

# **Human resource practices and firm growth: an exploratory analysis from the matched employer skills survey and the ONS business structure database**

**A statistical report produced by the Enterprise Research Centre for UKCES**

**ERC Research Report**

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## **EXECUTIVE SUMMARY**

This project aimed to explore the role of Human Resource (HR) practices in driving firm growth. Central to the project is the use of the 2011 Employer Skills Survey (ESS) which provides detailed information on the HR practices adopted in individual workplaces. These observations were matched to establishment data derived from the longitudinal Business Structure Database (BSD) which provides time-series information on employment and turnover for all UK firms and establishments registered for VAT and/or PAYE.

The ESS 2011 dataset was extended by adding unique identifiers to enable it to be integrated with the BSD in the Secure Data Lab run by the UK Data Service (UKDS). Issues arise with the matching of multi-site firms as the BSD is firm based and the ESS establishment (site- based). The match is one-to-one, however, for single-site firms and we focus here on this group of 22,152 single site firms with both BSD and ESS data.

Estimating results for the whole group of single-site firms proved difficult perhaps due the variety of firm size and sector. For the whole group few of the HR indicators proved significant in our regression models. Focussing on a narrower group of UK-owned small firms (with 10-49 employees) provided more robust results.

Estimating the relationship between HR practices in 2011 and growth over the 2011 to 2014 period for UK-owned small firms suggests:

- Skills investment – our estimation results suggest a relatively complex set of relationships between investment in the skills of employees and firm performance. It is difficult to suggest a definitive set of investment behaviours in which firms should be engaging in which to grow.
- High performance work practices are a poor predictor of future growth.
- Skills gaps proved more consistently important for growth: where higher proportions of staff experiencing skill gaps this created a negative growth impact. Where firms took action to improve the proficiency of such staff both employment growth and productivity levels increased.

We also explored the correlation of HR practices with the incidence of high growth (>20 per cent pa) over the 2011-14 three year period:

- Skills investment – a number of investment variables are strongly correlated with high growth: training with induction, supervisory, management and new technology training, learning through watching others, off-the-job training and having an annual performance review.
- High performance work practices - again a number of variables were strongly correlated with high growth, namely employees knowing the financial position of the firm; the creation of project teams or problem solving groups and having regular team meetings. A variable to capture the number of high performance work practices utilised by the firm was also highly significant.
- Skills shortages or gaps were less important with only recruitment difficulties being more significant for high growth firms.

Our analysis has established proof-of-concept for the ESS-BSD match for

single-plant firms and emphasises the difficulty of isolating an HR effect on performance across the broad group of companies. More focussed analysis of UK-owned small firms and high growth companies highlight some significant linkages.

These results should be regarded as exploratory. Future analysis should seek to confirm the results identified here with more recent editions of the ESS and consider the HR-performance link for other groups of businesses.

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## 1. INTRODUCTION

The aim of this project was to explore the potential insights into the role of HR Human Resource (HR) practices in driving firm growth by making a new match between detailed cross-sectional data on HR practices and longitudinal data on firm performance. The project explored the practicality of making this match and provides some initial insights into the HR-growth relationship. Central to the project is the use of the 2011 Employer Skills Survey (ESS) which provides detailed information on the HR practices adopted in individual workplaces. These observations were matched to individual firm and establishment-level data derived from the longitudinal Business Structure Database (BSD) which provides time-series information on employment and turnover for all UK firms and establishments. This matching should enable firms' HR resources and practices to be considered in terms of their impact on performance metrics, including firms' turnover, employment and productivity growth.

The project had three objectives:

- (1) Establish the proof of concept of matching data from the ESS to the BSD at the level of the individual observation/firm.
- (2) To create a new data resource linking HR practices and subsequent performance (which will develop through time as new waves of both datasets become available).
- (3) To understand the benefits of skill investments and high performance work practices in terms of their subsequent impact on growth and also whether skills gaps or the under-utilisation of skills impacts on performance. The relationship between these HR activities and the performance of firms identified as achieving high growth is also investigated.

The remainder of the report is organised as follows:

- Section 2 describes the data-matching approach adopted in the study and highlights some of the methodological issues involved in

using the establishment (site) based ESS survey to examine the implications of HR practices for firm level performance.

- Section 3 outlines our empirical approach to exploring the relationship between HR practices and firm growth and the correlates of high growth.
- Section 4 presents the main empirical results relating to HR practices and growth.
- Section 5 reports the results relating to high-growth firms
- Section 6 provides a summary of the main findings and identifies directions for future study

## 2. DATA SOURCES AND MATCHING

The two data sources used here are the ESS 2011 and the Business Structures Database or BSD:

- The **Employer Skills Survey** or ESS is a biennial UK-wide individual establishment survey providing details of firms' training activities, vacancies, skills gaps, and investment in training. The 2011 survey dataset comprises data from harmonised skills surveys from across the four UK nations, following individual surveys undertaken in England, Northern Ireland, Scotland and Wales. The 2011 version of the ESS was used here to provide a sufficient run of performance data (2011 to 2014) to allow the performance effects of HR practices to be observed.
- The **Business Structure Database** BSD is an annual snapshot of the Inter Departmental Business Register (IDBR) which is the UK's business register covering all firms in the UK that are registered for VAT and/or PAYE. The BSD covers around 99% of UK economic activity (in terms of turnover) and is available annually including variables on employment, turnover, birth, death, geography and sector. Linking the BSD datasets together longitudinally enables firm growth to be analysed over time.



Unlike most ONS business surveys the ESS 2011 survey was not sampled from the IDBR but uses sample data from a commercial data provider. Individual records in the ESS did not, therefore, originally contain the unique identifying enterprise reference numbers (entrefs) that are available in the BSD and most other ONS business surveys. To enable matching of the individual company records from the two surveys to be undertaken the survey company for the ESS provided the ONS with the respondent firms' contact details (i.e. name, postcode) and the ONS then undertook a matching exercise to attach the entrefs based on these company name and address details.

The resulting ESS 2011 survey dataset with the unique identifiers (entrefs) was uploaded to the Secure Data Lab (SDS) provided by the UK Data Service. The Secure Lab permits researchers to work on anonymised business datasets within a secure environment. Uploading the ESS 2011 dataset into the SDS enabled the data to be linked to the BSD via the unique entref identifier. The ESS dataset contained 47,113 records in total but it must be remembered that the survey was undertaken at establishment level (i.e. individual plant, office or workspace) as opposed to firm level. This meant that for multi-plant firms it was possible that there are multiple respondents to the ESS survey from the same business, for example, from different branches of a bank or supermarket. These multiple responses would have a common entref. This creates issues in terms of the matching of firm level BSD data and establishment level ESS data. To be precise:

- It is not clear whether some or all establishments within a multi-site business responded to the ESS. This makes it difficult to draw inferences between a firm's HR practices and subsequent performance.
- It is not clear *a priori* how the HR practices of different sites within a business should be combined to derive an overall picture of the HR practices of the entire firm.

