) *Employment and Skills Strategies in the United States: OECD Reviews on Local Job Creation*, OECD Publishing, Paris.

OECD (2016a) *Enhancing Child Well-Being to Promote Inclusive Growth*, OECD Publishing, Paris.

OECD (2016b) *Back to Work: United States- Improving the Re-employment Prospects of Displaced Workers,* OECD Publishing, Paris.

OECD (2016c) OECD Regional Outlook 2016: Productive Regions for Inclusive Societies, OECD Publishing, Paris

OECD (2017) "How technology and globalisation are transforming the labour market" in *OECD Employment Outlook*

OECD (2018) *Job Creation and Local Economic Development 2018: Preparing for the Future of Work*, OECD Publishing, Paris.

OECD/ILO (2017) *Engaging Employers in Apprenticeship Opportunities: Making it happen locally*, OECD Publishing, Paris

Pager, D. (2003) "The Mark of a Criminal Record." American Journal of Sociology, vol. 108, no. 5.

Pager, D., B. Western, and N. Sugie (2009). "Sequencing Disadvantage: Barriers to Employment Facing Young Black and White Men with Criminal Records". *Annals of the American Academy of Political and Social Sciences* 623 (May):195-213.

Pierce J. and P. Schott (2016) "Trade Liberalization and Mortality: Evidence from U.S. Counties" Finance and Economics Discussion Series Divisions of Research & Statistics and Monetary Affairs Federal Reserve Board, 2016-094

San Diego Workforce Partnership (2017) "Understanding the story of San Diego's opportunity youth".

Sawhill I. and J. Venator (2016) "Is There a Shortage of Marriageable Men?" Center on

Schleicher D. (2017) "Stuck! The Law and Economics of Residential Stagnation" The Yale Law Journal, Vol 127, No 1

Schulhofer-Wohl, S. and G. Kaplan (2015) "Understanding the Long-Run Decline in Interstate Migration" Working Papers 697, Federal Reserve Bank of Minneapolis

Shannon S., C. Uggen, J. Schnittker, M. Thompson, S. Wakefield, M. Massoglia (2017) "The Growth, Scope, and Spatial Distribution of People with Felony Records in the United States, 1948–2010", Demography, Volume 54, Issue 5

Terry E. (2017) "Is Poor Health Hindering Economic Growth?" Atlanta Fed's microblog, August

Tüzemen D. (2018) "Why Are Prime-Age Men Vanishing from the Labor Force?" Federal Reserve Bank of Kansas City Economic Review.

Van Zandweghe W. (2017) "The Changing Cyclicality of Labor Force Participation", Federal Reserve Bank of Kansas City Economic Review Third Quarter

Wardrip, K., K. Fee, L. Nelson and S. Andreason, (2015) "Identifying Opportunity Occupations in the Nation's Largest Metropolitan Areas" Special Report of the Federal Reserve Banks of Philadelphia, Cleveland, and Atlanta, September

Yagan D. (2016) "Is the Great Recession Really Over? Longitudinal Evidence of Enduring Employment Impacts" mimeo

Annex A. San Diego county approach to the NEETS issue[23]

One of the many examples of how local institutions are addressing obstacles to labour force participation is the case of the NEETS in San Diego county.

San Diego county counts about 41000 youth who are neither in education employment or training, locally referred to as "opportunity youth" or "disconnected youth". They represented a bit less than 10% of the 16-24 population of the county in 2016, less than the US average of 11.7% in 2016 and the California average of 11.5%. San Diego ranks among the metropolitan areas with the lower percent of disconnected youth overall but some parts of the county still have 20% of disconnected youth.[24] It is also estimated that 57 percent of these youth are living below 200 percent of the federal poverty line. Only a third are looking for a job and hence counted as participating in the labour force. San Diego county also has the second highest rate of African American disconnection among the 99 largest metropolitan areas.

Disconnected youth have been identified as a key priority for labour force development in the county, given the long-term implications of this situation on the prospects of those concerned and beyond on the prosperity of the county as a whole.

The policy goal is to reduce the share of NEETS in the youth population to 7.3% by 2020 and reduce the intra county gaps. To reconnect the NEETS to the labour market and prevent new disconnections, a comprehensive strategy has been launched under the lead of the San Diego work force partnership (SDWP, the local Workforce Development Board).

SDWP has relied on interviews and analyses to define local needs, priorities and policy recommendations. This approach has revealed 3 main obstacles to labour force participation faced by the NEETS. First, occupations that are in high demand in the county typically require post-secondary educational attainment and work experience, that opportunity youths lack. 92.5 % do not have more than a High School diploma, while 2/3 of jobs in the county will require higher education by 2020. Potential employers are also stressing a lack of "soft skills" of the disconnected youth. Second, the identification of available resources has revealed important geographical disparities in the availability of resources to support the youth. Last, several key services that are essential for youth reconnection have been identified as lacking or difficult to provide: behavioural health support, housing, and transportation. Housing and transportation are especially important in San Diego which is one of the most expensive city in the US and lacks public transportation (see figure 2.10 in main text).

Against this background, a comprehensive approach that includes training and skills development but also housing, transportation and mental health support is being put together. The approach also seeks to be inclusive in the sense that it gathers all stakeholders

---

[23] This annex is based on the SDWP 2017 report Understanding The Story of San Diego's Opportunity Youth and 2018 conference on Opportunity youth

[24] Burd-Sharps and Lewis (2018)

including via a conference where NEETS, employers, workforce professionals, service providers, educators, funders, community members and elected leaders meet every year in San Diego.

Annex B. Sources of state-level data

The data used for state labour force participation, share of the population over 65, unemployment and incidence of long term unemployment all come from the OECD regional database. A few missing years for long term unemployment were interpolated

Real GDP: BEA

Education: Percent of the population over 25 with bachelor's degree or higher from US Census

Disability: Disability benefits beneficiaries aged 18–64 as a percentage of the resident population aged 18–64. From Social Security Administration.

Health Indicators

Share of the state population not participating to the labour force and saying they are not participating because they are too sick or too disabled to work. Source: BLS, microdata of the current population survey.

- Health outcomes. All Outcomes by state. Source: Americas health rankings, Annual report, 2016

- Death from opioids (Death per 100000 people) and Opioids prescription rate (Number of prescriptions per 100 persons), Source: Centers for Disease Control and Prevention

Housing indicators and transport

- Warthon index, from J. Gyourko, A. Saiz, and A. Summers (20018) A New Measure of the Local Regulatory Environment for Housing Markets: The Wharton Residential Land Use Regulatory Index" Urban Studies Vol 45, Issue 3, pp. 693 - 729

- Avg. listing price from Trulia

- Average rent, Zillow

- Percentage of crowded housing (more than one person per room), US Census Bureaus, Housing census, 2000

- Commute time, American Community Survey, US Census Bureau

Licensing

- Share of licensed work force, Source: Kleiner, Morris M., and Evgeny Vorotnikov. 2015. "The Economic Effects of Occupational Licensing Among the States." Working Paper, University of Minnesota, Minneapolis

- Number of 102 Lower-Income Occupations Licensed, Average Fees, Average Estimated Calendar Days Lost. Source Institute for Justice (2017) License to work.

Felony: Ex-felons as percentage of total adult population source: Shannon S., C. Uggen, J. Schnittker, M. Thompson, S. Wakefield, M. Massoglia (2017) "The Growth, Scope, and Spatial Distribution of People With Felony Records in the United States, 1948–2010", Demography, Volume 54, Issue 5.

Child Care

- Availability of child care (space by number of children below 5), from Child Care Aware of America, 2017 report

- Cost of child care as % of state median income, married couple, from Child Care Aware of America, 2017 report

3. The Impact of the Nurse Licensing Compact on Inter-State Job Mobility in the United States

Aimi Abdul Ghani

The prevalence of occupational licensing has increased over time, while over recent decades the mobility of workers between jobs and across the country has declined. There is a concern that Stat-level licensing can hinder the movement of workers across the country. At least some States have recognised the potential costs arising from differing requirements across States, leading some States to establish or subsequently join the Nurse Licensure Compact, which frees nurses from having to obtain a new license to another Compact State. Using a new database – the Census Bureau's Job-to-job flows – allows a fresh look at the relationship between occupational licensing and labour mobility. The paper examines the impact on migration flows across State boundaries when new States joins the Nurse Licensure Compact. Using a difference-in-difference econometric approach, the results suggest that mutual recognition of occupational licenses, at least in the health sector, can boost job-related migration across State boundaries. Joining the Compact does not have an impact on migration flows within the State, but may divert some flows to non-Compact States. The results suggest that mutual recognition of occupational licenses is one approach to mitigating the barriers to mobility that licensing can introduce.

Introduction

Occupational licensing in the United States has provoked debate among economists, consumers, policymakers and workers over the course of the past century. The debate has once again risen in intensity as the rising prevalence of licencing has become more obvious and given that occupational licensing has strong corollaries to labour market performance (Kleiner and Krueger, 2008). Numerous studies have illustrated the impact of licensing policies on a number of variables such as the quality of services provided, wages, employment, prices, and geographic or job mobility; all of which provide mixed results. In this paper, the link with job mobility is the focus of the analysis.

Job-to-job flows in the U.S. have exhibited a net decline over the past decade, which is a source of concern given that job transitions can be considered a source of opportunity for workers and one of the ways workers have been able to raise their income over their career (OECD, 2016). One main factor that has been attributed to this decline is the prevalence of regulatory barriers, notably occupational licensing. In the United States, occupational licensing is a State-level jurisdiction, resulting in requirements that are heterogeneous

across states (Kleiner, 2015).[25] As a result, workers can be obliged to obtain separate licenses with different requirements for each state, implying a significant commitment of time, effort and financial resources for workers relocating to another State. This hinders workers from reaping the advantages of career opportunities elsewhere (Holen, 1965) and can subsequently result in a mismatch between the demand and supply of talents. Nevertheless, the extent to which licensing contributes to the decline in labour market fluidity remains quantitatively unclear.

This paper thus aims to provide some clarity on this front. As of mid-2018, a number of studies have analysed the relationship between licensing and mobility. Notably, the most recent works by DePasquale and Stange (2016) that focus on the nursing industry provide important groundwork for this study. Similar to what the authors have done, this paper leverages on the Nurse Licensure Compact (NLC) to study its impact on interstate job mobility within the relevant sector. More specifically, it assesses whether the adoption of the NLC increases job-to-job flows in the healthcare and social assistance industry from a given Compact state using a difference-in-differences approach.[26] While DePasquale and Stange use data from the U.S. Census and American Community Surveys, this paper relies on a new dataset of job-to-job flows released by the U.S. Census Bureau, which is based on the Longitudinal Employer-Household Dynamics programme that bring together administrative, census and survey data to provide detailed job flow statistics. In addition to contributing to the existing literature on this area of research, findings from this study can provide an assessment of one approach to reduce regulatory burdens.

Related Literature on Occupational Licensing and Job Mobility

Pioneering studies that attempt to examine the impact of licensing on the mobility of workers begin with Holen (1965), who performed a cross-sectional analysis and found that the inter-state mobility of professionals, particularly dentists and lawyers, was higher in states that had less-restrictive licensing practices. Pashigian (1979) later reinforced this idea, adding that beyond occupational licensing itself, the limitations of reciprocity further reduced interstate movement of lawyers, although by a diminishing amount.[27] In the same vein, Kleiner, Gay and Greene (1982) presented results showing that more restrictive state licensing statutes decreased immigration in 14 occupations, which further supports the view that restrictive licensing may act as a barrier to mobility, thus causing a misallocation of labour resources across states. However, as already pointed out by Depasquale and Stange (2016), such cross-sectional analyses face constraints in that licensure practices may correlate to other state-level characteristics that influence migration. This in turn would produce biased results. Nevertheless, such studies have provided the foundation, paving the way towards further exploration of the impact licensing can have on labour mobility.

---

[25] To become a licensed cosmetologist, Iowa requires 490 days of education and training but the national average is 372 days, while New York and Massachusetts require only 233 days (Carpenter et al. 2012).

[26] While a look at the nursing industry in isolation would be ideal, existing data constraints prevent us from doing so, as explained in the data description section.

[27] Reciprocity (also known as mutual recognition) denotes a cooperative agreement between states whereby any individual holding a license in a participating state may work in a difference state for the same occupation without the need to repeat licensure processes, or face less requirements, depending on the case.

More recently, Johnson and Kleiner (2017) performed a difference-in-differences analysis for five universally licensed professions and found that workers in regulated occupations have lower interstate migration rates than non-regulated ones. This is consistent with the works of Pashigian (1979) and Kleiner et al. (1982) which find that states adopting licensing reciprocity have higher migration rates than states with more rigid policies. Mulholland and Young (2016) use spatial Durbin models of odds migration ratios on occupational licensing burden ratios and conclude that occupational licensing and other barriers to employment may be partly attributable for the decline in mobility for workers in the United States. Moreover, they find that occupational licensing also acts as a barrier to exit. Altogether, this literature suggests that there are large potential gains from eliminating hurdles to labour market entry. Occupational licensing results in higher labour market rigidity reducing interstate labour mobility.

In contrast, a recent analysis by DePasquale and Stange (2016) comes to different findings. Focusing on the nursing sector, the authors estimate difference-in-differences models to examine whether the Nurse Licensure Compact (NLC) altered the labour market, specifically labour force, migration, and commuting outcomes. In regards to migration, the authors find little evidence of an increased likelihood of migration within a year for workers in states that adopted the NLC. These results hold for nurses living near the borders of contiguous Compact States, for whom arguably the effect should be more visible. While the lack of an effect could be due to the already low rates of migration, making it difficult to detect any true effects, the authors attempt to address this by restricting the analysis to health workers that are likely to be most mobile (i.e. young workers without children). Even so, while some effect is revealed the results were imprecise and insignificant. This grey area opens a window to explore this mobility channel further in this paper.

Data description

The analysis relies on the national statistics on job-to-job (j2j) flows in the United States, released by the U.S. Census Bureau. Job-to-job flows data tracks worker movements across industries, geographic labour markets, and to and from employment, via the use of longitudinal administrative data on worker job histories. Specifically, this dataset on job-to-job flows contains statistics on the job-to-job transition rate, hires and separations to and from employment, and characteristics of origin and destination jobs for job-to-job transitions. These data are available on a national and state level, by industry and by worker characteristics. This dataset is thus unique in that it allows a comprehensive look at the reallocation of workers across different industries and regions, which caters well to the objective of this paper. The primary data used in the analysis is job-to-job hires, which correspond to hires that are part of a job-to-job move with little non-employment between jobs.

