

## *Chapter 3*

### *Getting to grips with the Productivity-Inclusiveness Nexus*

Why has the great slowdown in productivity growth played out against a backdrop of rising inequality? Are declining productivity growth rates and increasing inequality linked? Are there policies that could address both trends? Building on existing OECD work, this chapter brings a new analytical perspective and the latest empirical evidence to bear in order to elaborate the potential links between rising inequalities and slowing productivity growth. The chapter explores possible feedback loops between productivity and inequality. It examines how inequalities amongst individuals (and regions) in areas like income, access to education and training, health care, quality jobs and new technologies tend to hinder aggregate productivity growth by reducing human capital accumulation, increasing the under-utilisation and misallocation of resources in the economy, and ultimately slowing the diffusion of innovation.

There is no single ‘smoking gun’ cause which explains both the slowdown in productivity growth and the increase in inequality, but they could be linked in several ways. More importantly - from the standpoint of recommendations to policymakers - both challenges derive from the same set of policy fundamentals that create the environment in which individuals, firms, regions, and overall economies interact. This Chapter presents the main ways in which the two challenges may interact, with the objective of setting up for Chapter 4, where we consider how better policy coherence among competition and innovation policies; labour market, education, and skills policies; and financial sector policies can yield better outcomes for both productivity and inequality.

In the current context, low income groups accumulate disadvantages, and there is a negative feedback of policy distortions. Because productivity growth depends on human capital, a policy environment that yields the outcome where some people have few resources and find it difficult to get and keep a good job, to save and invest in their own skills, and to support good quality education for their children, is also one where productivity growth is sub-optimal. By the same token, a policy environment characterised by insufficient competitive pressures allows incumbency dominance in labour, finance, and innovation markets, which can make it harder for other firms to contest markets, attract quality labour, and invest and adapt technologies to create new products and jobs. Lower productivity and greater inequality result from low investment in assets, trapped resources and sluggish reallocation and growth. Aggregating up to the regional perspective, regions can fall into a low-skill, low productivity, low growth equilibrium: firms do not invest there because there is no connectivity and no skilled workers; workers, therefore have weak incentives to invest in their own or their children’s skills, thus setting the whole area into decline.

Rethinking the *coherence* of basic policy foundations is essential. A rethink to the coherence of basic policy foundations – in areas like competition and innovation, labour and skills, and allocation of financing – is needed to turn the tide of slowing productivity and rising inequality which both undermine social cohesion and multidimensional living standards. Along some dimensions, there is strong empirical evidence of links between the coherence of these basic policies, productivity, and inequality, social cohesion and multidimensional living standards. Along others, further research is needed to confirm the available evidence. However, it is already apparent that coherent policy packages can foster opportunities for individuals, firms and regions, allow investments to flow, enable reallocation and enhance economic dynamics which could tackle high and often growing inequalities, but also contribute to stronger aggregate

productivity growth and more sustainable long-term growth. Some of the preliminary findings set out in this chapter include:

- The effect of inequalities on individual’s opportunities (for example, income, education/training health, and access to quality jobs or new technologies) tend to feed on each other and, by reducing labour quality, undermine productivity diffusion, aggregate productivity, and growth – foundations of higher multi-dimensional living standards. The under-utilisation and misallocation of resources in the economy – including workers trapped in low productivity activities and firms that stay too small or are too old to succeed – has contributed to the slow diffusion of innovation, divergent productivity growth rates between frontier and laggard firms, and overall lower aggregate productivity.
- Recent evidence based on micro-data from a few countries (including the United States, Italy, Germany, Portugal and Brazil) suggests that much of the widening of the wage distribution across workers over the past two or three decades can be attributed to increases in the variance of wages between firms rather than within firms (Song et al 2015 and Card et al 2013). Widening wage dispersion may be related to widening dispersion in productivity across firms, although the strength of the relationship is difficult to measure since other factors may also contribute. Future research can help point to the relationship between policy settings and the dynamics around how frontier firms achieve, maintain, and share their rents. If this is related to barriers of entry, or rent seeking behaviour, negating the impact on productivity and inequality is important.
- Further technological progress holds enormous potential for improving people’s well-being, notably by improving access to health, finance and education, but policy settings across a broad range of complementary areas need to be adjusted to ensure that these benefits materialise and that they are broadly shared.
- As outlined in the previous chapters, policy settings—with regard to labour market and skills policies; product market competition and innovation policies; and financial sector regulation and conduct policies – point the way to address the twin challenges of reducing inequality and improving productivity, and are the focus of Chapter 4.

This chapter is organised as follows.

- The first section looks at ***negative feedback loops between productivity and inequality***: the effect of inequalities in individuals’ opportunities (e.g., income, access to education/training, health care, quality jobs or new

technologies) tend to feed on each other. By reducing human capital or lack of access to finance, these undermine productivity diffusion, aggregate productivity, and the growth-foundations of higher multi-dimensional living standards. Similarly for firms, the under-utilisation and misallocation of resources in the economy – including workers trapped in low productivity activities – contributes to the slow diffusion of innovation, divergent productivity growth rates between frontier and laggard firms, and overall lower aggregate productivity. For regions, lack of quality infrastructure or connectivity prevents them from benefiting from higher levels of investment.

- The second section assesses links between *technological change, productivity and inequality*. There are various ways in which productivity-enhancing technological change might increase inequalities in the population; this section reviews the evidence on the different links and considers which of these links can be best addressed by policy. On the other hand, new technologies might act to counter social exclusion through reducing the costs of acquiring skills or gaining access to financial markets.
- The third section considers the relationships between *reallocation and dynamism, and productivity, and inequality*. It highlights what we already know and where we need to do more research on these relationships, including on how policies may inhibit or enhance the ability of workers and firms to adapt to changing circumstances, whether due to globalisation, technological change, migration, or policy reforms themselves. Resource reallocation is fundamental to productivity growth and the ability of an economy to deliver higher multidimensional living standards. But, reallocation can also incur costs to workers, firms, and economies, including inequality. Policies that inhibit adaptation and transformation can lead to people becoming trapped in low productivity firms, low income jobs and lagging regions. The challenges of the political economy of policy making and the capacities of workers to adapt to new circumstances are both important.

### 3.1 How might inequality affect productivity and growth?

This section considers what evidence there is relating inequality and aggregate productivity growth.<sup>19</sup> The main link is via high income inequalities reducing investments in human capital, which in turn lead to

---

<sup>19</sup> This section does *not* discuss whether there are policy reforms (e.g. in tackling health inequalities, or gender gaps) which might simultaneously promote both high productivity and lower inequalities. These issues are discussed in Chapter 4 which demonstrates that there are indeed a number of such policies. Instead the focus here is on the relationships between inequality and productivity growth.

diminished prospects for productivity growth. Hence, in referring to the link between inequality and growth, a strong emphasis is put on the impact of poverty and the inequality of opportunity on growth.

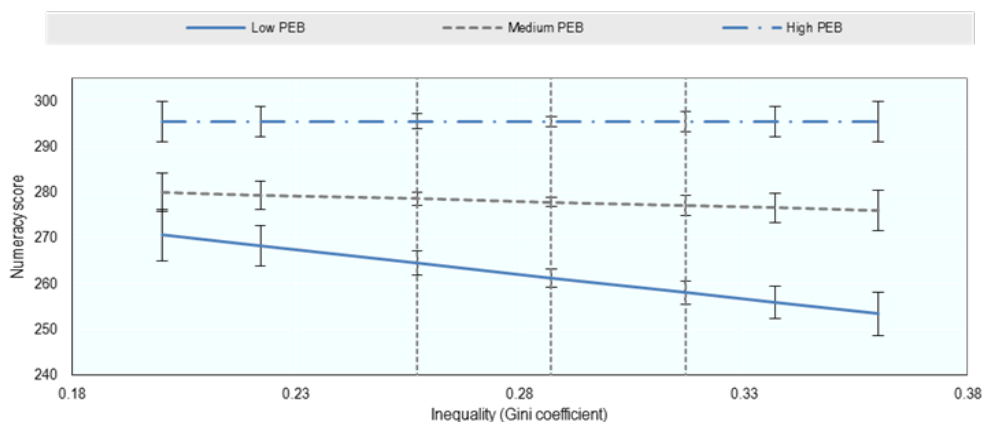
There are many theories about how inequality might affect growth. For example, higher inequality might encourage people to work harder, and - for those with the means - to invest in more education because the rate of return to additional years of schooling is high. Another theory is that poor families may not be able to offer their children the quality education that would give them the same job opportunities and career prospects as children from more privileged backgrounds, thereby harming skill development, and future earnings. Evaluating the policy settings needed to overcome this negative relationship is the object of on-going research, and is clearly complex. In any case, lagging human capital development undermines productivity and prospects for growth.

Recent OECD evidence supports the view that rising income inequality and slow long-term growth go hand-in-hand through their negative impact on employment opportunities and human capital accumulation by low-income families. Research based on data for 31 OECD countries covering the period 1970-2010 finds strong evidence that the long-term rise in inequality of disposable incomes observed in most OECD countries is associated with slower long-term GDP per capita growth, with the key channel being that income inequality limits the opportunities for the poor and lower-middle classes to invest in the education of their children (OECD 2015a). This is particularly likely to be the case when poor families tend to be concentrated in remote regions or neighbourhoods within urban areas that are characterised by limited economic opportunities, poor social services and concentrated poverty.

Intergenerational effects generate persistence in the negative feedback loop. The children of parents with relatively little formal education are less educated and skilled as adults, and this effect is larger in countries where income inequality is more pronounced. (**Figure 3.1**) In other words, it is not just being at the lower end of the income distribution that matters, it is also how the bottom 40%, in terms of income, compare with the well-off in terms of skill levels. Children from poor families in countries with high inequality spend less time in education, but also have lower skills for any given level of education, implying that the quality gap in education is larger than the income gap. At the same time, the relationship between the economic background and educational achievements may differ across countries as it is also conditioned by factors such as the quality of schooling facilities, pre-schooling educational opportunities and how the functioning of the labour market influences the perceived rates of returns on schooling.

**Figure 3.1. Inequality lowers the skills of poor**

Average numeracy score by parent educational background (PEB) and inequality



Note: The graph plots the average predicted numeracy score for individuals from low, medium and high family (educational) backgrounds, as a function of the degree of inequality (Gini points) in the country at the time they were around 14 years old. Low PEB: neither parent has attained upper secondary education; medium PEB: at least one parent has attained secondary and post-secondary, non-tertiary education; high PEB: at least one parent has attained tertiary education. The bars indicate 95% confidence intervals. The vertical dashed lines indicate the 25th, the median and the 75th percentiles of the underlying distribution of inequality.

Source: OECD (2015b)

Effective use of skills is central to productivity and equity. There is ample empirical evidence pointing to the key role that human capital plays for individual earnings and aggregate productivity growth of countries. But beyond the effects on productivity, skills are an important determinant of well-being, with higher levels of skills leading to better jobs, improved health and greater trust in others and institutions. Skills also play an important role in shaping wage inequality across countries. OECD work (OECD 2015b) shows that the distribution of skills within a population affects the extent of wage inequality, with differences in wages tending to be lower in countries where skills are more equally distributed. At the same time, countries that make better use of their workforce's skills tend to exhibit lower wage inequality and higher productivity growth.

