The weak link between productivity and wages in London: Evidence from firms and local labour markets (2004-2014)

Summary Report for the Greater London Authority

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UNIVERSITY OF SUSSEX

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1. Introduction and descriptive evidence

The UK has suffered a double dip recession since the financial crisis in 2008, characterised by stagnant productivity (Blundell et al., 2014), a flattened wage dynamic (Valero and Van Reenen, 2019) and an increase in income inequality (Joyce and Xu, 2019). These trends preceded the financial crisis, and have worsened since. The current recession, following the COVID-19 pandemic and the backlash of Brexit (Fusacchia et al., 2020) calls for structural policies to reverse these trends (McCann et al., 2021). Compounding these issues is the large divide across UK regions, and within regions between individuals.

Within this context, it is of pivotal importance that sectoral and industrial policies that aim to foster productivity recovery (Balawejder and Monahan, 2020), including in locations that top the productivity and wages distribution such as London, are able to stimulate wage growth and living standards more generally, without further increasing the inequality that is endemic within large cities such as London (Lee et al, 2016) but also between locations (Evenhuis et al, 2021). To inform such policies, evidence on the impact of productivity on wages and inequality within firms and in local labour markets, in London and in relation to the rest of the UK, is needed.

This report provides this solid evidence. Based on a large set of matched data on productivity and wages over 2004-2014, it estimates the impact of labour productivity (LP) on wages at the firm and local labour market levels (Travel-To-Work-Area, TTWA) in Great Britain (GB).[1] The report offers evidence on whether such impact differs in firms based in London and for the local labour markets composing the Greater London Authority (London, and Slough and Heathrow (S&H) (Figure A)) with respect to the rest of GB.

The remainder of this summary report provides: i) an overview of the dynamics of wages and labour productivity in the London and S&H TTWAs, and for the rest of GB (Section 2); ii) the main findings on the impact of productivity on wages at the firm and local labour market levels, which refer to the tables included in the full report (Section 3); and iii) an overview of key policy implications to address the main challenges for the GLA emerging from our findings (Section 4).

The full report provides details on the methodology, the dataset, a summary of the relevant academic literature, the full set of results, and includes an Appendix with a set of robustness checks.

[1] England, Scotland and Wales: the analysis is restricted to Great Britain due to data on productivity being unavailable for Northern Ireland.

