

# The value of apprenticeships: Beyond wages

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There is strong political commitment to the apprenticeships programme as a part of the strategy to achieve a high quality workforce that can help improve UK productivity and economic growth.<sup>1</sup> Apprenticeships have the potential to provide opportunities for gaining training whilst working, thereby improving career opportunities and helping to fill skills gaps across a range of sectors. The Government is planning to implement a new levy on businesses, designed to raise funding that will allow sustainable long-term investment in high-quality apprenticeships.<sup>2</sup>

The SMF has undertaken research to look at what types of apprenticeships create the most value, in terms of both wages and firm performance. This in turn will help inform policy recommendations on how Government should support the next phase of the apprenticeships programme.

In the [first paper](#) published as part of this project, we examined the effect of having completed an apprenticeship on wages, and how the wage premium association with apprenticeships varies by level and by sector. We found that Level 3 apprenticeships deliver larger wage uplifts than those at Level 2, and that manufacturing apprenticeships are particularly valuable in terms of the earnings gain that they deliver. In this paper, we set out findings from our analysis of data examining whether there are wider productivity benefits associated with apprenticeships, which are not captured in wages alone.

## **In summary, we find that:**

- There are reasons to believe that looking at wages alone under-estimate the total productivity benefit associated with apprenticeship investment.
- This is because firms are likely to experience net benefits in terms of performance from investing in apprenticeships, even after accounting for the fact that they may need to pay higher wages to employees who have received training.
- The extent to which firms will need to pay higher wages is likely to depend on the relative bargaining power of employees relative to employers. Our findings from the data are consistent with this. Our analysis of groups of employees that are likely to have more bargaining power than others suggests that it is indeed the case that these employees gain more from having completed an apprenticeship qualification. The effect is especially strong among Level 3 apprenticeship holders. The wages of these workers is likely to be better reflect the overall productivity gain of apprenticeship investment, although even this is likely to be an under-estimate.
- There are also likely to be broader firm-wide benefits of investing in training, however our analysis of these effects are not conclusive due to data limitations.

## Why go beyond wages?

Broadly, wages tend to rise in line with productivity. Countries with higher levels of productivity tend to have higher wages.<sup>3</sup> This makes sense from a theoretical perspective. In competitive markets, firms should be willing to pay higher wages for workers that are more productive, and thereby add value to the firm. Wages are therefore often used as a proxy for productivity, particularly where other data is difficult to obtain.

However, wages do not necessarily represent the full productivity benefit of apprenticeships.<sup>4</sup> There are two reasons for this. Firstly, firms do not necessarily need to pay employees the full additional value that they bring to the business to ensure that they retain those employees. The split between wages and value captured by the firm will depend on the relative bargaining power of the firm versus the employee.<sup>5</sup> For example, if it is difficult for an employee to move jobs, or there are few other employers that an employee could move to, then it is likely to be easier for a firm to pay a worker a wage that is below the productivity benefit they bring to the firm. In fact, the gap between the total productivity gain and the uplift in wages associated with apprenticeships determines how much it makes sense for a firm to invest in apprenticeships. We can gain a better understanding of the extent to which productivity uplifts are not captured in wages by looking at the variation in wage premium across former apprentices, as we know that differences in labour market competition will affect the extent to which the full productivity value is reflected in wages.

Secondly, there may be wider productivity benefits that are unlikely to be fully captured in wages, even in a highly competitive labour market. The overall benefit to a firm from investing in training may vary depending on the number of apprentices it hires. For example, it may need a critical number of skilled workers before substantial benefits are unlocked (this might be particularly true in capital intensive sectors). In addition, the benefits of skills investment in one person may boost productivity of other employees in the firm, for example where skills are complementary.

Whilst less straightforward than looking at wages alone, looking at productivity more generally helps to better understand the overall benefits and case for businesses to invest in apprenticeships.