The sample used in this study is a panel of 12 states spanning 2000Q2 to 2016Q1. Given the multidimensionality of this dataset, it should be specified that the primary data used in the analysis is restricted to job *out*flows from a given state to its destination states (i.e. intra-state job movements are not considered) across different industries. This paper pays special attention to the health and social assistance sector to discern the impact of the NLC on nurse mobility.

Table 3.1. Summary statistics

VARIABLES	(1) N	(2) sum	(3) mean	(4) sd	(5) kurtosis	(6) skewness	(7) min	(8) max
Job-to-job (j2j) flows	461,143	8.54E+06	18.51	39.65	56.48	5.823	0	1361
logj2j	439,672	872,612	1.985	1.336	2.679	0.406	0	7.216

Several constraints arise in using these j2j data. One is the inconsistency of data availability across states, with the earliest available quarter being 2000Q2. This eliminates the possibility of performing a difference-in-difference analysis for 17 states in which the NLC was implemented prior to the availability of j2j data, leaving the 8 Compact states used in the analysis.

Another shortcoming is that although the data provides a breakdown by industry, it may not be as granular as wanted given our focus on the nursing sector, rather than the health industry as a whole. The j2j data series used contains aggregate data on all workers in the health and social assistance sector, which comprise of trained professionals delivering health and social services.[28] A further look into the data reveals that nurses (that are relevant to the NLC) make up approximately 17% of the entire health and social assistance industry (see Figure 3.2). Although this share can be considered small, there still may be some signalling effects of the NLC impact through this dataset. For example, the "dual-body problem" would lend support to the use of the data, particularly when partners in a household both work within the same sector and therefore move in tandem with one another. Bearing in mind these caveats, these data provide a proxy for job-to-job flows among nurses while complicating finding an empirical relationship between the occupational licensing and job mobility.

Figure 3.1. Breakdown of healthcare & social assistance sector
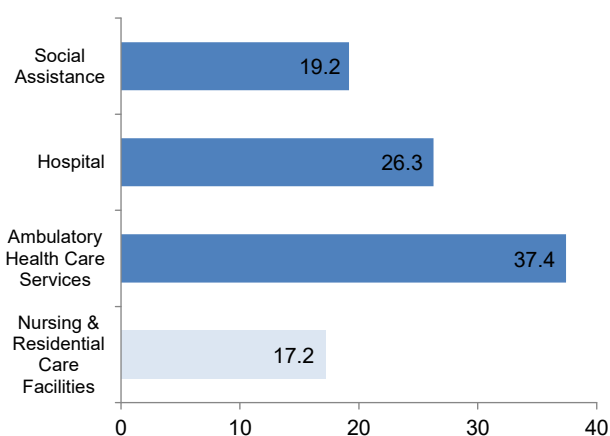
Source: Current Employment Statistics (Bureau of Labour Statistics, BLS)

---

[28] More detailed information on the health and social assistance sector can be found here: https://www.census.gov/eos/www/naics/2017NAICS/2017_Definition_File.pdf (p. 438-457)

Figure 3.2. Percentage of nurses in the healthcare & social assistance sector
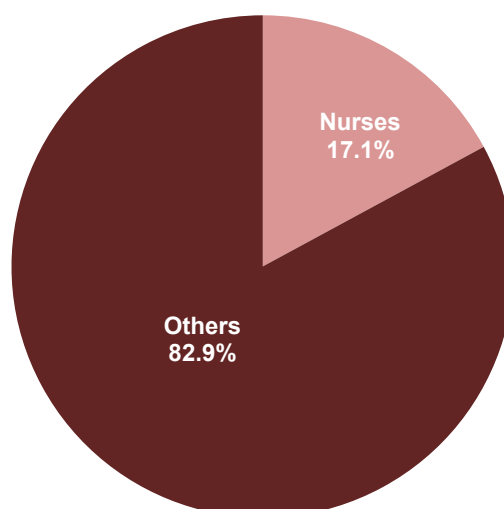
Source: Occupational Employment Statistics (BLS)

The Nurse Licensure Compact

The ongoing evolution of health care delivery is creating structural changes in the health industry, which is creating the need to revise licensing models. For example, cross-State movement of patients and medical practitioners alike to receive and provide healthcare respectively are common, owing to advancements in transportation and information technology Furthermore, tele-nursing has also become a norm. As a consequence, single-State licenses have become anachronistic. Over time, some States began to address this shortcoming, which eventually led to the creation of the Nurse Licensure Compact.

The Nurse Licensure Compact (NLC), introduced in 2000, is a statutory agreement of nursing license reciprocity between participating states in the United States. For example, a registered nurse (RN) or a licensed practical nurse (LPN) that resides in one Compact state can practice in another without having to undergo procedures of relicensing, subject to each state's practice laws. The primary objective behind the NLC is to remove barriers and impediments to borderless practice for nurses. This can benefit States and nurses in a number of ways, including ease of aid assistance during disaster situations, lower licensing costs for practicing nurses and organisations, and reduce the burden of military spouses who relocate frequently, in line with recommendations by the Department of Labour and the Administration. Proponents of the NLC also maintain that the quality standards are not compromised given the regulatory oversight in place.[29]

In 2015, an updated version of the NLC termed the Enhanced Nurse Licensure Compact (eNLC) was approved by members of the National Council of State Boards of Nursing (NCSBN) with the objective of eventually having all 50 States become part of the Compact.

---

[29] All nurses practicing under a multi-state license must meet a minimum set of requirements, which includes a fingerprint federal criminal background check (National Council of State Boards of Nursing).

States that previously adopted the NLC legislation must now pass the enhanced legislation, which simultaneously repeals the original version. Key elements of this revised Compact include provisions for uniform licensure requirements for all States, reductions of regulatory requirements by eliminating the necessity to obtain a license in each State, clarifications in regards to a nurse's authority to practice in multiple States via tele-health, and provisions to member States of the authority to facilitate a disciplining case across State lines, to name a few. The effective date of the Enhanced NLC legislation is determined by either 26 States joining the Compact or 31 December 2018, whichever materialises first. Given so, this paper maintains the analysis for States adopting the original NLC. In early 2018, 25 States form the network of the NLC, while 4 States are currently pending legislation. Meanwhile, 10 states have adopted the Enhanced NLC.[30]

Figure 3.3. Snapshot of NLC vs Non-NLC States*
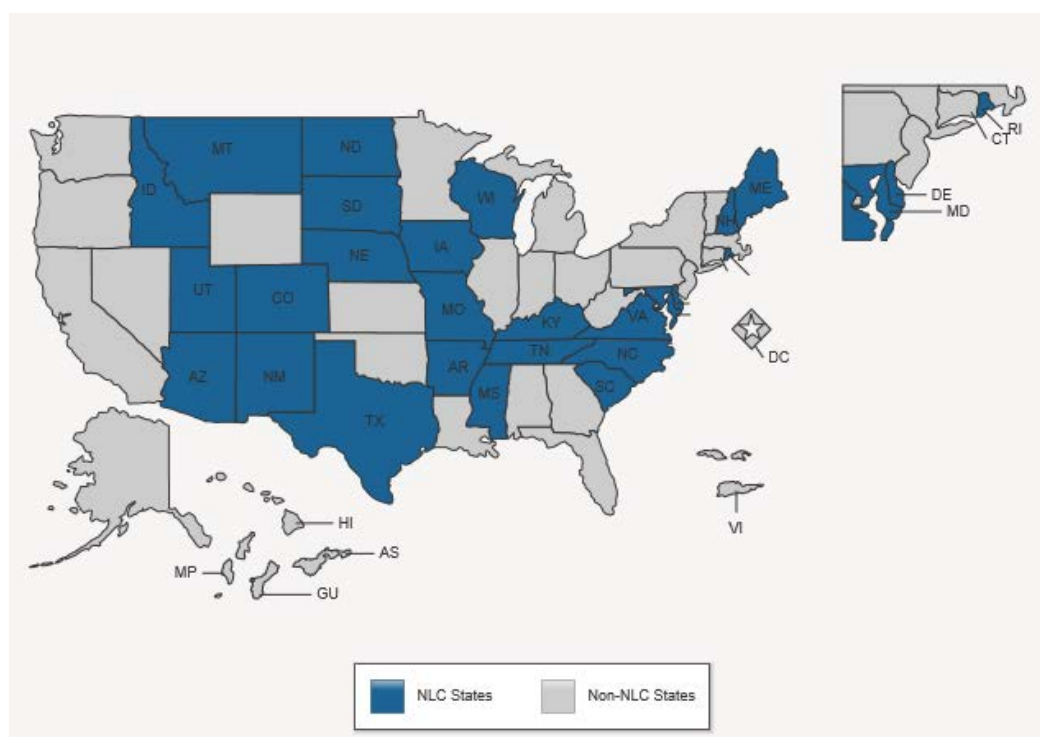
*Enhanced NLC states not depicted
Source: National Council of State Boards of Nursing

---

[30] These States are currently part of the NLC, except for Florida and Oklahoma, who join as new members.

Identification Strategy and Methodology

Although the gold standard for making causal inferences in the realm of social sciences is randomisation, this is often not feasible in practice. When a policy is being implemented at the national or State level, pure time-series or before and after analyses of the impact of these policy changes will likely be contaminated by other changes occurring simultaneously. This is the case with the NLC. Natural experiments therefore act as the next-best alternative. The introduction of the NLC in several states at differing moments in time offer a suitable setting for such a natural experiment using the difference-in-differences approach, whereby states adopting the NLC act as the treatment group, while comparable states not adopting the NLC serve as the control group.

In this analysis, 8 Compact states are identified as the treatment group, comprising Nebraska, South Dakota, Tennessee, North Dakota, South Carolina, Kentucky, Colorado, Missouri and Montana. Meanwhile, 12 non-Compact states serve as the control group, including Wyoming, Kansas, Oklahoma, Minnesota, Iowa, Illinois, Indiana, Ohio, West Virginia, Pennsylvania, Alabama and Georgia.

Figure 3.4. Snapshot of treatment vs. control groups

$$Y_{i,s,t} = \beta_0 + \beta_1 Post_t + \beta_2 Treatment_{i,s} + \beta_3 Post*Treatment_{i,s,t} + \gamma_i + \gamma_s + \gamma_{t} + \varepsilon_{i,s,t}$$

In the equation, the dependent variable $Y_{i,s,t}$ is the job outflows of nurses within a given state at a given time in a given industry. The variable $Post_t$ indicates a post-treatment dummy, where an observation equals 1 if it falls within the post-NLC implementation

period and zero otherwise.[31] The variable *Treatment$_{i,s}$* indicates a dummy with a value of 1 if the observation belongs to the health and social assistance industry in a state that implemented the NLC and is restricted to job flows to other states that have also adopted the NLC at the time of implementation. The interaction coefficient β3 is the change in job-to-job flows following the introduction of the NLC relative to the time pattern experienced by other states, which is thus the coefficient of interest.

γi, γs, and γy, denote industry, state and year fixed effects, respectively. State fixed effects account for average differences in job flows across areas that may lead to the implementation of the NLC, while year fixed effects control for aggregate time trends in the prevalence of job-to-job flows. Industry fixed effects are included to control for industry characteristics that might affect the dependent variable. In addition, standard errors are clustered at the state and year level to account for the possibility that observations within states and across years are not independent.

As a sensitivity analysis, a placebo Difference-in-difference was estimated using intrastate job flows, i.e. worker movements within the same state in the same industry. The idea being that theoretically the NLC should not have an impact on intra-state job flows since the NLC does not offer added advantages for nurses to move within a given state. Another sensitivity test involved analysing the impact of the NLC from treated to control states, with the idea being that a nurse in a Compact state should, in theory, not be compelled to relocate to a non-Compact state once the NLC is introduced in his or her resident state. Hence, we should observe the impact to be statistically negligible.

Results

The results of the difference-in-differences estimation suggest an approximately 11% increase in job outflows within the health and social assistance industry (significant at the 1% level) following the implementation of the NLC (see Table 3.2, column 1). While this may seem trivial at a glance, an 11% increase may be quantitatively substantial when translated to the actual number of workers on aggregate.

For the placebo difference-in-difference estimation using intrastate mobility, the coefficients were reduced to zero and estimates were statistically insignificant, confirming that the intra-state job mobility should not be affected by the NLC. In the same vein and providing another robustness test, the estimations when restricting the sample to job flows from Compact states to non-Compact states was -0.11, implying that the NLC had a negative impact on the number of health-workers moving from a Compact to non-Compact state (see Table 3.2, column 2).

---

[31] Because there is no uniform date for the NLC introduction, the post-treatment dummies for the control group were assigned at random. Several permutations were applied to test for robustness and the results do not significantly differ.

Table 3.2. Main results of difference-in-differences

VARIABLES	Compact to compact states (1) logj2j	Compact to non-compact states (2) logj2j	Compact to any states (3) logj2j
Treat	-0.0326	0.442***	0.00907
	(0.0255)	(0.0543)	(0.0292)
Post	0.00883	0.0112	0.00952
	(0.00813)	(0.00814)	(0.00824)
Treat X Post	0.111***	-0.108*	0.0205
	(0.0342)	(0.0612)	(0.0330)
Observations	439,672	439,672	439,673
R-squared	0.142	0.143	0.142
Outcome mean	0.978***	0.979***	0.978***
	(27.93)	(0.0349)	(0.0350)

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Figure 3.5. Marginal effect of the transition to post-policy era in both groups (treat =) and treat = 1)
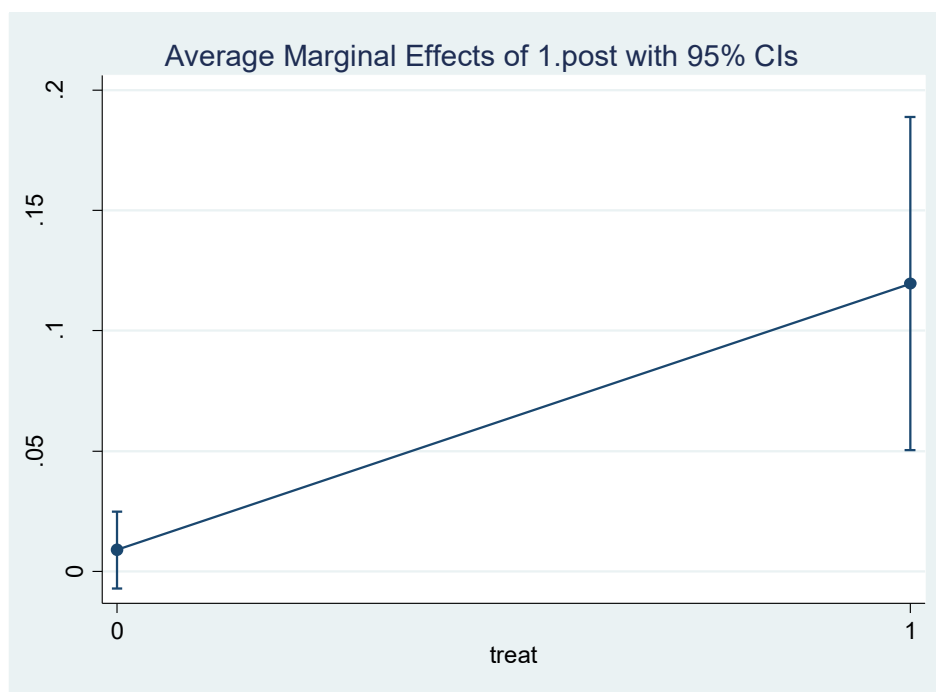
While the NLC does appear to influence job-to-job flows it is still necessary to acknowledge the potential identification difficulties that accompany research on policies that are not randomly assigned. First, while the identification strategy addresses policies that may affect all workers within a State it does not preclude other policies introduced with the NLC affecting health sector workers and therefore biasing the results. Second, as mentioned earlier, there may be an issue of measurement error given that we are interested in the mobility of nurses in particular, yet we only have job-to-job flows data for the health and social assistance sector as a whole. In principle, this limitation should work against finding a sizeable and statistically significant effect. Third, we restrict the data to job-to-job flows within a given industry. Should the NLC have a bearing on an individual's desire to enter or leave the healthcare industry, this could create a selection bias and therefore not capture the pure effects of the policy.