These issues arise only in the case of multi-plant firms. For single-site enterprises where the site is the same as the firm there is a one-to-one

match between entrefs on the BSD and ESS. As a consequence, we restrict our analysis to these single-site establishments/firms in the first instance. The dataset was, therefore, restricted to respondents who stated that they were the only establishment in the organisation<sup>1</sup>. This smaller dataset within the ESS was then linked to the BSD resulting in a total of 22,152 single-site firms with data from both the BSD and ESS.

### **3. METHODOLOGY – RELATING HR PRACTICES TO FIRM PERFORMANCE**

The main method used to investigate the relationship between HR practices and firm growth was OLS regression. These OLS models are a way of determining statistically significant causal relationships between variables while controlling for other background characteristics of the firm. In a regression the firm growth is the dependent variable of interest and the explanatory variables are those variables whose relationship with the growth outcome we are seeking to test. The coefficients on the explanatory variables allow us to isolate the contribution of each, by holding everything else constant, and thus provide an indication of the strength and direction of the relationship with the dependent variable.

For this exploratory analysis we report three groups of models representing the various categories of HR activity:

- skills investment
- high performance work practices
- skills gaps and staff under-utilisation

Variables representing each of these categories were selected from the ESS survey and included as explanatory variables in the regression models, with firm growth as the dependent variable. A selection of firm-level characteristics were also included as control variables. Four separate

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<sup>1</sup> There were a number of respondents identified as such but for whom there was more than one set of responses on the ESS dataset. These were also removed so that only single-plant firms, as identified by question A3 in the ESS survey questionnaire and by unique entref, were included.

models were run, under each category, using different dependent variables to capture different growth metrics:

- Employment growth 2011-14;
- Turnover growth 2011-14;
- Productivity growth 2011-14 and
- Productivity levels 2014

The use of a variety of dependent variables also provides a robustness check on the results of any individual model. For example, we might anticipate that high performance work practices would have a consistently positive effect on each of the growth and productivity metrics.

It is worth highlighting one aspect of the ESS survey at this point which limits the sample size available for each analysis. Although we were able to match the ESS with over 20,000 single-site enterprises the structure of the ESS means that many questions are only asked of smaller groups of firms on a quota basis. This limits sample sizes in any particular set of regression models although the extent of this limitation varies considerably.

Aside from the regression analysis a separate descriptive examination of high growth firms was undertaken. Here firms were categorised as exhibiting high growth based on the OECD definition, which classifies firms with 10 or more employees as high growth if they have an annual average growth in employment of 20% or more over a three year period prior to 2011. Once firms were categorised as such t-tests were run, using the same variables as the regression models, to test which HR activities were statistically significantly correlated with high growth.

## **4. HUMAN RESOURCE PRACTICES AND FIRM GROWTH**

### **4.1 Skills Investment**

The first set of models we consider relate to skills investment, that is, those practices undertaken by firms to train or upskill their employees. We would

expect, *a priori* that upskilling would have a positive impact on firm growth and productivity levels. Initial models, using the full sample of 22,152 firms, were found to be relatively poor in explaining firm growth perhaps due to the diversity in the sample group. We, therefore, restricted the sample to UK-owned small firms (with 10-50 employees), as this provided a more cohesive group for which to estimate the growth models.

Table 4.1 presents the descriptive statistics for the sample of UK-owned small firms for whom the model was estimated. The number of firms in the sample is reduced to 2,218 due to restricting the sample to single-site, smaller UK-owned firms and also due to certain questions being asked only to subsamples of the respondents to the ESS. The table and subsequent regression model contain only those variables that were observed as important determinants of firm performance<sup>2</sup>.

The descriptive statistics show that, for this sample of firms, mean employment growth is zero, whilst mean turnover and productivity growth is around 1% over 2011-14 (logs are reported in the Table). The mean productivity level (sales per employee) in 2014 was around £69,000<sup>3</sup>. These results are in line with previous research that indicates that most firms do not grow over a three-year period (Anyadike-Danes et al., 2009)<sup>4</sup>. The firm characteristics show that the average firm size is 20 employees, with an average age of 12 years. Around 9 in 10 firms are profit-making and 13% are exporters.

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<sup>2</sup> Other variables were included in preliminary models but were dropped if they were found to have no impact on the growth metric or overall explanatory power of the model.

<sup>3</sup> The mean productivity level appears relatively high; outliers have been removed from the data but the productivity levels in general are higher than we would normally expect, for example, around one third of the sample have productivity levels (turnover per employee) of over £100k. These high productivity firms are prominent in four sectors, namely Wholesale and Retail Trade; Manufacturing; Real Estate, Renting and Business Activities; and Construction.

<sup>4</sup> Anyadike-Danes, M., Bonner, K., Hart, M. and Mason, C. (2009) "Measuring Business Growth: High-growth firms and their contribution to employment in the UK," NESTA Research Report

**Table 4.1: Descriptive Statistics for Skills Investment Regressions:  
Small UK-owned firms**

Variable	Obs	Mean	Std. Dev.
Log Emp growth 2011-14	2,218	0.00	0.43
Log Turn growth 2011-14	2,218	0.07	0.55
Log Productivity 2014	2,218	4.24	0.92
Log Productivity growth 2011-14	2,218	0.06	0.55
Job description	2,218	0.88	0.32
Annual performance review	2,218	0.66	0.47
On-job training	2,218	0.22	0.42
Training Plan	2,218	0.51	0.50
Training Budget	2,218	0.41	0.49
Job specific training	2,218	0.85	0.36
Supervisory training	2,218	0.33	0.47
Management training	2,218	0.29	0.46
New technology training	2,218	0.44	0.50
Annual performance review & Job specific training	2,218	0.58	0.49
Annual performance review & Management training	2,218	0.23	0.42
Annual performance review & New tech training	2,218	0.33	0.47
Provided supervision	2,218	0.80	0.40
% staff trained	2,218	52.39	37.98
Length of training	2,218	6.81	10.97
<b>Control Variables</b>			
Size 2011 (emp)	2,218	19.81	9.75
Age	2,218	11.57	3.59
Log previous emp growth (2009-11)	2,218	0.09	0.40
Profit-making	2,218	0.92	0.27
Sell regionally	2,218	0.19	0.39
Sell nationally	2,218	0.16	0.36
Sell within UK	2,218	0.22	0.41
Sell outside UK	2,218	0.13	0.34
% managerial	2,218	22.07	13.42
% support staff	2,218	13.26	14.38
Business Plan	2,218	0.69	0.46

With regards to the skills investment variables the majority of firms provide employees with a job description (88%); and job-specific training (85%); two thirds also undertake an Annual Performance Review (APR). The other training measures are not so prevalent with just half of firms having a training plan and two-fifths, a training budget. Those that have both an APR

and do specific types of training also varies from 58% of those who do APR and job-specific training to 23% who do APR and management training. On-the-job training is provided by just one fifth of firms, and training had been arranged for just over half of all staff in the previous 12 months, with an average of 7 days training.

