

## Mårten Blix

# The Effects of Digitalisation on Labour Market Polarisation and Tax Revenue<sup>1</sup>

### INTRODUCTION

Digitalization is sometimes described as the third industrial revolution. What insights can be gained from comparing the present situation to the state of society at the outset of the first industrial revolution some two-and-half centuries ago? From the late 18th century onwards, it led to an upheaval in work and livelihoods at a time when there were few social safety nets. The rapid transformation of economies and societies triggered a drive to create new social and political institutions to manage and reduce the social costs of change. Universal education, social security and pension systems were introduced. Spurred by hazardous and difficult work conditions, as well as excessively low pay, labour organised into trade unions to become a counterweight to employers and owners of firms. Societies developed methods to handle change and devised ways to resolve conflict through rules and negotiations, rather than through force.

There is no need to reinvent the institutions and safety nets thus established. Indeed, the modern welfare state has shown a remarkable resilience over the years. But digitalization is now affecting some of its fundamental building blocks and, unless institutions are reformed, the social contract holding society together could be damaged.

For the welfare state, providing protection against a potentially destructive change and promoting innovation has been a central task and a delicate balancing act from the outset. On the one hand, heavy regulation of the economy can dent productivity growth and undermine rising prosperity. On the other, strained social cohesion can erode the legitimacy of institutions.

The modern welfare state has managed change, but some countries have at times veered off course. Take the example of Sweden. Its welfare state expanded rapidly during the 1970s and 1980s, but high marginal tax rates dented incentives to work and fiscal profligacy gradually created an untenable economic situation. Interest payments on public debt began to squeeze out social spending. Trust in the stability of the Swedish economy declined and reached an absolute low in the autumn of 1992, when the *Riksbank* (the Swedish central bank) unsuccessfully defended the

krona by raising the interest rate to 500 percent. The deep crisis spurred structural reforms and set the stage for welfare state reforms during the 1990s.

The effects of digitalization are not dramatic in the short run, compared to a fiscal or financial crisis when GDP can fall abruptly and many jobs may be lost. Indeed, there is no compelling evidence to date that employment levels in OECD countries are declining. One reason for this is that the modern labour market has a great capacity for change and continuously creates new jobs, especially in services, as old ones are shed. In Sweden, for example, about 17 percent of all jobs were destroyed and created during the period 1990–2009 – see Heyman *et al.* (2013). In OECD countries as a whole, employment levels have not fallen, although unemployment – and especially youth unemployment – is a major concern after the fallout of the financial crisis.

Yet, although the modern welfare state does not face an imminent crisis, over the medium to long term the changes due to digitalization will put a strain on existing institutions and labour market arrangements. In addition, the welfare state has to cope with unprecedentedly high levels of immigration. The labour market is changing to such an extent that the social contract could begin to crack (Blix 2017).

The legitimacy of the welfare state stands on several pillars that include:

- Comprehensive social welfare spending (health care, education and care of the elderly) financed by taxes
- Social inclusion through universal education, progressive tax systems and transfer payments to reduce income inequality
- A balance of power between trade unions and employers through rules to manage and resolve conflicts and a trade union policy to increase low wages.

Digitalization affects all of these pillars both directly and indirectly. Most will acknowledge that consumption behaviour has changed due to digitalization, but the biggest changes are those that affect the labour market.

The changes to the labour market tend to occur more gradually than in consumption, depending on the rate at which young people are entering the market, older persons are retiring and others are switching jobs. The impact of technology and digitalization on the labour market comes from the accumulated changes of such dynamics. The main impact of technological change and digitalization has been an increase in polarization, which has affected middle-level workers the most (Goos *et al.* 2014). Income has become more volatile and uncertainty in the labour market has grown.

With gradual changes, in principle, there should be ample time to adjust and reform. In practice, the reforms necessary to accommodate changes may be



Mårten Blix  
Research Institute of  
Industrial Economics,  
Stockholm

<sup>1</sup> I am grateful to Marianna Blix Grimaldi for comments.

made too slow – or not made at all. Firstly, the political system often has difficulties managing reform when the political costs of action tend to be up-front and the potential economic benefits come much later. Secondly, the reform of existing institutions often meets with resistance from special interest groups, employer organizations, the professions and regulatory bodies. Changes typically imply a shift in power, resulting in winners and losers.