Growth and policies that yield more equal employment opportunities improve equity. OECD research finds that policies that enhance employment opportunities of the lower half of the distribution (including both faster growth overall and policy reforms that reduce insider-outsider

labour market outcomes) are important channels to reduce income inequality as well as raise productivity.<sup>20</sup>

### 3.2 Technological change, productivity, and inequality

This section discusses how technological change – which is a key driver of productivity growth – might be linked with changes in inequalities, both across individuals, but also firms and regions. It considers the evidence along four possible channels:

- **Persistent digital divide:** A lack of adequate skills combined with a lack of access to ICT implies that the digital divide among people may persist. For individuals, even as access to digital technologies has increased strongly, skills to effectively use ICT and drive associated wage increases have both lagged. By the same token, the uptake of ICT and KBC by smaller firms has also lagged, thus contributing to lagging diffusion of frontier productivity. Across regions too, those less connected fair worse in terms of equity and growth.
- **Digitalisation and polarisation.** What used to be termed skill-based technical change has evolved into a broader concept of how technology affects the demand for skills. Evidence from a number of countries suggests that the demand for labour is *polarising* at the two extremes – high, abstract skills and low, manual skills with a ‘hollowing out’ of the middle-skilled jobs dominated by intermediate, routine skills. The question is how far and fast this trend could further develop. Ongoing technological changes including developments in artificial intelligence and big data could lead to more dramatic changes than experienced in the past, and in particular, to a further hollowing out of employment and wages. At the same time, these innovations harbour great promise for more robust productivity growth and new jobs that, as yet, have not even been imagined.
- **Rents and winner take all dynamics.** The slowdown in productivity growth, discussed in Chapter 1, may be exacerbated by the nature of technological change and how firms and policies interact. Companies at today’s technological frontier in sectors characterised by network externalities (a type of natural monopoly) could gain a persistent competitive edge with little spill-over of the technological advances to the other firms that come later. Some frontier firms may hence earn more excess returns – rent – that, if not

<sup>20</sup> See Causa, O., A. de Serres and N. Ruiz (2014); Causa, O., S. Araujo, A. Cavaciuti, N. Ruiz and Z. Smidova, (2014); Adalet McGowan, M., and D. Andrews, (2015a); and Adalet McGowan, M., and D. Andrews, (2015b).

competed away over time, can have negative effects on the diffusion of productivity. Apart from increasing capital incomes – themselves a source of inequality – these firms will be able to pay persistently higher wages to their staff, contributing to widening inequalities at the level of individuals. Evidence for these network externality-driven effects is tentative, but new OECD work suggests that it needs to be taken seriously. Further research is needed to evaluate how rents come about (legitimately or supported by policies) and persist, how technology has affected this process, how contestable they are and what prevents laggard firms from increasing their performance, and what policies can best serve to support innovation whilst also ensuring that productivity and wage diffusion take place.

- Financialisation. Technological tools and the expansion of the financial sector have enabled greater financialisation of business and the economy and have altered how firms and individuals behave. At the same time, finance is a core element of how reallocations within an economy proceed, to either enhance or inhibit productivity growth and equity. Poorly performing financial institutions can hold back the reallocation process of exit and entry of new firms, thus reducing productivity growth as well as capturing skilled workers in poorly matched jobs, and hence hindering equity. Individuals that start unequal with respect to income and wealth have greater difficulty accessing credit, thus compounding their situation.

### ***3.2.1 A Persistent Digital Divide***

Even as the internet becomes pervasive, it is clear that differences persist in the uptake by individuals and firms. It is plausible that low proficiency in ICT skills will increasingly limit individuals' access to many basic services, to better-paying and more-rewarding jobs, and to the possibility of participating in further education and training. At the national level, if large proportions of the adult population have low proficiency in information-processing skills, the introduction and adoption of productivity-improving technologies and work organisation may be hampered; and that, in turn, could stall improvements in productivity diffusion and living standards. Further research is needed to identify what holds back uptake (for example, income or age of individuals, size or age of firms, regional location) and what the implications of the digital divide are for productivity and inequality, controlling for the aforementioned additional factors.

- Internet usage continues to vary widely across OECD countries and among social groups (OECD, 2015c). In 2014, over 95% of the adult population were accessing the Internet in Iceland, Norway, Denmark and Luxembourg, but only just over half of the population in Turkey and less in Mexico. From 2006 to 2014, many lagging countries caught up thanks to advances in mobile

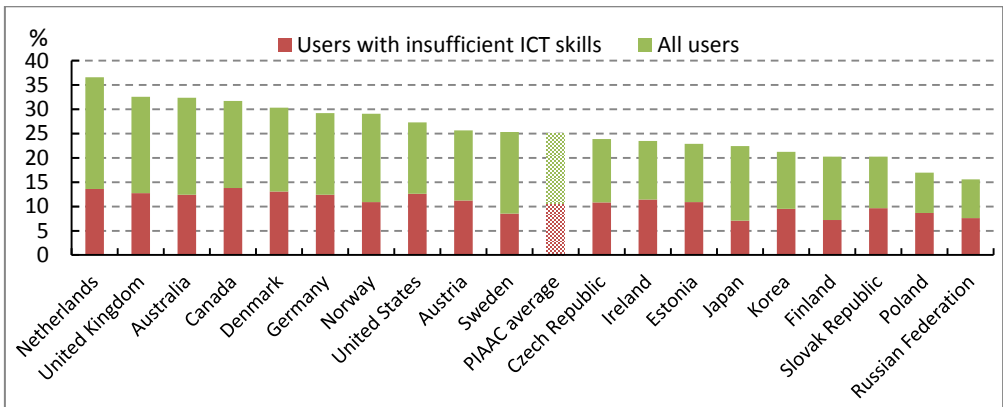


broadband availability and uptake. Developments in mobile technology have also enabled people to conduct daily personal computing and communications activities “on the go”. On average, 70% of individuals in OECD countries connect to the Internet on a daily basis. Differences in Internet uptake are linked primarily to age and education, often intertwined with income levels. Data on Internet access by income quartiles show that the diffusion process has advanced substantially for low-income households (OECD, 2016). In most countries, uptake by young people is nearly universal, but there are wide differences for older generations, especially seniors; with gender differences being relatively small.

- OECD evidence suggests that despite increasing diffusion of ICTs in business, a large proportion of people in OECD countries do not use ICTs at work or do not have adequate ICT skills (OECD 2015d). On average, only 25% of individuals use simple office software, e.g.: word processors and spreadsheets, every day at work. Among them, over 40 per cent do not appear to have sufficient ICTs skills to use these tools effectively, according to the OECD Survey of Adult Skills (PIAAC) (Figure 3.2).
- Among students the digital divide is shifting from inequality in access to inequality in how the internet is used to support skill development. PISA data show that in most countries, differences in computer and Internet access between advantaged and disadvantaged students shrank in all countries between 2009 and 2012. Generally, the amount of time that students spend online does not differ widely across socio-economic groups, but does appear to differ by use with a students’ socio-economic status associated with decisions about what to use ICT for.
- Businesses also are increasingly using the Internet (OECD, 2015c). In 2014, 95% of enterprises in OECD had a broadband connection, although with considerable variation among small enterprises. Remaining cross-country differences in the use of ICT are closely related to the role of smaller firms across countries. As already stressed in Chapter 1, the uptake of ICT and KBC remains low among small firms even for technologies that seem particularly relevant for SMEs, such as cloud computing.

**Figure 3.2. Workers using office software at work every day, 2012**

As a percentage of all workers



Source: OECD (2015d) Measuring the Demand and the Supply of ICT Skills at Work, [DSTI/ICCP/UIS\(2015\)4](#).

### 3.2.2 Digitalisation and polarisation.

OECD findings suggest that so far, while leading to restructuring and reallocation, ICT has not led to greater unemployment over time. If adopted successfully, i.e. if combined with organisational changes and good managerial practices (Brynjolfsson and Hitt, 2000; OECD, 2004), ICTs can contribute to increased productivity, which progressively translates into lower prices and/or new products, higher final demand and higher employment, thus compensating for the initial job displacement. There is indeed evidence that ICT has thus far not produced an increase in technological unemployment (OECD, 2015e).

Skill-biased technological change, a manifestation of productivity enhancing technological change, has been a main driver of inequality over recent decades. Most new technologies have required higher levels of skill to use than those they displace. This has been a long-standing trend, going back a century or more. In 2011, the OECD published a major review of the previous studies of the causes of the rise in income inequality and presented new analysis covering OECD and emerging economies (OECD, 2011). It found that, the faster the rate of technological change, the wider the increase in wage dispersion is, and that the greater the increase in the supply of skilled labour is, the slower the increase in wage dispersion is. Further work is needed to round-out the productivity side of the story, since, as we have seen in Chapter 1, technological change does not inevitably increase productivity growth.

However, the skill-biased technological change theory cannot explain all aspects of the rise in inequalities. The SBTC hypothesis is successful in explaining the rise in the employment share of workers in high-skill jobs over the past three decades. For example, in the United States, the employment share of workers in high-skill occupations increased by 11 percentage points from 26% in 1983 to 37% in 2012 (Tuzemen and Wills, 2013). However, a simple version of the SBTC hypothesis suggests that the share of low-skill jobs should have fallen. Instead, the employment share of low-skill occupations rose from 15% in 1983 to 18% in 2012 in the United States. This pattern of an increasing share of low-skilled jobs has been mirrored in other countries. Such trends do not necessarily disprove the SBTC hypothesis – it is possible that some jobs require a higher level of skills than in the past (car mechanics now often need to have ICT skills, for example). Nevertheless, attention has turned to another possible link between technological change, productivity and inequality – the ‘hollowing-out’ or job-polarisation hypothesis.

Developments in artificial intelligence, unprecedented computer power, the Internet-of-Things and Big Data, among other technological advancements may change the nature of the link between technology and inequality. Some studies suggest that digitalisation makes it possible that, in the near future, a large proportion of tasks or even entire occupations currently carried out by workers could be performed by machines (Frey and Osborne, 2013; Elliot, 2014) enhancing the fear that computers and robots will replace some types of human labour, throwing workers into a “race against the machine” that many are bound to lose (Brynjolfsson and McAfee, 2011). Key research questions are whether digitalisation increases the pace or nature of hollowing-out, with implications for inequality, and to what extent digitalisation might also be manifest in a widening of the diffusion gap between innovation leaders and other firms in the economy.

Those jobs relying on a high proportion of automatable tasks are at high risk of being substituted for by new technology, but only if these technologies are taken up by firms, or firms that do not use the technologies exit. Computers and algorithms mainly substitute for easily codifiable “routine” tasks, which are typically carried out in middle-skilled jobs. “Non-routine” tasks, either at the top end (conceptual jobs) or at the bottom end (manual jobs) of the skill distribution will remain in demand. This could imply that “employment polarisation will not continue indefinitely as there are many tasks that people understand tacitly and accomplish effortlessly, but for which neither computer programmers nor anyone else can enunciate the explicit “rules” or procedures” (Autor, 2015). To the extent that firms overall or within certain regions do not take up the innovations and yet remain in business, then the implications for job change would be less

severe, but the gains to overall productivity would also be limited. Such an outcome would not best enhance the overall capacity of the economy to deliver higher living standards.