Table 4.2 provides the regression results for each of the performance metrics (the correlation matrix is provided in Appendix One) when size, age, previous growth, and other firm characteristics are used as control variables. The explanatory power of the models are relatively moderate, explaining around 15-20% of the variation in growth and around 35% of the variation in productivity levels.

The model for employment growth indicates that growth was higher for firms that undertook an APR; those that provided job specific training and those that provided supervision to guide employees through their job role. However, when APR and job specific training was considered together (i.e. firms do both), the resulting impact on employment growth was negative. This was in contrast to firms that have both an APR and do management training; and those that have both an APR and do new technology training, which were both correlated with higher employment growth. This perhaps suggests a more strategic focus on skills development within the business which results in faster growth. The results for the former suggest that when firms train employees for their specific role and review their performance annually it reduces the need for extra staff. This is also confirmed by the negative signs on the staff trained and length of training variables, whereby the higher shares of both were related to a lower employment growth. The results, therefore, suggest that certain targeted training and skills investment reduces the need for additional labour, by making employees better at their own job, whilst training to upskill employees creates employment growth.

The results of the turnover growth model suggests that firms that do management training and those that undertake an APR in conjunction with new technology training are the only positive influences on turnover growth.

Notably, when undertaking an APR in conjunction with management training, turnover growth is lower, which may reflect that time diverted to such activities reduces that spent on other strategic aspects of the business such as marketing or selling. This would be more likely to be the case in such small firms in which the manager may solely perform several of these roles, in contrast with larger firms that would have separate departments for marketing, HR etc. Having a job description was also negatively related to turnover growth.

The model for the change in productivity **levels** had the best explanatory power of the four, with around one third of the variance in the sample explained. Management training, and undertaking an APR in conjunction with job-specific training were both positively related to productivity levels, the latter suggesting that better trained employees, who are annually reviewed are more productive. However, firms that did on-the-job training only had lower productivity levels as did those that did job-specific training; and those undertaking an APR along with management training. On-the-job training, may result in lower productivity levels if the in-house trainers are themselves below par, or where the training is sporadic, and the employee is only trained when a problem arises. It appears that job-specific training only results in higher productivity levels when combined with annual reviews, whilst management training results in lower productivity levels when combined with such reviews. The negative result for the latter appears to be driven by the APR variable, and suggests that staff being trained for a more advanced role who have their performance reviewed may, in the short-term, have lower productivity levels until they become more proficient in the job.

Just two variables had a positive impact on productivity **growth**, management training and undertaking an APR combined with job-specific training. Negative variables again included having a job description; undertaking job-specific training; doing an APR combined with management training, and providing supervision to guide employees through their role. This latter negative association may be explained by the fact that employees may be less productive when supervising more junior

staff, and as a result slow down overall productivity growth. The APR and management training finding can be explained in the context of the employment growth model, in which these activities combined were found to increase employment growth. Given the trade-off between employment growth and productivity growth this finding may not be unexpected.

Overall, the results suggest a relatively complex set of relationships between investment in the skills of employees and subsequent performance. Certain activities have competing effects depending on the growth metric used and, therefore, it is difficult to suggest a definitive set of behaviours in which firms should be engaging that lead to growth. This is particularly the case if the growth intention of the firm is unknown, that is, whether they wish to grow employee numbers versus having increased turnover growth, higher productivity, or indeed, if they wish to improve their performance across all growth metrics.



**Table 4.2: Skills investment and Firm Growth: Small UK-owned firms**

<b>VARIABLES</b>	<b>Emp Growth</b>	<b>Turn Growth</b>	<b>Productivi ty</b>	<b>Prod growth</b>
Job Description	0.024 (0.040)	-0.108** (0.048)	-0.033 (0.089)	0.132** (0.067)
Annual performance review	0.163** (0.081)	-0.134 (0.092)	-0.126 (0.137)	0.298** (0.132)
On-job training	0.043 (0.032)	0.039 (0.031)	-0.186*** (0.067)	-0.003 (0.040)
Training Plan	0.031 (0.027)	-0.025 (0.031)	-0.143** (0.070)	-0.055 (0.039)
Training Budget	0.026 (0.026)	0.027 (0.031)	0.156** (0.070)	0.002 (0.034)
Job specific training	0.205*** (0.076)	-0.123 (0.091)	-0.342*** (0.123)	0.329** (0.144)
Supervisory training	0.084** (0.034)	0.021 (0.040)	0.025 (0.061)	-0.063 (0.051)
Management training	-0.144 (0.092)	0.283** (0.120)	0.446*** (0.155)	0.427** (0.196)
New technology training	-0.081 (0.067)	-0.086 (0.053)	-0.052 (0.156)	-0.005 (0.079)
Annual performance review & Job specific training	-0.214** (0.088)	0.113 (0.111)	0.357** (0.164)	0.328** (0.164)
Annual performance review & Management training	0.184** (0.090)	-0.327*** (0.113)	-0.397** (0.158)	0.513** (0.181)
Annual performance review & New technology training	0.156** (0.076)	0.227*** (0.065)	0.237 (0.172)	0.071 (0.093)
Provided supervision	0.074** (0.030)	-0.014 (0.038)	-0.039 (0.062)	-0.087* (0.048)
% staff trained	-0.001** (0.000)	-0.000 (0.000)	-0.000 (0.001)	0.000 (0.000)
Length of training	-0.004* (0.002)	0.000 (0.001)	-0.002 (0.002)	0.004 (0.003)
<b>Control Vars</b>				
Size 2011 (emp)	-0.004*** (0.001)	-0.000 (0.002)	-0.002 (0.003)	0.003* (0.002)
Age	-0.002 (0.004)	-0.021*** (0.005)	-0.005 (0.009)	0.020** (0.007)
Previous emp growth (2009-11)	0.104** (0.049)	0.101*** (0.039)	-0.045 (0.120)	-0.002 (0.073)
Profit-making	0.038 (0.047)	0.019 (0.076)	0.219 (0.142)	-0.019 (0.088)
Sell regionally	-0.024 (0.042)	0.041 (0.050)	0.148 (0.118)	0.065 (0.070)
Sell nationally	0.040 (0.036)	0.007 (0.049)	0.332*** (0.080)	-0.034 (0.055)
Sell within UK	0.011 (0.053)	0.024 (0.048)	0.371*** (0.075)	0.013 (0.058)
Sell outside UK	0.092** (0.046)	0.127*** (0.048)	0.398*** (0.079)	0.034 (0.056)
% managerial	-0.004*** (0.001)	-0.003*** (0.001)	0.002 (0.002)	0.001 (0.002)
% support staff	-0.002* (0.001)	0.004*** (0.001)	0.004 (0.002)	0.005** (0.002)

