

The Great Divergence(s)

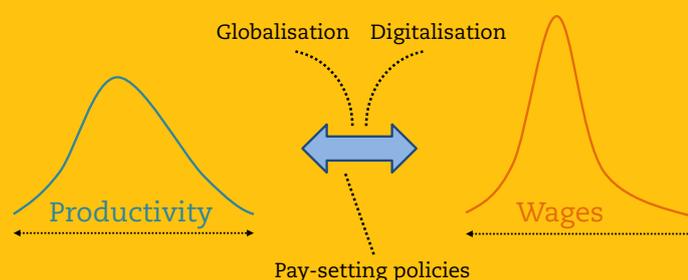
The link between growing productivity dispersion and wage inequality

Over the past three decades, several OECD and non-OECD economies have experienced increasing inequality in income between the rich and the poor (Piketty, 2014; Piketty, Saez, and Zucman, 2016; OECD, 2016), which has put growth and inclusiveness at the forefront of academic and policy discussions (Furman, 2016). A number of studies have shown that the dispersion in wages is largely explained by an increase in wages between firms rather than within them – that is, most of this dispersion comes from increasing differences in wages between the highest and lowest paying firms, rather than from an increasing gap between top- and bottom-earners within the same firm.¹ At the same time, recent evidence suggests that there has been a significant increase in the gap between the globally most productive firms and the rest (Andrews, Criscuolo, and Gal, 2016), suggesting that there might be a positive relationship between the two divergences in wages and productivity.

In a recent study (Berlingieri, Blanchenay, and Criscuolo, 2017a), we provide new evidence on the increasing dispersion in wages and productivity using novel micro-aggregated firm-level data from 16 countries.² The dataset contains harmonised information about productivity dispersion and wage inequality between firms. It extends on previous studies in: i) using data that are based either on the full population of firms in each country (including small firms) or data from a large sample of firms that are made representative and comparable by re-weighting, using the full business population; ii) covering both manufacturing and services in 16 countries; and iii) measuring both labour productivity and multi-factor productivity (MFP).³

The quick read

With the renewed focus on sources of inequality in our economies, attention has turned towards differences in productivity across firms as a potential source of wage inequality. Using firm-level data, this study, based on the OECD MultiProd project shows that:



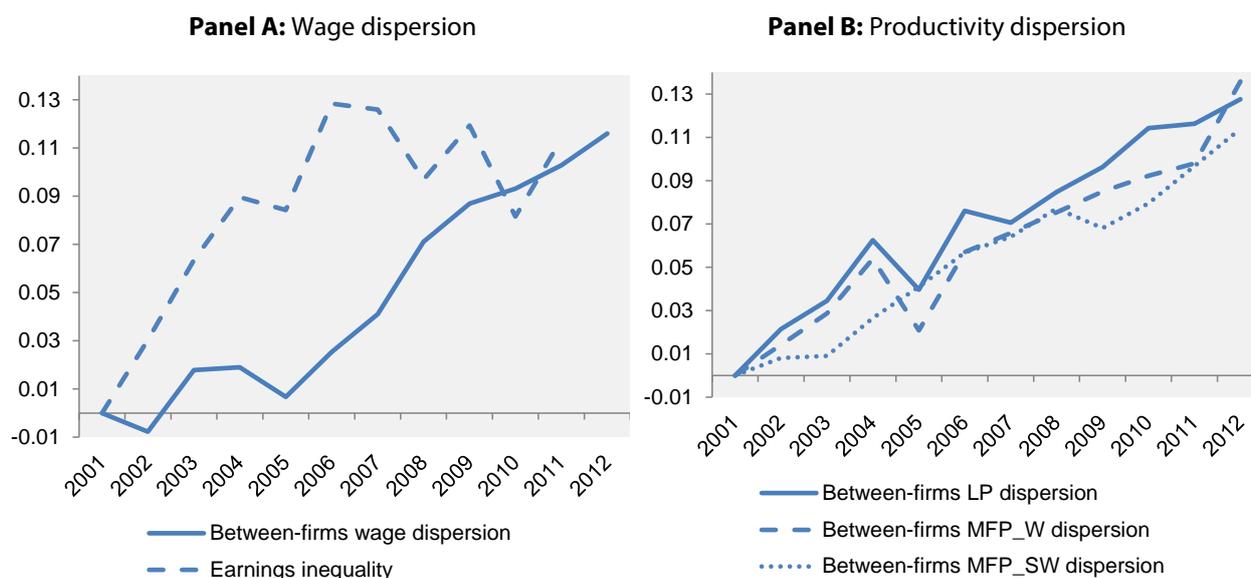
- The gap has increased between the most and least productive firms, and between the top-paying and bottom-paying firms.
- Inequality in wages has grown faster in sectors in which the gap in productivity has increased the most.
- Structural factors – globalisation and digitalisation – as well as labour market policies and institutions explain some of these differences. They also affect the link between productivity dispersion and wage dispersion, and can therefore affect the extent to which productivity differences translate into wage differences.