## When are wages higher/lower?

In this section, we set out results from our analysis exploring how the wage premium associated with apprenticeships varies according to three potential indicators of bargaining power of workers versus their employers in wage setting.

We use regression analysis to compare the earnings of those who have completed an apprenticeship against those with similar characteristics who have not. The percentage difference in earnings between these two groups is what we refer to as the wage premium. Our methodology is the same as that used in our first paper, *The Value of Apprenticeships: Wages*, and is set out in more detail in the Annex. We use data from the Labour Force Survey, pooled across a 10 year period: 2004 to 2014. In our regression analysis, we aim to isolate the effects of having completed an apprenticeship by controlling for other factors that could affect wages, such as age, gender, ethnicity, geographic area, family and household type, type of work, sector and other qualifications.

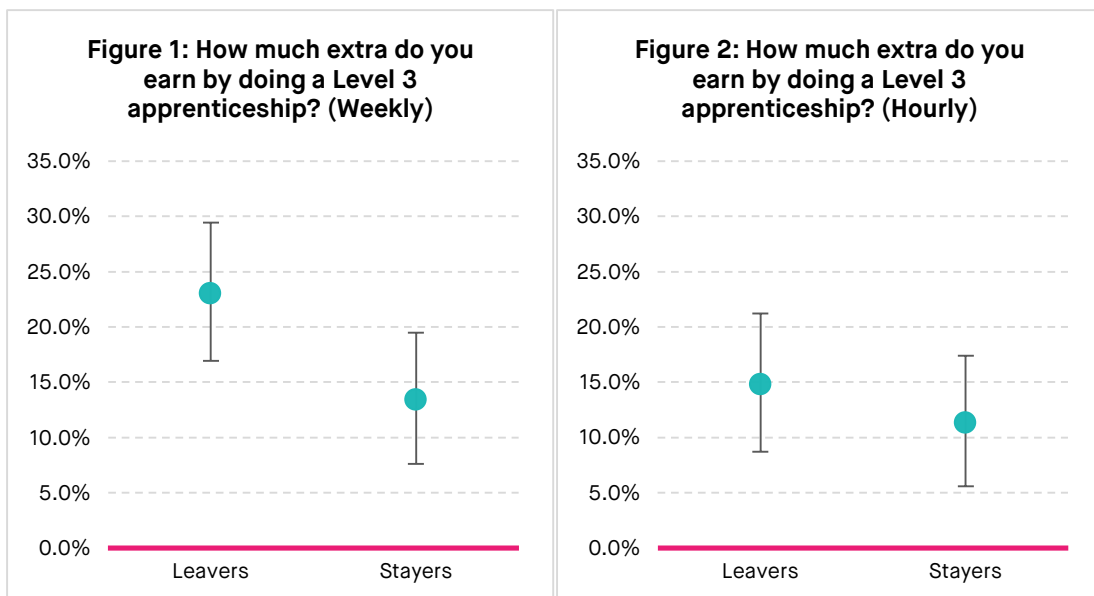
There are no direct measures of bargaining power in the data we use, so we look at three factors that are likely to influence the relative bargaining power of employees versus employers.