	(0.001)	(0.001)	(0.003)	(0.002)
Business Plan	-0.052*	-0.043	-0.054	0.010
	(0.030)	(0.029)	(0.061)	(0.038)
Constant	0.166	0.774***	4.358***	0.609*
	(0.175)	(0.244)	(0.442)	(0.315)
Observations	2,218	2,219	2,218	2,218
<b>R-squared</b>	<b>0.157</b>	<b>0.139</b>	<b>0.346</b>	<b>0.200</b>

Robust standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

## 4.2 High Performance Work Practices

High performance work practices are those activities firms undertake for the purpose of creating a better working environment and/or to provide enhancements to staff. They would, therefore, be expected to positively affect employees' job engagement and hence contribute to growth via improved job satisfaction. Table 4.3 details the descriptive statistics for these variables. Again, the table relates to the reduced sample of UK-owned single-site small firms, and the variables identified as important with regards to firm performance.

The growth metrics and firm characteristics are similar to those shown in Table 4.1 due to the use of a similar sample of firms. Of the high performance work practices, scheduled team meetings were the most commonly observed with 71% of firms undertaking such activities, followed by processes which would enable the identification of "high potential" or talented individuals within the firm (54%). Just under half of the firms gave employees information about its financial position whilst equal shares (around a third) created work teams to work on a specific project; paid bonuses based on company performance; or gave performance related pay. Around one quarter of firms adopted ISO9000; had a staff intranet or staff newsletter. Interaction variables were created based on firms' age and whether they paid bonuses or performance related pay; in both cases the average age of such firms was around 4 years; in contrast to the overall average age of 12 years.

**Table 4.3: Descriptive Statistics for High Performance Work Practices Regressions: small, UK owned firms**

Variable	Obs	Mean	Std. Dev.
Log Emp growth 2011-14	2,109	0.02	0.41
Log Turn growth 2011-14	2,109	0.09	0.53
Log Productivity 2014	2,109	4.26	0.88
Log Productivity growth 2011-14	2,109	0.07	0.54
Know financial position	2,109	0.45	0.50
Create work teams	2,109	0.34	0.48
ISO 9000 standard	2,109	0.27	0.45
Identify high potential	2,109	0.54	0.50
Scheduled team meetings	2,109	0.71	0.46
Staff Intranet	2,109	0.27	0.44
Staff newsletter	2,109	0.25	0.43
Bonus	2,109	0.35	0.48
Performance related pay	2,109	0.29	0.46
Age*Bonus	2,109	4.21	6.04
Age*Performance related pay	2,109	3.43	5.64
<b>Control Vars</b>			
Size 2011 (emp)	2,109	20.39	9.74
Age	2,109	11.69	3.53
Log previous emp growth (2009-11)	2,109	0.08	0.37
Profit-making	2,109	0.93	0.25
Sell regionally	2,109	0.19	0.39
Sell nationally	2,109	0.17	0.37
Sell within UK	2,109	0.23	0.42
Sell outside UK	2,109	0.13	0.34
% managerial	2,109	20.28	11.49
% support staff	2,109	12.64	13.68
Business Plan	2,109	0.67	0.47

Table 4.4 provides the results of the high performance work practice OLS regressions. Again the model is run for the four performance metrics (the correlation matrix is provided in Appendix One). The explanatory power of these models with respect to growth is considerably lower than for skills investment, with the R-squared below 10% in each case, except for the productivity level model.

In the employment growth model only the identification of high potential employees is significant, suggesting that where this process is adopted firms have higher growth. This tends to suggest that the recognition of

valuable staff has important benefits, over and beyond the skills that these high potential staff may have.

In the turnover model two variables are negatively associated with growth, scheduled team meetings and performance related pay. The former of these, in such small firms, may be disruptive to the working day, and if undertaken more regularly than needed, and/or without any particular outcomes or associated goals may be ineffective and serve only to reduce time spent in production or selling. It is notable that performance related pay is negative on its own but positive when interacted with firm age, suggesting that older firms that provide this have higher turnover growth. It suggests that such incentives may be ineffective in general at motivating staff, and in fact there may be a net negative effect if not all staff are in receipt, where the allocation is seen as unfair, or staff feel they cannot improve any further (Marsden and Richardson, 1992). In this case it appears that older firms, in which the process is embedded, may benefit more.

Unsurprisingly, higher productivity **levels** are associated with firms in which staff know the financial position; have ISO 9000 standard, which relates to quality management practices; have a staff intranet and where bonuses are paid. It is worth noting that, when interacted with age, younger firms that pay a bonus have higher productivity levels, suggesting that the staff may be more motivated in the early years of the firm. Again, team meetings are found to be associated with lower productivity levels, perhaps reinforcing the disruptive nature of such activities if not well organised.

In the productivity **growth** models older firms that paid performance related pay; and those that created teams to work on specific projects had higher productivity. Factors that caused growth to be lower included scheduled team meetings; having a staff newsletter; paying performance related pay and identifying high potential employees. The latter two of these could again be related to the identification of staff that are viewed as more valuable to the firm, and so as before, could create an unfair working environment which de-motivates other staff members.

Overall, there again appears to be a mixed picture with regards to the high performance work practices that firms could adopt and have a subsequent impact on performance. Certainly it would appear that incentives do not always have the desired effect, particularly if they demoralise other employees. In general, high performance work practices, on their own, are not a good predictor of growth.