Conclusion

This paper examines the impact of the Nurse Licensure Compact on the job mobility of workers in the healthcare sector in the United States through the analysis of worker flows. The estimations are obtained through a difference-in-differences analysis, whereby 8 states that had implemented the NLC were included in the treatment cohort and 12 non-Compact states comprised the control group. Contrary to the findings of DePasquale and Stange (2016) on which this paper builds, we find that there is a positive, albeit small, effect of the NLC on job movements of nurses from one Compact state to another. It is likely that the results could be even stronger once the enhanced NLC reaches its objective of having all states become part of the Compact.

As robustness checks, sensitivity analyses were performed. First, estimations on intra-state job flows were derived and were reduced to zero, affirming the idea that the NLC should not have an impact on intra-state job movements. Second, when the treatment sample was altered to restrict observations from Compact states to non-Compact states, the results were barely significant in a statistical sense. In fact, the estimation indicated a negative impact, implying that the NLC contributed to a decline of nurses moving from Compact states to non-Compact states, which fits the logic that more nurses would be encouraged to move to another NLC-adopting state rather than one where barriers to enter the nursing market are higher.

The aim of this paper was to build on the existing literature on occupational licensing and its effects on job mobility. The results in this paper support earlier findings that some forms of occupational licensing act as a hindrance to job mobility and that there are ways the barriers to mobility can be reduced. Whether this result can be generalised to other occupational licensing policies in different sectors is a task for future work.

References

Carpenter II, Dick M., Lisa Knepper, Angela C. Erickson, and John K. Ross (2012), "License to Work: A National Study of Burdens from Occupational Licensing". Arlington, VA: Institute for Justice.

Cox, C., and Foster, F. (1990), "The Costs and Benefits of Occupational Regulation." Bureau of Economics, Federal Trade Commission, Washington DC.

DePasquale, C., and Stange, K. (2016), "Labor Supply Effects of Occupational Regulation: Evidence from the Nurse Licensure Compact". NBER Working Paper 22344.

Handbook on Arizona's Sunset & Sunrise Review. https://www.azleg.gov/sunset_review.pdf

Holen, A. (1965), "Effects of Professional Licensing Arrangements on Interstate Labor Mobility and Resource Allocation". Journal of Political Economy, 73(5), 492-498

Johnson, J., and Kleiner M.M. (2015), "Does Occupational Licensing Reduce Interstate Migration?" Paper presented at the W.E. Upjohn Institute for Employment Research, Kalamazoo, MI, July 30.

Kleiner, M. M. (2015), "Reforming Occupational Licensing Policies". The Hamilton Project. Discussion paper 2015-01.

Kleiner, M. M., Gay, R.S., and Greene, K. (1982), "Barriers to Labor Migration: The Case of Occupational Licensing". Industrial Relations: A Journal of Economy and Society, 21(3), 383-391.

Kleiner, M. M., Krueger, A.B. (2008), "The Prevalence and Effects of Occupational Licensing". NBER Working Paper 14308.

Molloy, R., Smith, C.L., and Wozniak, A.K. (2011), "Internal Migration in the United States." NBER Working Paper 17307.

Mulholland S.E. and Young A.T. (2016), "Occupational Licensing and Interstate Migration". Cato Journal, 36(1), 17-31.

National Council of State Boards of Nursing (NCSBN). Website.

OECD (2016), OECD Economic Surveys: United States 2016. Chapter 2, Realising and expanding opportunities, 108-112. OECD Publishing, Paris.

Pashigian, P.B. (1979), "Occupational Licensing and the Interstate Mobility of Professionals". Journal of Law and Economics 22, 1-25.

Annex A. Job Outflows

**Figure A.1. Job outflows in the health and social assistance industry in Treated states
(seasonally adjusted)**

Tennessee

Colorado

North Dakota

Missouri
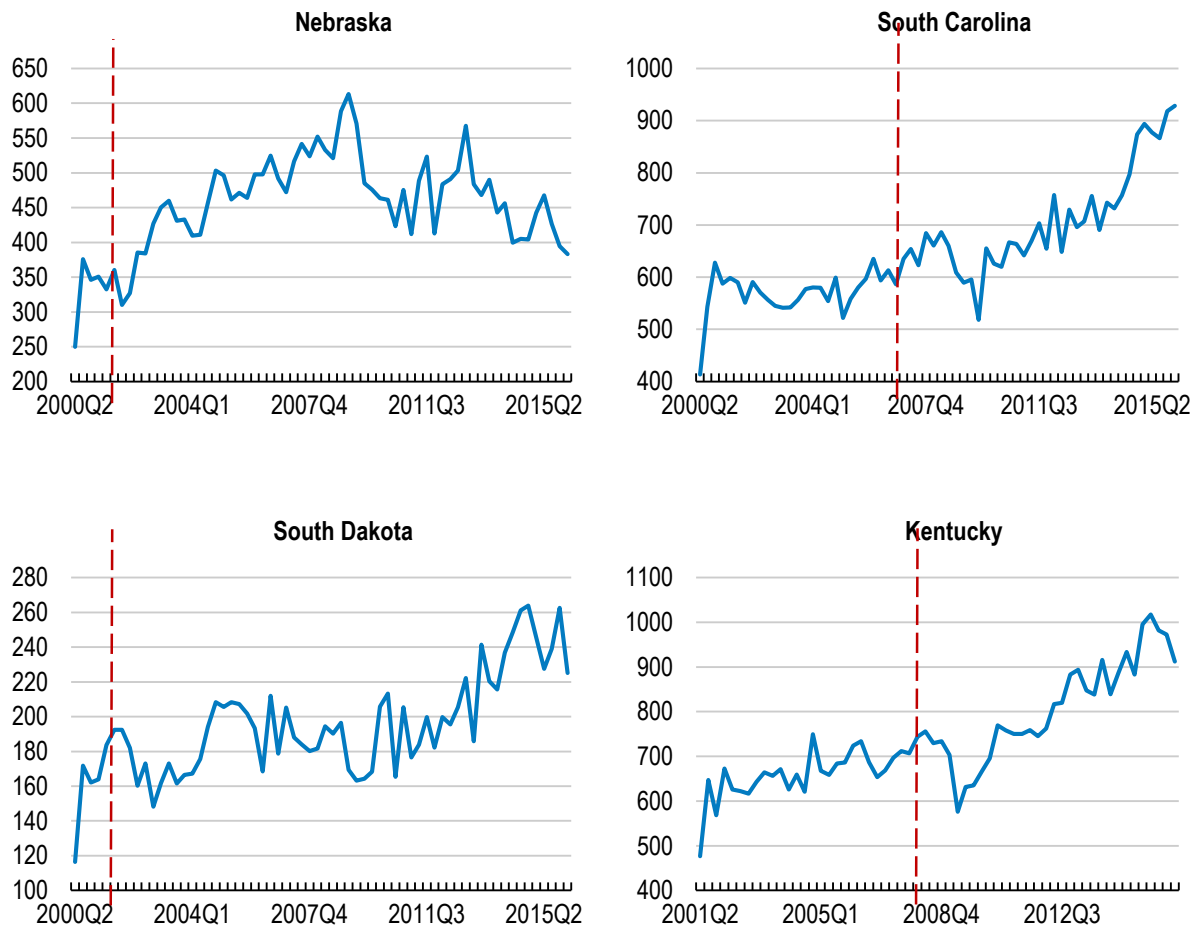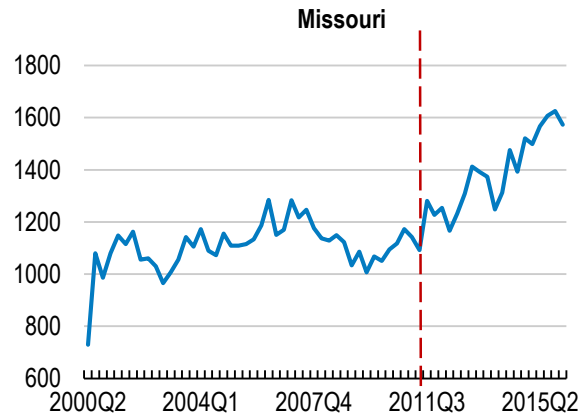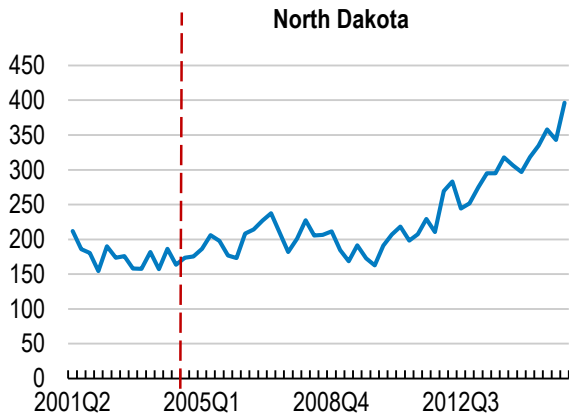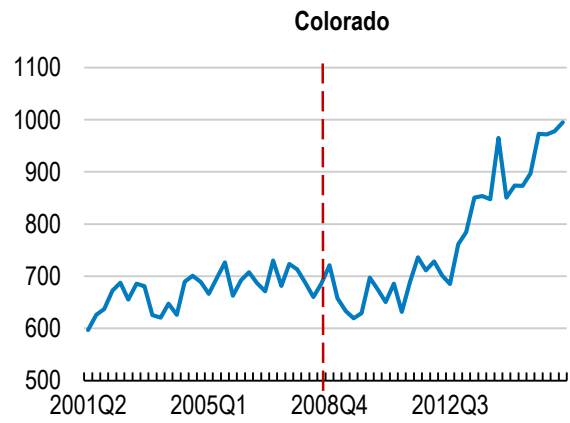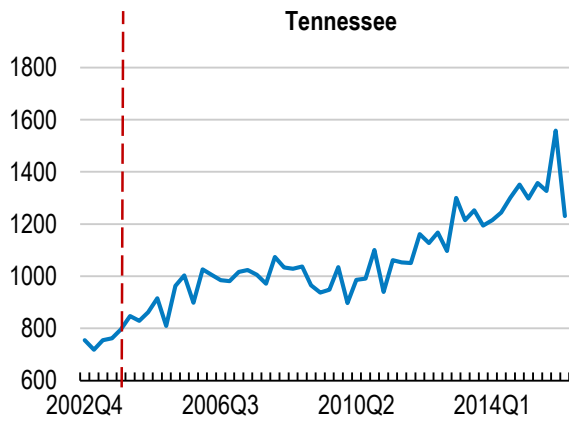
Note: red line denotes NLC introduction.

Figure A.2. Job outflows in the health and social assistance industry in Control states (seasonally adjusted)

