

**WERS 2004 Information and Advice Service
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**Innovations in WERS 2004:
The Collection of Objective Data on Workplace Performance**

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1. Introduction

One of the central purposes of the Workplace Employment Relations Survey series has been to map patterns and trends in employment relations in Britain. However, another principal application of the survey data has been to analyse the relationships between workplace performance and various types of human resource management practices, employment practices and compensation systems. Much of this work arises from a desire to establish the impact and efficacy of different workplace practices. The subjects investigated have included union representation, employee consultation arrangements, performance-related pay, workforce training, bundles of human resource management practices, and work-life balance policies.

A prerequisite for such analyses is the availability of information on workplace practices and relevant contextual variables, on the one hand, and workplace performance measures, on the other. In this respect, the Workplace Employment Relations Surveys (WERS) (previously, the Workplace Industrial Relations Surveys) have proved an invaluable source, as few other inquiries provide data in both areas. But despite the extensive use of WERS in industrial relations, labour economics and human resource management, some commentators have questioned its value. One such area of debate concerns the ability of the survey (indeed, any survey) to capture the complexity and diversity of human resource management practices and industrial relations at the workplace. We do not address this particular issue here.¹ Instead, we focus on another area of contention, which concerns the validity of the measures of performance that have traditionally been available in WERS. The latter comprise subjective assessments of relative productivity and relative profitability acquired in each Cross-Section survey from the main management respondent (the senior person at the workplace with responsibility for personnel or employment relations issues). The nature of these measures, and the way in which they have been collected, have raised questions about both their reliability and their usefulness in identifying performance-enhancing or performance-limiting practices.

In acknowledgement of these concerns, efforts were made in the 2004 WERS to collect objective (accounts-based) measures of workplace productivity and profitability, in addition to the subjective measures previously captured. These efforts involved the administration of a new Financial Performance Questionnaire within the 2004 Cross-Section Survey. They also involved attempts to link both the 2004 Cross-Section and 1998-2004 Panel data with performance data collected in the Office for National Statistics' (ONS) Annual Business Inquiry.

This paper describes these attempts, and also examines the nature and availability of the objective measures of performance that were subsequently obtained. It is complemented by a separate paper (Forth and McNabb, 2007) which evaluates the degree of convergence between the objective and subjective measures.

¹ For a general discussion of the issues see, for example: Huselid and Becker (1996, 2000); Gerhart et al (2000a, 2000b); Wright et al (2000) .

2. Existing measures of workplace performance

Before we consider the objective performance data available in WERS 2004, it is useful to consider the existing measures of workplace performance available in earlier surveys in the series and collected again in WERS 2004. Here we focus on final performance indicators, that is, labour productivity and profitability, rather than intermediary measures such as labour turnover and absenteeism.

Subjective assessments of relative financial performance have been sought from workplace managers in each of the five Cross-Section surveys in the WERS series. The subjective assessment of relative productivity was added in 1990. The question text used for each measure in WERS 2004 is reproduced in Appendix A, though the wording has remained virtually identical over the series: the principal change was the move from a three to a five-point scale for the measure of financial performance in 1984. These questions have typically been directed to the main management respondent, though in 1990 they were directed to a financial manager in private sector workplaces that had someone in such a role (24 per cent of all surveyed workplaces).

There are a number of criticisms that might be levelled at these subjective measures. The first is that performance may be measured with error since the main management respondent in WERS may have only limited information on either or both of the performance variables. In the WERS 2004 Cross-Section Survey, half of all respondents were personnel specialists. A further 47 per cent were owners or general managers, whilst only 4 per cent were financial managers. It seems probable that some personnel managers will not be well informed about the level of labour productivity or financial performance within their own workplace, and will be even less knowledgeable about the performance of their competitors; the respondent requires knowledge of both in order to provide the relative evaluation sought within the question. Such concerns are seemingly given weight by the fact that around half of all respondents report their establishment's productivity or performance as being above average and only a small proportion report it to be below average (see Appendix A). There is also a significant amount of non-response.