**Table 4.4: High Performance Work Practices and Firm Growth: Small UK-owned firms**

VARIABLES	Emp Growth	Turn Growth	Productivity	Prod Growth
Know financial position	0.002 (0.024)	0.017 (0.024)	0.075** (0.036)	0.015 (0.028)
Create work teams	-0.025 (0.022)	0.026 (0.029)	-0.037 (0.039)	0.051* (0.028)
ISO 9000 standard	0.013 (0.032)	0.034 (0.031)	0.184*** (0.045)	0.020 (0.034)
Identify high potential	0.059*** (0.022)	0.015 (0.024)	-0.017 (0.037)	-0.044* (0.026)
Scheduled team meetings	0.021 (0.023)	-0.074*** (0.024)	-0.083** (0.039)	-0.096*** (0.028)
Staff Intranet	0.015 (0.023)	-0.028 (0.030)	0.109** (0.048)	-0.043 (0.032)
Staff newsletter	0.028 (0.024)	-0.039 (0.027)	-0.062 (0.042)	-0.067** (0.028)
Bonus	0.027 (0.076)	0.080 (0.090)	0.466*** (0.130)	0.052 (0.096)
Performance related pay	0.094 (0.083)	-0.166* (0.093)	0.119 (0.131)	-0.259** (0.106)
Age*Bonus	0.001 (0.006)	-0.000 (0.007)	-0.018* (0.010)	-0.001 (0.008)
Age*Performance related pay	-0.007 (0.007)	0.013* (0.007)	0.001 (0.011)	0.020** (0.008)
<b>Control Vars</b>				
Size 2011 (emp)	-0.006*** (0.001)	-0.001 (0.001)	-0.001 (0.002)	0.004*** (0.001)
Age	-0.009** (0.004)	-0.013*** (0.005)	0.005 (0.007)	-0.005 (0.005)
Previous emp growth (2009-11)	0.019 (0.036)	0.154*** (0.038)	0.025 (0.050)	0.135*** (0.042)
Profit-making	0.034 (0.044)	0.118 (0.075)	0.458*** (0.113)	0.084 (0.084)
Sell regionally	0.006 (0.025)	0.061* (0.034)	0.267*** (0.055)	0.055 (0.035)
Sell nationally	0.057** (0.029)	0.118*** (0.040)	0.397*** (0.057)	0.062 (0.040)
Sell within UK	0.017 (0.035)	0.117*** (0.036)	0.431*** (0.055)	0.100** (0.041)
Sell outside UK	0.057* (0.032)	0.190*** (0.045)	0.434*** (0.068)	0.133*** (0.049)
% managerial	-0.004*** (0.001)	-0.001 (0.001)	0.009*** (0.002)	0.003** (0.001)
% support staff	-0.001 (0.001)	-0.001 (0.001)	0.007*** (0.002)	-0.000 (0.001)
Business Plan	0.005 (0.022)	0.041* (0.022)	0.007 (0.041)	0.036 (0.023)
Constant	0.492*** (0.130)	0.238* (0.133)	3.281*** (0.437)	-0.254* (0.134)
Observations	2,109	2,109	2,109	2,109
<b>R-squared</b>	<b>0.064</b>	<b>0.066</b>	<b>0.345</b>	<b>0.051</b>

Robust standard errors in parentheses  
\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

### 4.3 Skills Gaps & Under-utilisation

Skills gaps refer to the situation in which the employees of firms are not fully proficient at their proscribed job, By contrast, under-utilisation occurs when staff are fully proficient but are overqualified for their current role and this occurs when their qualifications and skills exceed those required. We would expect that skills gaps would negatively impact on firm performance and underutilisation could have either a positive or negative impact. If staff are overqualified they may be highly productive in the role, alternatively they may feel demotivated particularly if the job is at a much lower level than that for which they are qualified.

Table 4.5 details the descriptive statistics for those variables included in the growth regressions. Again, the sample of UK-owned small firms is used; the number of observations exceeds those in the previous two models as the questions were not restricted to the same sub-samples.

Within this sample of firms mean employment actually fell over the period 2011-14 by around 1%. Turnover and productivity grew by 1% on average, whilst average productivity levels were around £67,000. Recruitment and retention were not an issue for firms, with just 7% reporting such problems. Skills gaps were more of a concern, reported by just under one-third of firms, although on average just 5% of staff within firms were considered not fully proficient at their job. In fact a greater share of employees were considered to be underutilised, at 14%. For those with skills gaps 6% felt that they lost business to competitors as a result whilst 11% felt that it resulted in increased operating costs however just 4% felt that it had a major impact on firm performance. Just over one-fifth of firms had taken steps to improve the proficiency of staff with skills gaps.

**Table 4.5: Descriptive Statistics for Staff Skill Gaps and Under-utilisation: UK-owned small firms**

Variable	Obs	Mean	Std. Dev.
Log Emp growth 2011-14	5,200	-0.03	0.44
Log Turn growth 2011-14	5,200	0.04	0.55
Log Productivity 2014	5,200	4.21	0.92
Productivity growth 2011-14	5,200	0.07	0.57
Recruitment/Retention difficulties	5,200	0.07	0.25
Skill gaps	5,200	0.29	0.46
% staff with skill gaps	5,200	5.36	11.36
Major impact	5,200	0.04	0.20
% staff underutilised	5,200	13.76	25.16
Lose business due to skill gaps	5,200	0.06	0.24
Increased costs due to skill gaps	5,200	0.11	0.31
Improve skills	5,200	0.22	0.42
<b>Control Vars</b>			
Size 2011 (emp)	5,200	18.88	9.27
Age	5,200	11.56	3.61
Previous emp growth (2009-11)	5,200	0.08	0.40
Profit-making	5,200	0.93	0.26
Sell regionally	5,200	0.18	0.38
Sell nationally	5,200	0.15	0.36
Sell within UK	5,200	0.21	0.41
Sell outside UK	5,200	0.13	0.34
% managerial	5,200	22.77	14.44
% support staff	5,200	13.17	14.90
Business Plan	5,200	0.65	0.48

Table 4.6 shows the OLS regression results (correlation matrix provided in Appendix One) for the impact of skills gaps and under-utilisation on firm performance. Again the models were not strong predictors of firm growth, with an R-squared of less than 10% for each; the model explaining productivity levels performed better with an R-squared of 26%.

Somewhat surprisingly skills gaps were found to have a positive impact on employment growth, although as the share of staff with skills gaps increased employment growth decreased. It suggests that firms may be forced to recruit additional staff in the face of skills gaps amongst existing



employees although it depends on the scale of these gaps. It appears that higher proportions of staff that are not fully proficient at their job reduce the capacity for recruiting additional staff. Where skills gaps had a major impact on firms it reduced their subsequent employment growth, whilst those that took action to improve staff skills had higher employment growth.

The turnover growth model had some similar findings, in that firms with skills gaps had higher turnover growth but those with a higher share of staff not fully proficient had lower turnover growth. Where firms lost business to competitors due to these skills gaps their turnover growth was unsurprisingly lowered whilst those who had increased costs as a result, had higher turnover growth. This may reflect the fact that firms passed these higher costs onto the consumer, thus raising overall turnover growth.