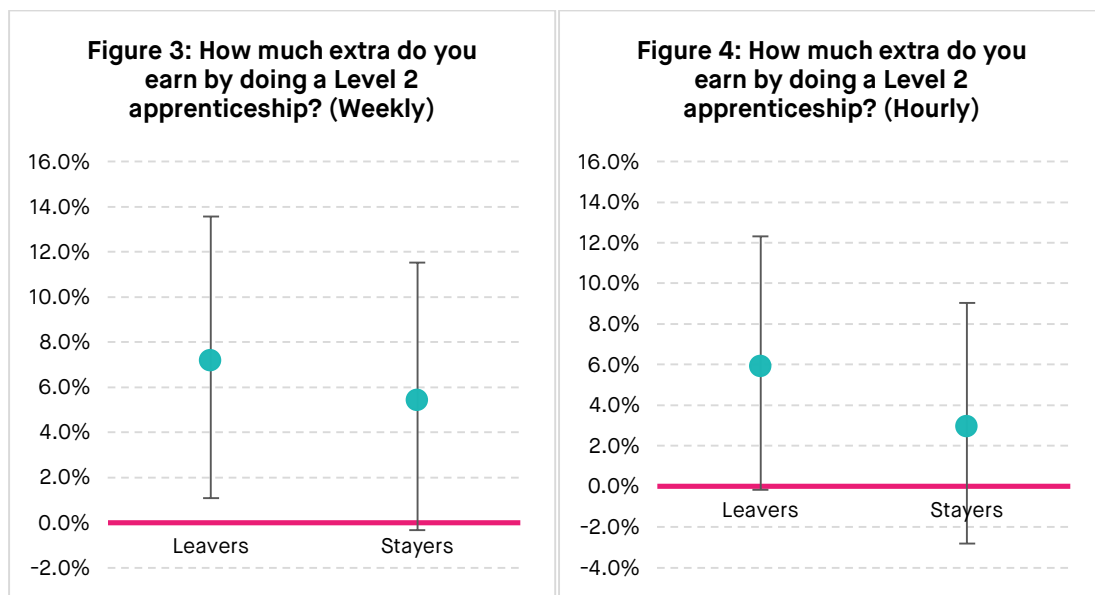
### 1) Leavers vs stayers

We separate our former apprentices into two groups: those who are working at a different firm to the one where they completed their apprenticeship (leavers) and those who are working at the same employer where they completed their apprenticeship (stayers).

By definition, leavers have alternative employment options, their current and previous employer. The ability to leave should confer more bargaining power on the employee, enabling the employee to benefit from a wage level that is closer to the overall productivity value that they bring to a firm. Ideally, we would identify individuals by their ability to leave, rather than by the fact that they have actually left. However, the data does not allow us to do this. The group of “stayers” may therefore include individuals who do have the ability to leave, which may in turn have enabled them to secure a higher wage at their current firm. The difference between leavers and stayers may therefore underestimate the overall wage uplift that would be conferred by the ability to and threat of leaving.

As can be seen from the charts below, the wage premia for former Level 3 apprentices who have since left the firm at which they undertook their apprenticeships is on average higher compared to those who stayed with the same employer. A similar pattern is apparent for Level 2 apprenticeships, although the differences between leavers and stayers are much less pronounced.





Note: Error bars indicate 95% confidence intervals. Where the error bar overlaps with the 0% line, this indicates that the estimated return is not statistically different from 0%.