If any measurement error was random, the impact would be to reduce the apparent strength of any associations that could be identified. However, a second criticism is that the limited variance in the data (also partly a function of the limited response categories) provides the analyst with less information than a continuous, accounts-based measure of productivity or profitability. This further restricts the analyst's ability to identify associations between practices and performance, since the impact of a practice must be sufficient to move a workplace from one category to the next in order to be observable in the data.

If any measurement error was non-random, and there were consistent positive (or negative) response biases across a range of variables, the impact could be more problematic. This may occur if a manager responsible for introducing specific practices, presumably with the expectation that they may improve productivity or profitability, then overstates any positive effect these practices may have had (or downplays any negative

impact), leading to a spurious positive correlation between responses about employment practices and responses about performance.

Quite apart from any potential measurement error, another possible criticism is that there is some lack of clarity in the WERS subjective measures as to what is actually being measured. Since 1998, a precursor to the question about financial performance has asked the respondent to specify the measure of financial performance on which their evaluation is based (sales, profits, costs etc), but there is no such precursor to the question on productivity. Two managers may then base their productivity ratings on very different measures, with one taking sales as the numerator and another taking value-added. The denominator for the respondent's evaluation is not defined for the ratings of either productivity or financial performance, and so may be variously taken as either total employees, full-time equivalents or even hours worked. Furthermore, the nature of the industry comparison is not defined and respondents may clearly have differing views as to what constitutes "your industry".

Finally, and of no less importance in policy terms, the subjective measure may be criticised because the limited, ordinal nature of the response categories means that it is not possible to quantify the impact of any particular practice on workplace performance. Instead, one is limited to making general statements about the sign of any impact or association (whether positive or negative) and about the relative importance of different practices included within the same analysis.

Notwithstanding these various concerns, subjective performance measures do have a number of significant advantages. From a pragmatic point of view, objective measures of profitability or productivity are not always available at the level of the establishment. Respondents to workplace surveys may have an accurate perception of how their establishment is performing, but may not have - or be willing to release - actual data on sales, value-added or profitability. This may be because such information is not collected at the level of the individual workplace or because, even if it is available, it is commercially sensitive. In contrast, subjective measures tend to have high response rates, with 85-90 per cent of respondents typically providing a rating in WERS. They are also less costly to construct, since one merely incurs the negligible marginal cost of asking (answering) one or two additional questions within an existing face-to-face interview that, in WERS, already lasts an average of two hours.

Prior evaluations of the subjective performance ratings in WERS have also generally been positive. In their analyses of the impact of unions on financial performance, Machin and Stewart (1990, 1996) accepted that the subjective measure included a degree of 'noise', but their tests found no evidence of systematic reporting errors. They also found that workplaces which gave higher subjective ratings of financial performance were less likely to close down in subsequent years, a finding replicated by Bryson with more recent data (2001). Machin and Stewart also pointed out that objective valuations may be subject to measurement error and may vary because of differences in accounting practice across firms, and they noted the value of the subjective measure in implicitly controlling for unobservable industry-specific effects.

Nevertheless, there have been continual calls advocating the collection of objective (accounts-based) performance data in WERS. This was first attempted during the design phase for WIRS 1990, but abandoned after piloting suggested a low response rate (Airey et al, 1992: 20).

A second attempt to obtain objective performance data was made in 1998. The Cross-Section Survey included a question (MCENPRO) which sought consent from the management respondent to link the survey data from their workplace to any return that had been provided for that workplace in response to the ONS Annual Business Inquiry (ABI). The ABI provides information, inter alia, on gross output, intermediate inputs and employment that can be used to derive a measure of per capita gross value added (Jones, 2000). Successive years of data are made available for research use within an ONS repository named the Annual Respondents Database (ARD) (Oulton, 1997; Barnes and Martin, 2002). The ABI (and hence the ARD) does not, however, contain much information on the sorts of contextual variables found in WERS and contains no data on workplace human resource practices or industrial relations.