The extent and permanence of hollowing-out remains controversial. Some authors (e.g. Frey and Osborne, 2013) suggest that a large share of occupations is at risk of being automated. However, such estimates have been criticised on the basis that rather than occupations it is specific tasks that are at risk of automation, whilst occupations are more likely to evolve – as many have for the past century – to accommodate the penetration of technology rather than face complete substitution (Bessen, 2015). Workers with the skills to adapt to changes in the workplace are less at risk of being left behind. Also, with the productivity gains and the adoption of technology, new direct and complementary jobs are likely to be created (Autor, 2015; Moretti, 2010; Goos, Konings and Vandemeyer, 2015). Overall, however, these studies find evidence that the share of middle wage jobs, characterised by routine tasks, has declined and the wage share of the middle-skilled has also contracted, which has contributed to increased inequality. Evidence of – temporary – job polarisation is also supported by OECD findings (OECD, 2015f) which suggest that in periods where labour demand decreases due to ICTs, the decrease is stronger for medium skilled workers than for their high and low skilled counterparts.

Workers will need different skills, not just more skills. Regardless of the precise number of jobs at risk of automation, continued hollowing-out will disrupt the labour market, yielding further inequalities, unless policy adapts. Up-skilling will be part of the answer – the same policy priority as required to respond to skill-biased technological change. But workers will also need a different sort of skill-set. Data from the Survey of Adult Skills show that, on average across the 22 countries that implemented the Survey, 55% of workers lack basic problem-solving skills in technology-rich environments suggesting weak prospects for these workers, but also for employers' and countries' ability to capitalise on the opportunities offered by a digital economy (OECD, 2013a).

Digitalisation is also changing the way work is organised. The 'platform economy' (referring broadly to the 'gig', 'sharing', and 'on-demand' economies), though still small in scale, is allowing businesses to have access to a larger pool of potential workers and suppliers, with workers increasingly engaged as independent contract workers. This has benefits for some workers, providing them with greater flexibility, and allowing people to earn additional income and access work, sometimes for the first time. At the same time, these jobs rely mostly on non-standard work arrangements (e.g. self-employment and contract work). Even though the platform "sharing" economy is creating job opportunities for people who may have

no access to regular jobs, it may also offer less promising employment trajectories and lower access to social protection or training opportunities. It could also limit worker’s access to union representation and wage setting mechanisms. Research on the Future of Work should evaluate how the nature of contract work intersects with employment and wage trajectories as well as institutions and social protection for workers.

### ***3.2.3 Rents and Winner-take-all dynamics***

Is innovation in the digital world different? Metcalf’s law says that the value of the innovation rises with the square of the users. These network externalities imply that innovations associated with digital platforms, applications, and data are the new version of natural monopolies where one firm can become dominant, and that is the efficient outcome, at least at a point in time. What might be the implication of these new winner-take-all dynamics for productivity and inequality? At this point, there are observations on the phenomenon, but further research is needed to link these observations to productivity and inequality, and to evaluate policy implications.

As highlighted in Chapter 1, there is a big productivity differential between global leaders and other firms. Comprehensive research is still ongoing to assess the impact of slow diffusion and rent outcomes on inequality, and - as detailed below - there are several preliminary indications that there may be some effect.

An increase in wage dispersion. Is this due to winner-take-all outcomes whereby dominant firms capture innovation rents and the diffusion of ideas to other firms lags behind, or are there other reasons for lagging diffusion (as discussed in detail in Chapter 1)? Micro data-based evidence suggests that much of the increase in wage inequality between individuals can be attributed to increases in the variance of wages between firms rather than inside them. While most of this evidence concerns the United States,<sup>21</sup> similar results seem to hold across a number of OECD and emerging economies.<sup>22</sup> Two potentially coexisting explanations are provided for this phenomenon: i) the large increase in the “sorting” of workers across firms, such that the most productive workers increasingly work together and for

---

<sup>21</sup> See Dunne et al. (2004), Barth et al (2014), and Song et al. (2015).

<sup>22</sup> See for instance the United Kingdom for the period 1984–2001 (Faggio, et al, 2007); Germany over the 1985–2009 period (Card et al, 2013); Brazil over 1986–1995 (Helpman et al, 2015) and Sweden over 1986–2008, (Håkanson et al 2015). For new evidence and a more detailed literature review see Berlingieri, Blanchenay and Criscuolo (2016).

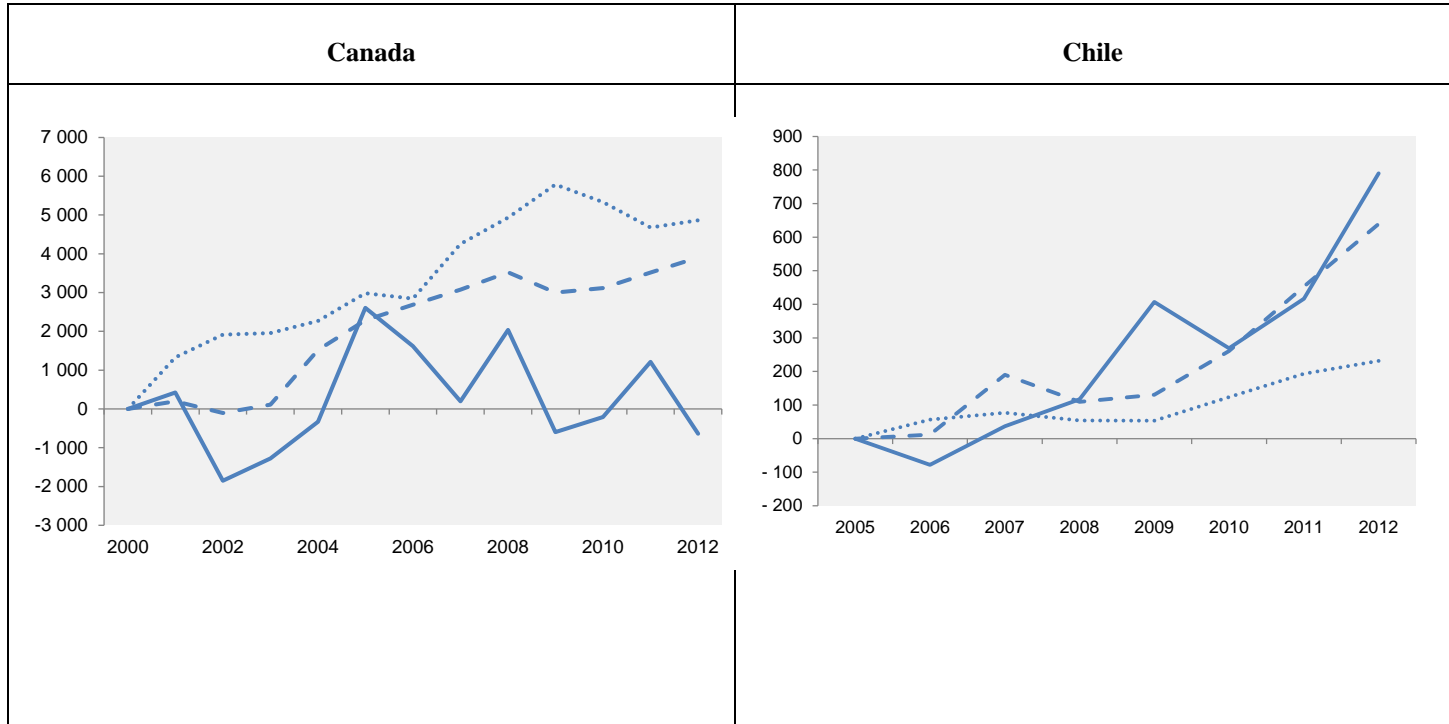
the most productive firms; and ii) rent sharing, when the most productive firms earn rents that they share with their workers. If the most innovative and productive firms also share their gains with their workers, then presumably this is a positive outcome, so long as markets remain contestable, and innovations diffuse. Comprehensive research is ongoing to assess the foundations of productivity and wage disparity, and how both are related to fundamental policies.

Preliminary OECD analysis suggests that productivity dispersion and wage dispersion at the firm level go hand-in-hand. Preliminary evidence for eleven OECD countries suggests that dispersion in wages and productivity has increased over the last 20 years across most countries (**Figure 3.3**). The evidence suggests that wage inequality between firms with different productivity performance has increased. There are, nonetheless, some important cross-country and cross-sectoral differences in the magnitude of the gap between wages in the most productive firms and wages in the worst performing firms. For instance, between 2005 and 2012, real average wages in Chile's service sector increased by little more than USD 1 200 for firms with the highest labour productivity (top 10%), while they only increased by just above USD 120 for the bottom 10%, a tenfold difference. In Chile's manufacturing over the same period the difference in wage growth between the top and bottom performing firms was only threefold: for firms with the highest labour productivity, real average wages increased by almost USD 630, while they only increased by USD 175 in the bottom 10%. Further work is underway to assess more precisely the drivers of wage dispersion and whether it results from an increase in dispersion within industries or from reallocation of labour to industries with higher dispersion.

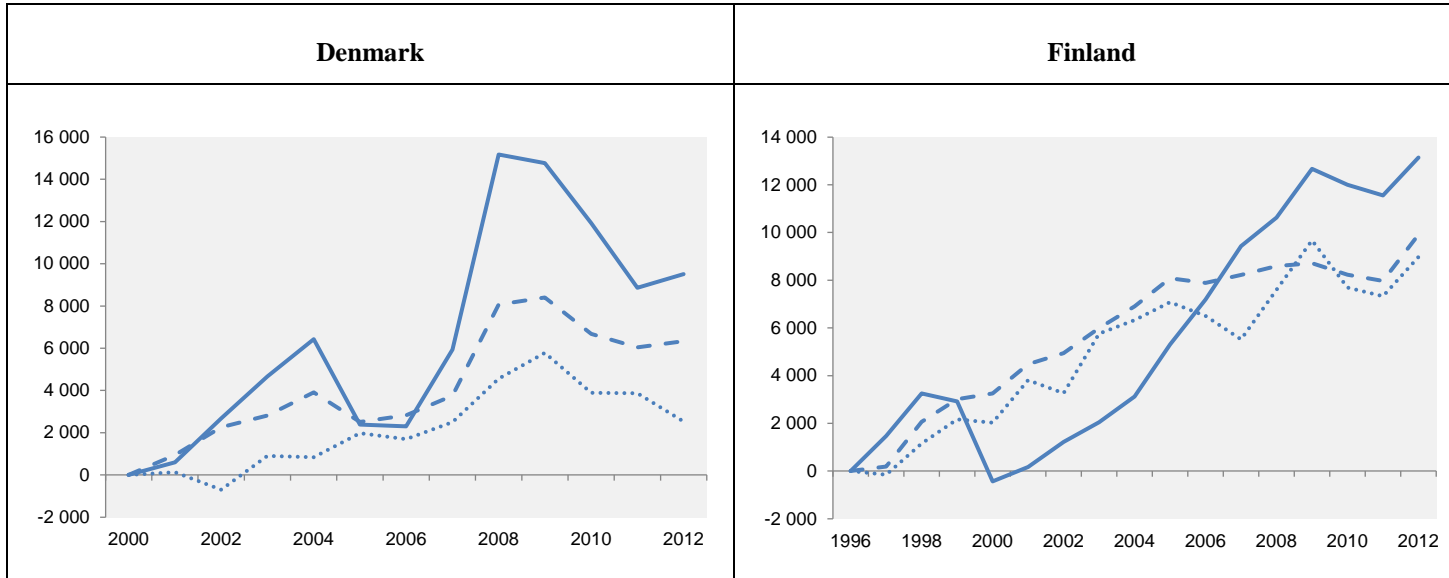
**Figure 3.3. Change in real wages in different parts of the productivity distribution of firms**