The divergence of wages and the divergence of productivity

The first key result of this work is that both wages and productivity have experienced a divergence – that is, the differential between the top and the bottom of the wages and productivity distributions has increased. This is true not only across the whole economy but also within two-digit sectors within countries. In Figure 1, panel A shows the 90-10 wage difference (in logs), which compares wages in firms at the top 10% of the wage distribution to wages in firms at the bottom 10% of the wage distribution. The upward trend points to an increase in this wage gap, both across workers in the overall economy (dashed line) and between firms in the same sectors (solid line). Even within the same sectors, the 90-10 wage gap is 12.3% higher in 2012 than in 2001. The figure shows that the increase in the between-firm wage dispersion is of similar magnitude as the increase in overall earnings inequality, hence analysing the former can go a long way in understanding what drives overall wage inequality.

This divergence in wages across firms is matched by a divergence in productivity between firms of the same sectors. Panel B of Figure 1 shows the 90-10 log ratio of productivity, capturing the gap between firms at the top 10% and firms at the bottom 10% of the productivity distribution in a given sector. This top-to-bottom gap in labour productivity increased by 12.8% between 2001 and 2012 (solid line). Capital intensity typically boosts labour productivity, but the divergence cannot solely be explained by certain firms' increased use of capital: multi-factor productivity, which accounts for capital use, also diverged, with a top-to-bottom gap rising by 13.6% over the same period (dashed line). We can therefore speak of the “Great Divergences” of both wages and productivity.

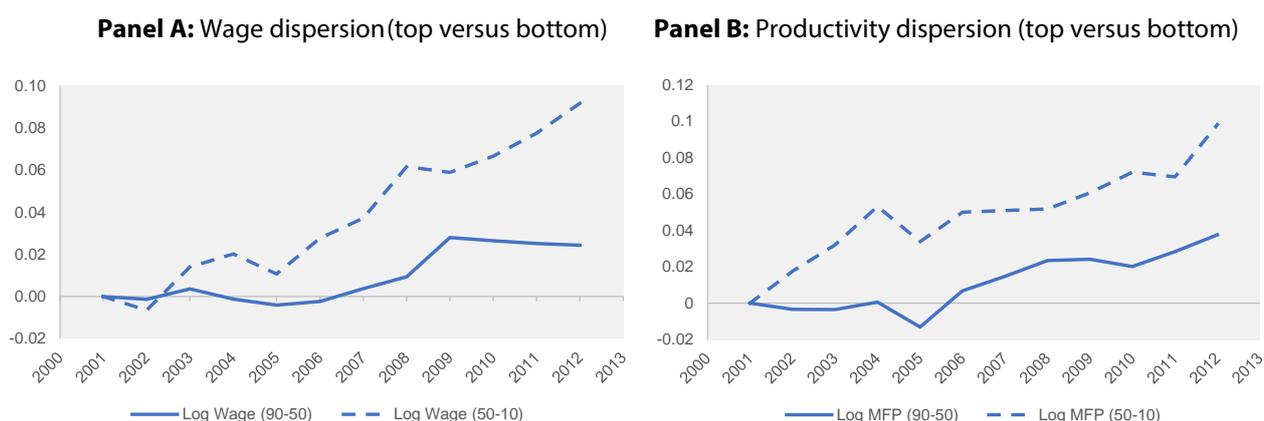
Figure 1. The Great Divergences in wages and productivity