Productivity **levels** were found to be negatively affected by recruitment and retention difficulties and also by higher shares of staff with skills gaps, as one would expect. The proportion of staff that were underutilised had a positive effect on productivity levels, suggesting that such staff were more productive and not demotivated by their over-qualification, as hypothesised. The negative significant sign on the squared underutilisation term indicates that this is a u-shaped relationship whereby there is a peak in terms of the share of underutilised staff that positively affect productivity, after which the opposite occurs. Finally, firms that took measures to improve the skills of those with gaps also had higher productivity levels. The model for productivity **growth** did not yield any significant results.

Overall, there were some consistent results in terms of the effect of skills gaps on firm growth; notably that having skills gaps in themselves did not negatively affect growth but actually higher proportions of staff with gaps created a negative impact. Where firms took action to improve the proficiency of such staff both employment growth and productivity levels increased.

**Table 4.6: Skill Gaps /Under-utilisation and Firm Growth Regression Models: Small UK-owned firms**

VARIABLES	Emp growth	Turn growth	Productivity	Prod growth
Recruitment/Retention difficulties	0.013 (0.031)	-0.002 (0.042)	-0.111** (0.048)	-0.015 (0.047)
Skill gaps	0.093*** (0.031)	0.086*** (0.033)	0.031 (0.054)	-0.006 (0.038)
% staff with skill gaps	-0.002* (0.001)	-0.002** (0.001)	-0.003** (0.001)	-0.000 (0.001)
Major impact	-0.088** (0.043)	0.001 (0.063)	-0.119 (0.076)	0.089 (0.069)
% staff underutilised	-0.001 (0.001)	-0.002 (0.001)	0.005* (0.003)	-0.000 (0.002)
% staff underutilised sq	0.000 (0.000)	0.000 (0.000)	-0.000** (0.000)	0.000 (0.000)
Lose business due to skill gaps	-0.032 (0.041)	-0.110** (0.045)	0.025 (0.059)	-0.078 (0.049)
Increased costs due to skill gaps	0.034 (0.028)	0.084*** (0.031)	-0.033 (0.051)	0.050 (0.038)
Improve skills	0.071** (0.029)	0.036 (0.028)	0.084* (0.045)	-0.034 (0.035)
<b>Control Vars</b>				
Size 2011 (emp)	-0.002* (0.001)	0.000 (0.001)	-0.003 (0.003)	0.002 (0.001)
Age	-0.008** (0.003)	-0.008* (0.005)	0.009 (0.007)	-0.000 (0.005)
Previous emp growth (2009-11)	0.051 (0.036)	0.104*** (0.032)	0.017 (0.087)	0.054 (0.051)
Profit-making	0.027 (0.048)	0.045 (0.051)	0.275*** (0.090)	0.019 (0.075)
Sell regionally	0.035 (0.032)	0.052 (0.037)	0.156* (0.081)	0.016 (0.046)
Sell nationally	0.031 (0.037)	0.024 (0.037)	0.322*** (0.092)	-0.007 (0.044)
Sell within UK	0.064** (0.028)	0.054 (0.035)	0.396*** (0.049)	-0.010 (0.034)
Sell outside UK	0.108*** (0.032)	0.118*** (0.040)	0.511*** (0.066)	0.010 (0.042)
% managerial	-0.003*** (0.001)	-0.001 (0.001)	-0.000 (0.002)	0.002 (0.001)
% support staff	-0.001 (0.001)	0.000 (0.001)	0.005** (0.002)	0.001 (0.001)
Business Plan	-0.002 (0.021)	0.000 (0.025)	0.051 (0.039)	0.003 (0.027)
Constant	0.221** (0.091)	0.065 (0.139)	3.686*** (0.232)	-0.156 (0.171)
Observations	5,200	5,202	5,200	5,200
R-squared	0.063	0.040	0.261	0.016

Robust standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

## 5. HIGH GROWTH FIRMS

For this part of the analysis high-growth firms were classified as such based on their employment growth over the 2011-14 three year period and confirms to the official OECD definition. The purpose of exercise is to understand which of the variables (under the same previous headings) are correlated with being a high-growth firm, rather than trying to predict what causes high growth. Table 5.1 details the variables related to skills investment and provides an indication (by way of the t-test result) as to those which are correlated with high-growth firms.

The variables which are most strongly correlated all relate to training with induction, supervisory, management and new technology training all statistically significant. Their mean values, showing the percentage of firms undertaking these activities, are around 10 percentage points higher than for non-high growth firms. Learning through watching others, off-the-job training and having an Annual Performance Review were also highly significant – a lower share of high-growth firms were involved in off-the-job training compared to non-high growth firms. The length of training and job specific training were more weakly correlated with being a high-growth firm.

**Table 5.1: Skills Investment and High-Growth Firms**

	not high growth			high growth			<i>t-stat (z)</i>
	N	mean	Sd	N	Mean	sd	
Job descriptions	3,462	0.84	0.36	203	0.83	0.38	<b>-0.39</b>
Annual performance review	3,454	0.60	0.49	204	0.70	0.46	<b>2.71***</b>
Off-job training	6,803	0.16	0.37	394	0.10	0.30	<b>-3.13***</b>
On-job training	6,801	0.20	0.40	394	0.17	0.37	<b>-1.49</b>
On and off-job training	4,540	0.65	0.48	283	0.69	0.46	<b>1.38</b>
Induction training	6,833	0.48	0.50	396	0.59	0.49	<b>4.30 ***</b>
Health & safety training	6,833	0.63	0.48	396	0.67	0.47	<b>1.59</b>
Job specific training	6,833	0.66	0.47	396	0.70	0.46	<b>1.83*</b>
Supervisory training	6,833	0.26	0.44	396	0.40	0.49	<b>5.89***</b>
Management training	6,833	0.25	0.43	396	0.34	0.48	<b>4.35***</b>
New technology training	6,833	0.34	0.47	396	0.42	0.49	<b>3.18***</b>
Employee supervision	6,869	0.74	0.44	397	0.75	0.43	<b>0.57</b>
Learn through watching	6,869	0.68	0.47	397	0.76	0.43	<b>3.65***</b>
Perform tasks above role	6,869	0.62	0.49	397	0.62	0.48	<b>0.34</b>
% Staff trained	6,869	43.20	44.47	397	46.09	43.44	<b>1.27</b>
Length of training	5,607	7.12	13.61	345	8.51	15.90	<b>1.78*</b>

Table 5.2 performs the same analysis but for high performance work practices. Again, there were a number of variables which were strongly correlated with being a high-growth firm, namely, employees knowing the financial position of the firm; the creation of project teams or problem solving groups and having regular team meetings. A variable to capture the number of high performance work practices utilised by the firm was also highly significant. The identification of high potential individuals within the firm, although significant, was more weakly correlated with a high-growth firm.