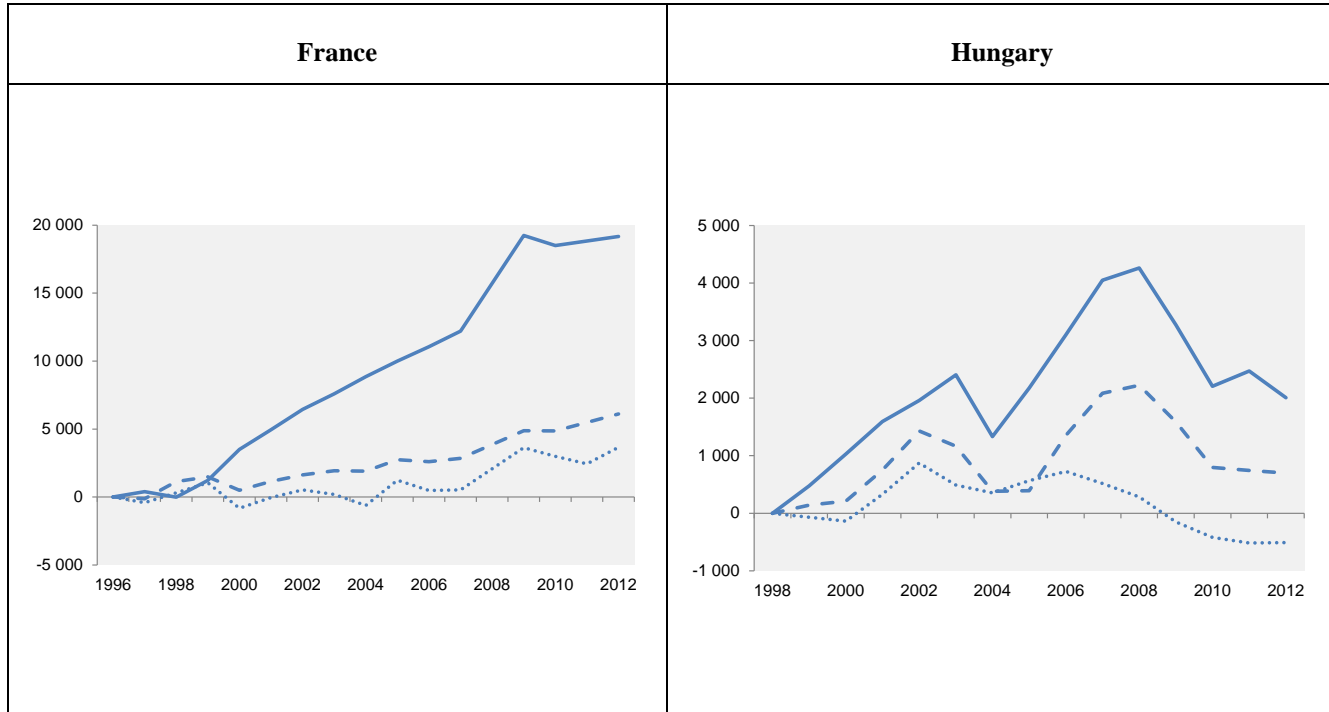
**A. Manufacturing**

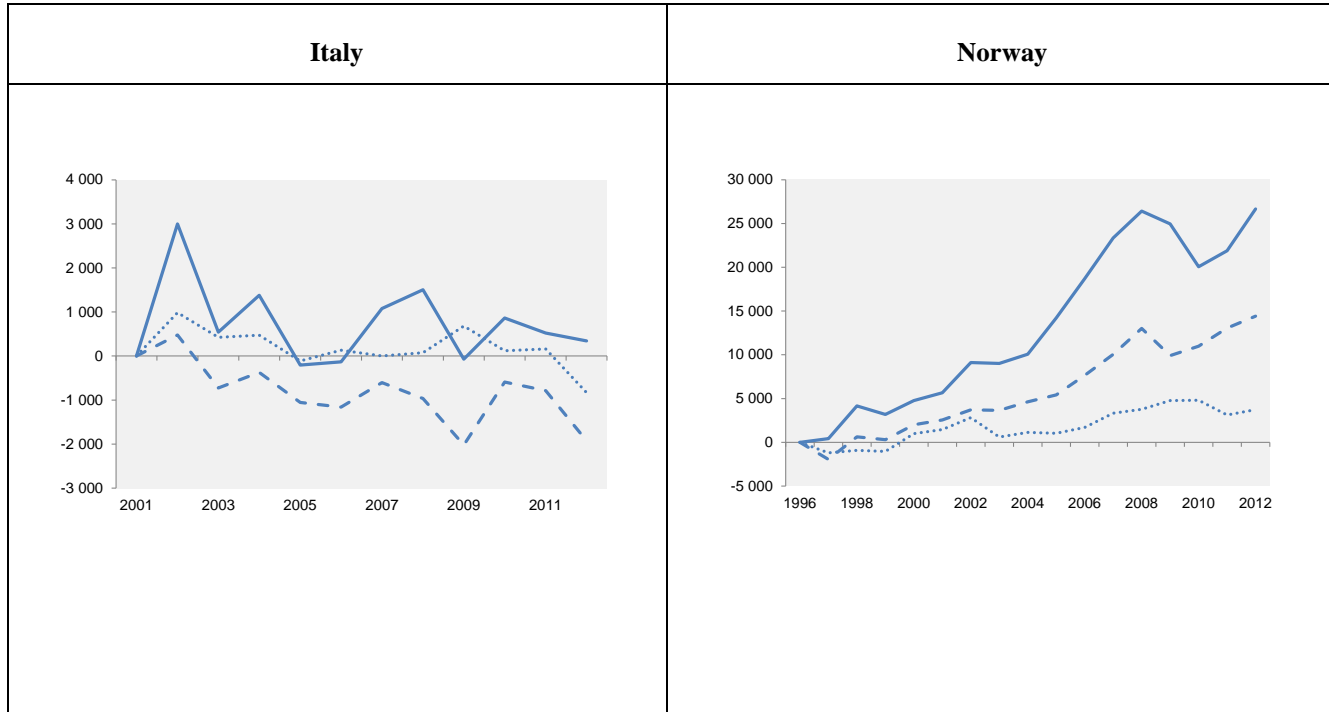


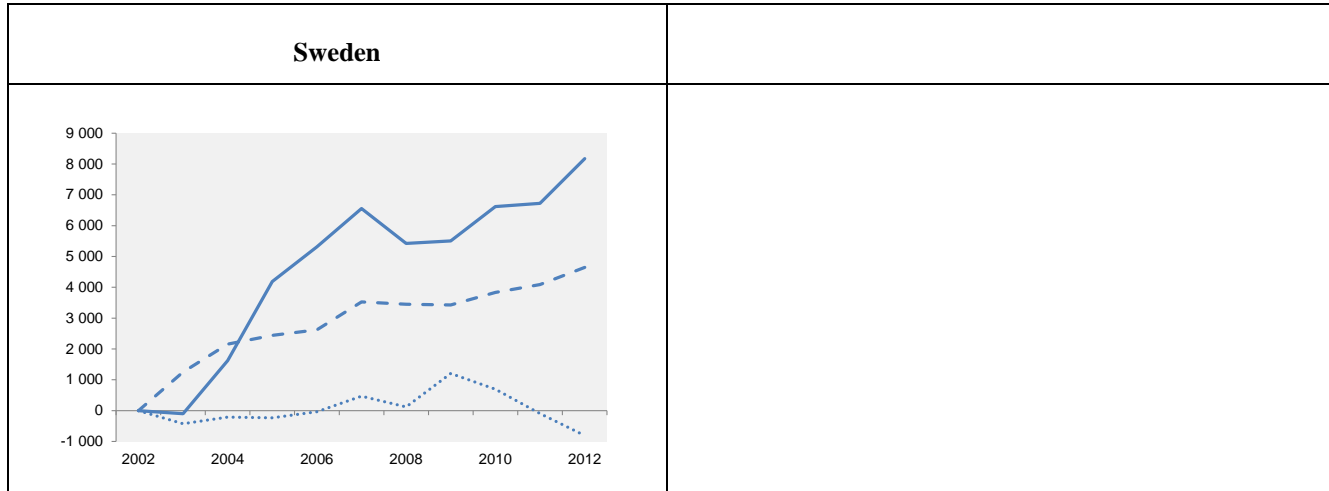










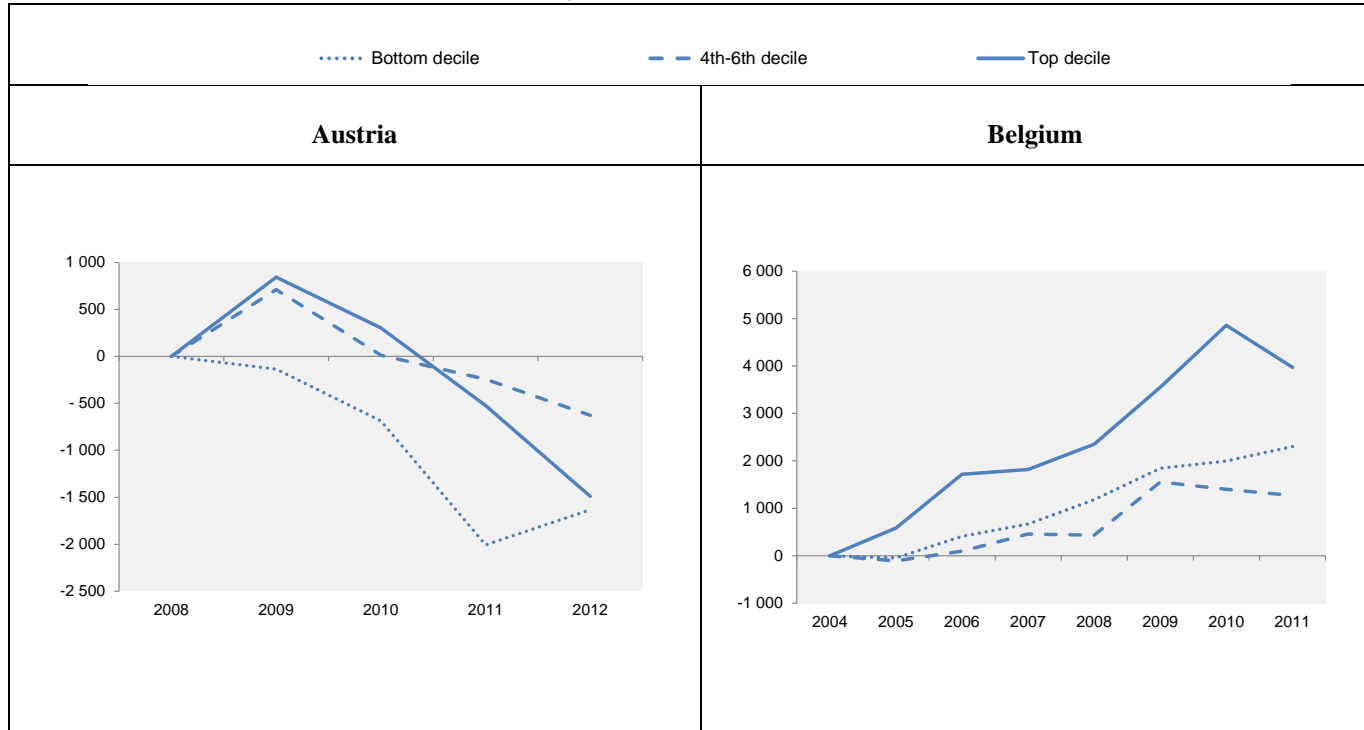


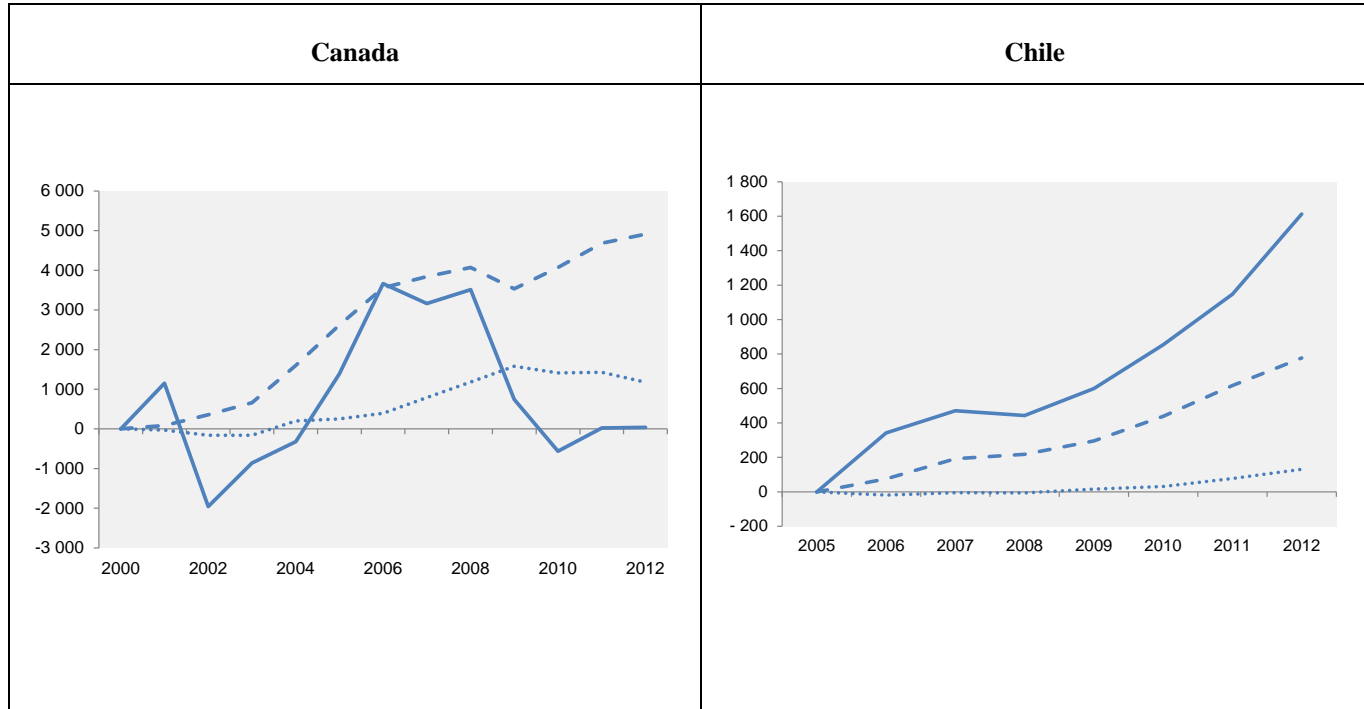
Notes: Each line represents the unweighted average of real wages across firms in a given part (bottom decile, 4<sup>th</sup> to 6<sup>th</sup> deciles, and top decile) of the productivity distribution in each year. Thus, “Top decile” represents the evolution of the average wage among the 10% most productive firms of a given year. Within each part of the distribution, wage levels are normalised at 