Note: The figure in panel A [B] plots the estimated year dummies of a regression of log-wage [productivity] dispersion (90th and 10th percentiles ratio) within country-sector pairs, using data from the following countries: AUS, AUT, BEL, CHL, DNK, FIN, FRA, HUN, ITA, JPN, NLD, NOR, NZL, SWE. The line referring to overall earnings inequality in Panel A plots the estimated year dummies of a similar regression using the dispersion in earnings from the OECD Earnings Distribution database within each country. The data on overall earnings inequality are only available at the country level and for a more limited set of countries: FIN, FRA, HUN, JPN, NOR, NZL for the whole period; AUS, ITA, SWE from 2002; and NLD between 2002 and 2010.

Source: Berlingieri, Blanchenay and Criscuolo (2017a).

Figure 2. Within-sector dispersion of wages and productivity increased faster at the bottom



Note: The figure in panel A [resp. B] plots the estimated year dummies of a regression of log-wage [resp. log-MFP] dispersion at the top (90th to 50th percentiles ratio, solid line) and at the bottom (50th to 10th percentiles ratio, dashed line) within country-sector pairs, using data from the following countries: AUS, AUT, BEL, CHL, DNK, FIN, FRA, HUN, ITA, JPN, NLD, NOR, NZL, SWE.

Source: Berlingieri, Blanchenay and Criscuolo (2017a).

Much discussion of inequality has focused on increasing differences between the top earners and the rest of the income distribution. But in the paper, we show that wage inequalities have grown even more at the bottom of the distribution (Figure 2). Panel A of Figure 2 displays the differences in wages between the top decile and the median (90-50 log ratio, solid line) and between the median and bottom decile (50-10 log ratio, dashed line). The 90-50 log ratio can be thought of as “upper tail wage inequality” – it measures the wage at the ninetieth percentile (the average wage paid by a firm at the top 10% of the wage distribution) relative to the fiftieth percentile (wages paid by a firm right in the middle) – whereas the 50-10 log ratio can be considered as “lower tail wage inequality”. The gap in average wage between the median and the bottom decile grew faster between 2001 and 2012 than the gap between the median and the top decile; that is, lower tail inequality grew faster than upper tail inequality. And the same growth in dispersion at the bottom occurred in the distribution of MFP. In other words, the dispersion of both wages and productivity has been faster at the bottom than at the top. In the upper tail there is even evidence of a small element of convergence in the early 2000s, which disappears in the second half of the decade when there is also more divergence at the top.

These parallel trends in dispersion both at the bottom and the top suggest that the distribution of wages and productivity are linked. In well-functioning markets, we expect that wages reflect labour productivity, so that dispersion in wages should be linked to dispersion in productivity. The literature has suggested that this could be further strengthened by the fact that the most productive workers increasingly work for the most productive firms, with a clustering of high-skilled workers in high-paying firms (Bagger, Sørensen, and Vejlin, 2013) as well as increased use of outsourcing of non-core low-value added low-pay activities (Goldschmidt and Schmieder, 2015). Rent sharing – that is, workers of high-profit, high-productivity firms enjoying a share of the firms’ rents – also seems to play a role in explaining this trend (Card, Devicienti, and Maida, 2014; Card, Heining, and Kline, 2013).