**Table 5.2 High Performance Work Practices and High-Growth Firms**

	not high growth			high growth			<i>t-stat (z)</i>
	N	mea n	sd	N	Mea n	sd	
Know financial position	3,446	0.46	0.50	202	0.56	0.50	<b>2.61***</b>
Create teams	2,880	0.38	0.49	174	0.51	0.50	<b>3.45***</b>
Problem solve groups	2,929	0.48	0.50	183	0.61	0.49	<b>3.43***</b>
Equal opportunities	3,447	0.92	0.28	205	0.89	0.31	<b>-1.08</b>
Employee consultation	3,422	0.50	0.50	201	0.50	0.50	<b>-0.20</b>
ISO 9000	3,101	0.26	0.44	179	0.28	0.45	<b>0.41</b>
High potential individuals	3,454	0.54	0.50	201	0.61	0.49	<b>1.76*</b>
Team meetings	2,966	0.73	0.44	183	0.86	0.35	<b>3.82***</b>
Variety in work	3,469	0.85	0.36	204	0.81	0.39	<b>-1.38</b>
Discretion over work	3,456	0.86	0.35	202	0.85	0.36	<b>-0.11</b>
Flexible working	3,481	0.68	0.47	205	0.72	0.45	<b>1.11</b>
High performance total	3,500	6.02	2.11	205	6.58	2.23	<b>3.40***</b>

Table 5.3 looks at those variables related to skills shortages or gaps. Only recruitment difficulties were significant with 9% of high-growth firms experiencing such difficulties compared to 6% of non-high growth firms.

**Table 5.3: Skills Shortage/Gaps and High-Growth Firms**

	not high growth			high growth			<i>t-stat (z)</i>
	N	mean	sd	N	mean	sd	
Recruitment difficulties	6,682	0.06	0.24	388	0.09	0.28	<b>1.98*</b>
Loss of business	6,682	0.02	0.15	388	0.03	0.16	<b>0.75</b>
Increased costs	6,682	0.03	0.18	388	0.05	0.21	<b>1.20</b>
Difficulties working practices	6,682	0.02	0.12	388	0.02	0.15	<b>1.13</b>
Difficulties technological change	6,682	0.01	0.10	388	0.02	0.13	<b>1.40</b>
Underutilised staff	6,301	17.41	29.24	352	18.05	29.58	<b>0.40</b>

Finally, examining the general background characteristics, Table 5.4 indicates that the proportion of staff qualified to level 3 and degree level are highly correlated with a high-growth firm, as are the proportions with managerial and support level staff – that is, high-growth firms having a lower share of managerial staff than the non-high growth. A higher proportion of high-growth firms also have a business plan, a training budget and only minor differences in the range of their goods. The markets in which firms sell to is also correlated, although more weakly, with a lower share of high-growth firms selling regionally, compared to non-high growth firms, and a higher share selling outside the UK. Unsurprisingly, employment and turnover growth are both higher for high-growth firms, whilst productivity levels and productivity growth is lower.

**Table 5.4: General Characteristics and High-Growth Firms**

	not high growth			high growth			<i>t-stat (z)</i>
	N	mean	sd	N	Mean	Sd	
Employment growth	6,713	-0.14	0.50	397	0.84	0.31	<b>38.75 ***</b>
Turnover growth	6,715	0.00	0.62	397	0.52	0.71	<b>16.07***</b>
Productivity	6,713	4.20	1.08	397	3.97	1.25	<b>-4.10***</b>
Productivity growth	6,713	0.14	0.65	397	-0.32	0.71	<b>-13.48 ***</b>
Size2011	6,869	73.71	912.19	397	59.12	355.91	<b>-0.32</b>
Profit-making org	6,869	0.92	0.27	397	0.92	0.27	<b>-0.05</b>
Sell local	6,869	0.33	0.47	397	0.30	0.46	<b>-0.98</b>
Sell regional	6,869	0.19	0.39	397	0.14	0.35	<b>-2.12*</b>
Sell national	6,869	0.15	0.36	397	0.16	0.37	<b>0.89</b>
Sell within UK	6,869	0.20	0.40	397	0.22	0.42	<b>0.97</b>
Sell outside UK	6,869	0.14	0.34	397	0.17	0.37	<b>1.71*</b>
% Graduates	6,587	22.74	28.40	378	26.71	29.68	<b>2.66***</b>
% Level3	5,561	25.75	26.91	329	35.02	31.79	<b>5.98***</b>
% Managerial	6,869	27.02	20.96	397	24.04	20.86	<b>-2.76***</b>
% Support	6,869	14.77	17.24	397	19.01	26.05	<b>4.62***</b>
Have training plan	6,803	0.43	0.50	392	0.46	0.50	<b>1.23</b>
Have training budget	6,728	0.35	0.48	385	0.40	0.49	<b>2.03**</b>
Have business plan	6,686	0.66	0.47	383	0.75	0.43	<b>3.83***</b>
Minor diff in goods	6,869	0.31	0.46	397	0.37	0.48	<b>2.73***</b>
Substantial diff in goods	6,869	0.38	0.49	397	0.35	0.48	<b>-1.36</b>
Investor in people	6,209	0.13	0.34	366	0.13	0.34	<b>-0.04</b>

## 6. SUMMARY AND CONCLUSIONS

Four main conclusions follow from our analysis. First, in methodological terms it is possible to create a useful link between the ESS 2011 survey and the BSD. Although difficult for multi-site businesses the match is direct for around 22,000 single site businesses. The resulting data-set provides a potentially unique window on the growth implications related to HR practices. Second, identifying generalised relationships between HR practices and growth across the entire group of single-site businesses proved difficult perhaps due to the size and sectoral variation in the firms included in the sample. Third, there is more evidence of a consistent relationship between some HR practices and growth for a more homogenous group of firms – small UK-owned businesses. For this group of firms, skills investment measures and high performance work practices are relatively poor predictors of future growth. Skills gaps proved a more consistent indicator and, where firms took action to address skill gaps, both employment growth and productivity levels increased. Finally, a number of skills investment measures and high performance work practices are correlated with a high-growth firm. Here, skill shortages are less useful.