0 in the first available year: in 1996 for Finland, France, and Norway, 1998 for Hungary, 2000 for Canada and Denmark, 2001 for Italy, 2002 for Sweden, 2004 for Belgium, 2005 for Chile and 2008 for Austria. Wages are expressed in 2005 US dollars.

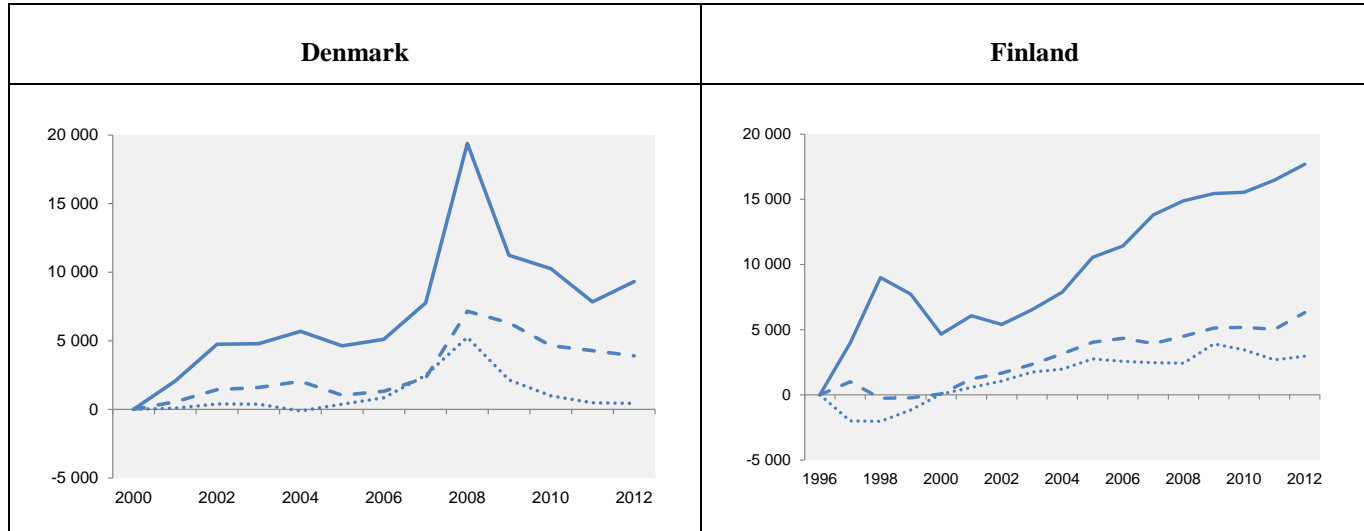
Source: Data from the OECD Multiprod project, preliminary results, April 2016. See <http://www.oecd.org/sti/ind/multiprod.htm> and Berlingieri, Blanchenay and Criscuolo (2016) for more details.

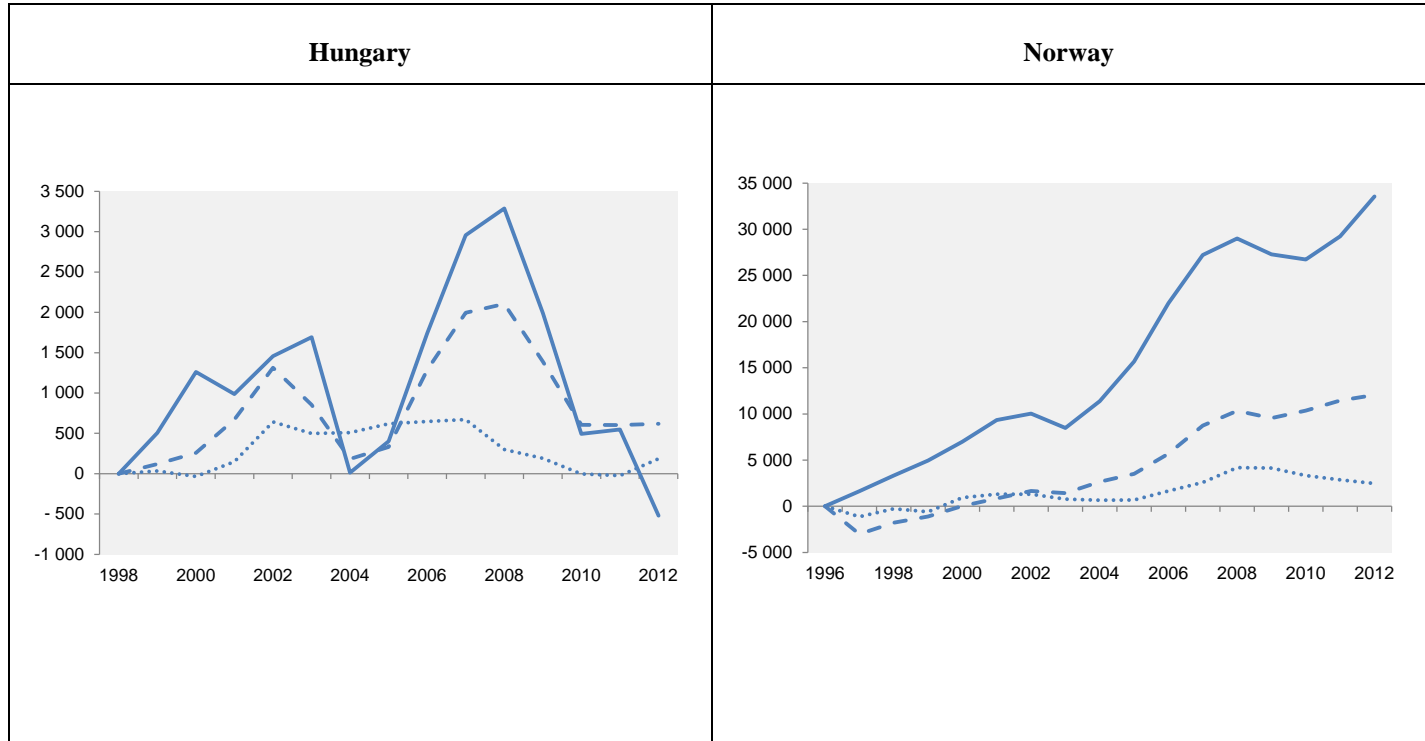
Disclaimer: estimates are based on micro-aggregated data and they might differ from official national statistics.