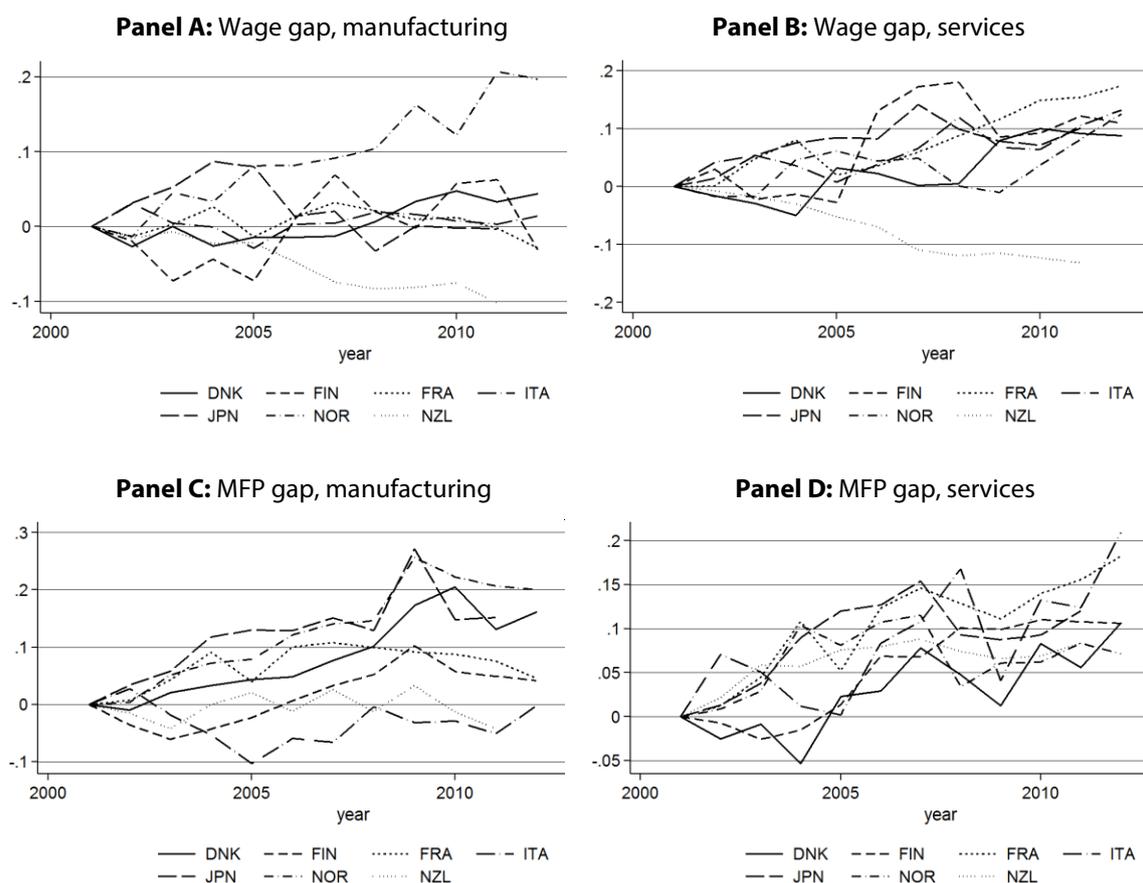
To assess the link between the distribution of productivity and the distribution of wages, we econometrically estimate the correlation between the 90-10 wage ratio and 90-10 productivity ratio. We find that within country-sector pairs, there is a positive correlation between an increase in productivity dispersion and an increase in wages, even accounting for the workforce skill composition or firm age composition of the sector. An increase of one standard deviation in the dispersion of logged labour productivity (respectively MFP) correlates with an increase of logged wage dispersion by 25.5% (respectively 19.5%). In other words, it is not possible to understand wage inequality without taking into account increasing differences in firms’ productivity.