Indiana

Pennsylvania

Ohio

Alabama

West Virginia

Georgia
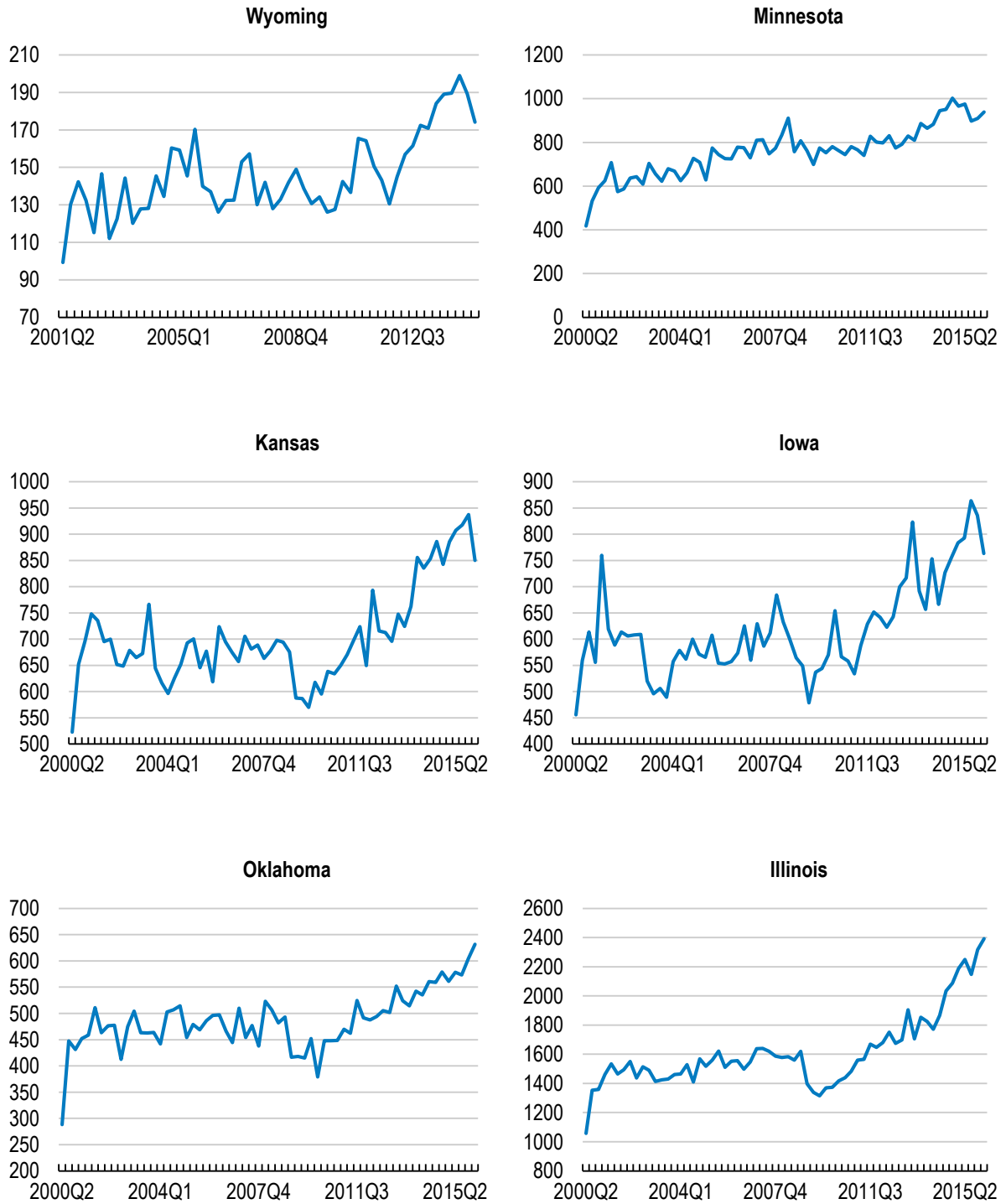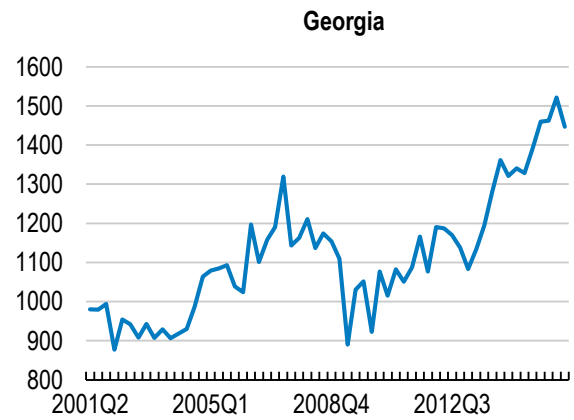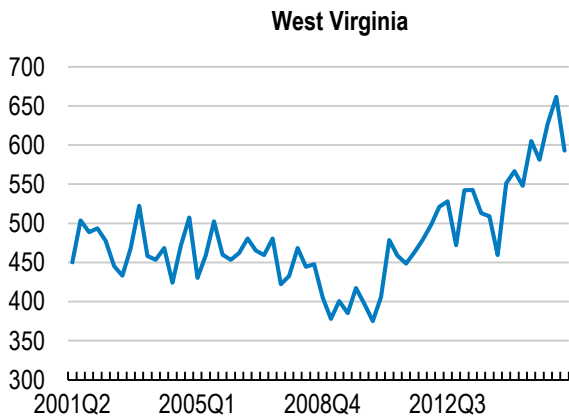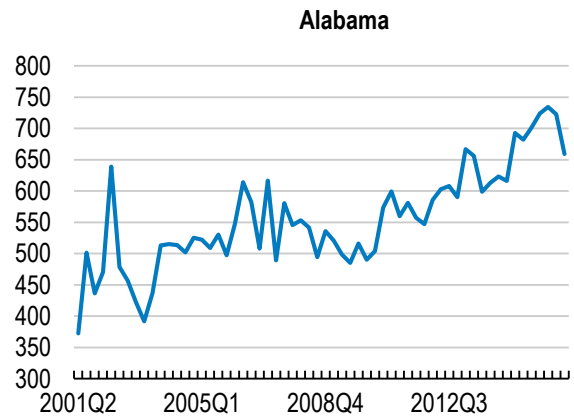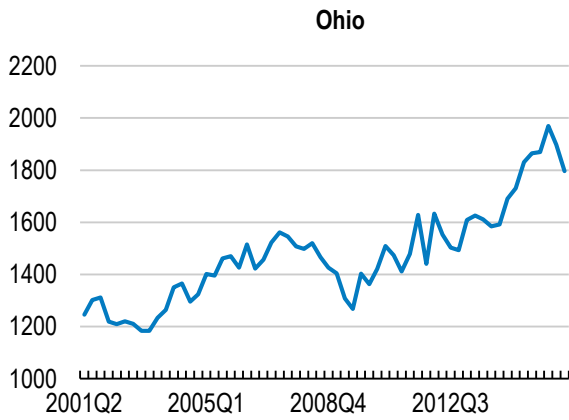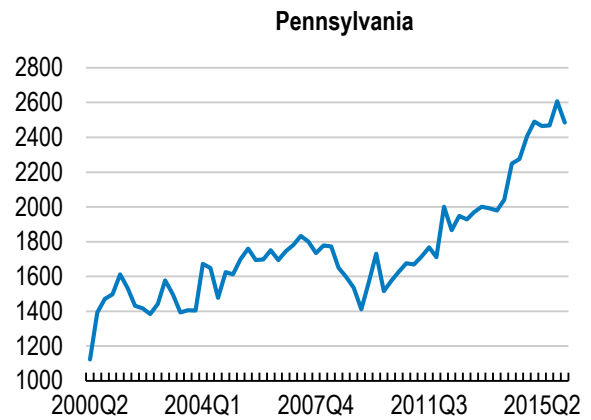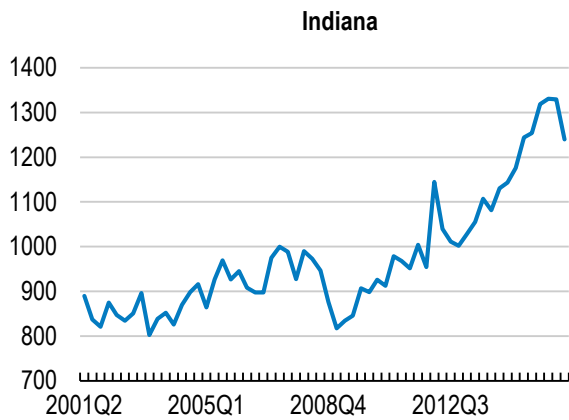
Figure A.3. Total employment in the Healthcare and Social Assistance Sector, national
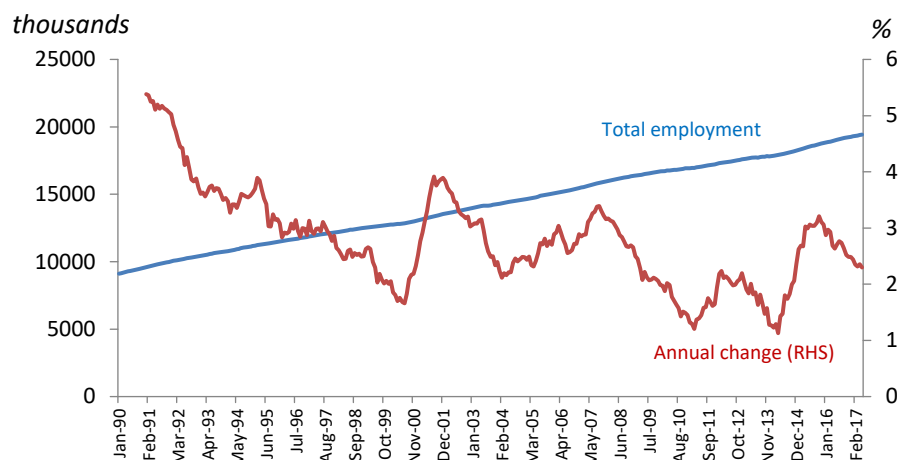
Table A 1. Marginal effect of the transition to post-policy era in both groups (treat=0 and treat=1)

		Delta-method				
	dy/dx	Std. Err.	t	P>|t|	[95% Conf.	Interval]
1.post						
treat						
0	.0088275	.0081284	1.09	0.278	-.0071635	.0248184
1	.1196371	.0352673	3.39	0.001	.0502562	.1890181

Note: dy/dx for factor levels is the discrete change from the base level.

Figure A.4. Average marginal effects of 1 .post with 95% CIs
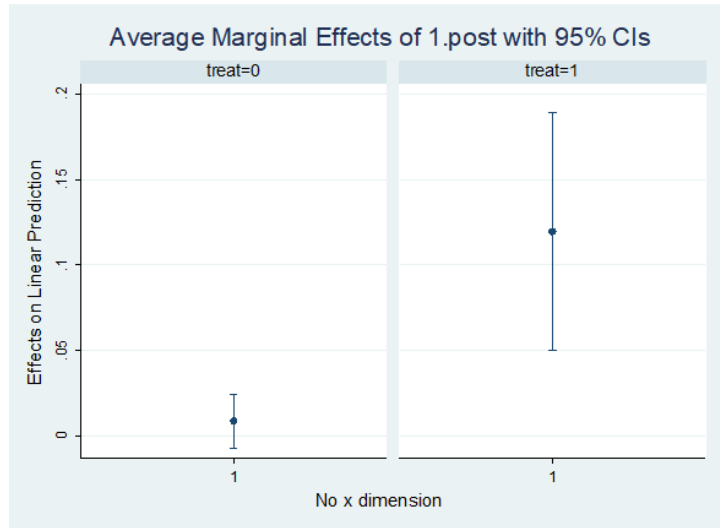
4. Assessing Household Financial Vulnerability: Empirical evidence from the U.S. using machine learning

Damien Azzopardi, Fozan Fareed, Patrick Lenain and Douglas Sutherland

Household financial vulnerability has gained considerable attention since the global financial crisis and it concerns policymakers due to its impact on macroeconomic indicators of financial instability. However, financial vulnerability is a complex multi-dimensional concept and large gaps remain in the underpinning of a comprehensive financial vulnerability assessment at the micro level. In this paper, a new approach is proposed to assess financial vulnerability by employing an unsupervised machine learning technique. A two-step empirical strategy is used to conduct this analysis. First, Hierarchical Ascending Clustering (HAC) and K-means clustering analysis is undertaken to identify homogenous clusters of households, which are financially vulnerable. Afterwards, we estimate the probability of being financially vulnerable depending upon different household and geographical characteristics using a logistic regression. Data from the Survey of Consumer Finance (SCF) for the years 1998, 2007 and 2016 are used for this analysis. The empirical results show that about 28% of the households in United States are financially vulnerable as of 2016, which is 4% less as compared to 2007. The results of the econometric estimations highlight that Black and African Americans are 8% and Hispanic Americans are 6% more likely to be financially vulnerable than non-Hispanic white persons, after taking into account other household and regional level characteristics. Econometric estimations also highlight the existence of large gaps in household financial vulnerability across other household characteristics, such as education level, employment status, marital status, and age of the household head. Lastly, regional characteristics do not seem to have a significant impact on household's financial vulnerability as long as the net-worth of the household is taken into account.

Introduction

Since the financial crisis of 2007-08, policy makers have increasingly focused on monitoring the financial health of indebted households. One of the reasons for this interest is that financial risks and vulnerabilities of households are generally analogous to that of financial institutions (Brown et al., 2010). A delay in the payment of debt or inability of a household to meet its financial commitments affect the bank's profitability and asset quality, and can result in financial instability (Acharya et al., 2009). Moreover, an increase in the level of indebtedness makes households more sensitive to economic shocks (Michelangeli & Ramapazzi, 2016; Herceg & Nestić, 2014). Bunn and Romstom (2015) also argue that the run up in households' debt can also anticipate a financial crisis.

Financial vulnerability is a complex and multi-dimensional phenomenon and a single metric is not sufficient to fully capture its effect. That is why the definition of household's financial vulnerability remains quite vague till date, and there is a lack of consensus on the operational definitions as highlighted by (Leika and Marchettini, 2017). Several academics and central banks around the world have developed their own indicators of household financial vulnerability by establishing different threshold levels. Some of the standard indicators which are used to measure household financial vulnerability include (a) debt to asset ratio (DTA), (b) debt to income ratio (DTI), and (c) debt-service to income ratio (Bank of England, 2016; Michelangeli & Ramapazzi, 2016, among others). A substantial amount of literature has empirically looked at the determinants of financial distress and household debt burden (Anderloni et al., 2012; Christelis et al., 2010). However, these approaches provide a rather restricted way of assessing financial vulnerability by establishing a threshold for a debt related indicator. It is important to note that household's financial vulnerability can also be derived by factors apart from debt. These other factors may include aspects pertaining to low income and wealth level, non-optimal money management, and economic shocks, amongst other reasons. These reasons have been largely ignored by the existing empirical literature.

In this paper, we propose a new methodological approach as an alternative to the standard line of research on household financial vulnerability. The main objective of this paper is twofold. First, to use an unsupervised machine learning technique to create profiles of households that are financially vulnerable. Second, to analyse how household characteristics and geographical characteristics affect financial vulnerability and consequently, use this analysis to classify policy measures in order to address financial vulnerabilities.

The availability of nationally representative micro data in the U.S. allows us to identify the types of households that are more susceptible to the risk of being financially distressed and more likely to default on their financial commitments. We use the Survey of Consumer Finance (SCF) for the years 1998, 2007 and 2016 to conduct this analysis. First, instead of using a definition of financial vulnerability that replies on imposing a certain threshold on a single debt related indicator, we use Hierarchical Ascending Clustering (HAC) and K-means Clustering to identify homogenous clusters of financially vulnerable households. For that purpose, we use three sets of variables including the leverage ratio, debt burden, and the households' income level. Leverage ratio is measured as total debt over total assets, and the debt burden is measured by the ratio of monthly repayments to monthly income. The results show that 28% of the households in the U.S. are financially vulnerable in 2016, whereas the percentage of financially vulnerable households was 32% and 30.3% in 2007 and 1998, respectively. A comparison of households which are financially vulnerable vis-à-vis households which are not financially vulnerable indicates that vulnerable households earn a higher income, have less debt burden, save more with respect to other households, and have more assets.

To further inform this debate, we estimate the probability of being financially vulnerable depending on different household and geographical characteristics, using a logistic regression. We analyse the differences in financial vulnerability across regions, ethnicities, gender, education level and other individual characteristics. To be more specific, we empirically analyse whether certain ethnic groups are more vulnerable than others, and whether certain geographical regions are more prone to financial vulnerability. Moreover, we examine how these findings vary across urban and rural areas, and across other household characteristics, such as employment status, education level, age, and the marital

status of the household head. Lastly, we analyse what the evidence suggests regarding the gender gap in financial vulnerability of households.