The risk of not responding to rising labour market uncertainty and income volatility is that disenfranchisement will continue to rise. Institutional legitimacy may be damaged and, indeed, in some OECD countries the rise of populist parties may be seen as a sign of declining trust in the establishment and the institutions that represent it.

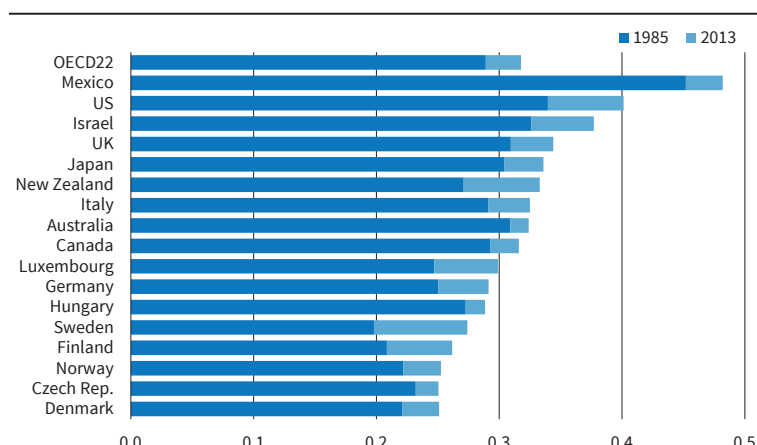
**RISING INEQUALITY IN THE WELFARE STATE**

A common measure of income inequality is the so-called Gini coefficient. As can be seen from Figure 1, the Gini coefficients have been trending upwards in many OECD countries since the 1980s. Although it is a fairly common measure of income inequality, the Gini coefficient measure has some well-known drawbacks. For instance, in the aftermath of the financial crisis, the fairly modest changes in relative incomes could mask more problematic absolute changes in low level incomes.<sup>2</sup> In addition, the Gini coefficient does not account for publicly-provided welfare services. For a country like Sweden with comprehensive benefits, this makes some – but not a huge – difference. Other measures like the share of individuals earning below 60 percent of median incomes or measures of risk of absolute poverty may be better at capturing income inequality. However, notwithstanding the measure used, it is unequivocal that inequality has increased in most OECD countries.

Despite increases in income inequality, the Nordics and much of northern Europe (excluding Anglo-Saxon countries) remain in the lower half in terms of Gini coefficients. But not all welfare states have fared the same. It is worth highlighting that Sweden has experienced the largest increase in Gini coefficient since the 1980s. However, this is an increase from a suppressed low level that turned out to be unsustainable. In particular, the 1970s and 1980s was a period of economic stagnation in Sweden with a long-lasting decline in GDP per capita growth rates compared to other OECD countries.

<sup>2</sup> One way to address this measurement issue is to consider so called anchored poverty rates relative to a base year – see e.g. Blix (2017).

Figure 1  
Gini Coefficients in Selected OECD Countries



Note: The Gini coefficient is zero when everybody has identical incomes, and one when one individual has all income. Source: OECD. © ifo Institute

Trade and globalization has probably led to lower income inequality in the world as a whole, but most arguments indicate that income inequality within countries will continue to rise. Rapidly ageing populations will accelerate changes and new technologies will compete with humans in many new areas, notably also in advanced services. Countries need to find ways to address these changes or risk seeing further deterioration in their institutional legitimacy.

A very simple way of summarising different models of growth and social inclusion is presented in Sapir (2005). In Table 1, some countries and regions are divided into combinations of low-high equity and efficiency. A useful way to think about the different country models is to give the labels a broad interpretation. Efficiency can be thought of as productivity growth, per capita growth or capacity for innovation; equity can be thought of as measuring income inequality or, better still, equality of opportunity.