Source: Social Market Foundation (SMF) analysis of Quarterly Labour Force Survey

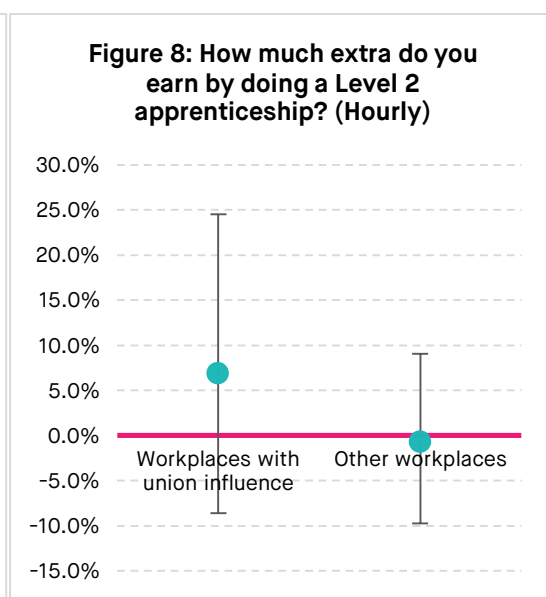
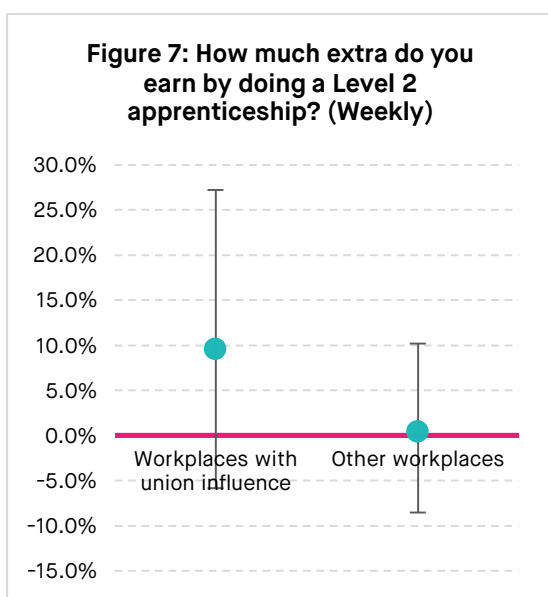
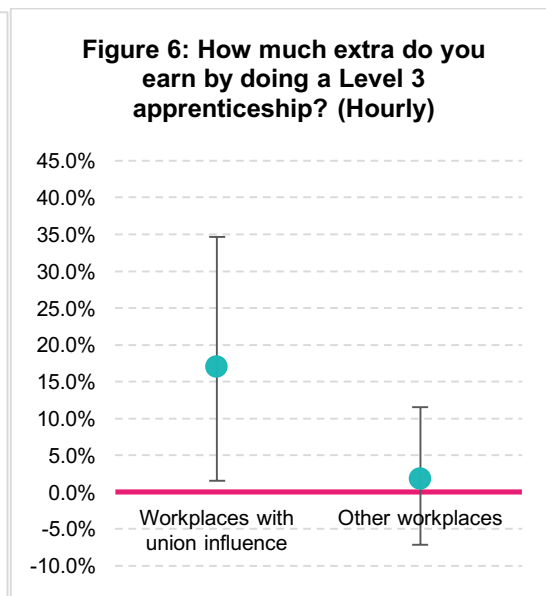
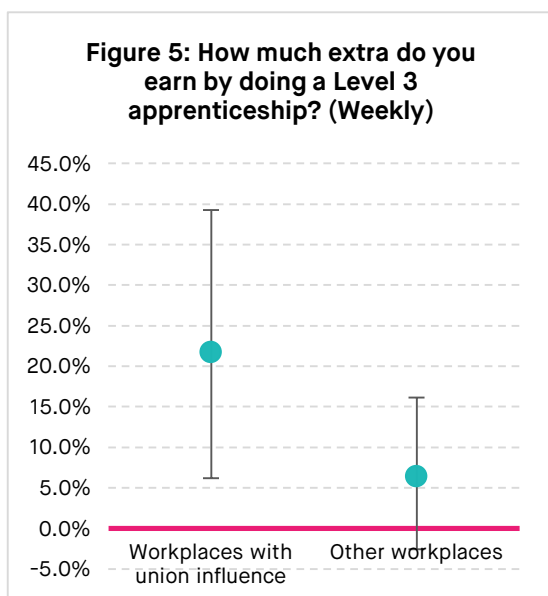
There may be other factors that mean that those who leave have improved wage prospects: other possibilities could include that they undertook more valuable apprenticeships which consisted of more transferrable skills, thereby allowing them to move employer. They may also be more capable in other ways, although we try to control for this as much as possible by taking into account other qualifications and characteristics in our analysis.

## 2) Workers in unionised vs non-unionised workplaces

Here, we separate former apprentices into two groups: those in workplaces where unions or staff associations directly affect pay and conditions, and those in workplaces where this does not happen.