The main findings suggest that household characteristics such as ethnicity and race, education level, age, marital status, and working status of the household head are amongst significant determinants of household's financial vulnerability. Econometric estimations show that Black and African Americans and Hispanics are financially more vulnerable as compared to non-Hispanic white Americans, after controlling for other household and regional characteristics. A higher education level of the household head also appears to be statistically significant and is negatively linked with financial vulnerability. On average, having a college degree decreases the probability of being financially vulnerable by 11 percentage points as compared to having no high school diploma. Moreover, an increase in the age of the household head decreases the chances of being financially vulnerable. Being married and living with the spouse is also negatively associated with the probability of financial vulnerability. Our results also highlight that, even after controlling for traditional household and regional characteristics, there is clear evidence that an increase in the size of monthly debt repayment raises household's financial vulnerability, and an increase in the net-worth of the household decreases financial vulnerability. Lastly, regional characteristics such as living in an urban locality do not seem to have an impact on households' financial vulnerability once we take into account the net worth of the household.

This paper adds to the existing literature on financial vulnerability in two different ways. First, as far as we know, this is one of the earliest studies which empirically investigates the subject of household financial vulnerability using an unsupervised machine learning technique. Most of the existing analyses are based on aggregate data and cross country analysis which have some significant shortcomings due to their inability to account for differences in distributions (Christelis et al., 2010; Vatne, 2006). Even, the within country studies have not adequately addressed this issue as they concentrate on a constrained definition of financial vulnerability, by solely looking at a debt related ratio. Second, our analysis contributes to the existing literature on financial vulnerability by analysing how racial background-along with other household and regional characteristics- has an influence on household's financial vulnerability.

The remainder of the chapter is organized as follows: Section two reviews the existing literature. Section three goes on to discuss our two-step empirical methodology. It presents the results of the unsupervised machine learning approach in detail and then presents our econometric model of households' financial vulnerability. Section four then provides the results of the econometric analysis, aiming at examining the key drivers of financial vulnerability. Section five provides a conclusion.

Existing Literature

There is a vast amount of empirical literature that analyses households' financial vulnerability. This empirical literature can be broadly categorized under two main lines of research. On one hand, there is empirical literature which looks at household's financial vulnerability from a "macro perspective". On the other hand, there is a large volume of research that looks at the issue of household's financial vulnerability from a "micro perspective". The literature which adopts the macro approach uses aggregate data in order to analyse the various channels and causes of households' indebtedness growth. However, numerous studies have highlighted several limitations of using aggregate data to analyse household's financial vulnerability. There is a general consensus in the existing literature

about the inability of aggregate data to account for the differences in distributions between groups (Fareed at al., 2017; Albacete and Fessler, 2010; Dey et al., 2008, among others). It is important to note that country level indicators like average household's *debt to income ratio* are quite useful in detecting the fluctuation in financial vulnerability over time, across different regions and countries. However, due to a potentially large variation in financial vulnerability between groups of households, using aggregate data on debt burden offers a coarse direction on the actual household vulnerabilities.

The most recent empirical literature on financial vulnerability uses household level micro-data from surveys in order to identify the profiles and distribution of household vulnerabilities. The most widely used methodology in this regard is to (a) establish a benchmark indicator to identify financially vulnerable households, and then (b) test for the effect of different economic shocks, polices, and household characteristics on financial vulnerability[32]. It is important to note that there is no conventional system when it comes to defining or analysing household's financial vulnerability. Policy makers and academics have come up with their own different versions. Most of the existing empirical literature uses a very restricted definition of financial vulnerability by focusing only on the fragility of a household with respect to its debt commitments. According to this approach, a household is termed as vulnerable if its indebtedness level or its debt service ratio exceeds a certain threshold.

Some researchers have used a slightly broader notion of household's financial vulnerability by considering certain dimensions apart from debt, e.g., household expenditures, utility bills or rent payments (Anderloni et al., 2012; Worthington, 2006). These indicators are usually criticized for their lack of cogently defined boundaries, along with the fact that most of them do not take into account other factors, such as income and wealth levels, differences in life-cycle stages, and other economic conditions among different households.

Some authors have also used a subjective methodological approach to gauge financial vulnerability of a household. This approach usually involves constructing a financial vulnerability indicator based on the household's self-assessment of their financial wellbeing. One major issue with this self-assessed financial wellbeing is that it often does not correlate with financial distress (Herrala & Kauko 2007). It is usually influenced by other factors such as comparisons with reference groups.

Therefore, keeping in mind the shortcomings of the existing methodologies, we propose a new methodological approach in this paper by using an unsupervised machine learning technique to identify financially vulnerable households. This approach provides an alternative to the standard line of research on household financial vulnerability.

Empirical Strategy

The empirical strategy is divided into two parts. In the first part, we use an unsupervised machine learning algorithm to identify clusters of households which are financially vulnerable. Afterwards, in the second part, we estimate the probability of being financially vulnerable depending on different household and geographical characteristics by using a logistic regression.

In order to conduct this analysis, we use the Survey of Consumer Finance (SCF). It is a triennial cross-sectional survey of U.S. households conducted by the Federal Reserve. We

---

[32] See for instance (Leika and Marchettini, 2017)

build a pseudo-panel of nationally representative data sets for the years 1998, 2007 and 2016 with a total of about 15,000 households in the dataset. The survey provides information pertaining to the debt burden of households, their income and wealth levels, credit commitments, expenditure vulnerabilities, saving patterns, socio-demographic characteristics, and other household characteristics. The details of our empirical strategy are provided below.

Assessing Financial Vulnerability using Machine Leaning

This section details the machine learning methodology applied to discover how the U.S households are structured in terms of financial vulnerability. Unsupervised machine learning techniques, and in particular clustering algorithms, make it possible to break down set of observations into several subsets that are fairly homogeneous in their characteristics. To cope with computational complexity of the algorithms, this approach adopts a two-step procedure using hierarchical and partitioning methods.

In the first step, the Hierarchical Ascending Clustering (HAC) is run on four different random samples chosen from the overall population. This establishes the optimal number of underlying clusters 'K' within the U.S households. The HAC organises the clusters into a structured tree called a dendogram, which is the conventional way of depicting HAC results. The ascending approach, or agglomeration, starts with an observation in each class, then successively merges the two closest classes, and stops when there is only one class containing all the observations. The numbers of clusters are not required to be predefined in this algorithm. The dendogram represents the inclusive relationships of the clusters. The classification is obtained by cutting the tree at a given level and Figure 4.1 shows how a dendogram helps in depicting different homogenous clusters.

Figure 4.1. Selection of clusters on a dendogram
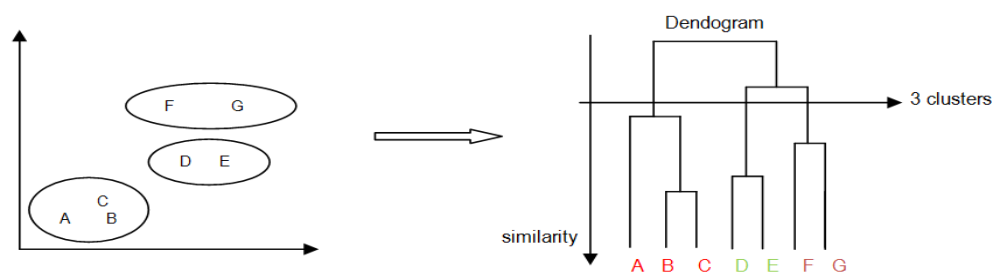
In the second stage, the partitioning method named K-means algorithm is applied on the whole survey. The K-means algorithm partitions the full set of observation into K numbers of clusters. Each cluster is represented by its gravity centre; and an observation belongs to the cluster whose centre is the closest. The number of clusters must be defined prior to running the algorithm. The general framework for identifying homogenous groups of financial vulnerability is summarized below:

1- Selection of variables related to household's financial vulnerability
2- Determining the optimal number of clusters 'K' using HAC algorithm
3- Partitioning overall sample into homogenous clusters using K-Means algorithm
4- Characterizing the clusters

Selection of Variables

Financial vulnerability is a complex phenomenon and a single metric is not enough to fully gauge its effect. Therefore, instead of relying on a definition of financial vulnerability that requires using a certain threshold level for one dimension of financial vulnerability, we use three different variables and reply on the unsupervised machine learning technique to classify clusters of financially vulnerable households. These variables have been chosen keeping in mind the existing literature that identifies the pertinence of certain variables in explaining financial vulnerability. First, we use the ratio of monthly repayments to monthly income to reflect the burden of debt repayments for a household. A higher ratio indicates a higher debt burden which increases the chances of default on loan commitments. Second, we use the leverage ratio measured as total debt over total assets. It is a measure of financial flexibility of a household. Third, we use household income to reflect the needs and behaviours of the household. A household in the top quintile has different financial needs and different consumption patterns than the ones in the bottom quintile. To normalize the distribution of these variables and to reduce the distance with outliers, we do a logarithm transformation of the income variable and we cap the ratios to two.

A summary of these variables across time is provided in Table 4.1. The level of debt burden remained constant from 1998 to 2007 at 18%, but it went down to 15% in 2016. The leverage ratio steadily rose from 34% in 1998 to 37% in 2007 and then to 41% in 2016. The average level of total debt has also increased more than the value of assets.

Table 4.1. Summary statistics for debt burden, leverage ratio and income

Variable	N	Year	Mean	Std. Dev	Minimum	Maximum
Debt Burden	31240	2016	0.15	12.9	0	2
Leverage Ratio	31240	2016	0.41	33.7	0	2
Household Income	31240	2016	10.90	74.0	0	19.5
Debt Burden	22085	2007	0.18	17.6	0	2
Leverage Ratio	22085	2007	0.37	33.7	0	2
Household Income	22085	2007	10.84	86.9	0	19.2
Debt Burden	21525	1998	0.18	17.5	0	2
Leverage Ratio	21525	1998	0.34	31.7	0	2
Household Income	21525	1998	10.61	108.9	0	19.4

Source: Survey of Consumer Finance.

A correlation matrix along with the scatter plot matrix for these variables is provided in Appendix 1.

Determining the Optimal Number of Clusters

In order to find the underlying number of clusters amongst the overall population, a hierarchical ascending clustering (HAC) was conducted on three different random samples of 8000 households. The benefit of this technique is the tree-based representation of the observations on a figure known as the *dendrogram* which is particular easy to interpret. Figure 4.2 represents the results of hierarchical ascending clustering for the year 2016. The results show a clear separation of six clusters on the dendogran with the semipartial R-squared (SPRSQ) represented by the vertical line. The semipartial R-squared (SPRSQ) is a measure of the homogeneity of merged clusters. So, SPRSQ is basically considered as

the loss of homogeneity due to combining two groups or clusters to form a new group or cluster. Therefore, the value of SPRSQ should be small implying that, after merging, members of the two groups are homogenous. One drawback of the HAC is the minimum algorithm complexity in O (N^2), N being the number of observations which are too high. Therefore, this is one of the reasons why the K-means algorithm is preferred for the full sample exercise, and HAC is used to determine the number of clusters.

Figure 4.2. Dendogram from hierarchical ascending clustering (HAC)
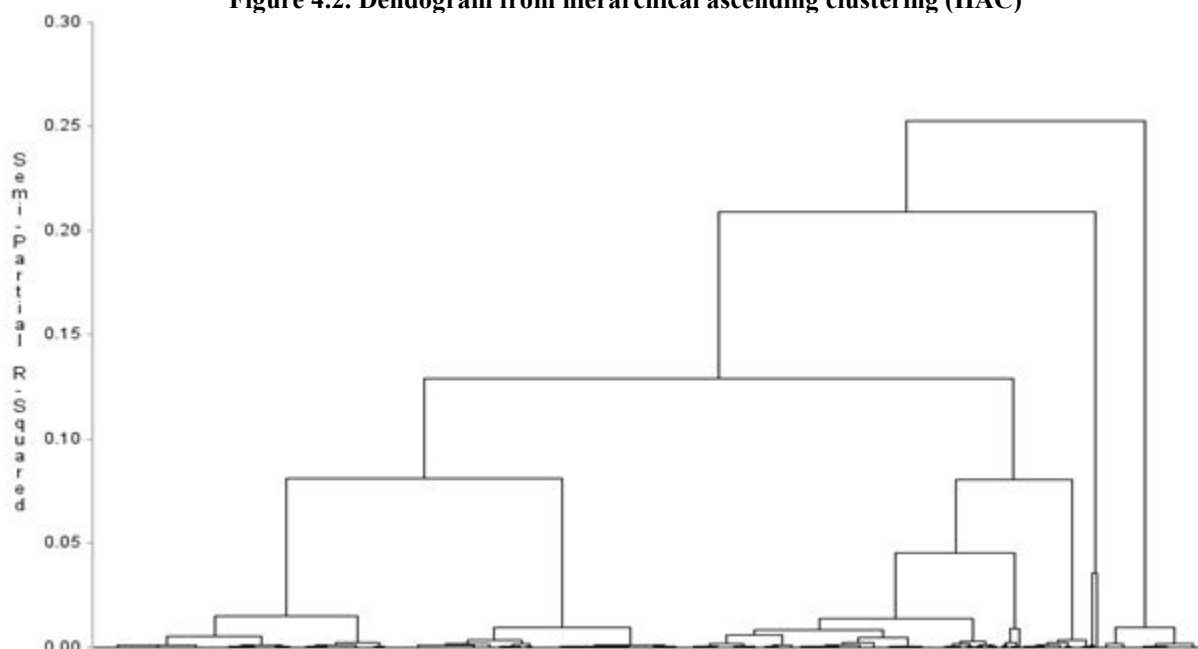
Source: Authors' calculations based on Survey of Consumer Finance.

K-means Clustering

In order to characterize all the households into different clusters, we carried out K-means clustering. The main benefit of the K-means algorithm is its algorithmic simplicity. However, it requires that the number of clusters are known prior to running the algorithm. Using the total number of clusters as six from HAC, the K-means algorithm carries out the following steps to classify the overall sample into clusters.

1. Conduct an initial cluster assignment for all the observations by randomly assigning a number from 1 to K to all the observations in the data

2. Keep the iteration process going until the cluster assignments stop changing

   a. Compute the centroid for all of the K clusters. The kth cluster centroid is the vector of the p feature means for the observations in the kth cluster.

   b. Based on the closest centroid, assign each observation according to the centroid. Euclidean distance is used to define the closest centroid.

Characterizing the Clusters

Hierarchical ascending clustering (HAC) and K-means clustering allowed us to classify all the households in the survey into six different clusters. The clusters vary from each other

with respect to different characteristics whereas the households within these clusters are very homogenous. The main characteristics of each cluster are summarized below.