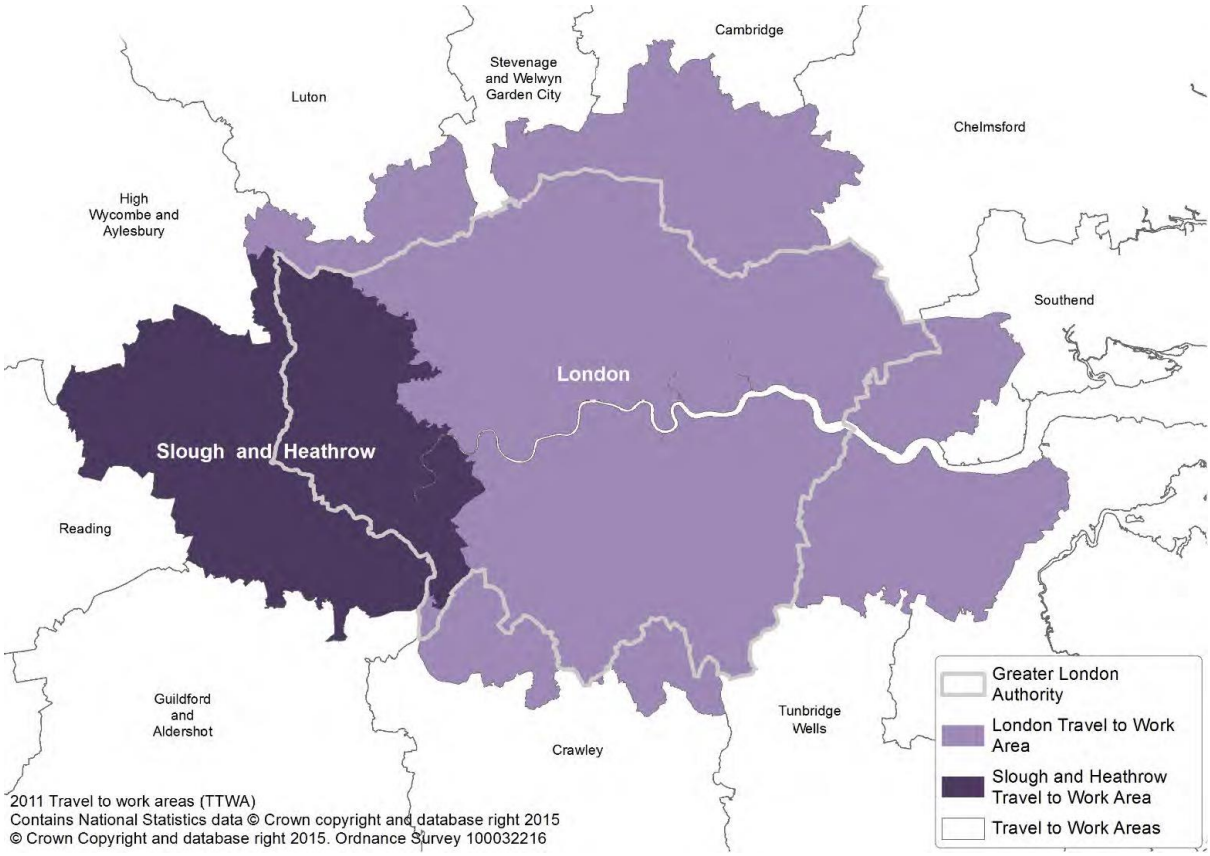


Figure A – The Greater London Authority, London and Slough and Heathrow Travel to Work Areas

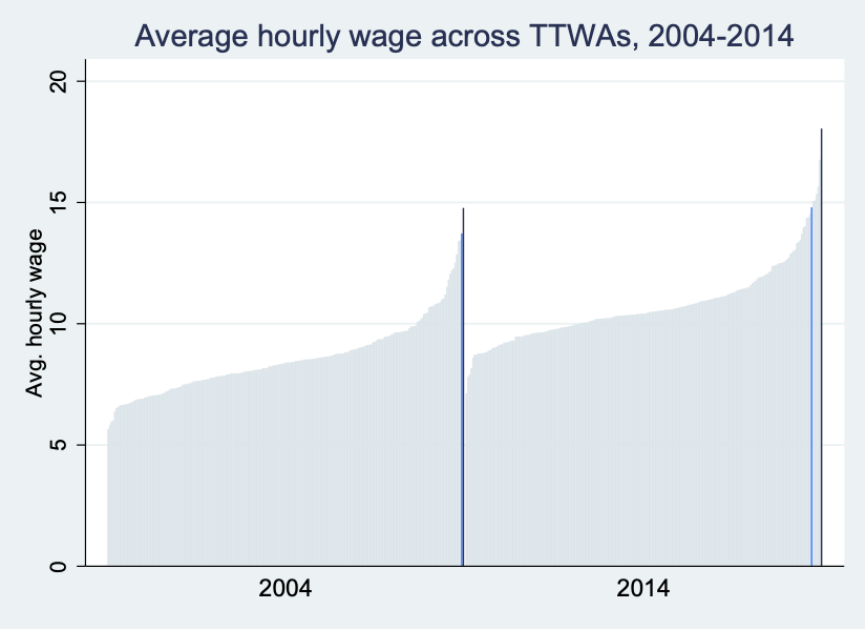
Source: GLA, 2020

Levels and changes of hourly wages and labour productivity in London and GB local labour markets (2004-14): Convergences and divergences

Labour productivity and nominal wages in London, and in relation to the rest of GB

We report the distribution of *levels* of labour productivity (panel (a)) and nominal hourly wages (panel (b)) in 2004 and 2014 in the 217 TTWAs in GB (Figure 1). The London TTWAs top the distribution for both indicators, being outliers with respect to the labour markets across GB. They are followed by a few local labour markets with relatively high labour productivity and wages. However, the majority of labour markets report levels of labour productivity that are 30% lower and nominal wages nearly 50% lower than the London TTWAs.