As can be seen in the charts below, there is a significant premium attached to having completed a Level 3 apprenticeship and being in a workplace where unions or staff associations are involved in setting pay and conditions, relative to having only Level 2 qualifications in such a workplace. This premium is higher than that for former apprentices working in firms where unions or staff associations are not involved in decisions on pay and conditions. A similar pattern exists for Level 2 apprenticeships, although the results are not statistically significant.

The influence of unions in setting wages should shift wages closer to the total productivity value of a worker due to the increased bargaining power that they confer on employees. The difference in wage premia across the two types of workplaces suggest that where unions are present, more of the productive value associated with apprenticeships is likely to be reflected in wages. This effect is after taking into account industry, which is important to control for as union presence may differ across various types of sector.



Note: Error bars indicate 95% confidence intervals. Where the error bar overlaps with the 0% line, this indicates that the estimated return is not statistically different from 0%.

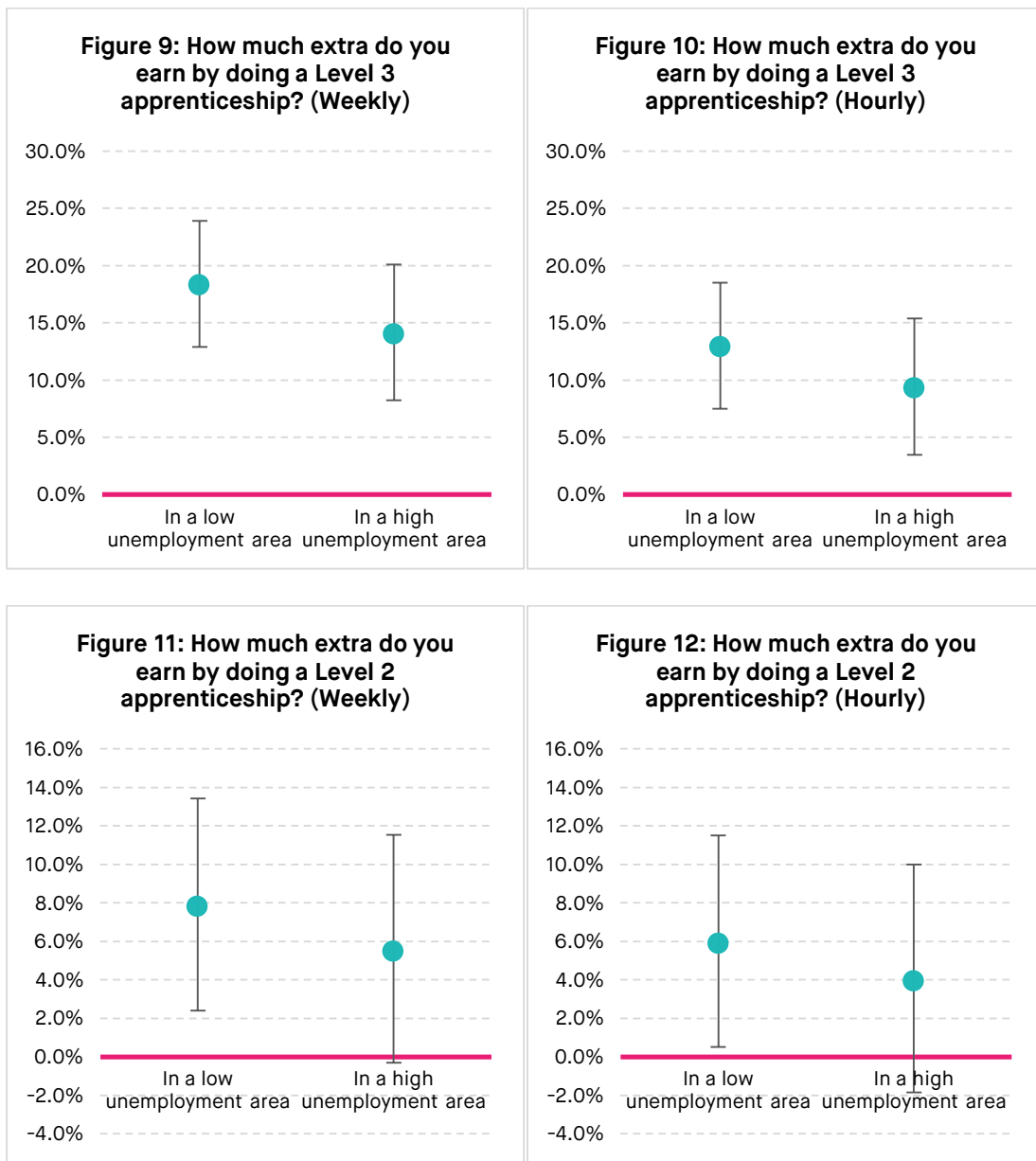
Source: SMF analysis of Quarterly Labour Force Survey