The divergences have not affected countries equally

Our key result concerning the great divergence of wages should not hide the fact that there are important differences across countries in our sample. Panels A and B of Figure 3 plot changes in the top-to-bottom wage gap (90-10 log wage difference) since 2001, within two-digit sectors in each country and separately for manufacturing (panel A) and services (panel B). In both manufacturing and services, this wage gap increased in most countries, with the exception of New Zealand, where it decreased significantly.⁴

As with wage dispersion, the increase in productivity dispersion has not occurred homogeneously across countries. Productivity divergence within a country's sector takes place if the productivity for the group of most productive firms increases faster than for the least productive firms. To illustrate the trends in the relative productivity performance of top performers versus laggards, Panels C and D of Figure 3 plot the top-to-bottom gap in MFP (90-10 log-MFP ratio) within two-digit sectors, over time and normalised at 0 in 2001. Panel C represents log-productivity dispersion in manufacturing and panel D represents log-productivity dispersion in (non-financial) market services. These figures illustrate well the trend in log-productivity dispersion, which is increasing both in manufacturing and in services. For the majority of countries dispersion in 2012 is higher than in 2001: in services this is the case for all countries but New Zealand in terms of labour productivity; in manufacturing for all but Italy and New Zealand (this also holds for labour productivity).

Figure 3. The wage (top) and productivity (bottom) divergences have not affected countries equally



Note: Change in the 90-10 difference of log wages and log MFP since 2001 (computed as the log difference between the 90th and the 10th percentile), respectively for manufacturing (panels A and C) and services (panels B and D). The 90-10 difference is normalised at 0 in 2001 and averaged across two-digit sectors weighted by employment (for wages) and value-added (for MFP). Countries with data starting after 2001 or for which data is only available at the macro-sector level are not included in these graphs; Hungary and the Netherlands are also excluded.

Source: Berlingieri, Blanchenay and Criscuolo (2017a).

MultiProd: an OECD project on firm-level productivity

MultiProd is an OECD project to study productivity patterns, investigating the extent to which different policy frameworks can shape firm productivity, and examining the extent to which resources are allocated to more productive firms. The analysis aims to be a key input for policy makers as firm-level productivity and allocative efficiency are the engines of future growth.

MultiProd provides cross-country harmonised micro-aggregated data of paramount importance for understanding productivity performances across countries. At present, more than 20 countries participate in the project.

In summary, the MultiProd project aims to:

- Better depict the Schumpeterian process of creative destruction across countries.
- Investigate the relationship between productivity and wage dispersion, and gauge to what extent heterogeneity in productivity has contributed to wage inequality.
- Identify the largest firms and understand how they differ in terms of their weight in the economy, their productivity performance, and their contribution to aggregate productivity growth.
- Gauge whether resources are efficiently allocated through the analysis of the entire firm-level productivity distribution, with further refinements by firm size, age, and ownership categories.
- Identify firms at the “frontier” – the best performers – and understand how they differ across countries, what drives their performance, and how much they contribute to aggregate productivity growth.
- Investigate the within-country difference between the “frontier” and the “laggard” firms, and understand how this difference varies across countries, which are its determinants and how it affects both aggregate productivity growth and allocative efficiency.
- Investigate the cross-country differences in firm-level productivity performance and allocative efficiency before, during and after the financial crisis.
- Examine the effectiveness of various policy frameworks aimed at shaping firm productivity and enhancing resource allocation to more productive firms.

For more details, see Berlingieri et al. (2017b) and <https://www.oecd.org/sti/ind/multiprod.htm>.

The drivers of the Great Divergences: structural factors and policies

To understand what affects wage inequality and its link with productivity divergence, our work also investigates the role of structural factors as well as policies and institutional features of the economy that might have strengthened or weakened the correlation between wage and productivity dispersion.

First, we find that globalisation and digitalisation are not only associated with an increase in between-firm wage inequality, but also strengthen the link between wages and productivity dispersion. In sectors where firms have increased their use of ICT over time, wage dispersion has grown faster, suggesting that ICT affects firms heterogeneously. We also look at sectors that have become more open to trade either through imports or through exports; in those sectors, not only wage dispersion increased but also its link with productivity dispersion was strengthened. Our results contribute to the literature that shows that globalisation may also have an indirect effect on between-firm wage inequality (Helpman et al., 2017).