(a) Productivity



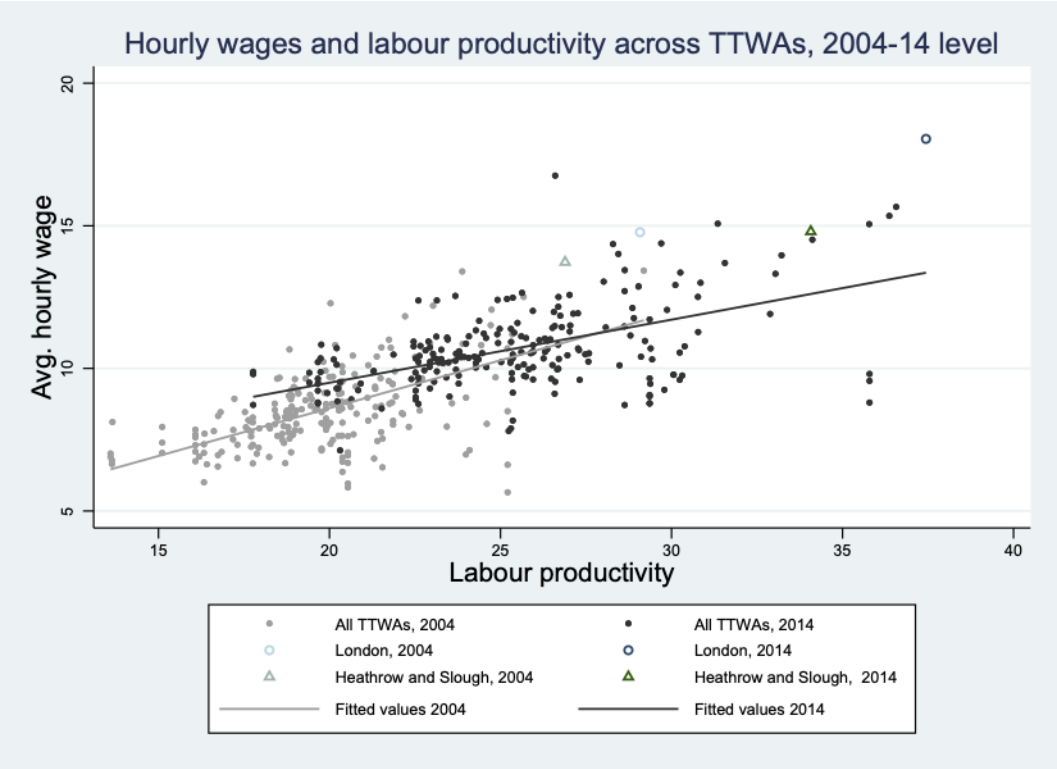
(b) Nominal wages

Note: Labour productivity is measured as nominal Gross Value Added (GVA) per hours worked, excluding rental income. TTWAs are sorted from low to high productivity (a) and average hourly nominal wage (b). Black vertical line: London TTWA; blue vertical line: Slough and Heathrow TTWA.

Figure 1: Distribution of labour productivity and nominal average wages across GB TTWAs: 2004 and 2014

Source: Our calculations based on data from the ONS regional and sub-regional productivity tables and Annual Survey of Hours and Earnings (ASHE)

Figure 2 shows that the two indicators are correlated: TTWAs with higher Labour Productivity (LP) also tend to show higher average nominal wages. However, the slope of the fitting curve has flattened between 2004 and 2014, suggesting that the relationship between productivity and wages has weakened across local labour markets in GB.



Note: Labour productivity is measured as nominal GVA per hours worked, excluding rental income. The two lines plot the linear fit between LP and wages in 2004 (lighter grey) and 2014 (darker black). Hollow circles: London TTWA; hollow triangles: Slough and Heathrow TTWA.

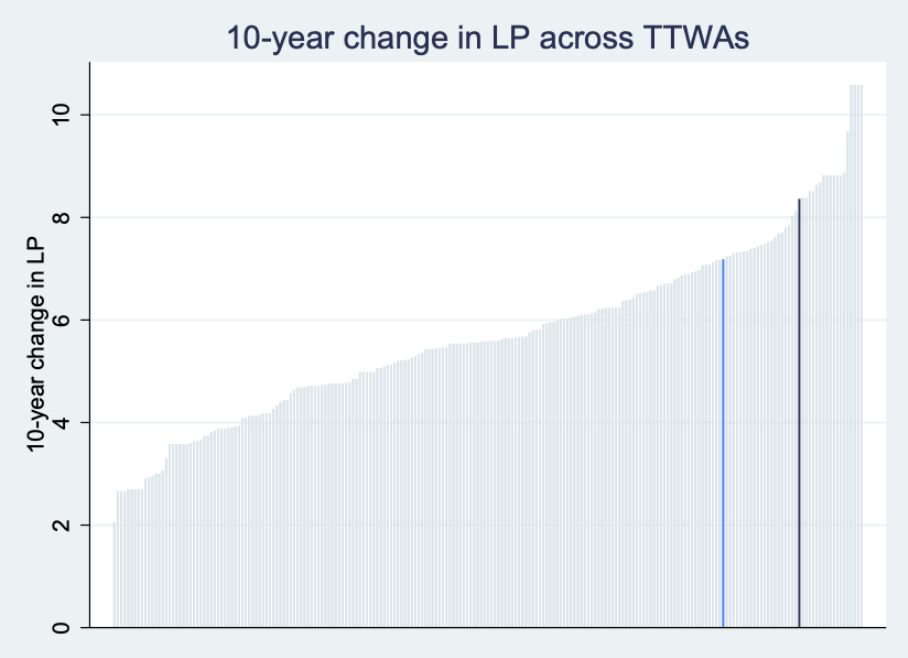
Figure 2: Correlation between LP and nominal average wages (2004 and 2014)

Source: Our calculations based on data from the ONS regional and sub-regional productivity tables and ASHE

London had the highest average hourly nominal wage and labour productivity distributions, both in 2004 and 2014. Slough and Heathrow is positioned close to London in 2004, although it dropped several places in 2014.

Changes in labour productivity and nominal wages in London, and in relation to the rest of GB

The 10-year change of labour productivity between 2004 and 2014 diverges substantially from the change in wages over the same period: productivity differences across GB increase, whereas wage differences shrink. That is, the most productive TTWAs in 2004 experience a larger productivity increase than other TTWAs, whereas TTWAs with the highest wages in 2004 experience a lower wage increase than other TTWAs (Figure 3). The two GLA TTWAs tell two opposite stories: unlike most other regions, London experiences a substantial increase in both productivity and average wages. S&H experiences a similar increase in productivity, although it has among the weakest increase in average wages across GB. S&H is an example of the decoupling between LP and average wages dynamics.