### 3) Workers in high unemployment vs low unemployment areas

Here, we look at the wage premium attached to having completed an apprenticeship and being employed in a low unemployment area versus a high unemployment area. Low unemployment areas are those with below average levels of unemployment, and high unemployment areas are those with higher than average levels of unemployment. Employees in low unemployment areas are likely to have higher bargaining power, as a firm is likely to find it difficult to replace employees in these areas should they be unable to retain them.

As shown in the charts below, there is a substantial wage premium for employees with Level 3 apprenticeship qualifications in low unemployment areas relative to those with Level 2 qualifications in the same areas. The wage premium is smaller for those in higher unemployment areas. A similar pattern is evident for those with Level 2 apprenticeship qualifications.

An alternative explanation may be that firms in low unemployment areas are in some way better able to take advantage of investment in apprenticeship skills, and so can afford higher wages for trained employees than those in high unemployment areas. This might be, for example, if low unemployment areas are also areas where the business environment is good for other reasons, such as better infrastructure or because greater clustering of firms results in a more dynamic economic environment that allows better use to be made of new skills developed during apprenticeships. It is difficult to capture this possible factor in the data, and so we cannot rule this possibility out.



Note: Error bars indicate 95% confidence intervals. Where the error bar overlaps with the 0% line, this indicates that the estimated return is not statistically different from 0%.  
 Source: SMF analysis of Quarterly Labour Force Survey

Across the three indicators of bargaining power shown above, the wage premium for former apprentices is higher among those whom we would expect to have higher bargaining power. If

that is indeed what our indicators reflect, this would suggest that average wage premia will usually under-estimate the total productivity benefit associated with apprenticeships.

The total underlying productivity benefit associated with apprenticeship investment will be better reflected in the premia achieved when the employee has higher levels of bargaining power. For example, focussing only on the results for “leavers” and those in workplaces affected by unions, the two factors that are more likely to be directly associated with bargaining power, suggests that average wage premia (13%) might under-estimate the total productivity benefit by 2-4 percentage points for Level 3 apprenticeships (on an hourly basis). This is likely to be an under-estimate as it is likely that even wage levels in situations where employees have relatively high bargaining power will not fully reflect the full productivity benefit, as explored in the next section.

### Wider productivity benefits<sup>6</sup>

We also conducted analysis looking at a direct measure of firm productivity, gross value added per head. Gross value added measures the value of the output produced by a firm, minus the cost of its inputs. It is roughly equivalent to the total of profits and wages.

We follow a similar methodology to that used by McIntosh, Jin & Vignoles (2011)<sup>7</sup>. We obtain gross value added data from the Annual Business Survey (ABS). The ABS does not contain apprenticeship information. We therefore obtain apprenticeship information from the National Employers Skills Survey (NESS). NESS contains information on whether a workplace has an apprenticeship scheme or not, and the number of apprentices employed. The 2011 paper by McIntosh et al examined the link between apprenticeships in 2007 and productivity only up to one year later, due to limitations in data availability at the time and did not find a statistically significant relationship. As it is likely to take some time for an investment in apprenticeships to show up in increased productivity, we link the slightly more recent NESS 2009 dataset with three different waves of the ABS – 2009, 2012 and 2014 (the latter was the most recently available at the time of undertaking the analysis).