The linking of the records was possible because both surveys drew their samples from the ONS Inter-Departmental Business Register (IDBR). However, when the matching exercise was conducted, ABI data were available within the ARD for only 175 of the 2,191 establishments surveyed in WERS 1998. The reasons were two-fold. First, the ABI covered only the production sector at the time that WERS 1998 was being designed and put into the field in 1997; data were first collected from the service sector in 1999 (albeit most typically for the calendar year January – December 1998).² For this reason, consent to link WERS and the ABI was only sought from workplaces in the production sector (n=418) and, because it was originally envisaged that the majority of WERS fieldwork would take place before the end of 1997, the question only sought consent to link WERS to the 1997 ABI. This naturally limited the opportunities for data linking. The second issue was that, being a sample survey among enterprises with fewer than 250 employees, the ABI has only partial coverage of the population of private sector businesses. Consequently, only 229 of the 319 workplaces providing signed consent in WERS 1998 could be identified on the ARD as having provided an ABI return for 1997 (Haskel, 2005).

A further issue to be confronted in any subsequent analysis of the matched data was that most returns to the ABI are completed at enterprise level. Thus, in cases where the surveyed establishment in WERS 1998 was part of a multi-site organisation, there was commonly a discrepancy in the unit of observation within the two surveys.³ A similar problem arose in matching ABI returns with another establishment-level survey – the Employer Skills Survey for England. Analysis of those data proceeded either by focusing solely on single-plant enterprises (Haskel et al, 2003; Galinda-Rueda and Haskel, 2005), by apportioning enterprise output across plants on a per-employee basis (thereby

² The ABI continues to exclude SIC(2003) Section J (Financial intermediation).

³ For example, if the WERS data related to a single outlet of a national retail chain, the ABI return may well concern the whole company. Haskel (2005) reports that only 69 of the 229 matched ABI returns had site-level data on labour productivity.

assuming homogeneity across plants within the same enterprise) (ibid), or by extrapolating from the small number of observations for workplaces in multi-establishment firms (Harris and Robinson, 2006). Each option naturally raises questions about the representativeness and reliability of the results.

3. Collecting Objective Measures of Workplace Performance in WERS 2004

The experience of the previous surveys led the Performance/Technology Specialist Team and the WERS Research Team to consider how objective performance data might be better collected in WERS 2004. It was clear that the size of any WERS-ABI linked dataset could be extended considerably by a more wide-ranging consent question that included service industries and which also provided for linkages to be made to multiple years of data in the ARD. However, questions would still remain about the common mismatch in units of observation. Accordingly, it was also agreed that, subject to successful pre-testing, WERS would again attempt to collect data at establishment level through the development of a questionnaire focused specifically on financial performance.

a) Linking WERS 2004 to the ARD

The development of a revised consent question took place via discussions with the Business Data Linking (BDL) team at the Office for National Statistics, headed by Felix Ritchie. BDL have responsibility for linking data from the various statistical inquiries undertaken by ONS, and have also facilitated the few links that have been made between these inquiries and external surveys (e.g. WERS 1998, Employer Skills Survey, International Benchmarking Survey). These discussions led to the adoption of a wide-ranging consent question previously used in DTI's Work-Life Balance Employer Survey 2003. The wording of the question as it appeared in WERS 2004 is reproduced in Appendix B.⁴ Where a positive reply is obtained from the respondent, the nature of the consent obtained via this question permits links to be made (by ONS and the WERS Research Team) between the WERS data from that workplace and almost any other source of data over any time period, as long as the resultant linked data are used for research purposes. In the event, consent was obtained from 2,166 (94 per cent) of the 2,295 workplaces that participated in the Cross-Section Survey.⁵

The WERS Cross-Section data for these workplaces were subsequently linked to ARD2 by the Business Data Linking team at ONS (see Davies, 2006 for a detailed discussion of the linking process).⁶ Table 1 provides a summary of the linkages made in respect of ARD2 for 2002, 2003 and 2004. The process of linking WERS with the ARD2 was done by matching via each workplace's unique IDBR identifier (called the IDBR Local Unit reference number), this identifier being present on both data files. The table indicates that

⁴ Verbal consent was considered sufficient by ONS in 2004. The requirement for signed consent in WERS 1998 had reduced the numbers available for matching, as signed consent forms were not collected for 54 of the 373 workplaces that were recorded to have given verbal consent in the survey interview.

