

Tax-advantaged employee share schemes: analysis of productivity effects

Overview

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Executive summary

Background and objectives of the study

Oxera was commissioned by HM Revenue & Customs (formerly the Inland Revenue) to examine the impact of tax-advantaged share schemes on UK company performance (whereby companies reward their employees by granting them shares, or share options, as part of their remuneration package).¹ Many companies reward their employees by granting them shares—or share options—as a complement to their earnings, thereby giving employees a personal stake in the company's future performance. By offering tax advantages to employees involved with such schemes, it is hoped that participation can be increased, leading to growth in productivity and employment.

Such employee share schemes are a subject of public policy concern—in particular, is the cost of these schemes warranted in terms of the benefits to the economy? On the one hand, tax-advantaged share schemes are costly to the government—the cost of the schemes to the Exchequer was estimated at around £800m per annum in tax and National Insurance relief in 2002/03.² On the other hand, such incentives are currently deemed to be warranted because share schemes are associated with increased productivity and employment in the firms concerned.

This study (comprising two separate reports) presents new empirical research into employee share schemes in the UK, drawing on HM Revenue & Customs' own administrative data on share schemes. In Report 1 this data has been matched with financial information, providing a rich dataset of thousands of companies over a ten-year period, thus facilitating a quantitative and methodologically sound assessment of these schemes. The empirical research focuses on the following tax-advantaged share schemes:

- Approved Profit Sharing (APS);
- Save As You Earn (SAYE);
- Company/Discretionary Share Option Plan (CSOP/DSOP).

Report 2 has examined the productivity effect on gross value added to assess how sensitive these results are to the use of financial data.

The research addresses the following questions:

- what are the characteristics of companies that operate these tax-advantaged employee share schemes in the UK?
- what is the impact of these tax-advantaged schemes on companies' productivity performance?

¹ Oxera (2007), 'Tax-advantaged Employee Share Schemes: Analysis of Productivity Effects—Report 1: Productivity Measured using Turnover', January, and Oxera (2007), 'Tax-advantaged Employee Share Schemes: Analysis of Productivity Effects—Report 2: Productivity Measured using Gross Value Added', January.

² Source: HM Revenue & Customs.

Report 1: Productivity measured using turnover

Comparisons with previous studies

While there is already a considerable body of empirical evidence linking employee share ownership to improvements in productivity, these studies differ from the new research in a number of respects, and these two reports highlight new insights concerning this issue. However, before turning to the results and the potential policy implications, it is worth bearing in mind some of the limitations of these two studies (some, or all, of which also affect previous studies).

- Due to the dataset used, the impact of wider profit-sharing schemes (and other employee participation/workplace relations factors) cannot be fully examined, and this may lead to the estimated effect of share schemes being biased.
- Again, due to the dataset used, many important firm/employee characteristics are not available for this study (such as scheme design and whether other organisational changes occurred at the same time as the scheme introduction). These characteristics may be related to the existence of share schemes in the workplace. Because these cannot be included in the model, the estimated effect of share schemes may be biased since it may also capture the effect of these characteristics.
- One important variable—the extent of employee participation in the tax-advantaged share schemes—could not be included in the analysis due to the raw data being a flow³ and some inconsistency in definition. As such, the analysis focuses on whether a firm has a particular tax-advantaged share scheme (represented by a simple dummy variable which takes the value of 0 or 1), and not on the amount of employee participation in the schemes, which may represent a more accurate measure of such participation. For example, one firm may have almost all employees participating in a tax-advantaged share scheme, while another firm may have only a few employees participating. If tax-advantaged share schemes have an impact on firm performance, the impact might be expected to be stronger in the former case; however, this difference is not examined in this study. The examined relationship between share schemes and company performance is therefore somewhat simplified in this study, with the impact of any variation in participation across firms averaged out.
- The sample of firms in this study may present a challenge since the dataset used in the analysis is almost exclusively based on surviving companies. If surviving companies differ in their overall characteristics from bankrupt companies, the estimated impact of the scheme may be biased. As a result, it may not be valid to draw conclusions about the effect of share schemes for the population as a whole since results are derived using part of the potentially non-representative population of surviving companies.⁴

It is not possible to state whether the biases discussed above result in the *estimated* effects of share schemes (discussed below) being lower or higher than their *actual* effects.

At the same time, however, this study has significant advantages compared with much of the previous UK work in this area.