B) Non-financial Services

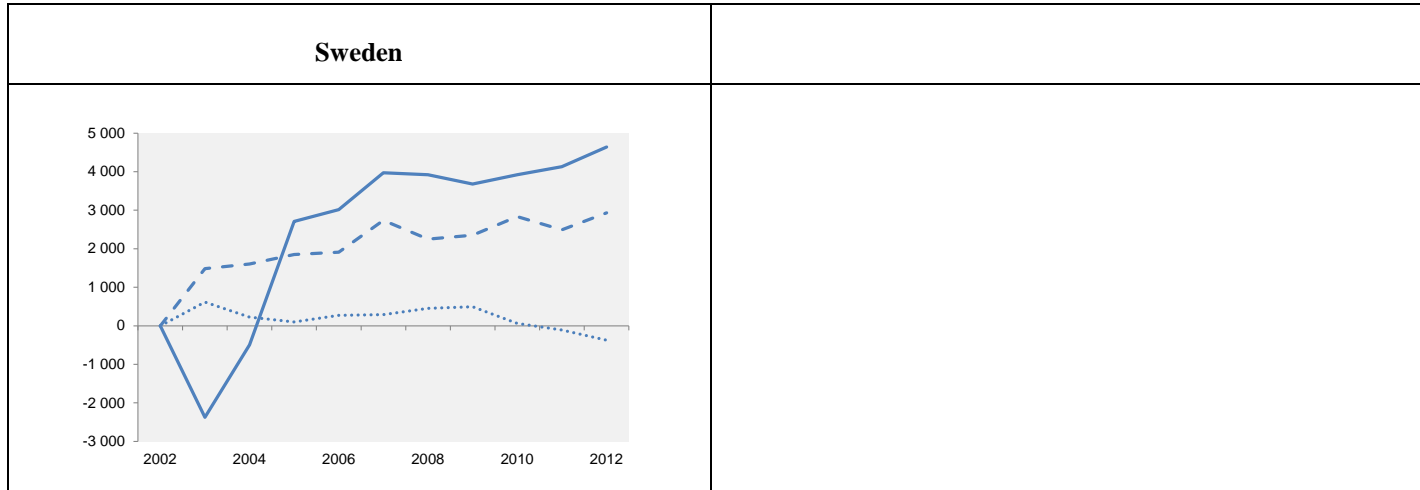












Notes: Each line represents the unweighted average of real wages across firms in a given part (bottom decile, 4<sup>th</sup> to 6<sup>th</sup> deciles, and top decile) of the productivity distribution in each year. Thus, “Top decile” represents the evolution of the average wage among the 10% most productive firms of a given year. Within each part of the distribution, wage levels are normalised at 0 in the first available year: in 1996 for Finland, and Norway, 1998 for Hungary, 2000 for Canada and Denmark, 2002 for Sweden, 2004 for Belgium, 2005 for Chile and 2008 for Austria. Wages are expressed in 2005 US dollars.

Source: Data from the OECD Multiprod project, preliminary results, April 2016. See <http://www.oecd.org/sti/ind/multiprod.htm> and Berlingieri, Blanchenay and Criscuolo (2016) for more details.

Disclaimer: estimates are based on micro-aggregated data and they might differ from official national statistics.

The dispersion of wages and the dispersion of productivity both depend on product and labour market institutions. The link between firm-level productivity and wages is expected to be weaker where the effective length, breadth and regional coverage of collective bargaining agreements are very extensive, where intermediate wage bargaining systems are combined with large coverage extension, or where workers are better protected during adverse market conditions. Cross-country differences in these different dimensions could help explain why wage polarisation was more acute in the US than in continental Europe. Research using data from the OECD's *MultiProd* project will provide new insights on how a country's specific policies and framework conditions shape the form of the wage distribution, the way it evolves over time and its relationship with the productivity distribution.<sup>23</sup>

The degree of market power of firms will also affect their ability to maintain rents, which may or may not be distributed to workers. As argued in Chapter 1, policies that reduce competition and protect incumbent firms against competitors weigh on productivity growth and may lead to excessive rent capture by firms and their workers. These policies include competition policies and product market regulation, but also innovation policies and industrial policies. More analytical work is needed to understand the policy settings that favour the development of excessive rents in specific markets and that may, in turn, lower productivity and contribute to higher wage inequality. On the other hand, if innovation leaders generate high productivity, rents and higher wages, then policies to drag down such leaders are not the objective; rather, ensuring a level playing field and the policies to promote diffusion of their knowledge and tools is. It is therefore particularly important to consider the source of the leadership and rents, and whether it is innate superiority or enabled by policies

Research is also underway, but could stand to be deepened, to better understand why average wage gains have tended to lag behind productivity, leading to a decline in the labour share of total income.<sup>24</sup> Evidence suggests that much of the decline in the labour share in many OECD countries over the past decades is explained by factors driving total factor productivity and capital deepening. Not only has ICT created opportunities for unprecedented advances in innovation and invention of new capital and services, but also for fragmentation and globalisation of the production process through global value chains. This rise of GVCs has had an impact on productivity and on the labour share and worker bargaining power (OECD 2015b). In advanced economies, at least 10% of the decline of the labour share is accounted for by increasing globalisation – and in particular by the pressures from the delocalisation of some parts of the production chain as well as from import

---

<sup>23</sup> See <http://www.oecd.org/sti/ind/multiproduct.htm> for further details on the project.

<sup>24</sup> Even as the share of total income going to the top earners has increased.

competition from firms producing in countries with low labour costs at the lower end of the global value chain.

### ***3.2.4 Financialisation.***

Technological tools have enabled greater financialisation of business and the economy and have altered how firms and individuals behave. Finance is a core determinant of how reallocation proceeds within an economy, thereby playing an important role in either enhancing or inhibiting productivity growth and equity. Poorly performing financial institutions can hold back the reallocation process of the exit and entry of new firms, thus reducing productivity growth as well as capturing skilled workers in poorly matched jobs, and hence hindering equity. Individuals that start unequal with respect to income and wealth have greater difficulty accessing credit, thus compounding their situation.

There is some evidence that the financialisation of the economy has exacerbated inequalities and hit the productive potential of smaller firms and low-income groups. The financial sector plays a central role for inclusive growth by enabling access to finance for firms and individuals. Over the past fifty years, credit from banks and other intermediaries to households and businesses has grown three times as fast as economic activity. However, in many OECD economies, this expansion has reached a stage where it has started to contribute to the slowdown in productivity growth (Cournède et al., 2015). Financialisation has also exacerbated inequalities, as people with higher incomes have benefitted more than their poorer counterparts from credit-financed investment opportunities, especially in European countries (Denk and Cazeneuve-Lacrouz, 2015), leaving lower-income groups with less opportunities to invest in housing, education and other assets. In the United States, by contrast, the financial sector prior to the crisis extended large amounts of poorly checked debt to low-income borrowers, especially in the form of mortgages. Lacklustre income growth among low-income groups in the United States may have explained their appetite for borrowing, suggesting a possible link from rising inequality to the financial crisis (Rajan, 2010). Moreover, through their access to financial leverage, large firms, especially in the financial sector itself, have also been a key beneficiary of the expansion of finance.

The expansion of the financial sector has also contributed to widening wage dispersion, while potentially slowing aggregate productivity. The expanding financial sector has drawn highly talented workers away from sectors with greater productive potential. OECD work has found evidence that the financial sector generally pays its employees more than what workers with similar profiles get elsewhere, and that this higher pay cannot be fully explained by higher productivity (Cournède et al 2015, Denk 2015).

In countries where the financial sector has become particularly large, this has possibly affected aggregate productivity, or at least overall growth, as well as contributed to widening income inequality by offering relatively higher wages compared to other sectors. The support to the sector through the too-big-to-fail policy response at the height of the crisis may have played a role.

### **3.3 Adaptability and dynamism: implications for productivity and inequality.**

The restructuring of firms and reallocation of resources is fundamental to productivity growth. However, the pace of technological change and its associated demand for restructuring and reallocation of firms and workers may be faster than the pace of adaptability of individuals, firms, and regions. A period of intensive job destruction could lead to a temporary rise in unemployment, with displaced workers encountering difficulties in finding appropriate new employment, as newly created jobs may require different skills. Some specific types of adaptability and dynamism warrant a closer look and further research into their relationship with both equity and productivity, and it is important to take a careful look at how policies either promote or inhibit restructuring of firms, adaptability of workers, and overall reallocation of resources.

#### ***3.3.1 Productivity growth and skill mismatches***

Potentially highly productive workers can get trapped in low-productivity activities within the economy rather than moving to sectors and firms (and possibly, regions) that are more productive and pay higher wages. Recent OECD work has pointed to resource misallocation in many OECD economies, including a high level of skills mismatch. It has also identified a number of policies and factors that can hamper the efficiency of resource allocation (OECD, 2015g). If the allocation of resources across firms and sectors is weak and inefficient, and in particular hampered by a combination of product competition, labour market and housing policies, it will perpetuate or durably increase income inequality and unemployment or under-employment. On the other hand, better skill use by employers can also improve productivity performance by reducing mismatch between workers' skills and job requirements.

The continuous reallocation of jobs from low to high productivity firms and industries is a key factor for productivity growth, but the associated worker displacement may have short-term costs for the individual concerned and local communities. The innovations in technology and business organisation that power productivity gains create structural adjustment

pressures in labour markets. Innovative firms expand at the expense of less productive firms, which in turn shed workers. This type of labour reallocation is vital for productivity growth. OECD work (OECD, 2013b) shows that 2-7% of workers with a year or more's job tenure are displaced annually in OECD countries. Research shows that such job churn is associated with higher levels of worker income and satisfaction (controlling for the overall unemployment rate) (Hijzen and Menyhert, 2016). On the other hand, workers who are less mobile or less able to adapt to new job requirements could face insecurity, earnings volatility and unemployment, weakening the potential benefits of reallocation. Ensuring that workers are re-allocated to firms and activities where they are best able to exploit their skills is a major challenge and requires skills and labour market policies that facilitate this transition (see Chapter 4).

Skills mismatch in OECD countries represents a drag on the growth potential of the economy. When reallocation of workers across firms and sectors is inefficient, skills mismatch is likely to ensue. Skills mismatch, which predominantly takes the form of over-skilling, affects one in five workers in the United States and as many as one in three in Italy (Adalet McGowan and Andrews, 2015b). Mismatches between the educational requirements of jobs and educational qualifications are also common. Both forms of mismatch result in lower productivity than could be achieved if workers were all employed in jobs that matched their skills. Simulated gains to moving all countries to the highest level of skill matching observed in the OECD would result in considerable gains in aggregate productivity, for example, a 3% gain in the United States and a 10% gain in Italy. If the full productivity dividend of innovative technologies is to be realised, it is important to ensure that the labour market is able to efficiently match workers with suitable jobs.

High levels of skills mismatch also contribute to wage inequality. Better adapting skill utilisation to the competences of workers could also reduce the insecurity and earnings volatility that innovation can imply for workers and their families. It could potentially reduce wage inequality by lifting wages in the bottom part of the distribution. In many countries there are more jobs requiring low use of skills than there are workers with low skills. For example, wage inequality in the Netherlands could be 8% lower if skills used in the countries better reflected the skills of the workforce. In other words, a 10% decline in the dispersion of skills use in the Netherlands would reduce wage inequality by 1.1% (OECD, 2015b).