Whilst the two datasets can be matched at the firm level (using each firm’s unique IDBR numbers), a difficulty arises because the two surveys are carried out at different levels of reporting unit within a firm. This can mean, for example, that a single firm has several reporting units corresponding to different workplaces or branches. A further complication is that the NESS surveys only a sample of firms, and the ABS is a part sample.<sup>8</sup> We therefore only match workplaces (observations) that have the same IDBR number and the same postcode.

Our sample size of workplaces ranges from 1137 observations to 621 observations, with fewer matches in later years. Because the ABS is sample-based, and because of the size of the matched sample, we are not able to track specific workplaces over time. Ideally, we would be able to look at the growth in productivity over time associated with having an apprenticeship scheme in 2009; this would allow us to take into account the possibility that firms with an initially higher (or lower) productivity are more or less likely to have an apprenticeship scheme. However because we are unable to track a large enough sample of organisations over time, instead we undertake regression analysis looking at the link between GVA per head in 2009, 2012 and 2014, and employment of apprentices in 2009. We follow McIntosh et al in controlling for firm type, capital expenditure per head, labour cost per head, the existence of skill gaps and skill shortage vacancies. We also control for sector, although this makes very little difference to results. Further details are included in the annex.

**Table 1: Sample sizes by matched dataset**

<b>Dataset</b>	<b>Observations</b>
NESS 2009 with ABS 2009	1137 observations
NESS 2009 with ABS 2012	790 observations
NESS 2009 with ABS 2014	621 observations

Source: ONS (SMF analysis of linked NESS/ABS data)

Our results are set out in the table below.

**Table 2: Effect on productivity of having an apprenticeship scheme, by year**

<b>Effect on GVA per head in 2009 associated with having an apprenticeship scheme in 2009</b>	<b>Effect on GVA per head in 2012 associated with having an apprenticeship scheme in 2009</b>	<b>Effect on GVA per head in 2014 associated with having an apprenticeship scheme in 2009</b>
-£9,700 (0.08)	-£11,599 (0.149)	£5,105 (0.337)

Note: P-values are included in brackets

Source: ONS (SMF analysis of linked NESS/ABS data)

On average, the establishments with apprenticeships schemes in 2009 had lower than average GVA per head. This differs from the analysis in McIntosh et al. (2011), potentially due to the effect of the downturn in 2009, which could influence our data. Over time, by 2014, the negative link disappears and turns into a positive one. This might be indicative of a positive effect of apprenticeships on productivity over time. However, our results are not statistically significant, and therefore it is difficult to draw specific conclusions. Ideally, a larger sample size combined with the ability to track a large number of firms over time would allow more conclusive findings to be drawn. Similar analysis recently published by BIS, based on linking the Annual Business Survey with Individual Learner Records, also finds no statistically significant relationship, although again, the analysis is constrained by the fact that not all firms can be tracked over time.<sup>9</sup>

## Conclusions

It is difficult to directly measure productivity, and much analysis therefore focusses on the effect of training on wages specifically. However, it is highly likely that the productivity benefits of investing in apprenticeships goes beyond that reflected in wages alone. Some of these benefits are captured by the firm. Some may even go beyond the firm itself, for example due to industry-



wide effects that come with having a higher-skilled workforce in general: these further effects are not captured in our data analysis.

From a Government policy perspective, whether investment in training is reflected in wages or wider measures of productivity raises some interesting questions. If the productivity benefits are to some degree captured by firms, then this raises the business case for investing in apprenticeships, and lessens the need for Government to introduce specific incentives. By contrast in areas where much of the productivity benefit of apprenticeship investment is reflected in wages, greater incentives might be needed to encourage firms to invest. This is likely to apply to other types of training and skills investment as well as apprenticeships specifically.