³ In other words, in any given year, the data reports only the number of employees who were granted *new* or *additional* shares/ share options, rather than the *total* number of employees participating in schemes.

⁴ For example, if, on average, the productivity impact of schemes were higher in surviving companies, to focus the analysis only on these companies (rather than a representative sample of the population) would lead to an overestimation of the productivity effect of share schemes.

- HM Revenue & Customs data used in this study is unique in that the analysis can examine the potentially differential effects of the various tax-advantaged schemes and those share schemes that are not tax-advantaged.⁵
- By merging the HM Revenue & Customs dataset with information from the FAME (Financial Analysis Made Easy) database, the complete dataset contains information on all companies that are listed on a UK stock market, plus a large number of unlisted companies, thus providing the possibility for some generalisations (other UK studies are often restricted to manufacturing or listed companies).
- Unlike studies based on survey data, this study has actual performance data rather than subjective performance measures, which have been found to over-report the effects.
- The use of panel data means that the dynamics of the effects of share schemes can be examined (although the length of the time series is relatively short).
- Panel data enables the use of more robust estimation techniques—in particular, this allows unobservable firm effects to be accounted for.⁶

Productivity effect using financial data

The first stage of the analysis was to examine the data to provide a preliminary indication of some of the relationships. This descriptive analysis indicated the following.

- Larger companies, as measured by number of employees (but also turnover and amount of capital employed) are more likely to operate schemes. They are also more likely to operate multiple schemes.
- Analysis of schemes by industry sector reveals that around 80% of all share schemes are concentrated in four sectors.⁷ When taking into account the total size of each industry, companies belonging to the electricity, gas and water supply, mining and quarrying, financial intermediation, and manufacturing sectors are shown to be most likely to operate a share scheme.
- Companies in any industry are more likely to operate a discretionary CSOP scheme than either a SAYE or APS all-employee scheme.
- On average, across all industries and years examined, 36% of companies with schemes are listed. The number of companies that are listed and that have a scheme has increased over time to almost 50% in 2001/02. Between 38% (mining and quarrying) and 74% (manufacturing) of all listed companies across industries operate a share scheme.
- Companies in the electricity, gas and water sector are most likely to operate any type of share scheme. When focusing the analysis on listed companies, the sector in which companies are most likely to operate a share scheme is manufacturing (74%).

⁵ Schemes that companies set up legitimately to remunerate their employees with shares, but that do not provide any tax advantages. There are also some schemes that are set up specifically to avoid tax/National Insurance Contributions. There is specific legislation in place to prevent this abuse.

⁶ To the extent that they are constant over time (eg, other employee participation/workplace relations factors).

⁷ Manufacturing; real estate, renting and business activities; wholesale and retail trade; and financial intermediation.

- Listed companies with schemes tend to have the same or higher average levels of productivity (capital or labour) and profitability as listed companies without schemes.⁸
- Additional modelling shows that companies are more likely to operate schemes the more capital-intensive they are. The analysis also indicates that companies are more likely to have share schemes under favourable economic conditions.

However, this paints an incomplete picture and more complex analysis (namely econometric modelling) is required to examine the impact of share schemes, controlling for other factors. This econometric analysis therefore provides a more definitive assessment of share schemes and their impact. Using dynamic panel data modelling, Oxera identified the following key points at the aggregate level (ie, across all firms).

- On average, across the whole sample, the effect of tax-advantaged share schemes is significant and increases productivity by 2.5% in the long run.
- However, when the schemes are analysed on a disaggregated basis, there is a 4.1% long-run improvement in performance for companies using SAYE schemes, but no significant improvement for CSOP or APS schemes.
- Critically, there are further benefits to be gained from operating several types of scheme—when companies have both CSOP and SAYE schemes, productivity increases by 4.4% (ie, a greater increase than the effect of operating only SAYE).

The literature suggests that the impact of financial participation schemes varies according to employee and firm characteristics. For example, the impact of tax-advantaged share schemes may be linked to other performance management schemes, structures, and incentives within a firm, such that the adoption of tax-advantaged share schemes only may not be sufficient to improve performance. Similarly, improvements in productivity are more likely if the nature of the firm's activity implies that, when incentivised, employees can have a significant effect on output. The impact may also be greater for larger firms as human resource managers in these firms may be more experienced in employee relations and thus better placed to coordinate profit sharing with other policies; furthermore, the cost per worker of implementing a scheme is likely to be lower for larger firms.