### ***3.3.2 The challenge of dual labour markets and mass layoffs***

Income inequalities become ever more deeply entrenched in a dual labour market. Some OECD labour markets are particularly characterised by

a divide between workers who are in the core labour market (the “insiders”) and those at the margin (“the outsiders”). Workers in precarious jobs tend to receive less training than those who are in well-protected regular contracts, despite the fact that those with temporary contracts are more likely to be low-skilled. In EMEs with large informal markets the divide is even deeper. Overall, part of the economy has only a limited capability to increase productivity, upscale and raise wages, and is increasingly falling behind.

Incomplete reforms of employment protection legislation can contribute to labour market duality, and skill mismatches. Employment protection legislation (EPL), and especially that which affects permanent contracts, plays an important role in shaping the magnitude and efficiency of the reallocation process. Inappropriately designed EPL can have a large impact on aggregate productivity and competitiveness (OECD, 2010), resulting in workers being stuck in jobs for which they are not a good match (and thus are likely to be less productive).<sup>25</sup> The issue is not a simple matter of whether EPL is too rigid or too lax. Several OECD countries have (or, given recent reforms, had) fairly flexible regulations on temporary and other atypical labour contracts, combined with strict regulations for permanent contracts. This leads to a very high turnover among workers on temporary and other atypical contracts – often with precarious employment being interspersed with unemployment and little if any career progression and acquisition of skills – and little reallocation of labour from protected, permanent jobs towards more productive sectors and firms. Those that suffer most from such a ‘dual’ labour market are the youth and the low skilled, in particular, who get trapped in temporary and precarious employment. This high but concentrated-at-the-margin churning is not conducive to a better reallocation of labour to more productive uses and, at the same time, contributes to inequality in the labour market and skill mismatch.

A number of OECD countries have, over the past five years, undertaken reforms of their employment protection legislation with the aim to reduce the gap in protection across different types of contracts and promote the creation of permanent jobs (OECD, 2015b). While the evidence on the impact of these reforms is still being collected, it is important to combine these reforms with efforts to strengthen the design of social safety nets, job search assistance and active labour market policies, investment in education

---

<sup>25</sup>

Forms of labour compensation that are tied to a specific employer, such as health insurance or pensions, can also create a barrier to labour mobility. In such cases, policies may be able to foster increased portability. For example, the 2008 Affordable Care Act in the United States facilitated efficiency-enhancing mobility by reducing the risk that changing jobs results in a partial or total loss of health insurance.

and training opportunities and portable health and pension benefits. These types of measures support displaced workers and insure workers against labour market risk more generally. The re-employment of older and long-tenure displaced workers also proceeds more smoothly if they received tailored assistance (**Box 3.1**). Research shows that money allocated to such tailored ALMP for workers displaced through mass layoffs is twice more effective at shifting such workers to new jobs than AMLP financed for workers who lost their job due to other involuntary reasons (Andrews and Saia, 2016).

### **Box 3.1. Rapid response measures for mass layoffs**

Older displaced workers who have accumulated many years of experience on their jobs require special help if they are to find suitable new jobs quickly. Along with the shock of losing a stable job, long-tenure displaced workers have not searched for a job in many years and often have little idea how to do so effectively. This group also has difficulty assessing the skills they have acquired on-the-job and how well these skills match job requirements in growing parts of the economy. Another particularity of long-tenure displaced workers is that many receive considerable advance notice that they will be displaced, yet fail to make an early start in preparing for a career change in the absence of timely assistance to do so.

A number of OECD countries offer specialised re-employment services to workers affected by mass layoffs and these “rapid response” measures appear to be highly cost-effective. One of the keys to effectiveness is to begin assisting workers to navigate the adjustment process as soon as they are notified of a pending layoff, rather than waiting until they become unemployed. Often, the public employment service establishes a temporary office at the work site where workers receive both individual and group assistance. These services range from basic counselling (e.g. about how to apply for unemployment benefits, labour market opportunities and vocational training options), to more intensive and individualised services, such as “skills audits” documenting workers’ competences possibly combined with a training plan to fill any gaps in their skillset so as to qualify them for job openings in growing occupations. Job fairs may also be organised to put displaced workers in direct contact with employers who are recruiting workers.

In Sweden, employer and union federations have set up Job Security Councils in a number of sectors which organise rapid response measures without any public involvement. Elsewhere, the government plays a more active role, but employer cooperation remains a key to success. Indeed, public rapid response measures presuppose that employers provide workers and public authorities with sufficient advance notification of pending layoffs and allow the public employment service access to the affected workers in advance of their becoming unemployed. Employers can also collaborate with public re-employment support by helping to document the skills these workers have acquired on the job. In Japan, most large employers voluntarily supply outplacement assistance when they displace permanent workers. Recently, the public employment service has made progress in better coordinating public re-employment assistance with these private measures, as in the case of a large layoff at the Sharp Corporation at the end

of 2012. The public employment service in Quebec province in Canada has extended rapid response services to workers affected by individual and small-scale displacements.

Sources: This note is based on information contained in OECD (2015h), OECD (2015i), and OECD (2015j).

Policy packages affect both productivity and inequality outcomes. Recent OECD research shows that the combination of changes in product and labour market policies can yield very different outcomes for workers and for productivity. Increased flexibility in labour markets without a complementary increase in product market competition does not enhance investment or productivity, but hurts workers. Similarly, product market competition without complementary labour flexibility fails reallocation, yielding the same bad outcomes (Egert, 2016).

### **3.4 Promoting social inclusion and economic growth through new technologies**

The digital economy has huge potential to enhance productivity, incomes and social well-being. A large part of the discussion of new technology, productivity and inequality focuses on the labour market – will people have the right skills? If they do not, will they be left behind? But new technologies can also affect inequality and productivity directly. Inequality, by definition, means that people do not have the same access to scarce resources, and that some do not have any access. New technologies in some cases can eliminate that scarcity. For example, new technologies can leverage human brain capacities and cognitive skills in similar ways to earlier breakthrough technologies, such as steam power and electricity, that magnified human physical strength. This holds the promise of similar or even greater increases in living standards, considering that digitised information can be reproduced at low cost and used simultaneously thus being far less subject to scarcity.

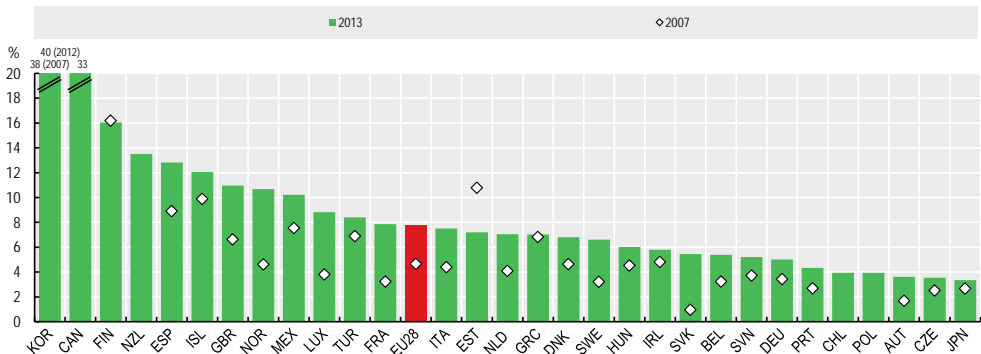
Digital technologies can also promote social inclusion by creating better access to quality education and offering new opportunities for skills development (OECD, 2014a). Inequality affects access to education, as shown earlier in this chapter. Digital learning environments can enhance education in multiple ways, for example by expanding access to content even to people from low income backgrounds or disadvantaged areas, supporting new pedagogies with learners as active participants, fostering collaboration between educators and between students, and enabling faster and more detailed feedback on the learning process. Recent innovations in



digital education are Massive Open Online Courses (MOOCs) and Open Educational Resources (OER). They provide complete, open-access university courses online to thousands of students at the same time by using some social networking practices (**Figure 3.4**).

**Figure 3.4. Individuals who participated in an online course, 2007 and 2013**

As a percentage of individuals who used the Internet in the last three months



Source: OECD (2014b).

New digital technologies are particularly important to better connect disadvantaged groups (OECD, 2016). For example, mobile connectivity is helping reach remote populations as well as those with lower incomes, due to its low costs. Pantea and Martens (2014) find that low-income users spend even more time on the Internet than the average, browsing websites that deal with education, career opportunities, health and nutrition themes and online sales platforms. Potential benefits for low-income groups also relate to improved access to free or very low cost knowledge and information; services that allow consumers to negotiate better prices for products (as well as identify better quality products); as well new consumption opportunities offered by Internet-based platforms that facilitate access over costly purchases.

Open digital learning resources could promote social inclusion, but positive evidence is limited. Such open digital learning resources could promote social inclusion by helping to contain the public and private costs of education and by breaking down boundaries to the distribution of high-quality resources across countries and between formal and informal education settings. They can also reduce barriers to learning opportunities easing requirements of place, time and pace of learning; and they can promote a continuous improvement in the quality of educational resources

by more rapidly and flexibly reflecting new knowledge developments and learning theories (OECD, 2015k). However, OER at large and MOOCs in particular have yet to find effective mechanisms for integrating in institutional frameworks for quality assurance, accreditation and recognition by employers. Seizing the educational opportunities from digital technologies requires a process of institutional learning, where actors – teachers, students, parents and educational institutions - are given sufficient scope to experiment with new tools and approaches and systematic assessment of outcomes leads to select the most effective practices. Evidence on the impact of technology in learning outcomes has so far been mixed at the system level (OECD, 2015b).

Technological innovations in the financial sector can promote social inclusion. Digital payments systems and mobile banking, for example, can reach the “unbanked” and households in remote areas who have had difficulties in accessing financial services such as money transfer services, and insurance and credit. Digital lending innovations and innovative financing like peer-to-peer lending and crowdfunding platforms have the potential to fill a bank lending gap and improve access to finance for both households and small enterprises, allowing for the participation of small investors. Financial innovations will, however, require an appropriate regulatory and legal framework ensuring transparency and accountability. Tailored financial education programmes can help enable individuals and small businesses to make use of these new opportunities and help them make informed choices.

### **3.5. A new approach is needed**

The expected potential benefits from new technologies will require policy action to ensure that everyone can benefit, including workers, firms, and regions. As shown in this chapter:

- Inequalities themselves prevent people from investing in skills, leading to low income families and their children being marginalised from the benefits of new technologies and higher productivity.
- Technological change offers both promise and peril and to make the most of it the key will be to ensure that skills and potential are developed and used. Although it is not yet clear how many people will be affected, there is evidence, in a number of countries, that the labour market is being hollowed-out with even skilled jobs being lost to new technologies, if they are routine. This means that not just up-skilling, but different sorts of skills, such as problem solving, will be needed in the new world of work.

- Conduct, incumbency, and the market power of firms at the frontier of productivity are important ingredients in the diffusion of productivity growth and dispersion of wages. Policy needs to address how more firms can adopt high productivity technologies and work practices, yielding greater diffusion of innovations, and higher aggregate productivity growth.
- New technologies can bring substantial benefits for social inclusion by enabling easier access to learning and training opportunities, by easing the access to finance and credit, and by lowering prices of financial services, thus contributing to higher productivity and growth while at the same addressing some of the root causes of increasing inequality. But this will not happen without policy interventions to ensure that everyone can benefit from such developments.