- Cluster 1: It is the smallest group with only 0.1% of total households in it. This cluster contains households with almost no income, household head being out of the labour force, and over representation of single household heads.

- Cluster 2: The size of this cluster is small too and it contains only 0.4% of the total households. It represents households who are over indebted, have income below the median level, with debt payment to monthly income greater than 1. There is an over representation of self-employed people, households which have been turned down for credit applications, 55-64 year-olds, white non-Hispanics, and female headed households.

- Cluster 3: This cluster contains about 18% of the U.S. households. It represents households with high debt to monthly income ratio (an average of 0.40). This population is likely to have financial difficulties.

- Cluster 4: This cluster covers wealthy families. About 38% of the households belong to this cluster. Households in this cluster have high income and relatively lower debt to monthly income ratio. There is an over representation of savers, managers, male headed households, and white non-Hispanics households.

- Cluster 5: About 34% of the U.S. households belong to this category. This cluster contains households with low income, low debt to asset ratio, mostly retired and 55 year old +, and an over representation of households with no credit card balance.

- Cluster 6: This cluster mainly represents households which have high debt to assets ratio and relatively low income. They have late repayments history, were denied credit in the past year, with an over representation of 35 years-old, female household heads, black/ African Africans, not married, and no children. About 9.4% of the households belong to this cluster. A summary of all the clusters is provided in Table 4.2.

Table 4.2. Classification of clusters

Cluster Number	Percentage of Households	Brief Description of the Cluster Characteristics
1	0.1%	No income, household head not working
2	0.4%	Over indebted, low income
3	18.1%	Over indebted, debt payment to monthly income averages 0.4
4	38.0%	High income, low debt repayment to monthly income ratio, saves money
5	33.9%	Low debt no asset ratio, low income, over representation of retired people
6	9.3%	Over indebted, high debt to assets ratio, over representation of black/ African people.

Source: Authors' calculations based on Survey of Consumer Finance

The clustering was run with the same centre of clusters on the Survey of Consumer Finance for the years 2007 and 1998. The composition of the different clusters looks relatively stable across the three surveys. There is a peak of financial vulnerable households in 2007, mostly coming from cluster 3. The distribution of clusters across time is shown in Table 4.3.

Table 4.3.Distribution of clusters across time

	Year 2016	Year 2007	Year 1998
Cluster 1	0.1%	0.1%	0.9%
Cluster 2	0.4%	0.7%	1.1%
Cluster 3	18.1%	24.8%	21.8%
Cluster 4	38.0%	35.2%	33.2%
Cluster 5	33.9%	32.7%	36.5%
Cluster 6	9.4%	6.4%	6.4%

Source: Authors' calculations based on Survey of Consumer Finance.

We use this clustering analysis to divide the households into two distinct categories i.e. households that are financially vulnerable (1) and otherwise (0). The households which belong to Clusters 1 2, 3, and 6 are the ones which are financially more vulnerable. This implies that for the year 1998, 30.3% of the households were financially vulnerable. The share of financially vulnerable households increased by about 2% in 2007, but it came down by about 4% in 2016. As of 2016, 28% of the households in the U.S. can be classified as financially vulnerable (Figure 4.3).

Figure 4.3. Percentage of household financial vulnerability varies over time

Percentage of Financially Vulnerable Households
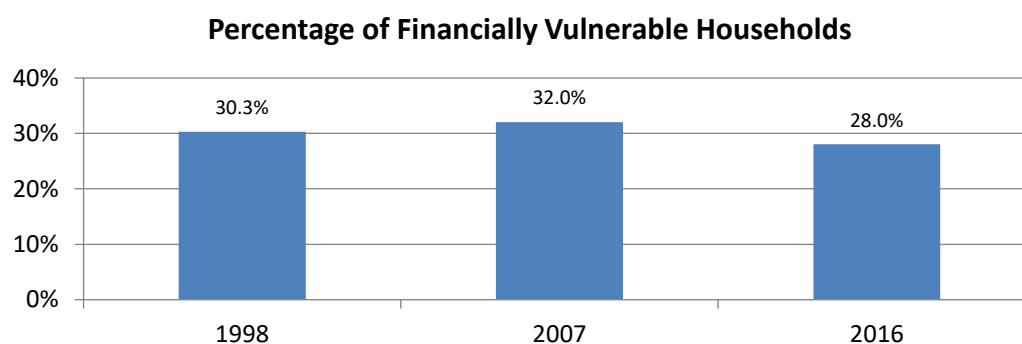
Source: Authors' calculations based on Survey of Consumer Finance

Race and ethnicity is associated with financial vulnerability in the United States. Black and African households have the highest proportion of financially vulnerable households (38.2 percent), followed by Hispanics (31.1 percent), other ethnicities which include Asians, native Hawaiian, Alaska native (30.6 percent), and white non-Hispanics (25 percent). The level of financial vulnerability decreased for all ethnicities from 2007 to 2016 except for households that belong to the other category (Figure 4.4).

Figure 4.4. Household financial vulnerability is higher for Hispanics and Black/ African American households
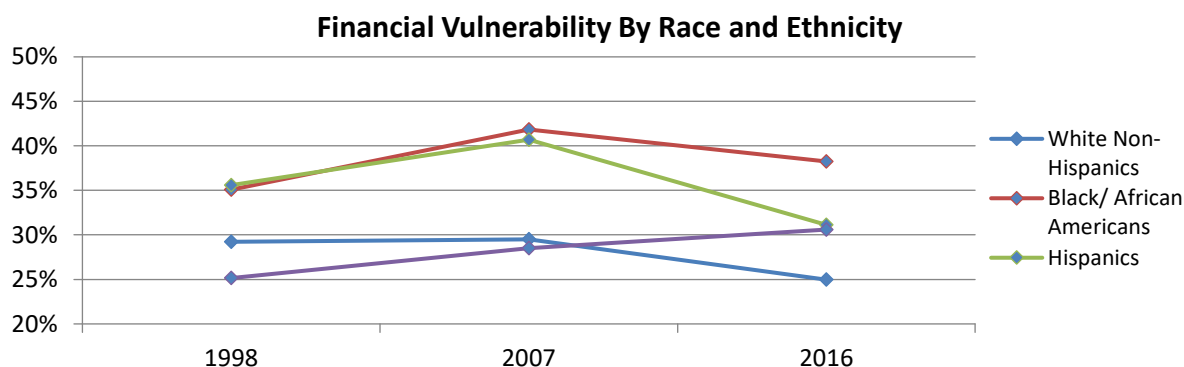
Financial Vulnerability By Race and Ethnicity

Source: Authors' calculations based on Survey of Consumer Finance

Household's financial vulnerability also varies across the education attainment level of the household head and the gender of the household head. Households where the household head has a college degree are less financially vulnerable as compared to households where the education level of the household head is lower (Figure 4.5). Moreover, female headed households are more financially vulnerable as compared to male headed households. However, it is important to note that household head is always considered to be male in case of a male/ female couple. This is the way household head is characterized in the survey of consumer finance due to historical reasons.

Figure 4.5. Household financial vulnerability varies by education attainment and gender of the household head
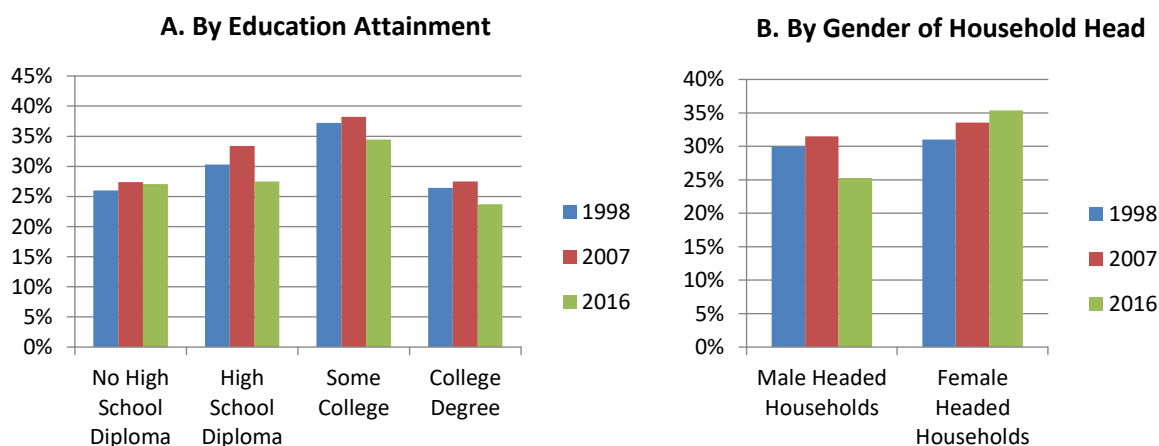
A. By Education Attainment

B. By Gender of Household Head

Source: Authors' calculations based on Survey of Consumer Finance.

Household's financial vulnerability also varies across different age groups of the household head. The financial vulnerability of households decreases with the increase in the age of the household head. Household heads within the age bracket of less than 35 years are the most financially vulnerable ones (42.6 percent) followed by household heads within the

age bracket 35-44 years (33.7 percent) and household heads within the age bracket 45-54 years (26.9 percent).

Figure 4.6. Financial vulnerability is lower for older household heads
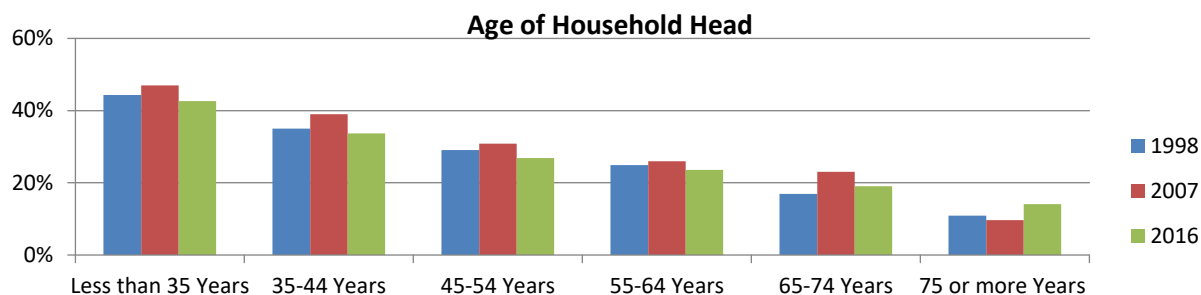
Source: Authors' calculations based on Survey of Consumer Finance.

A comparison of households which are vulnerable vis-à-vis households that are not financially vulnerable highlights that vulnerable households earn higher income, have less debt burden, are older in age, save more as compared to other households (Table 4.4). 44% of the financially vulnerable households have a student debt as compared to 14% of households that are not financially vulnerable. With regards to the working status of the household head, household financial vulnerability is the lowest amongst self-employed household heads (20 percent), followed by people who work for someone (31.4 percent). A detailed comparison of financially vulnerable households with other households is provided in Table 4.4.

Table 4.4. Profile of financially vulnerable households with respect to other households

	Financially vulnerable households vis-à-vis households that are not financially vulnerable			
	High Financial Vulnerability		Less or No Financial Vulnerability	
	28%		72%	
	Median	Standard Deviation	Median	Standard Deviation
Age	44	16.2	54	17.3
Total Household Income (US $)	40,505	33,552.4	62,783	531,919.0
Value of Total Household Debt (US $)	78,900	209,137.7	9,000	239,374.4
Ratio of Total Debt to Total Assets	0.80	809.7	0.06	0.24
Log (Monthly Loan Payment)	6.8	2.1	5.5	3.2
Number of Children	0	1.2	0	1.1
Ratio of Monthly Debt Payments to Monthly Income	0.29	2.3	0.05	0.1
	Percentage		**Percentage**	
Self Employed/ Partnership	25.1%		74.9%	
Employee	31.4%		68.6%	
Retired/ Disabled/ Homemaker/ Student	20%		80%	
% of Household with a Debt	99.9%		68.2%	
% of Households with Savings (i.e. spending less than Income)	44.3%		59.7%	
% of Households with Student Debt	43.9%		13.80%	

Source: Authors' calculations based on Survey of Consumer Finance.

Econometric Model: Estimating key drivers of financial vulnerability

The section develops a household financial vulnerability model to analyse the main drivers of financial vulnerability. The dependant variable is the status of household's financial vulnerability i.e. if the household is financially vulnerable (1) and otherwise (0). We use a logistic regression to predict this binary dependant variable. The likelihood of household h to be financially vulnerable is defined by equation 1. Let E_h be the outcome for household *h* in time period *t*.

$$P(E_h = 1|X) = G\left(\alpha + B_1(HH\ Characteristics)_h + B_2(\text{HH Characteristics})_h + B_3(Location\ type)_h + \mu_r + \mu_t\right) \quad \textbf{Equation (1)}$$

HH Characteristics refer to the variables pertaining to the household head's level of education, gender, marital status, occupation status and age. Household Characteristics

refer to controls pertaining to size of the household, value of debt payments, ethnicity, family structure of the household, and net-worth of the household. Location type refers to whether the household lives in a rural area or an urban area. Fixed effects at the regional level μ_r are also included to control for regional level heterogeneity which might affect chances of financial vulnerability. These regional fixed effects control whether the household lives in northeast, or north central, or south, or west part of the country. Furthermore, the term μ_t denotes time fixed effects since we have a pseudo panel for years 1998, 2007 and 2016.

Survey of consumer finance uses a multiple imputation methodology to approximate the distribution of missing data. These imputations are stored as five successive replicates i.e. five implicates for each observation. Moreover, the Survey of Consumer Finance does not have an equal probability sampling design. So, we use the nonresponse-adjusted sampling weights in order to compensate for unequal probabilities of selection. Furthermore, in order to get results with accurate standard errors in SCF, it is important to take into account the imputation error as well as the sample variability error. We take both of these aspects into account in our empirical results. We estimate sampling variability in our regression models by using a set of bootstrap replicate weights. Results of the econometric estimations along with a detailed discussion on these results are provided in the next section.

Results and Discussion

This section presents the results of our econometric analysis which aims at determining the key drivers of household's financial vulnerability in United States. Table 4.5 summarizes the results of the econometrics estimations. Summary statistics for all the control variables are provided in Annexure 3.