The characterisation is not meant to imply that there is a growth-equity trade-off. Ostry *et al.* (2014) argue that no such pattern is supported by data. Also, OECD (2017a) emphasises that there are several policy levers that support both equity and growth (like the promotion of product market competition, for example). Instead, a country may find it hard for political economy reasons to pursue the reforms that would lead to improvements in either productivity growth or equity.

Most of Table 1 capturing the state of affairs in 2005 stands the test of time, but not all of it. Several

Table 1  
Combination of Efficiency and Equity

		Efficiency	
		Low	High
Equity	Low	Southern Europe	US, UK
	High	Northern Europe	Scandinavia

Source: Sapir (2005).

countries have been experiencing declining productivity growth. For Britain the decline began before the financial crisis. Despite rising inequality, Sweden remains a country with one of the most favourable combinations of equity and growth. Will the Swedish welfare state prove better at coping with technological change than other systems?

### THE IMPLICIT SOCIAL CONTRACT IN WELFARE STATES IS THREATENED

The welfare state can be seen as a particular type of social contract between different groups: the young and the old; workers and owners of capital; cities and regions. Those in work and in good health pay fairly large shares of their income in tax in order to receive social support when they are old or fall sick. Those living in rural areas are often subsidised by more prosperous regions.

The challenge for all countries is that large relative changes in fortune for some groups or areas can lead to discontent and undermine the willingness to take part in intergenerational transfers or in geographical redistribution. Arguably, political events during 2016/17 could be a sign of such developments. These events include the election of President Donald Trump in the United States, the referendum outcome in favour of Brexit in Britain, and Catalonia's declaration of independence from Spain. Welfare states are by no means immune to this danger, as illustrated by the recent upsurge of populism in prosperous countries with medium-to-low inequality like Germany and Sweden.

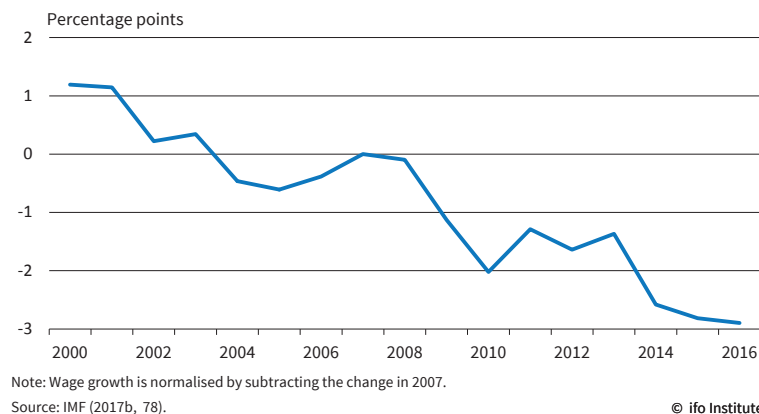
Resentment against the elites that are seen to benefit from changes can, in turn, undermine the social contract that holds the welfare state together, especially in countries with ageing populations and large immigration flows. Stagnant wages may also fuel disenfranchisement.

### THE LABOUR MARKET AND STAGNANT WAGES

The labour market is a key to the welfare state. Without a well-functioning labour market that delivers improvements in goods and services, prosperity cannot increase and support for the social contract may wane. One reason for concern in recent years is that wage growth has been stagnant in many advanced economies.

Productivity growth and slack in labour markets are traditional explanations for understanding how wages develop. According to the IMF (2017b), these factors may account for a large share of the recent

**Figure 2**  
Nominal Wage Growth in Advanced Economies Compared to the Level of Wage Growth 2007



stagnant wages.<sup>3</sup> As can be seen from Figure 2, wages in advanced economies have been in gradual decline recently, but this process started well before the financial crisis.

Although low productivity growth and the ready availability of workers can go some way towards partly explaining stagnant wages, they cannot fully explain the slow-down. Other explanations include advances in technology and automation that result in stronger competition between humans and machines (OECD 2017b). Even if past technological advances have had a far-reaching influence on work, advances in digitalization are being implemented faster than before (see e.g. Comin and Mestieri Ferrer 2013).