Further research is required to clarify the policy foundations of both productivity and inclusiveness, so as to better inform policy choices in order to kick start productivity growth, while also ensuring that the resulting benefits are widely shared. The policy foundations include product market competition and innovation, labour market and skills policies, and financial institution capabilities. These policies interacting with one another create the environment in which firms and workers meet and match, equally or unequally, to yield both productivity and equity outcomes. Upcoming research threads include:

- Probing more deeply into how these fundamental policies may yield differences in productivity performance across firms and translate into dispersion in earnings and income - including the gap between the wages of different workforce groups and advances in productivity.
- Considering how the rapid emergence of new technologies – including ICT-enhanced robotics – is changing labour demand, employer-employee relationships, and worker-wellbeing, and thus the need to enable workers to acquire the skills needed in the new emerging tasks and to move from declining to growing parts of the economy.

These research questions will feature prominently in the further development of the Inclusive Growth initiative, the implementation of the *OECD Skills and Innovation Strategies*, the new analysis that will be undertaken to develop the *new OECD Jobs Strategy*, including the *Future of Work* project, as well as the *Digitalisation of Economy and Society* project.

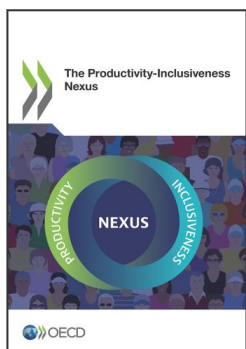
## References

- Adalet McGowan, M., and D. Andrews, (2015a) "Labour Market Mismatch and Labour Productivity: Evidence from PIAAC Data," OECD Economics Department Working Papers 1209, OECD Publishing.
- Adalet McGowan, M. and D. Andrews (2015b), "Skill Mismatch and Public Policy in OECD Countries", OECD Economics Department Working Papers, OECD Economics Department Working Papers, No. 1210, OECD Publishing, Paris, <http://dx.doi.org/10.1787/5js1pzw9lnwk-en>.
- Andrews, D. and A. Saia (2016), "Coping with Creative Destruction: Reducing the Costs of Firm Exit", OECD Economics Department Working Paper, Forthcoming
- Autor, David H. 2015. "Why Are There Still So Many Jobs? The History and Future of Workplace Automation." *Journal of Economic Perspectives*, 29(3): 3-30.
- Barth, Erling, Alex Bryson, James C. Davis, and Richard Freeman. 2014. *It's Where You Work: Increases in Earnings Dispersion across Establishments and Individuals in the U.S.* National Bureau of Economic Research. Working Paper No. 20447.
- Berlingieri, G., P. Blanchenay and C. Criscuolo "The great divergence", (2016 forthcoming) OECD STI Policy Paper.
- Bessen, J. (2015), *Learning by Doing: The Real Connection between Innovation, Wages, and Wealth*, New Haven: Yale University Press
- Brynjolfsson, E. and L. Hitt (2000), "Beyond Computation: Information Technology, Organizational Transformation and Business Performance," *Journal of Economic Perspectives*, Vol. 14, No 4.
- Brynjolfsson, Erik., and Andrew McAfee (2011). *Race against the Machine: How the Digital Revolution Is Accelerating Innovation, Driving Productivity, and Irreversibly Transforming Employment and the Economy*. Digital Frontier Press.
- Brynjolfsson, E., & McAfee, A. (2014). *The second machine age: Work, progress, and prosperity in a time of brilliant technologies* (First Edition.). New York: W. W. Norton & Company.
- Card, David, Jörg Heining, and Patrick Kline (2013), "Workplace Heterogeneity and the Rise of West German Wage Inequality," *The Quarterly Journal of Economics*, 2013, 128 (3), 967–1015.
- Causa, O., A. de Serres and N. Ruiz (2014), "Can growth-enhancing policies lift all boats? An analysis based on household disposable income",

- OECD Economics Department Working Papers, No. 1180, OECD Publishing, Paris.
- Causa, O., S. Araujo, A. Cavaciuti, N. Ruiz and Z. Smidova, (2014) “A preliminary analysis of income distribution developments”, OECD Economics Department Working Papers, No. 1111, OECD Publishing.
- Cournède, B. and O. Denk (2015), “Finance and economic growth in OECD and G20 countries”, OECD Economics Department Working Papers, No. 1223, OECD Publishing, Paris.
- Denk, O. and A. Cazenave-Lacroutz (2015), “Household Finance and Income Inequality in the Euro Area”, OECD Economics Department Working Papers, No. 1226, OECD Publishing, Paris.
- Dunne, Timothy, Lucia Foster, John Haltiwanger, and Kenneth R. Troske (2004), “Wage and Productivity Dispersion in United States Manufacturing: The Role of Computer Investment.” *Journal of Labor Economics* 22 (2): 397–429.
- Egert (2016), “Regulations, institutions and productivity: new macroeconomic evidence from OECD countries”, AEA Papers and Proceedings, Forthcoming.
- Faggio, G., K. G. Salvaness, and J. Van Reenen (2007), "Understanding wage and productivity dispersion in the United Kingdom." *VOX Occasional Paper Series* 742.
- Frey, Carl Benedikt, and Michael A. Osborne (2013), "The Future of Employment: How Susceptible are Jobs to Computerization?" Oxford Martin School, September
- Goos, M., J. Konings and M. Vandeweyer (2015), “Employment Growth in Europe: The Roles of Innovation, Local Job Multipliers and Institutions”, *Utrecht School of Economics Discussion Paper Series*, Vol. 15, No. 10.
- Håkanson, C, E. Lindqvist and J. Vlachos, (2015), “Firms and skills: the evolution of worker sorting”, *IFAU Working Paper* 2015:9.
- Helpman, E., O. Itskhoki, M. Muendler and S. Redding, (2015) “Trade and Inequality: From Theory to Estimation”, mimeo.
- Hijzen, A. and B. Menyhert (2016), “Measuring Labour Market Security and Assessing its Implications for Individual Well-Being”, *OECD Social, Employment and Migration Working Papers*, No. 175.
- Marcolin, L., S. Miroudot and M. Squicciarini (2016), “Routine jobs, employment and technological innovation in global value chains”,

- OECD Science, Technology and Industry Working Papers, 2016/01, OECD Publishing, Paris. <http://dx.doi.org/10.1787/5jm5dcz2d26j-en>
- Mokyr, Joel, Chris Vickers, and Nicolas L. Ziebarth. 2015. "The History of Technological Anxiety and the Future of Economic Growth: Is This Time Different?" *Journal of Economic Perspectives*, 29(3): 31-50.
- Moretti, E. (2010), "Local Multipliers", *American Economic Review: Papers and Proceedings*, No. 100, pp. 1-7.
- OECD (2016, forthcoming), *Perspectives on Innovation and Inclusive Growth*, OECD, Paris,
- OECD (2015a), *In It Together: Why Less Inequality Benefits All*, OECD Publishing, Paris.
- OECD (2015b), *OECD Employment Outlook 2015*, OECD Publishing
- OECD (2015c), *OECD Science, Technology and Industry Scoreboard 2015: Innovation for growth and society*, OECD Publishing, Paris. DOI: [http://dx.doi.org/10.1787/sti\\_scoreboard-2015-en](http://dx.doi.org/10.1787/sti_scoreboard-2015-en)
- OECD (2015d) *Measuring the Demand and the Supply of ICT Skills at Work*, [DSTI/ICCP/IIS\(2015\)4/REV1](#)
- OECD (2015e) *ICTS and Skills: Complement or Substitutes? The Effects of ICT Investment on Labour Demand for High, Medium and Low skills in 14 OECD Countries*, [DSTI/ICCP/IIS\(2015\)11](#).
- OECD (2015f) *ICTS, Jobs and Skills. New Evidence from the OECD PIAAC Survey*, [DSTI/ICCP/IIS\(2014\)8/REV1](#).
- OECD (2015g), *Future of Productivity*, OECD publishing, Paris
- OECD (2015h), *Back to Work Japan – Improving the Re-employment Prospects of Displaced Workers*, OECD Publishing, Paris;),
- OECD (2015i), *Back to Work Canada – Improving the Re-employment Prospects of Displaced Workers*, OECD Publishing, Paris;),
- OECD (2015j), *Back to Work Sweden – Improving the Re-employment Prospects of Displaced Workers*, OECD Publishing, Paris
- OECD (2015k), *Open educational resources: A catalyst for innovation*. Paris, OECD Publishing.
- OECD (2014a), *Trends Shaping Education 2014 Spotlight 5 – Infinite Connections*, OECD Publishing, <http://www.oecd.org/edu/ceri/Spotlight%20-%20Infinite%20Connections.pdf>.

- OECD (2014b) *Measuring the Digital Economy. A New Perspective*, OECD Publishing, <http://dx.doi.org/10.1787/888933148328>.
- OECD (2013a), *OECD Skills Outlook 2013: First Results from the Survey of Adult Skills*, OECD Publishing.
- OECD (2013b), *OECD Employment Outlook 2013*, OECD Publishing, Paris
- OECD (2013c), *Regions and Innovation: Collaborating across Borders*, OECD Reviews of Regional Innovation, OECD Publishing, Paris.
- OECD (2011), *Divided We Stand: Why Inequality Keeps Rising*, OECD Publishing, Paris, <http://dx.doi.org/10.1787/9789264119536-en>
- OECD (2010), "Institutional and Policy Determinants of Labour Market Flows", in OECD, *OECD Employment Outlook 2010: Moving beyond the Jobs Crisis*, OECD Publishing, Paris, [http://dx.doi.org/10.1787/empl\\_outlook-2010-4-en](http://dx.doi.org/10.1787/empl_outlook-2010-4-en).
- OECD (2004) *The Economic Impact of ICT*, OECD Publishing, Paris
- Pantea, S., & Martens, B. (2014). *The Value of the Internet for Consumers*. Available at SSRN 2446962.
- Rajan, R. G. (2010), *Fault Lines: How Hidden Fractures Still Threaten the World Economy*, Harper Collins, New York.
- Song, J, D. Price, F. Guvenen, N. Bloom, and T., von Wachter (2015) "Firming Up Inequality", NBER Working Paper n. 21199.
- Tüzemen, Didem and Willis Jonathan (2013), "The Vanishing Middle: Job Polarization and Workers' Response to the Decline in Middle-Skill Jobs," *Kansas City Federal Reserve Bank Economic Review (Q1) 2013*.



**From:**  
**The Productivity-Inclusiveness Nexus**

**Access the complete publication at:**  
<https://doi.org/10.1787/9789264292932-en>

**Please cite this chapter as:**

OECD (2018), "Getting to grips with the Productivity-Inclusiveness Nexus", in *The Productivity-Inclusiveness Nexus*, OECD Publishing, Paris.

DOI: <https://doi.org/10.1787/9789264292932-5-en>

This document, as well as any data and 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. Extracts from publications may be subject to additional disclaimers, which are set out in the complete version of the publication, available at the link provided.

The use of this work, whether digital or print, is governed by the Terms and Conditions to be found at <http://www.oecd.org/termsandconditions>.