In the first column of Table 4.5, we estimate the econometric model with very basic specifications. We only include household level controls and time fixed effects, but no regional characteristics. The results show that various household characteristics such as ethnicity and race, education level, work status and age, are associated with household's financial vulnerability. However, regional characteristics can also play a key role in influencing household's financial vulnerability. Therefore, in column two, we control for the difference in urban and rural locations by including an urban dummy. We also include regional fixed effects to control for regional level unobserved heterogeneity. In column 3, we also control for the net worth of the household as well as the value of monthly debt repayment. The results still come out to be significant for various household characteristics. However, the regional variables do not seem to be significant once we control for household net worth in the model. Lastly, in order to better estimate the magnitude of coefficients, we run a linear probability model and report the results in column 4. The results of the econometric estimations highlight the importance of socioeconomic and demographic characteristics such as ethnicity, age, marital status, education attainment, working status and household's net-worth in explaining household's financial vulnerability. The results of these regressions are summarized in Table 4.5.

The econometric estimations highlight that ethnicity is a significant determinant of household's financial vulnerability. Black and African Americans and Hispanics are financially more vulnerable as compared to non-Hispanic white Americans. On average, Black and African Americans are 8 percentage points more likely to be financially vulnerable whereas Hispanics are 6 percentage points more likely to be financially vulnerable, as compared to white non-Hispanics, after controlling for other household and regional characteristics.

Table 4.5. Econometric estimations for the determinants of household financial vulnerability

Variables	(1) Financial Vulnerability	(2) Financial Vulnerability	(3) Financial Vulnerability	(4) Financial Vulnerability
Race/ Ethnicity (Base: White Non-Hispanics)				
Black/ African Americans	0.29***	0.56***	0.45 ***	0.08 ***
	(0.06)	(0.06)	(0.06)	(0.01)
Hispanic	0.10	0.36***	0.27***	0.06***
	(0.07)	(0.08)	(0.08)	(0.01)
Others	-0.13	-0.06	-0.04	-0.01
	(0.10)	(0.11)	(0.11)	(0.02)
Age of HH (Base: Less than 35 Years)				
35-44	-0.35***	-0.83***	-0.72***	-0.13***
	(0.05)	(0.06)	(0.06)	(0.01)
45-54	-0.64***	-1.25***	-1.01***	-0.20***
55-64	(0.05)	(0.05)	(0.06)	(0.01)
	-0.81***	-1.43***	-1.05***	-0.21***
65-74	(0.06)	(0.07)	(0.08)	(0.01)
	-1.07***	-1.56***	-1.19***	-0.21***
	(0.07)	(0.08)	(0.09)	(0.01)
75 or more	-1.70***	-1.70***	-1.28***	-0.22***
	(0.10)	(0.10)	(0.12)	(0.02)
Education Level of HH (Base: No High School Diploma)				
High School Diploma	0.11*	-0.31***	-0.26***	-0.03**
	(0.06)	(0.06)	(0.07)	(0.07)
Some College	0.29***	-0.37***	-0.24***	-0.02**
	(0.06)	(0.07)	(0.02)	(0.02)
College Degree	-0.13**	-1.05***	-0.68***	-0.11***
	(0.06)	(0.07)	(0.02)	(0.02)
Occupation Status of HH (Base: Employee)				
Self Employed/ Partnership	-0.05	-0.06	0.39***	0.02*
	(0.06)	(0.07)	(0.08)	(0.01)
Retired/ Disabled/ Student/ Homemaker	-0.04	0.63***	0.70***	0.08***
	(0.06)	(0.07)	(0.07)	(0.01)
Not Working	0.10	0.97***	1.06***	0.13***
	(0.07)	(0.08)	(0.09)	(0.01)
Urban Dummy		-0.12**	-0.03	-0.02*
		(0.05)	(0.05)	(0.01)
Number of children in the household	0.06***	0.005	0.02	-0.0004
	(0.02)	(0.02)	(0.02)	(0.003)
Marital Status of HH (Base: Married/ living with partner)				
Neither married nor living with partner	0.78***	1.01***	0.89***	0.13***
	(0.04)	(0.05)	(0.05)	(0.01)
Log (Monthly Debt Payment)		0.52***	0.56***	0.07***
		(0.01)	(0.01)	(0.001)
Log (Total Household Net Worth)			-28.8***	-0.47***
			(2.94)	(0.05)
Regional Fixed Effects	No	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes
Total Observations	14,970	14,970	14,970	14,970
Pseudo R2	0.0543	0.2235	0.2591	0.22

Source: Authors' calculations

Education level of the household head also comes out to be statistically significant. An increase in education level is negatively related with the probability of financial

vulnerability. On average, having a college degree decreases the probability of being financially vulnerable by 11 percentage points as compared to having no high school diploma. Moreover, the age of the household head is also significant and it is negatively associated with financial vulnerability. An increase in the age of the household head decreases the chances of being financially vulnerable.

The results also provide strong evidence that an increase in the size of monthly debt repayment raises household's financial vulnerability, even after controlling for traditional household and regional characteristics. Furthermore, living in an urban locality does not seem to have an impact on households' financial vulnerability once we take into account the net worth of the household. The net worth of a household comes put to be statistically significant as well and it is negatively associated with households' financial vulnerability. An increase of 1% in the household's net-worth decreases the probability of being financially vulnerable by about 0.47 percentage points, on average. Hence, an increase in financial and real assets reduces financial vulnerability.

The working status of the household also comes out to be statistically significant. Household heads which are self-employed, unemployed, retired, studying, homemaker or disabled are more likely to be financially vulnerable as compared to household heads who are working as employees. Amongst other socioeconomic determinants, numbers of children in the family do not play any role in explaining households' financial vulnerability. However, marital status of the household head plays a significant role in impacting the financial vulnerability level. Being not married or not living with a partner raises the level of financial vulnerability.

Conclusion

This paper proposed a new methodological approach of assessing household financial vulnerability by employing unsupervised machine learning. Hierarchical ascending clustering (HAC) and K-means clustering was used to identify homogenous clusters of households within the nationally representative sample of households in the United States. We analysed the characteristics of these clusters and identified households with high financial vulnerability. The results show that about 28% of the households in 2016 can be classified as financially vulnerable. The percentage of financially vulnerable households comes out to be higher in 1998 and 2007.

In order to better understand the main drives of household financial vulnerability in the United States, this paper then analysed the probability of being financially vulnerable based on household and regional characteristics. At the household level, characteristics such as ethnicity, age, marital status, educational attainment, number of children, working status, value of monthly debt repayments and net-worth are considered, while regional level controls included whether the household resides in an urban location or a rural location along with regional fixed effects.

In line with the theoretical predictions, the econometric estimations confirm the importance of socioeconomic and demographic characteristics such as ethnicity, age, marital status and working status on household's financial vulnerability. Results highlight that Black and African Americans and Hispanics are financially more vulnerable than non-Hispanic white Americans. In the case of educational attainment, the results show a strong and negative association with household's financial vulnerability. Regarding the age of the household head, results show that there is a strong and negative association with financial vulnerability as well. In the case of working status of the household head, the results highlight that self-

employed, retired and people who are not working are more financially vulnerable as compared to people who work as employees.

Lastly, there is clear evidence suggesting that net-worth of the household and the size of monthly debt repayments effect household's financial vulnerability. Regarding net worth of the household, results show a significant and negative relationship. An increase in the net-worth of the households decreases the probability of being financially vulnerable. In addition, an increase in the value of monthly debt repayment raises the probability of being financial vulnerable. Whereas, living in an urban locality does not seem to have a significant impact on financial vulnerability after controlling for the net-worth of the household into account.

References

Acharya, V., T. Philippon, M. Richardson and N. Roubini. (2009). "The Financial Crisis of 2007-2009: Causes and Remedies". *Financial Markets, Institutions & Instruments*, 18 (2), 89–137

Albacete, N and P. Fessler (2010). "Stress Testing Austrian Households". *OeNB Financial Stability Report* 19, June.

Anderloni, L., Bacchiocchi, E., and D. Vandone (2012). "Household financial vulnerability: An empirical analysis". *Research in Economics.* 66: 284–296.

Bank of England (2016). *Financial Stability Report 39.* July 2016.

Brown, M., A. Haughwout, D. Lee, and W. van der Klaauw (2010). "The Financial Crisis at the Kitchen Table: Trends in Household Debt and Credit", *Federal Reserve Bank of New York Staff Reports*, 480.

Bunn, P., Johnson, R., Le Roux, J. and Rostom, M. (2015). "Household debt and spending in the United Kingdom", *Bank of England Staff Working Paper*, 554.

Christelis, D., T. Jappelli., O. Paccagnella. and Weber, G., (2010). "Income, wealth and financial fragility in Europe". *Journal of European Social Policy,* 19 (4), 359–376

Dey, S., R. Djoudad, and Terajima, Y. (2008). "A Tool for Assessing Financial Vulnerabilities in the Household Sector" *International Journal of Microsimulation*, 8(1). 97-109.

Fareed, F., Gabriel, M., Lenain, P. and Reynaud, J. (2017), "Financial Inclusion and Women Entrepreneurship", *OECD Economics Department Working Papers*, OECD Publishing, Paris.

Grohmann,, A., Klühs, T., and Menkhoff, L. (2018), "Does financial literacy improve financial inclusion? Cross country evidence" *World Development*, 111, 84-96.

Herceg I. and D. Nestić (2014). "A New Cluster-Based Financial Vulnerability Indicator and Its Application to Household Stress Testing in Croatia". *Emerging Markets Finance and Trade*, 50:5, 60-77.

Herrala R. and K. Kauko (2007). "Household Loan Loss Risk in Finland- Estimations and Simulations with Micro Data". *Research Discussion Paper, Bank of Finland*, Helsinki.

Leika M. and D. Marchettini (2017). "A Generalized Framework for the Assessment of Household Financial Vulnerability" *IMF Working Paper.* No. 17/ 228.

Michelangeli V. and C. Rampazzi (2016). "Indicators of financial vulnerability: a household level study". *Banca d'Italia: Questioni di Economia e Finanza* .163.

Vatne, B. H. (2006). 'How large are the financial margins of Norwegian households? An analysis of micro data for the period 1987–2004', *Norges Bank Economic Bulletin 4/06*, 77: 173-180.

Worthington , C. (2006). "Debt as a source of financial stress in Australian households". *International Journal of Consumer Studies*, 30(1). 2-15.

Annex A. Correlation Matrix

	Household Income (LINCOME)	Leverage Ratio (LEVRATIO)	Debt Burden (PIRTOTAL)
Debt Burden (PIRTOTAL)	1	0.22	-0.19
Leverage Ratio (LEVRATIO)	0.22	1	-0.13
Household Income (LINCOME)	-0.19	-0.13	1

Source: Survey of Consumer Finance (SCF).
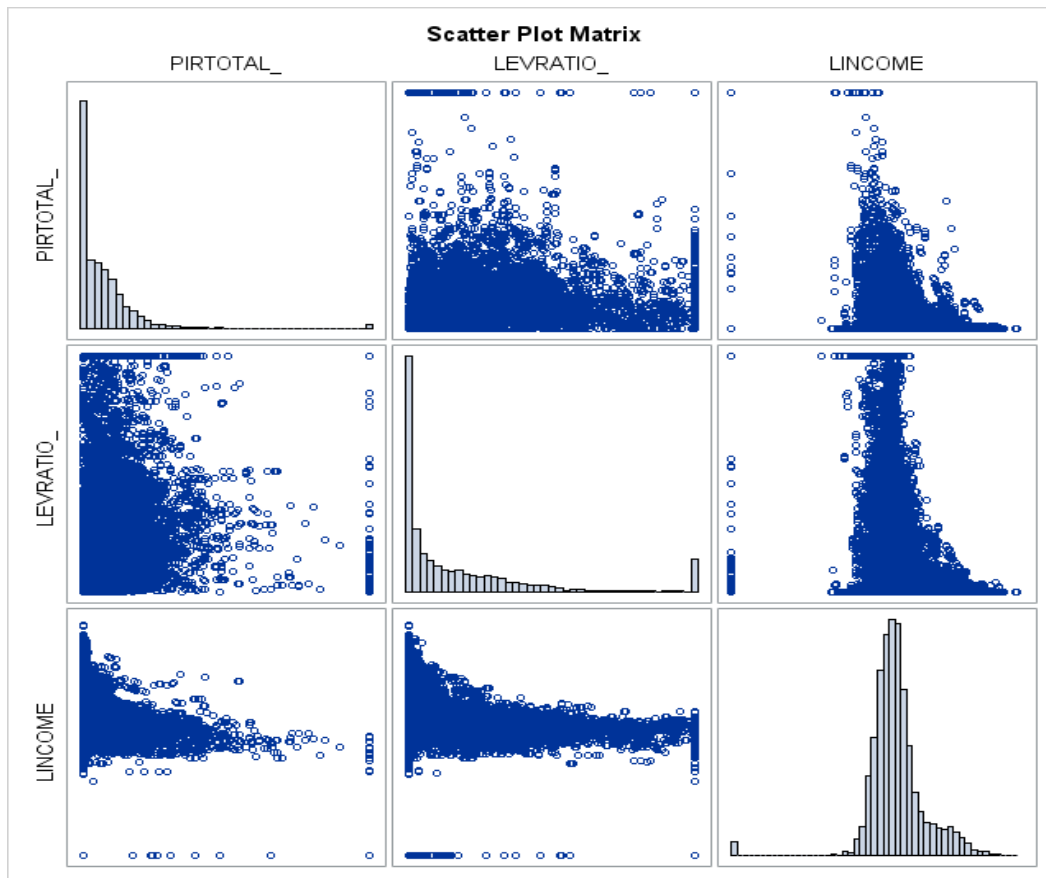
Source: Authors' calculations using Survey of Consumer Finance (SCF)

Annex B. Descriptive Statistics

Variable	No. of Observations	Mean	Std. Dev.	Min	Max
Financial Vulnerability_ Dummy	14,970	0.300507	0.458482	0	1
Monthly Debt Payment (Log)	14,970	4.801251	3.158039	0	13.22045
Total Household Net Worth (Log)	14,970	16.94653	0.074511	10.26876	21.26919
Gender_ Male Dummy	14,970	0.723286	0.447377	0	1
White Non- Hispanics_ Dummy	14,970	0.729047	0.444455	0	1
Black/ African Americans_ Dummy	14,970	0.135617	0.342383	0	1
Hispanics_ Dummy	14,970	0.094565	0.292615	0	1
Other Ethnicities _ Dummy	14,970	0.040772	0.197763	0	1
No High School Diploma_ Dummy	14,970	0.140907	0.347928	0	1
High School Diploma_ Dummy	14,970	0.300423	0.458445	0	1
Some College_ Dummy	14,970	0.256414	0.436656	0	1
College Degree_ Dummy	14,970	0.302256	0.459239	0	1
Employee_ Dummy	14,970	0.58359	0.492967	0	1
Self Employed/ Partnership_ Dummy	14,970	0.107667	0.309961	0	1
Retired/ Disabled/ Student/ Homemaker_ Dummy	14,970	0.259052	0.438117	0	1
Not Working_ Dummy	14,970	0.049692	0.21731	0	1
Number of children in the household	14,970	0.80332	1.134475	0	10
Married/ living with partner_ Dummy	14,970	0.579671	0.493615	0	1
Age Less than 35 Years_ Dummy	14,970	0.216244	0.411685	0	1
Age 35-44_ Dummy	14,970	0.196786	0.397572	0	1
Age 45-54_ Dummy	14,970	0.194136	0.395537	0	1
Age 55-64_ Dummy	14,970	0.165251	0.37141	0	1
Age 65-74_ Dummy	14,970	0.120523	0.325574	0	1
Age 75 or more_ Dummy	14,970	0.10706	0.309192	0	1