These results should be regarded as exploratory. Future analysis should seek to confirm the robustness of the initial results identified here exploring different types of modelling strategies and different explanatory variables. It may also be worth considering the HR-performance link for other groups of businesses such as medium-sized businesses or groups associated with particular industries or regions. Moderators of the performance effect of HR practices should also be considered. Such practices may be more significant for performance in particular industry contexts and/or where workforces are more highly skilled.

One limitation of the current analysis is its focus on single-site firms. In technical terms it would be possible to overcome this issue by matching ESS responses to local unit codes (lurefs) rather than firm-level codes (estrefs). Matching the two datasets could then be undertaken on the basis of lurefs. This would allow the HR-performance comparison to be made at

the establishment or local unit level and the utilisation of the whole of the ESS.

The scope of the analysis presented here is also limited to three sets of HR measures from the ESS. The survey contains a range of data on other HR practices and the impact of these on growth performance could usefully be considered.



**Table A1: Correlation Matrix for Skills Investment Regressions  
(explanatory vars only)**

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1 Log Emp growth 2011-14	1.00																		
2 Log Turn growth 2011-14	0.38	1.00																	
3 Log Productivity 2014	-0.07	0.31	1.00																
4 Log Productivity growth 2011-14	-0.40	0.70	0.36	1.00															
5 Job description	0.01	0.00	0.02	-0.01	1.00														
6 Annual performance review	0.08	0.02	0.06	-0.04	0.23	1.00													
7 On-job training	-0.01	-0.01	-0.07	-0.01	-0.02	-0.08	1.00												
8 Training Plan	0.03	-0.02	0.01	-0.04	0.11	0.19	-0.15	1.00											
9 Training Budget	0.03	0.01	0.02	-0.01	0.17	0.28	-0.17	0.31	1.00										
10 Job specific training	0.05	-0.01	-0.03	-0.05	0.03	0.10	-0.03	0.15	0.16	1.00									
11 Supervisory training	0.06	0.01	-0.05	-0.04	0.06	0.08	-0.09	0.20	0.15	0.12	1.00								
12 Management training	0.05	-0.01	0.00	-0.04	0.06	0.16	-0.10	0.23	0.22	0.13	0.46	1.00							
13 New technology training	0.05	0.05	0.12	0.01	0.07	0.17	-0.08	0.12	0.17	0.11	0.09	0.13	1.00						
14 Annual performance review & Job specific training	0.08	0.00	0.04	-0.06	0.19	0.84	-0.08	0.24	0.31	0.49	0.13	0.19	0.19	1.00					
15 Annual performance review & Management training	0.07	-0.02	0.00	-0.07	0.10	0.39	-0.09	0.23	0.28	0.13	0.37	0.84	0.14	0.39	1.00				
16 Annual performance review & New technology training	0.09	0.06	0.10	-0.01	0.12	0.50	-0.09	0.16	0.23	0.13	0.09	0.15	0.79	0.48	0.27	1.00			
17 Provided supervision	0.08	0.02	-0.03	-0.04	0.05	0.14	-0.03	0.12	0.08	0.18	0.13	0.12	0.11	0.19	0.13	0.14	1.00		
18 % staff trained	-0.01	-0.03	-0.07	-0.02	0.05	0.07	-0.01	0.20	0.12	0.11	0.15	0.14	0.06	0.11	0.14	0.09	0.09	1.00	
19 Length of training	-0.03	0.01	-0.03	0.03	-0.01	0.05	0.04	0.03	0.02	0.00	0.04	0.06	0.01	0.04	0.08	0.02	0.02	-0.04	1.00



**Table A2: Correlation Matrix for High Performance Work Practice Regressions (explanatory vars only)**

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1 Log Emp growth 2011-14	1.00														
2 Log Turn growth 2011-14	0.37	1.00													
3 Log Productivity 2014	-0.09	0.27	1.00												
4 Log Productivity growth 2011-14	-0.40	0.70	0.33	1.00											
5 Know financial position	0.02	0.03	0.08	0.01	1.00										
6 Create work teams	-0.03	0.01	-0.01	0.03	0.13	1.00									
7 ISO 9000 standard	0.01	0.04	0.16	0.03	0.07	0.03	1.00								
8 Identify high potential	0.07	0.03	0.01	-0.02	0.14	0.16	0.04	1.00							
9 Scheduled team meetings	0.06	-0.02	-0.01	-0.07	0.25	0.17	0.09	0.18	1.00						
10 Staff Intranet	0.03	-0.03	0.07	-0.05	0.17	0.10	0.09	0.10	0.21	1.00					
11 Staff newsletter	0.02	-0.04	-0.02	-0.05	0.11	0.11	0.07	0.10	0.09	0.15	1.00				
12 Bonus	0.06	0.09	0.23	0.04	0.21	0.03	0.06	0.10	0.12	0.11	0.03	1.00			
13 Performance related pay	0.05	0.03	0.15	-0.01	0.09	0.06	0.03	0.13	0.13	0.11	0.06	0.22	1.00		
14 Age*Bonus	0.03	0.06	0.22	0.04	0.18	0.02	0.07	0.08	0.10	0.10	0.03	0.95	0.20	1.00	
15 Age*Performance related pay	0.02	0.01	0.14	0.00	0.07	0.05	0.03	0.12	0.11	0.08	0.05	0.21	0.94	0.24	1.00

**Table A3: Correlation Matrix for Skills Gaps and Under-utilisation Regressions (explanatory vars only)**

	1	2	3	4	5	6	7	8	9	10	11	12
1 Log Emp growth 2011-14	1.00											
2 Log Turn growth 2011-14	0.36	1.00										
3 Log Productivity 2014	-0.08	0.27	1.00									
4 Log Productivity growth 2011-14	-0.42	0.69	0.33	1.00								
5 Recruitment/Retention difficulties	0.02	0.00	-0.07	-0.01	1.00							
6 Skill gaps	0.10	0.06	-0.01	-0.02	0.15	1.00						
7 % staff with skill gaps	0.06	0.03	-0.06	-0.01	0.19	0.73	1.00					
8 Major impact	-0.01	0.02	-0.04	0.03	0.18	0.32	0.39	1.00				
9 % staff underutilised	-0.04	-0.02	-0.08	0.01	0.02	-0.03	-0.03	-0.02	1.00			
10 Lose business due to skill gaps	0.01	0.01	-0.02	0.00	0.16	0.40	0.43	0.50	-0.01	1.00		
11 Increased costs due to skill gaps	0.05	0.05	-0.01	0.01	0.16	0.53	0.51	0.43	-0.01	0.52	1.00	
12 Improve skills	0.10	0.06	0.00	-0.02	0.13	0.83	0.61	0.28	-0.04	0.33	0.47	1.00



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