An overall effect of digitalization on the labour market is to reduce the bargaining power of workers. In many professions, the 'middle man' is a function that is under pressure from robots. Such pressures are in evidence in banking, insurance and retail, just to name a few sectors. In banking, for example, the continued fallout from the financial crisis combined with technological advances is leading many banks to reduce staff and automate a range of services. In Sweden, the Financial Supervisory Authority has granted licenses to financial institutions that provide automated advice. Other banks are testing so-called 'robo-branches', which are essentially local bank branches largely unmanned by professional staff.

As emphasised above, at the aggregate level jobs are not disappearing. Instead, technology is creating additional downward pressure on wage growth. Other parts of the economy are also set to be affected. High-street retail, for example, has long been in competition with e-commerce and semi-autonomous check-outs are fairly common. Notably, with automated check-out, the need for cashiers is gradually diminished. Such technology is now close to being rolled out by Amazon.

Such advances in technology have reignited fears that automation will destroy jobs. Frey and Osborne

<sup>3</sup> Why productivity growth is low is a big puzzle, but lies beyond the scope of this paper.

(2013), for example, argue that about half-of US jobs may be automated within the next two decades. Arntz *et al.* (2016) use a different methodology and produce lower estimates. More generally, evidence for EU countries continues to point to the labour market's ability to adapt. Gregory *et al.* (2016) show that job losses are compensated for by demand spill-overs in other areas, meaning that the net effect is mostly stable employment levels. Overall, there is no support for the notion that human work is disappearing.

But there is ample evidence for the notion that the *content* of work is changing – see the general overview in Acemoglu and Autor (2011). Improvement in technology has led to a process favouring those with high-skills in terms of cognitive or social abilities, so-called skilled-biased technological change. For such workers, wage developments have been positive and the share of such work has increased in the economy (Figure 3). By contrast, routine work has been in decline. The overall result has been growing polarisation of the labour market that has been steadily occurring over a long period of time (Goos *et al.* 2014).

The polarisation of work has occurred in most OECD countries. The automation of work can be expected to exert further pressure on wages for those with middle level skills. The tools and technology that are now available could accelerate polarisation compared to previous periods. There is a risk that those who are slow to upgrade their skills will experience further wage stagnation.

At the overall level, a combination of developments could lead to a decline in the wage bargaining power of labour. In addition to technology, both demographics and more flexible employment legislation serve to accelerate changes in the labour market. Ageing populations imply fewer young people compared to the old and so, in principle, the young could fill the jobs of those retiring. With large cohorts leaving the labour market, some areas will even experience a scarcity of workers. In practice, young workers can only seldom directly replace older workers, especially not in positions where on-the-job experience is

important. This means the incentive to automate work will gather strength due to ageing populations, as firms find it hard to find workers with the right skills.

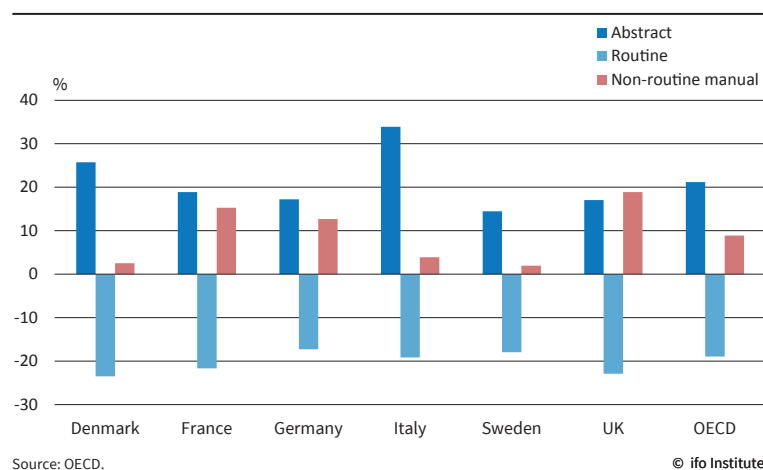
Technology is, of course, not the only factor affecting that bargaining power of labour; for an overview (OECD 2017b). In many OECD countries, protection for temporary or fixed term contracts has been in decline since the 1990s. By contrast, permanent positions have remained largely unchanged. As a result, the duality of labour markets has increased and especially so in Sweden (see e.g. Cahuc 2010). Young people are overrepresented among temporary workers and their share has increased. The OECD calculates that in 2015 around 40 million youths, or 15 percent of those in the 15–24 year age group will be neither in education nor in employment, but will instead be the so-called NEETs (see also OECD 2016).