(a) Productivity

(b) Nominal wages

Note: Labour productivity is measured as nominal GVA per hours worked, excluding rental income. TTWAs are sorted from low to high productivity growth (a) and average hourly nominal wage growth (b). Black vertical line: London TTWA; blue vertical line: Slough and Heathrow TTWA.

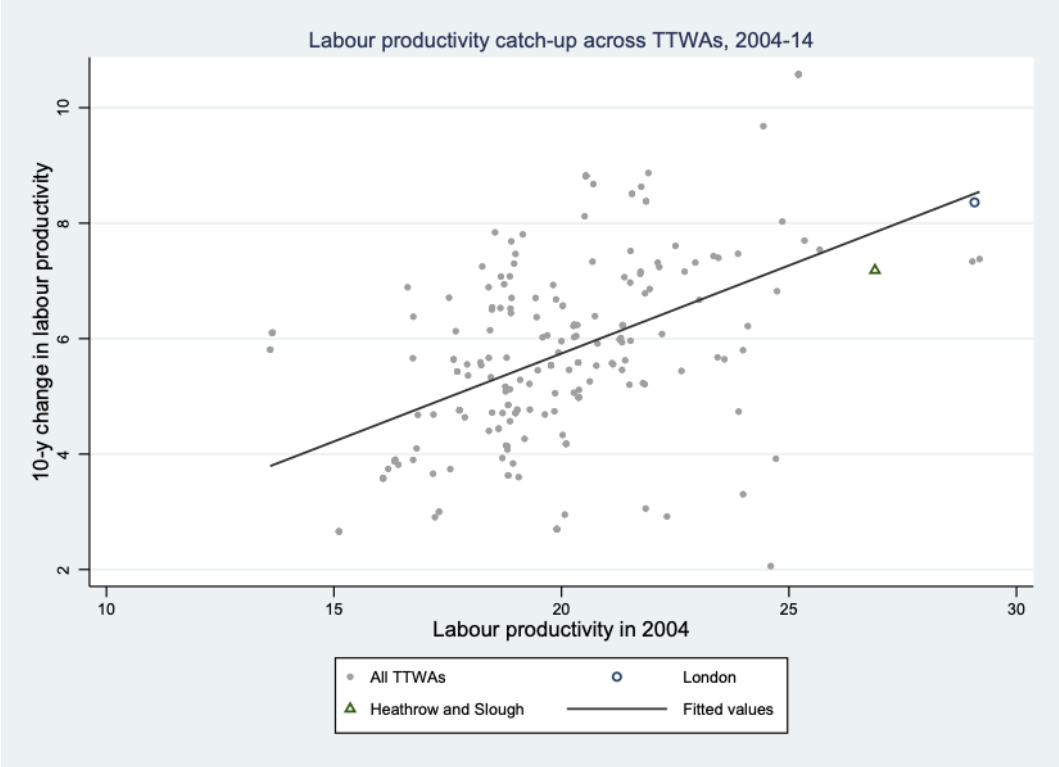
Figure 3: 10-year changes of labour productivity and nominal average wages across GB TTWAs (20014-14)

Source: Our calculations based on data from the ONS regional and sub-regional productivity tables and ASHE

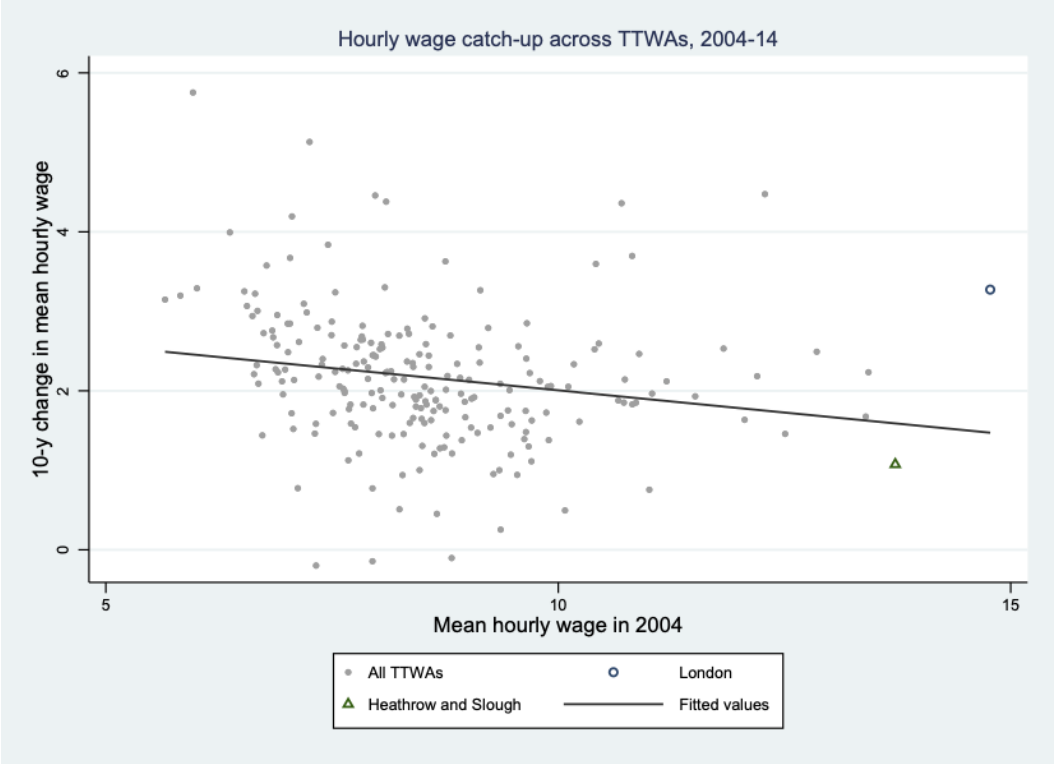
We show this more systematically in Figure 4. Panel (a) plots the relationship between the initial level of labour productivity and its change between 2004-2014 across TTWAs. It offers strong evidence that the TTWAs with higher productivity build on their advantages (such as their sectoral structure, capability to innovate, adoption of innovation, and presence of high skills) and further increase their LP over the ten years, in line with the literature (Balland et al., 2020 among others; see full report). In other words, there has been no levelling up, or catching up, in labour productivity across GB: laggard regions are even more behind, relatively speaking, in relation to labour productivity.