Country-specific policies and institutions also play a role in shaping the evolution of wage and productivity dispersions, and the link between them.⁵ Theory predicts that countries that attempt to shield workers and firms during adverse market conditions should feature lower wage and productivity dispersions. On the one hand, this is of course beneficial to workers as their jobs and salaries would be better protected and shielded by the cycles. On the other hand, less dispersion in wages and productivity due to regulations may inadvertently impact aggregate productivity by distorting the flow of resources from less to more productive firms. Thus, policies that might be welfare improving in the short-run may have a detrimental impact in the

long run: policies that hinder the reallocation of resources away from poorly performing to highly productive firms can result in slower aggregate productivity growth. And, as we have seen, this can have adverse implications for the workers themselves, inadvertently trapping them in low-paying firms, rather than giving them the opportunity to earn higher wages in more productive firms.

We examine the role of pay-setting institutions and labour market features, for example: minimum wages (in terms of both the hourly real minimum wage and the minimum relative to average wages of full-time workers); employment protection legislation (strictness of employment protection for both individual and collective dismissals, regular contracts); trade union density; and coordination in wage-setting.

Countries that have a higher minimum wage are also the ones that have a weaker link between wage and productivity dispersion. At the same time, increases in the minimum wage, both in real and relative terms, are associated with a stronger correlation between wage and productivity dispersions over time. A few factors could help explain this result: i) the exit of firms at the bottom of the productivity distribution; ii) an improvement in firms' performance (higher efficiency and/or higher innovation) in an environment characterised by higher labour costs; iii) a reduction in labour inputs (head counts or hours worked), a substitution of labour with capital, and/or a change in the composition of the workforce towards more productive workers, which again would result in productivity improvements over time.

Stronger employment protection legislation and higher union density are associated with a decrease in wage dispersion and to some extent a weaker link with productivity. It is interesting to note that the same pattern applies to both employment protection legislation and trade union density. They both play a significant role in lowering wage dispersion across countries and sectors as well as within country-sector pairs over time. And they both significantly affect the link between productivity and wage dispersion at a point in time across countries and sectors, but not so much within country-sector pairs over time. Once (time-invariant) country and sector characteristics are taken into account, the two policies therefore seem to have the intended consequence of reducing wage dispersion, and without weakening the link between productivity and wages over time, or at least not significantly so.

Finally, our work finds that coordination in wage-setting, which captures the extent to which institutional features of wage setting arrangements are likely to generate more or less coordination, helps limit the extent of wage dispersion, but at the same time weakens the link between wages and productivity over time, which might be detrimental for long run growth.

Notes

1. Some of the most recent contributions include: Barth et al., 2014; Card et al., 2013; Goldschmidt and Schmieder, 2015; Helpman et al., 2017; Song et al., 2015.

2. Australia, Austria, Belgium, Canada, Chile, Denmark, Finland, France, Hungary, Italy, Japan, Luxembourg, the Netherlands, Norway, New Zealand and Sweden.

3. The work has been carried out in the context of a wider OECD project called MultiProd, aimed at studying productivity patterns across countries using a distributed micro-data approach. For more information, see Berlingieri et al. (2017b) and <https://www.oecd.org/sti/ind/multiprod.htm>.

4. In unreported results obtained at the macro-sector level, we find that wage dispersion has decreased in Canada as well (data for Canada are not available at the two-digit level). This result is reminiscent of the findings in Fortin and Lemieux (2015) who, using data from the 1997 to 2013 Labour Force Survey for Canada, show that overall wage inequality has decreased in a few Canadian provinces due to the extractive resources sector boom.

5. A significant amount of evidence has been gathered on the role of policy and institutions for explaining the observed increase in wage dispersion, in particular the decline in real minimum wage (DiNardo et al., 1996) and, for the United Kingdom and the United States, the decline in unionisation (for an overview, see Machin, 2016). For continental European economies, the focus has been on the centralisation level of bargaining (see for instance Card and de la Rica 2006; Dahl et al. 2013).

Further reading

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