Thus, the impact of share schemes was examined for different types of firm and the question of whether firms operate other financial participation schemes (as far as such additional information was available) was investigated. The four key results from this analysis were as follows.

- Listed companies show a 4.9% long-run improvement in productivity if they have tax-advantaged share schemes; unlisted companies show no significant improvement. However, this improved productivity may be due not only to the potentially greater incentive properties of schemes in listed companies, but also to the likely higher degree of participation in these schemes. The HM Revenue & Customs dataset does not provide information on the total number of employees with schemes in any one year. It is therefore not possible to distinguish the productivity effects due to potential greater incentive effects in listed companies from those arising from greater employee participation in schemes. Given suitable data, an important area of further research would be to establish whether the observed improvement in productivity for listed companies is attributable to the higher degree of employee participation or the greater incentive properties in listed companies.

⁸ The statistical measure employed is the median or midpoint of the partial (labour and capital) productivity and profitability series (over time or by industry). Due to the considerable variation of firms in the sample, the median provides a more accurate picture of the underlying differences in these variables than the arithmetic mean, which tends to be influenced by extreme observations.

- When disaggregated by the presence of a non-tax-advantaged scheme, tax-advantaged share schemes *on their own* do not appear to be sufficient to improve performance— companies that have a tax-advantaged scheme only do not appear to have significantly higher productivity. However, if companies have share schemes that are not tax-advantaged (at any point in time) *and* a tax-advantaged share scheme, their productivity increases by around 5.2% in the long run. This implies that firms that also have a non-tax-advantaged scheme drive the significant effect of 2.5% from across the whole sample.
- When disaggregated by industry, productivity significantly increases by 5% for manufacturing, 24% for electricity, gas and water, and by 11% for financial intermediation when companies have tax-advantaged share schemes.
- The effect of a tax-advantaged share scheme increases as company size increases, with firms only in the upper quartile (ie, turnover greater than £36.3m) experiencing a statistically significant productivity effect.

These results indicate that the tax advantages of these share schemes are not sufficient on their own to increase company productivity. For tax-advantaged schemes to be effective in increasing productivity, other factors such as schemes that are not tax-advantaged, company size, and being a listed company are required for a significant productivity effect to be identified.

Table 1 summarises these results.

Table 1 Results from dynamic production functions

	Productivity effect (%)	Significance at 5%
Any tax-advantaged scheme	2.5	Yes
SAYE	4.1	Yes
APS	0.9	No
CSOP	1.6	No
Combinations of tax-advantaged schemes		
APS and CSOP	-3.3	No
APS and SAYE	-0.3	No
CSOP and SAYE	4.4	Yes
Listed companies with a scheme		
Listed companies with a scheme	4.9	Yes
Unlisted companies with a scheme		
Unlisted companies with a scheme	1.9	No
Any tax-advantaged scheme by turnover quartile		
Quartile 1 (less than £3.4m)	1.6	No
Quartile 2 (£3.4m to £11.2m)	1.1	No
Quartile 3 (£11.2m to £36.3m)	1.4	No
Quartile 4 (greater than £36.3m)	3.3	Yes
Companies with tax-advantaged schemes only		
Companies with tax-advantaged schemes only	-1.9	No
Companies with tax-advantaged and non-tax-advantaged schemes		
Companies with tax-advantaged and non-tax-advantaged schemes	5.2	Yes
Industries where the effect is greatest		
Electricity, gas and water	23.7	Yes
Financial intermediation	11.1	Yes
Manufacturing	4.8	Yes

Source: Oxera analysis.

Comparisons with UK studies that provide specific estimates of the effect of schemes are mixed. Conyon and Freeman (2004) find a positive impact for listed companies from APS and CSOP of up to 18.9% and 12.2% respectively.⁹ However, they find no evidence of a positive impact for SAYE. In contrast, Addison and Belfield (2001) find some indication that the existence of a SAYE scheme is associated with higher productivity levels (significant only at the 10% significance level).¹⁰