Technology is not only changing the landscape of work through automation and robots. With the so-called platform based labour market, *non-standard work* is on the rise. Platform-based work has been given many names, including the sharing economy or *gig work*. In what follows, I will use the term *gig work* to denote a situation whereby a worker performs tasks organized through the conduit of a digital platform, and whereby the platform owner does not take employer responsibilities, such as paying payroll taxes and value added tax (VAT).

Gig work has always existed, notably in entertainment, such as in music, art or television. Non-standard work without employment protection is also common in journalism (for an overview of how non-standard work contributes to rising inequality, see OECD (2015)). For example, the self-employed enjoy fewer benefits in social security. In addition, the self-employed are also excluded from additional benefits in collective wage bargaining agreements, such as topped-up pensions, parental leave and sick leave.

*Gig work* is increasing on broad fronts (Sundararajan 2017). A common misconception is that gig work is only about simple tasks like driving taxis (e.g. Uber) or household services like *TaskRabbit*. The services are much wider and range from medical to legal professions. While gig work has increased strongly in recent years, it remains small in terms of the overall share of employment. Despite its limited size, it could be said to affect the labour market in fundamental ways. Creating a situation whereby a worker is on a permanent standby, 24 hours a day, 7 days a week, lessens the need for permanent workers. One of the largest platforms is *Upwork* which has over 12 million workers worldwide, who perform tasks ranging from web-design to data analysis.

Figure 3  
Changing Employment Shares 1995–2010



Consider the thought experiment that today's digital gig platforms had existed for as long as there have been firms. In such a world, would firms have hired workers to the same extent as today's medium and large size enterprises? Probably not. Ronald Coase argued that the existence of the firm supercedes the price mechanism of hiring individual workers on an atomistic market. When the cost of individual contracts is higher than organising work into employment, the existence of the firm can be explained. With gig platforms, the cost of hiring temporary staff on a needs-only basis is much smaller than in the past. Hence, it is likely that the number of permanent workers looks set to drop.

What are the possible implications? The main channel of change is through the normal churn of the labour market: older workers retire, new workers are hired, and there are changes in voluntary and involuntary employment. These changes occur slowly and mostly without drama. In countries with collective wage agreements, bargaining over wages and benefits may occur over various yearly intervals. In Sweden, for example, some wage agreements cover two-to-three years.

Gig markets pose a direct threat to the Swedish labour market model where the trade unions and the employer organisations are responsible for setting wages. Gig contracts *completely bypass* collective wage bargaining agreements. The transaction occurs in the cloud. Moreover, the buyer and seller of services can be in different countries. This means that the traditional trade union threat of boycott is more difficult to use compared to a shop or a factory. The non-payment of taxes is also an issue for the government. A tilted playing field in tax can lead to unfair competition, where tax and regulatory differences play an outsized role in success compared to the efficiency of services.

So far changes have occurred gradually. But most of the incentives point to an unequivocal change in direction towards work and jobs becoming more loosely tied to a single employer and with a shrinking share of permanent employment. Exactly how far this process will continue is hard to say. It will, *inter alia*, depend on the policy responses of governments, employers and trade unions.

For the welfare state, it means both more flexible labour markets, but also that security through work will be lower than in the past. In Sweden, collective wage bargaining agreements cover about 90 percent of the present labour market. A system of collective wage bargaining can probably survive a small share of

gig work in the economy, but begins to lose its legitimacy if gig work becomes very popular.