The plan to introduce a new levy to fund apprenticeships has the potential to fund more high quality apprenticeships. In the next phase of our work on apprenticeships, we plan to explore what Government and the new Institute for Apprenticeships can do to maximise the value of the new funding that is set to be made available, and help fulfil the potential of apprenticeship investment to improve the UK's productivity.

*The SMF is currently undertaking a research project to look at the link between apprenticeships, wages and productivity, kindly supported by Gatsby Charitable Foundation. This briefing paper outlines findings of the second phase of the project examining the link between apprenticeships and productivity. The first paper, *The Value of Apprenticeships: Wages*, is available at: <http://www.smf.co.uk/publications/smf-briefing-the-value-of-apprenticeships-wages/>*

## Annex

In this annex, we set out further detail on the regression models and controls used in our analysis.

### **Analysis of how wage uplifts differ based on different measures of bargaining power**

We use Ordinary Least Squares regression analysis to examine how the wage of an individual (the dependent variable) relates to whether they have completed an apprenticeship, and how this interacts with our set of indicators of bargaining power. We run three separate analyses, one for each measure of bargaining power. Our measure of the wage uplift associated with having completed an apprenticeship is based on those who have an apprenticeship as their highest qualification. We measure these individuals' earnings relative to those without an apprenticeship qualification and whose highest qualification is the same or below. We set out our reasoning for using this measure in our previous paper, *The Value of Apprenticeships: Wages*.

Control variables that we include are: age, age squared, gender, ethnicity, marital status, presence of dependent children under the age of 16, sector (public or private), industry, size of workplace, seasonal and yearly dummies, numbers of years of experience, academic qualifications, vocational qualifications.

We use Quarterly Labour Force Survey, pooled across a 10 year period, using the responses of individuals responding for the first time only to avoid repeated observations (the QLFS tracks households over five quarters). We restrict our analysis to those living in England and in full-time work.

### **Analysis of wider firm productivity benefits**

We use Ordinary Least Squares regression analysis to examine how gross value added per head in a firm (the dependent variable) relates to whether the firm had an apprenticeship scheme in 2009.

Control variables that we include are: type of establishment (profit-seeking, charity, local government, central government, other); capital expenditure per head; labour costs per head; whether the workplace is the only one in the firm; number of skills shortage vacancies and whether there are skill gaps across managers, professionals, administration staff, skilled staff, personal services, sales, machine operative and elementary; proportion of staff trained and sector.

## Endnotes

<sup>1</sup> HM Treasury, Fixing the Foundations: creating a more prosperous nation, July 2015

<sup>2</sup> BIS, Apprenticeships levy: employer owned apprenticeships training, August 2015; BIS, Apprenticeships levy: employer owned apprenticeships training: Government response, November 2015

<sup>3</sup> See for example, Nigel Meager and Stefan Speckesser, Wages, productivity and employment: a review of theory and international data, 2011

<sup>4</sup> Paul Lewis, The Simple Economics of Apprenticeship, Gatsby 2014

<sup>5</sup> See, for example, Alan Manning, Imperfect competition in the labour market, CEP Discussion paper No.981, 2010 for a discussion

<sup>6</sup> This work contains statistical data from ONS which is Crown Copyright. The use of the ONS statistical data in this work does not imply the endorsement of the ONS in relation to the interpretation or analysis of the statistical data. This work uses research datasets which may not exactly reproduce National Statistics aggregates.

<sup>7</sup> Steve McIntosh, Wenchao Jin and Anna Vignoles, Firms' engagement with the apprenticeship programme, Department for Education, 2011

<sup>8</sup> Specifically, it contains large firms, and a sample of SMEs.

<sup>9</sup> BIS, Estimating the impact of publicly funded training on industry and firm-level outcomes, 2016