Instead, wages have been converging, as TTWAs with initial low average nominal wages have experienced a higher increase than TTWAs with initial high nominal wages (panel (b)). Slough and Heathrow is a typical example, being the second TTWA in terms of nominal wages in 2004, and amongst those that experience the lowest increase between then and 2014. The London TTWA, instead, is an exception, being one of the few that have a high wage in 2004 and a large increase between then and 2014.

In sum, we observe a reduction in wage inequality across UK labour markets. As we discuss later, this may imply that increased differences in labour productivity across TTWAs might increase inequality, although not through wages, which remain low even where labour productivity increases.



(a) Productivity



(b) Nominal wages

Note: Labour productivity is measured as nominal GVA per hours worked, excluding rental income. The two lines plot the linear fit between the level of LP (a) and wages (b) in 2004 and their 10-year change. Hollow circles: London TTWA; hollow triangles: Slough and Heathrow TTWA.

Figure 4: Relationship between the initial level of labour productivity and nominal wages and the 10-year change (2004-2014)

Source: Our calculations based on data from the ONS regional and sub-regional productivity tables and ASHE.

London and Slough and Heathrow experience a large increase in labour productivity between 2004-2014. In London, this is coupled with a similar positive change in average nominal wages, whereas in Slough and Heathrow average nominal wages increase less than in most other Travel-to-Work-Areas in Great Britain (GB)).

As a result of the regional divergence in labour productivity and convergence in average nominal wages, the **relationship** between wages and LP has flattened between 2004-2014 across GB local labour markets (Figure 2). London is one of the few exceptions experiencing an increase in both LP and wages, unlike the S&H TTWA.

London is one of the few Travel-to-Work-Areas where we observe a rise of both labour productivity and wages.

Although there is a weak average relationship between productivity increases and wage increases across TTWAs, confirming an on-going decoupling between the two dynamics, the two London TTWAs exhibit different trends (Figure 5). London TTWA is one of the few that has experienced both a high increase in LP and a high increase in **average nominal wages** over 2004-2014. However, in London, the **wages of the median worker** have not increased as much

as that of the better paid, average worker. This suggests an increase in wage inequality over the same period, related to the labour productivity increase. In Slough and Heathrow, instead, the increase in LP was not accompanied by an increase in **average wages**, whereas median wages have increased similarly to the average, thus not leading to an increase in inequality.

Inspection of the y-axes in Figure 4 suggests that, overall, wages increased proportionately less than productivity over the 2004-2014 period. Because of that, we do not observe a strong correlation between LP and wages across TTWAs. We plot this in Figure 5, in relation to both average and median wages, both showing a relatively flat relationship with changes in productivity. As anticipated above, Figure 5 also shows two other important pieces of evidence. First, the change in average wages (£2.16 per hour) is larger than the change in the median wage (£1.63 per hour). Because the average is higher than the median wage, this suggests that, against the discussed reduced wages inequality **across** TTWAs, wage inequality **within** TTWAs has increased.

However, the slope of the relationship between LP and wages is very similar for the average and the median wage. This suggests that it is not the increase in labour productivity that contributes to the within-TTWA inequality: the wages of the workers in the 50th percentile is correlated to changes in labour productivity as much as that of the worker with the average wage.

(a) Average nominal wages

(b) Median nominal wages

Note: Labour productivity is measured as nominal GVA per hours worked, excluding rental income. The two lines plot the linear fit between the 10-year change in LP and average (a) or median (b) wages between 2004-2014. Hollow circles: London TTWA; hollow triangles: Slough and Heathrow TTWA.