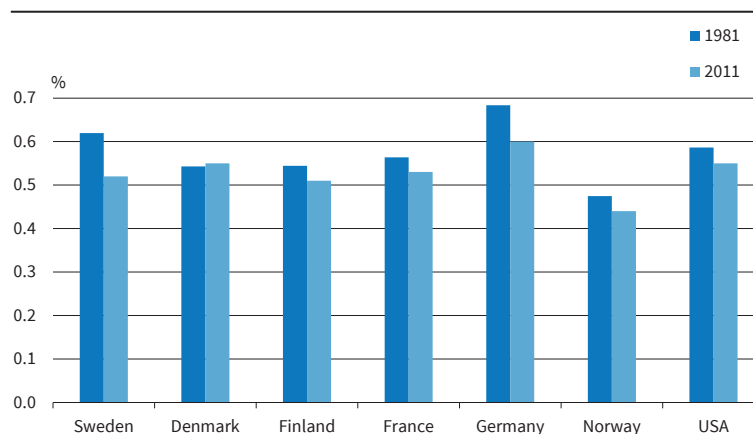
#### FINANCING THE SOCIAL WELFARE STATE: TAX BASE ON LABOUR BECOMING MORE MOBILE

The mobility of capital has been a feature of world economies for a long time. Of course, workers have a longstanding tradition of switching jobs, even if not as readily as capital. However, as outlined in the previous section, technology is now increasing the mobility of labour in ways that were not previously possible. Technology makes it easy to outsource work with a simple press of a button to global gig markets. Moreover, the expanding possibilities of automating all forms of services from simple to advanced will make it easier for firms to replace human labour with machines. This will have implications for government revenues, as tax on labour is one of the largest tax bases: on average, about 50 percent of government revenue stems from tax on labour in OECD countries. The implications may be even more significant in countries with high tax rates on human work, and notably, of course, with welfare states. It is not that governments will not be able to collect revenue. Rather, the challenge is that the distortions of high tax on labour may become more significant, which poses risks to productivity growth.

The threat to government revenue and the advent of rising distortions are not immediate. Instead, labour markets are likely to change over many years, but there are already some indications that the relation between machines and humans have shifted. Karabarbounis and Neiman (2014) show that the wage share of national income has fallen in most industrialised countries over the last three decades (see Figure 4). This means that as GDP is expanding, humans are no longer keeping the same share of the pie.

IMF (2017a) calculates that around half of the decline in the wage share of labour can be attributed to technology. Notably, this development has been observed years before smartphones became ubiquitous and

Figure 4  
Wage Share of National Income



Source: Karabarbounis and Neiman (2014).

© ifo Institute

before the so-called frightful five digital behemoths (Amazon, Apple, Facebook, Google and Microsoft) gained dominance in global markets. Since the capacity of software has expanded greatly, it stands to reason that the wage share of labour is set to fall further. This could induce an even more significant shift away from human labour to machines. Evidence from other areas shows that high tax rates can give rise to big shifts. For example, Davis and Henrekson (2005) show that high tax rates can lead to a sizeable substitution between legal and shadow economy, as well as between unpaid household production and market production. The effects from automation could be even larger.

## CONCLUSION

As labour markets are becoming more polarised, inequality increases and income uncertainty becomes more pronounced. What happens to the legitimacy of institutions when a large number of persons get less of the benefits of growth and when the share of labour market outsiders grows?

Welfare states may be more resilient to these changes than other countries. Notably, they have more well-developed and inclusive social safety nets. They are geared towards providing social security and support workers to find new jobs through retraining and education.

But the welfare state also has some weaknesses: the high levels of taxes required to support welfare spending create even stronger incentives for firms to automate work or to buy services on global *gig* markets, thus bypassing the high taxes and collective wage agreements that are the key pillars of Nordic labour markets.

The ultimate impact on the welfare state depends on the policy responses of governments, trade unions and employer organisations. Trade unions that adapt and provide new forms of support and safety to their members could remain relevant to workers and partially offset the increase in income uncertainty. By the same token, governments may try to broaden tax bases to support welfare ambitions, especially for the self-employed.