Annex C. Classification of Clusters and Distribution of Debt Burden, Leverage Ratio and Household Income

Cluster = 1

Variable	Cluster mean	Overall mean	Cluster size	Test value	Probability of test value	--------
LINCOME	0	10.84515	82	-1,33	0.0920	*|

Cluster = 2

Variable	Cluster mean	Overall mean	Cluster size	Test value	Probability of test value	--------
PIRTOTAL_	1.86443	0.14815	263	2,16	0.0154	|**
PIRTOTAL	8.76196	0.17838	263	1,76	0.0390	|**
LINCOME	5.14604	10.84515	263	-1,25	0.1049		

Cluster = 3

Variable	Cluster mean	Overall mean	Cluster size	Test value	Probability of test value	--------
PIRTOTAL_	0.40112	0.14815	4496	1,42	0.0783	|*

Cluster = 4

Variable	Cluster mean	Overall mean	Cluster size	Test value	Probability of test value	--------
INCCAT	4.63798	3.10008	15199	2,64	0.0041	|***
LINCOME	11.78958	10.84515	15199	2,20	0.0141	|**

Cluster = 5

Variable	Cluster mean	Overall mean	Cluster size	Test value	Probability of test value	--------
LEVRATIO_	0.08132	0.40718	8596	-1,05	0.1460		
HDEBT	0.47254	0.77116	8596	-1,22	0.1114		
INCCAT	1.88800	3.10008	8596	-1,32	0.0939	*|

Cluster = 6

Variable	Cluster mean	Overall mean	Cluster size	Test value	Probability of test value	--------
LEVRATIO_	1.73730	0.40718	2604	2,11	0.0176	|**

Box Plot for PIRTOTAL_

Box Plot for LEVRATIO_

Box Plot for LINCOME

Box Plot for INCCAT
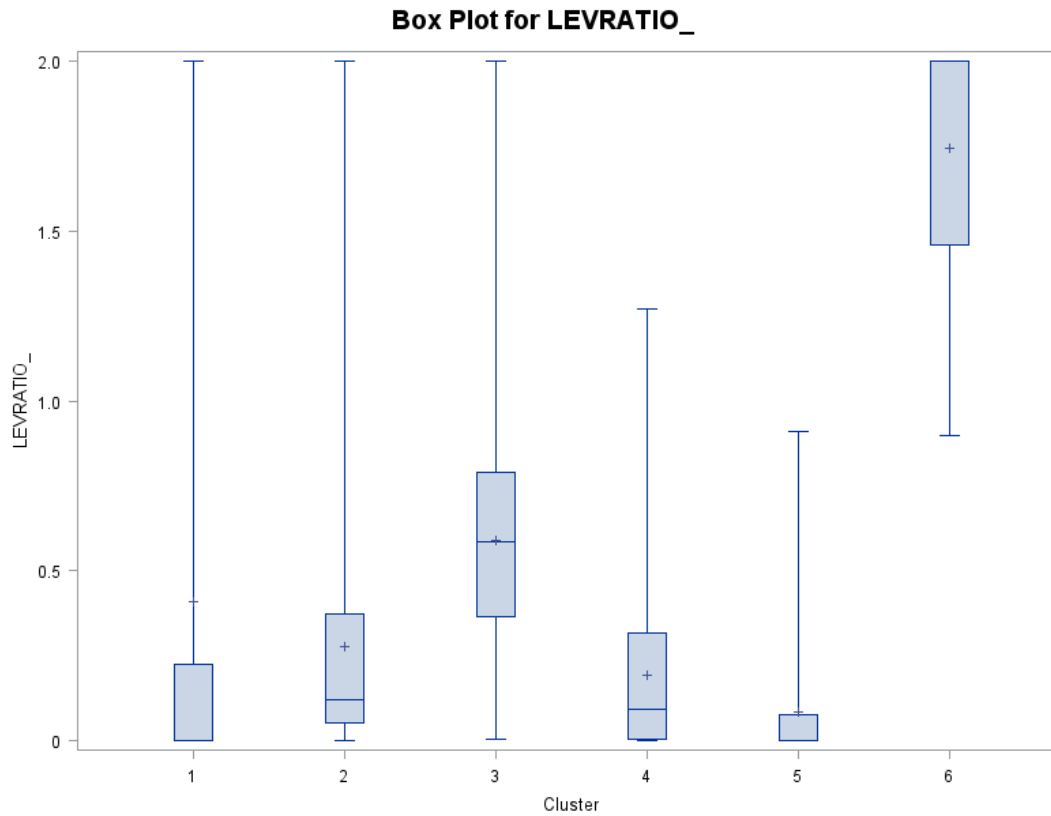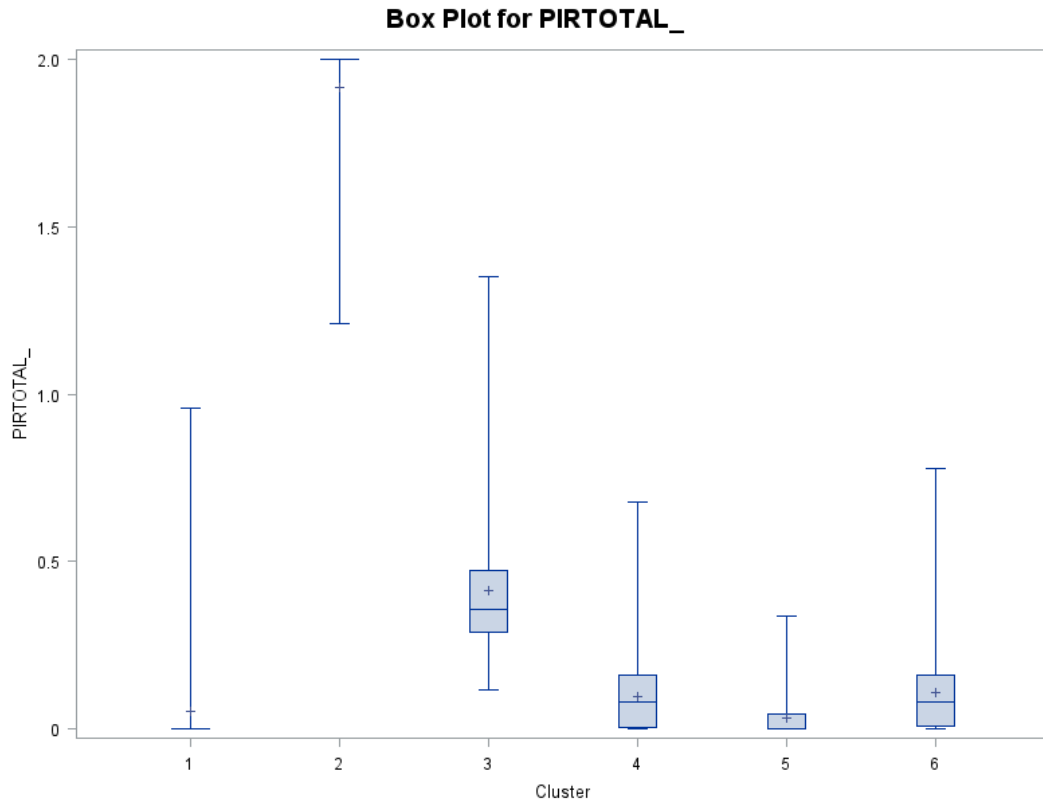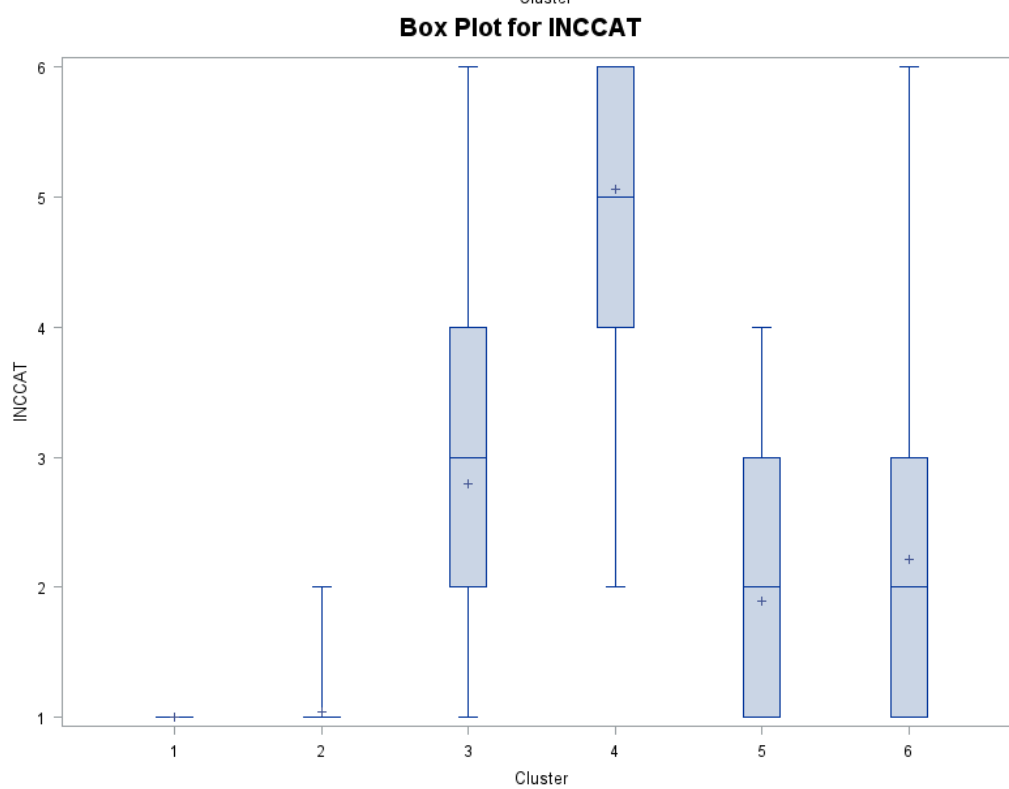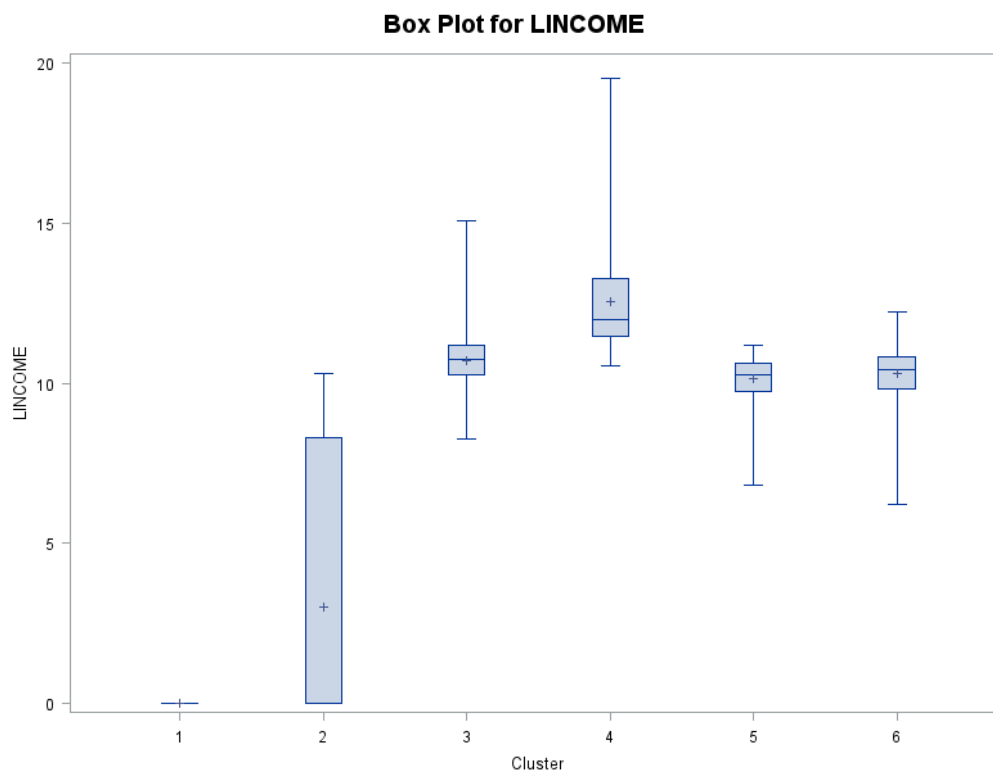
ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

The OECD is a unique forum where governments work together to address the economic, social and environmental challenges of globalisation. The OECD is also at the forefront of efforts to understand and to help governments respond to new developments and concerns, such as corporate governance, the information economy and the challenges of an ageing population. The Organisation provides a setting where governments can compare policy experiences, seek answers to common problems, identify good practice and work to co-ordinate domestic and international policies.

The OECD member countries are: Australia, Austria, Belgium, Canada, Chile, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Latvia, Lithuania, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, the Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States. The European Union takes part in the work of the OECD.

OECD Publishing disseminates widely the results of the Organisation's statistics gathering and research on economic, social and environmental issues, as well as the conventions, guidelines and standards agreed by its members.

OECD Economic Survey of the United States: Key Research Findings

This volume collects four studies that were prepared as background research to the 2018 OECD Economic Survey of the United States. Using micro-data survey responses, regional and sectorial data, these studies seek to provide insights into how employment responds to labour market disruption and the drivers of household financial vulnerability in the United States. This volume represents a collaborative effort by a team of OECD and academic researchers.

Aimi Abdul Ghani, Intern, Institut d'Études Politiques de Paris

Damien Azzopardi, Statistician, Economics Directorate, OECD

Fozan Fareed, Consultant, Université Paris-Est

Stephanie Guichard, Consultant.

Patrick Lenain, Assistant Director, Economics Directorate, OECD.

Douglas Sutherland, Senior Economist and Deputy Head of Division, Economics Directorate, OECD.

OECDpublishing

www.oecd.org/publishing

9 789264 310285