Figure 5: Relationship between 10-year change in labour productivity and nominal wages across GB TTWAs (2004-2014)

Source: Our calculations based on data from the ONS regional and sub-regional productivity tables and ASHE

2. The impact of labour productivity changes on wages within firms and in local labour markets

The full report makes a contribution beyond the descriptive relationships to explore the **causal effect of productivity changes on wages** both within firms and within labour markets over time. Results largely confirm the descriptive evidence discussed above. We then propose potential explanations for the presence of a labour productivity-wages decoupling, including measurement problems in the presence of large shares of services in the local economies.

We estimate the impact of labour productivity using a robust identification strategy for all firms in GB. We split the sample to isolate potential differences in the Greater London TTWAs, and to investigate potential differences between main sectors. At the firm level, the wage elasticity with respect to productivity is tiny. On average, a 10% increase in firm productivity translates into a 0.06% increase in the average individual real wage. At the firm level we do not find a statistically significantly different productivity-wage relationship in either London or S&H, relative to the rest of GB. The estimates on the London subsample confirm a positive causal effect of productivity on wages, although this is not found in the S&H subsample.

Within firms in GB, an annual increase in labour productivity of 10% translates to as little as a 0.06% increase in real wages, on average. Although the effect labour productivity has on wages is slightly larger in London-based firms (0.1%), the difference compared to the rest of GB is not statistically significant.

Wage elasticities differ substantially across sectors in the entire country, and particularly in London-based firms. In most sectors we do not observe the average (tiny) positive impact of labour productivity on firm real wages. Across GB, a positive and statistically significant impact of LP on wages occurs only in the **professional services activities**, with a magnitude about three times as large as that of the remaining sectors. Professional services seem to drive the positive rent sharing discussed above.

London-based manufacturing and financial firms exhibit a different behaviour. In manufacturing, an increase in productivity results in lower increases in real wages, although (or because) on average, all wages in London manufacturing are higher than the rest of the UK. Instead, London-based firms in financial services share part of the productivity increases with employees' real wages, unlike what is observed in financial services in the rest of GB.

There are sectoral differences in the impact of labour productivity on wages in firms. In GB, only firms in professional services experience a (tiny) increase in wages of their employees as a result of increases in productivity. In London, beyond professional services, in firms in the financial sector, a 10% increase in labour productivity leads to 0.04% increase in real wages. The opposite occurs in manufacturing firms, where changes in productivity have led to a lower than average change in real wages in London. Because the data include the years of the financial crisis, the negative effect may be also due to stagnant wages during the productivity dip.

At the TTWA level, the elasticity of nominal wages to productivity is substantially larger than at firm level, but it is weakly statistically significant. A £1 larger increase in labour productivity over five years (2004-2009 and 2009-2014), across GB TTWAs, results in an £0.28 increase in average nominal wages and a £0.35 increase in median nominal wages. The larger effect on the median wages suggests that LP has not contributed to increased (income) inequality via wages.

The impact of labour productivity on the average and median nominal wages in London is not different from the rest of GB: the stronger relationship between labour productivity and the average, rather than the median nominal wage for London, (Figure 5) is not statistically significant when we control for variables that can affect both wages and productivity.

Rather, in the S&H TTWA the impact on average nominal wages is still positive but substantially smaller: a £1 larger increase in labour productivity over each 5-year period in S&H results in only a £0.05 larger increase in mean nominal wages. For median nominal wages, the relationship is not as small, with a £1 larger increase in LP over each 5-year period in S&H resulting in a £0.17 larger increase in mean wages. This confirms the descriptive evidence in Figure 5 that, in S&H, gains from productivity increases have accrued more to the median than to the average worker. However, a word of caution is necessary when inspecting the coefficients estimated for London TTWAs, as these results are derived from only two observations.

Within the local labour market, there is some evidence that the average and median worker benefit from productivity increases:
- A £1 increase in labour productivity results in a £0.28 increase in average nominal wages and in a £0.35 increase in median nominal wages: the effect is small, and points to a decoupling between productivity and wage growth in GB within labour markets.
- The statistical evidence on the impact of labour productivity changes on wage changes is however weak, which the descriptive analysis also suggests (Figure 5).
- The London labour market follows this pattern but Slough and Heathrow labour market shows a different pattern, with productivity leading to a more marginal increase in nominal wages.
- Across GB Travel-to-Work-Areas, we find a stronger impact of productivity on median than on average wages. This is also true for London, different from what was concluded from descriptive evidence in Figure 5. However, a word of caution is necessary when inspecting the coefficients estimated for London Travel-to-Work-Areas, as these results are derived from only two observations.
- A stronger impact of productivity on median rather than average wages shows that productivity gains do not necessarily increase wage inequality in labour markets.
- However, our results show a decoupling between productivity and wage growth within labour markets.