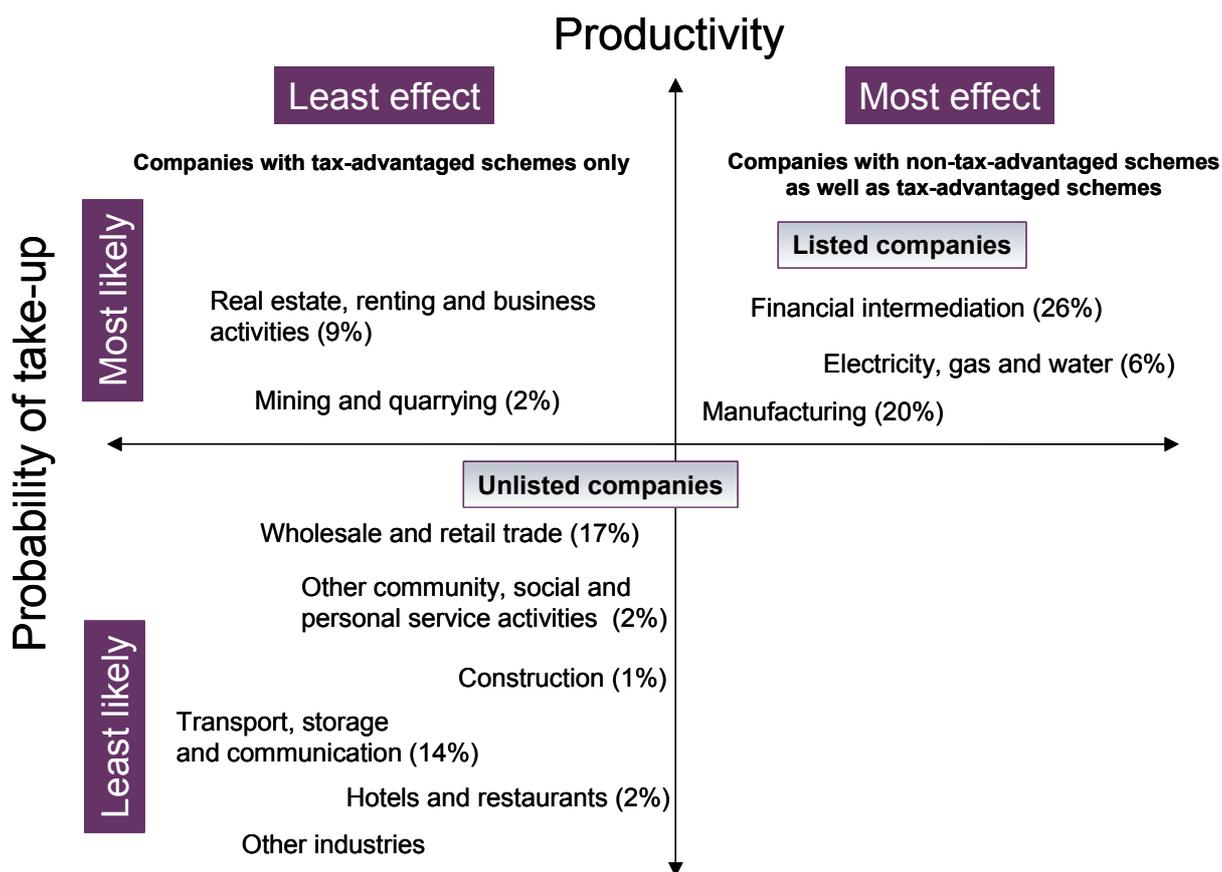
Policy implications

Figure 1 summarises the results of the financial data research according to the probability of taking up a tax-advantaged scheme and the likely productivity effect. The figure also shows, for each industry, the approximate value of shares/options held by employees, expressed as a proportion of the aggregate share/option value across all industries.

⁹ Conyon, M.J. and Freeman, R.B. (2004), 'Shared Modes of Compensation and Firm Performance: UK Evidence', in D. Card, R. Blundell and R. Freeman (eds) (2004), *Seeking a Premier Economy: The Economic Effects of British Economic Reforms, 1980–2000*, National Bureau of Economic Research, University of Chicago Press.

¹⁰ Addison, J.T. and Belfield, C.R. (2001), 'Updating the Determinants of Firm Performance: Estimation Using the 1998 UK Workplace Employee Relations Survey', *British Journal of Industrial Relations*, **39**, 341–66.

Figure 1 Summary of results



Source: Oxera.

Possible policy options therefore include:

- encouraging take-up of tax-advantaged share schemes by those companies that show the most productivity effect, namely, financial intermediation, electricity, gas and water companies, and companies in the manufacturing sector (ie, the top right-hand quadrant);¹¹
- encouraging take-up in listed companies, encouraging employee participation in all companies (particularly in certain industries), or both.¹² Establishing which factor is most significant would be an important area of further research.