It is hard to say how likely institutions are to rise to the challenge. One political difficulty is that the changes tend to be gradual; and it may be tempting to postpone reforms rather than address the hard choices early on. Institutional reform may also be hampered by special interest groups and lobbyists that act to protect the *status quo*.

Low inequality is crucial to the welfare state, yet it is set to rise further in the future. Without judicious reform, the welfare state will not be immune from cracks in the social contract. One way or another, the outcome for the welfare states hangs in the balance in the years ahead. Will the welfare state be able to reinvent itself once again?

## REFERENCES

- Acemoglu, D. and D. Autor (2011), "Skills, Tasks and Technologies: Implications for Employment and Earnings", *Handbook of Labor Economics* 4, 1043–1171.
- 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 Paper 189.
- Blix, M. (2017), *Digitalization, Immigration and the Welfare State*, Cheltenham: Edward Elgar.
- Cahuc, P. (2010), *Det svenska anställningsskyddet*, Bilaga 6 till Långtidsutredningen 2011, SOU 2010:93, Swedish Government.
- Comin, D. and M. Mestieri Ferrer (2013), *If Technology Has Arrived Everywhere, Why Has Income Diverged?*, NBER Working Paper 19010.
- Davis, S.J. and M. Henrekson (2005), "Tax Effects on Work Activity, Industry Mix and Shadow Economy Size: Evidence from Rich-Country Comparisons", in: Gómez-Salvador, R., A. Lamo, B. Petrongolo, M. Ward and E. Wasmer (eds.), *Labour Supply and Incentives to Work in Europe*, Cheltenham: Edward Elgar, 44–104.
- Frey, C.B. and M.A. Osborne (2013), *Future Employment: How Susceptible Are Jobs to Computerisation?*, Oxford Martin School Working Paper, [https://www.oxfordmartin.ox.ac.uk/downloads/academic/The\\_Future\\_of\\_Employment.pdf](https://www.oxfordmartin.ox.ac.uk/downloads/academic/The_Future_of_Employment.pdf).
- Karabarbounis, L. and B. Neiman (2014), "The Global Decline of the Labor Share", *Quarterly Journal of Economics* 129, 61–103.
- Goos, M., A. Manning and A. Salomons (2014), "Explaining Job Polarization: Routine-biased Technological Change and Offshoring", *American Economic Review* 104, 2509–2526.
- Gregory, T., A. Salomons and U. Zierahn (2016), *Racing with or against the Machine? Evidence from Europe*, ZEW Discussion Paper 16-053.
- Heyman, F., P.J. Norbäck and L. Persson (2013), *Var skapas jobben? En ESO-rapport om dynamiken i svenskt näringsliv 1990 till 2009*, Rapport till Expertgruppen för studier i offentlig ekonomi, 2013:3, Ministry of Finance, Sweden.
- IMF (2017a), "Understanding the Downward Trend in Labor Income Shares", Chapter 3 in *IMF World Economic Outlook*, April 2017.
- IMF (2017b), "Recent Wage Dynamics in Advanced Economies: Drivers and Implications", Chapter 2 in *IMF World Economic Outlook*, October 2017.
- OECD (2015), *In It Together: Why Less Inequality Benefits All*, Paris.
- OECD (2016), *Society at a Glance 2016: OECD Social Indicators*, <http://dx.doi.org/10.1787/9789264261488-en>.
- OECD (2017a), *Going for Growth*, <http://dx.doi.org/10.1787/growth-2017-en>.
- OECD (2017b), "Collective Bargaining in a World of Changing Work", Chapter 4 in *OECD Employment Outlook 2017*.
- Ostry, J.D., A. Berg, and C.G. Tsangarides (2014), *Redistribution, Inequality and Growth*, IMF Staff Discussion Note, February 2014.
- Sapir, A. (2005), *Globalisation and the Reform of European Social Models*, Bruegel Policy Note, Background Document for Ecofin Informal Meeting in Manchester, 9 September 2005.
- Sundararajan, A. (2017), "The Future of Work", *IMF Finance & Development* 54(2), <http://www.imf.org/external/pubs/ft/fandd/2017/06/sundararajan.htm>.