In summary, the descriptive evidence and the causal estimates suggests that differences in labour productivity across GB grew substantially between 2004-14, with the two GLA (London and S&H) TTWAs leading them. At the same time, nominal wage differences across TTWAs have been shrinking, but they have been increasing within TTWAs. This implies that changes in labour productivity translate only partially to changes in wages: the link is weak but stronger at the firm (for real wages) than at the TTWA level (for nominal wages), where productivity gains benefit workers to a larger extent (but statistical evidence is weaker). The stronger impact of labour productivity on median wages than on average nominal wages, and the opposite divergence/convergence dynamics of labour productivity and nominal wages across TTWAs suggests that labour productivity has not contributed to an increase in wage inequality through wages within and across TTWAs. However, the weak relationship between LP and wages suggests that labour productivity might be contributing to income inequality via market concentration and reduced wage shares (Autor et al., 2020; Song et al., 2019), as well as via earnings not included in our data, such as bonuses, stock options and premia (Atkinson et al., 2011; Frydman and Jenter, 2010).

Policymakers might want to exploit such conditions, where we observe that labour productivity contributes to the increase in median wages in local labour markets: that is, increasing labour productivity may contribute to higher wealth or living standards without necessarily increasing differences in wage income among workers. However, this also needs to come with a substantial effort of catching-up of LP in laggard regions.

In a context of persistently sluggish productivity growth in the UK, which threatens a full growth recovery from the previous and the present crises, we find that the **London local labour market** benefits from favourable labour productivity changes and this partly led to an increase in nominal wages (average and median). However, the links are statistically weak and economically small. Relying on such weak links between wage and productivity might not be enough to get out of the double dip crises in a sustainable and inclusive manner. In addition, the effects of Brexit and the COVID-19 pandemic might further erode the already weak link

between productivity and wages, considering the evidence that these have had on increasing inequality among workers with different skills (Adam-Prassl et al, 2020).

The key findings in our report indicate that a sustained productivity growth is a necessary but not a sufficient condition to achieve increases in living standards, neither in GB, nor in London. The good news is that median wages seem to have gained more than average wages from productivity (although this is less clear in the London Travel-to-Work-Area). Policies should focus on how to increase the elasticity between productivity and median wages, so to achieve both a more productive and inclusive economy.

3. Policy implications for a more inclusive and resilient London

A few established policy tools to tackle the productivity-wage decoupling, and the increases in wage and productivity dispersion, are based on institutional factors, such as strengthening bargaining regimes, employment protection legislation, and the role of the minimum wage (see Berlingieri et al., 2017 for a multi-country study). Further evidence is needed to establish how such policies can support increases in productivity while increasing wages and living standards for all workers in London.

Our findings on the specific characteristics of London-based firms and the London TTWAs need also to be interpreted in the light of the contradiction between the 'secular stagnation' (sluggish productivity growth) despite a 'secular innovation' within the new technological paradigm of the fourth industrial revolution, which has great potential for productivity increases not yet realised (Brynjolfsson et al, 2017; Haldane, 2017).

We suggest five broad policy considerations centred around the role of innovation as a potential engine of productivity growth, and the recent push for inclusive innovation and growth policies, especially at level of city councils (Lee, 2019).

Policy recommendation 1:
Focusing on innovation incentives for firms and public investments in Research and Development (R&D) and innovation might be a more effective strategy to increase living standards than focusing on productivity alone, which might also be achieved by cutting labour costs. In parallel, and not less important, tools to support innovation diffusion should be prioritised, to maximise benefits of innovation and reduce asymmetries across local labour markets in both labour productivity and wages.

Innovative firms pay comparatively higher wages, and an innovation rent-sharing mechanism is at work, mostly to non-routinised, highly paid jobs (Ciarli et al., 2018c), but to some extent also to low skilled workers (Aghion et al., 2020). At a regional level, there is evidence that focusing on innovation increases wages of mid-skilled workers (Lee and Clarke, 2019). This does not happen automatically, though, and is linked to the conditions and the industrial structure of the local labour market context (Ciarli et al., 2018a and 2018b, McCann et al., 2021): in contexts with high levels of non-routine jobs, such as London, there is evidence that an increase in innovation activities benefits employment levels and quality (Ciarli et al., 2018a and 2018b).

Policy recommendation 2:
There is no automatic trickle-down effect, but policy at both national and local levels should aim at creating the conditions for it to occur. Supporting London's innovative sectors as identified in the London Industrial Strategy Evidence Base is important for wage trends and job quality. These are digital services, advanced urban services, life sciences, cultural and creative activities and environmental services (GLA, 2020). However, this must be accompanied by policies that increase the inclusion of parts of the population currently excluded from entrepreneurship opportunities, curbs market concentration, and favours redistribution of innovation rents.

Wages benefit from an urban premium, the sectoral composition of local labour markets in high value added activities, and from agglomeration economies (Meliciani and Savona, 2015; Balland et al., 2020). London seems to be in an advantageous position, both in terms of its sectoral specialisation in high skilled sectors such as professional services as well as arts and creative industries (Siepel et al., 2020), and of urban agglomeration and spatial spillovers (Duranton and Puga, 2020). In the current context of stagnation and potential post-Brexit and post-Covid stagflation these advantages might be eroded, therefore, a concerted vision of both industrial and innovation policies is needed to maintain London's comparative advantages (McCann et al., 2021).