However, whether it would be necessary for the government to provide tax incentives to improve performance is not clear, since there is some evidence indicating that productivity is enhanced in companies with both types of scheme (ie, tax-advantaged and non-tax-advantaged) and not in those with tax-advantaged schemes only.

Report 2: Productivity effect using gross value added

One of the limitations of the dataset used in Report 1 is that the definition of productivity assumes that any change in company turnover, all other things being equal, is seen as an increase in the productivity. This might not necessarily be the case since the company's

¹¹ Furthermore, the underlying reasons for the observed effect of schemes in industries that are likely to offer schemes but do not display higher-than-average productivity rates could be further investigated (ie, the top left-hand quadrant).

¹² It should be noted that the data employed for the analysis in this report does not enable researchers to establish whether the improved productivity effects observed in listed companies are attributable to the higher degree of employee participation in listed schemes or to the greater incentive properties in listed companies.

turnover may fluctuate due to factors other than productivity, such as changing stock levels, the value of insurance claims, acquisitions and purchase costs.

Given the inputs of production, using gross value added (the part of production that is the actual contribution of an enterprise to the economy) rather than an increase in turnover as the measure of productivity aligns the productivity measure used in this study more closely with the aim of measuring the wider benefits to society, because it captures only increases in value added to the economy as a whole rather than all the increases in turnover.

The data from HM Revenue & Customs used in Report 1 has been matched with information from the Office for National Statistics' Annual Respondents Database (ARD), providing a rich dataset of thousands of companies over a number of years, thus facilitating a quantitative assessment of these schemes (Report 2).

Although gross value added provides a better measure of productivity, it is still not possible to assess the impact of wider profit-sharing schemes (such as non-tax-advantaged schemes and other employee participation/workplace relations factors), which may lead to bias in the estimated effect of share schemes.

From ARD an average of three years' data was available for each company. This compares with an average of six years when using FAME data. The change in variable definitions in 1997 restricts the possibility of having a longer time dimension in the ARD dataset until further years' data are added. This shorter time series limits the ability of the dataset to infer any dynamic effects that take longer than three years to manifest.

Report 2 examines the impact of share schemes for different types of firm and investigates whether firms operate other financial participation schemes (as far as such additional information is available), with the following results.

- There is no significant effect from having an approved share scheme on gross value added for either listed or non-listed companies.
- Tax-advantaged share schemes implemented on their own do not appear to be sufficient to improve performance—companies with only a tax-advantaged scheme do not appear to have significantly higher productivity. However, if companies implement non-tax-advantaged share schemes (at any point in time) *and* a tax-advantaged share scheme, there is weak evidence (at the 10% confidence level) that productivity increases by around 6.1% in the long run.
- When disaggregated by industry, productivity increases significantly by 7.2% for manufacturing and 28.9% in wholesale and retail when companies have tax-advantaged share schemes. It seems unlikely that a share scheme on its own would generate such a large increase in value added; as such, this result should be treated with caution until verified by other studies on the wholesale and retail industry.
- The effect of a tax-advantaged share scheme increases as company size increases, with firms only in the upper quartile (ie, those with an annual turnover of greater than £36.3m) experiencing a statistically significant productivity effect.

The main material differences between Report 1 and Report 2 are the change in the dependent variable from logged turnover to logged gross value added as a more robust measure of productivity, and the improved measure of employment from the ARD. The change in the dependent variable means that the results are not directly comparable; however, in the ARD dataset, it is more difficult to identify a significant effect on productivity from employee share schemes, but where an effect is found for SAYE schemes, or in the wholesale and retail or manufacturing sectors, the percentage impact on gross value added is greater than that on turnover. Alternatively, the shorter time dimension available from the ARD may limit the potential to find a statistically significant relationship. This implies that

there is little effect from approved employee share schemes—apart from in large companies where the effect may be due to the existence of non-tax-advantaged schemes.

The results from this study (Report 2) indicate that the use of a tax-advantaged share scheme is not sufficient on its own to increase company productivity. However, there is some evidence that SAYE schemes in large companies may have an effect. For tax-advantaged schemes to be effective in increasing productivity, other factors such as the existence of non-tax-advantaged schemes, company size, and being a listed company increase the probability of a significant productivity effect.

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