However, our evidence shows that London premia do not necessarily trickle down to workers. There is evidence that only occupational categories in a few sectors benefit from productivity and innovation (Ciarli et al, 2018c; Lee and Clarke, 2019), and that as innovation concentrates more and more in cities and firms, it can contribute to furthering inequality (Autor et al, 2020; Feldman et al, 2021; Song et al, 2019). Our evidence suggests that in local labour markets LP has a similar effect on the median and the average wage. Exclusion is then more a matter of who accesses non-routine job opportunities, and non-wage income. Policymakers need to investigate this further, in order to design innovation policies that not only lead to shared benefits across workers, but also to less concentration, more turnover and more social mobility opportunities for the many that are occupied in marginal (albeit essential) jobs and left behind (Bell et al, 2019 Aghion et al, 2019), particularly in the post-pandemics context (Savona, 2020).

Policy recommendation 3:
Firms need to invest in formal training, skills upgrading and life-long learning to make innovation more inclusive.

Empirical evidence has shown that innovative firms pay higher wages: R&D intensive firms share innovative rents, although favouring particularly high-wage, non-routinised workers (Van Reenen, 1996); software capital-intensive firms also favour wage progression, again particularly at the top end of the wage distribution (Barth et al., 2020). In general, if innovative firms favour wage progression, support to innovation should be accompanied by complementary investments to make routinised jobs and low skilled workers catch up in terms of skills, hence the importance of firm investments in on-the-job training and skill upgrading. Incentives to invest in on-the-job training and soft skills will have to come from job retention policies and firm re-investments of innovation premia that can also be distributed to vulnerable workers (HLG, 2019).

Policy recommendation 4:
Focusing on the principles of Inclusive and Sustainable Growth, the Government must maintain employment schemes that allow workers to benefit from innovation outcomes at firm and local labour market levels while avoiding premature austerity measures that might be counter-cyclical in the aftermath of the pandemic.

The level and quality of employment should be maintained as a priority, in a context that often over-emphasises the role of productivity performance in driving wage gains, in the absence of convincing evidence (Compagnucci et al., 2018).

Policy recommendation 5:
Promoting inclusion that is innovation- and wage-progression friendly is something that policies should pursue. This is also something that would go beyond the hyper-focus on productivity that has recently dominated the policy debate in the UK.

It has been shown that more inclusion is conducive of more innovation, so that a virtuous circle between redistributive policies that favour inclusion and innovation performance might be created (Bell et al., 2019; Ciarli et al., 2021; Saha and Ciarli, 2018). Innovation might in turn increase further inclusion via wage premia and wage progression.

In sum, a comprehensive policy framework to achieve an inclusive post-crises recovery, based on higher living standards for low skilled workers and the occupational categories at the bottom of the wage distribution, or those currently excluded from the job market of innovative activities, should go beyond productivity. It should ensure innovation in, and structural changes of, local labour markets (Ciarli et al., 2021) by leveraging on inclusion as a tool, rather than considering inclusion as a constraint or simply an objective; mitigate the effects of digital transformations on labour markets (HLG, 2019) by ensuring life-long learning and soft skills enhancement where the share of low skilled is particularly important (Aghion et al., 2020); and prioritise employment protection and jobs quality in a recession context. A comprehensive, place-based policy approach (Evenhuis et al., 2021) should also involve social partners and ensure that alternative work arrangements such as self-employed and gig workers are protected similarly to paid labour (Ciarli et al., 2020, HLG, 2019). Finally, policy should mitigate the detrimental effects on inequality caused by the fact that superstar firms and megacities are innovating but not redistributing effectively or allowing effective diffusion. Our findings show that LP does not seem to increase wage inequality but might still affect income and wealth inequality through the effects of capital concentration.

There is no silver bullet recipe to address the shortfall of productivity in GB while also raising living standards of low wage workers. However, if the main priority is to increase living standards and wellbeing through wage progressions, policy might need to concentrate on a concerted effort of innovation and industrial policy built on measures to include excluded talents and redistribute the innovation rents.

This is all the more so in the aftermath of the Covid-19 pandemic and requires an immense effort to avoid a triple dip recession. Along the lines put forward by Bloom et al. (2019), it is important to build an institutional architecture, arguably even at the local level, to mitigate

what has been labelled as a "Policy Attention Deficit Disorder" (Bloom et al., 2019). This consists of the damaging effects of uncertainty, lack of infrastructural investments and long-term investments in physical and human capital. Innovation policy should be prioritised, and London is in the best position to attract and support innovative human capital (Bloom et al., 2019). This is equally needed for public services and, in the case of London, for advanced urban services and local public services (GLA, 2020).[2]

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[2] In relation to this, there is a need to revise the methodological approach to measuring productivity in non-manufacturing sectors. The mismeasurement of services' productivity is a long-term issue (Grassano and Savona, 2021) and one that is being affected by the increasing digitalisation of the economies (HLG, 2019). As London and S&H, and more generally in the UK, the share of these activities is substantial, and such mismeasurement is likely to lead to under-estimation of productivity trends.

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