⁵ The consent question was also included in the 2004 wave of the 1998-2004 Panel Survey. See section 7.

⁶ ARD2 is a revised version of the ARD, released in mid-2006, with improved consistency in variable names and definitions across years (see Robjohns, 2006, for further details).

it was possible to identify 1,979 of the 2,166 consenting WERS workplaces (91 per cent) on ARD2 in 2003. The slightly higher match rate for 2003 when compared with 2004 is to be expected, since the sample for the WERS Cross-Section was drawn from the Inter-Departmental Business Register in September 2003 and establishment reference numbers disappear from the Register over time for reasons other than establishment closure (e.g. company takeover).

* Table 1 about here *

The fact that the Annual Business Inquiry is not a census of enterprises is seen by the fact that only half of those workplaces identified on the ARD2 in a particular year (47 per cent for 2003) belong to enterprises with an ABI return for that year. The proportion is slightly higher (55 per cent in 2003) when the attention is confined to WERS workplaces located in the trading sector of the economy (defined as the private sector, plus trading government corporations and nationalised industries), since the ABI purposefully does not cover the public sector.⁷ Within the trading sector, ABI returns are more likely to be available for workplaces that belong to larger enterprises and for those outside of the Financial Intermediation sector, reflecting the sample design of the ABI. One inadvertent implication is that WERS workplaces that recognise trade unions have an above-average probability of having an ABI return, since union recognition is more common among workplaces belonging to larger organisations.

The table also highlights (in the final row) the common mismatch in observational units between WERS and the ABI, with only one fifth of matched ABI returns (19 per cent in 2003) being provided for a single establishment. The remainder cover a wider unit, commonly the whole enterprise to which the workplace belongs.⁸ Further analysis shows that, in instances where the ABI return is not at establishment level, the number of workplaces covered by the return is typically very high: half of all multi-establishment matched returns for 2003 covered 30 or more local units, but the distribution was heavily skewed, with the mean standing at 332. These multi-establishment returns clearly offer the *potential* for measurement error if used to estimate the productivity of a single workplace.⁹

Table 2 focuses further on the nature of the matched ABI data available for 2003, tabulating the period covered for each of the 929 matched returns with data on this item

⁷ In WERS 2004, trading sector workplaces are those where ASTATUS1<=8.

⁸ This comparison is made possible by the LIVELU variable, which indicates the number of local units present in the ARD reporting unit. It should be noted that this does not correspond perfectly with the WERS data contained in ASINGLE: 278 (14 per cent) of the 1,979 WERS establishments identified on ARD2 in 2003 are differently classified on these two data items. This may be due to differences in the timing of data collection (see later text) or differences in interpretation by respondents to the two inquiries.

⁹ As well as looking at the number of units covered by the ABI return, it is also possible to make a comparison on the basis of IDBR employment, thereby identifying workplaces for which employment in the surveyed local unit comprised at least 50 per cent of employment in the reporting unit for the ABI. We identify 315 WERS workplaces where IDBR-recorded employment for that establishment comprised at least 50 per cent of employment in the matched reporting unit for the ABI. One might speculate that measurement error arising from the mis-match of units *could* be fairly minimal in this circumstance, but we do not investigate this issue further here.

(3 of the 932 matched returns have no information on the period covered). Around two-fifths of matched returns cover the calendar year, i.e. January – December 2003. A further fifth cover the financial year April 2003 – March 2004.

* Table 2 about here *

Whilst the process of matching WERS 2004 to ARD2 yields ABI returns for only a partial sub-set of the full sample, one notable attribute of the ABI is the low rate of item non-response observed on most of the survey questions. Table 3 indicates the availability of a number of key data items within the subset of 932 matched ABI returns for 2003. The table indicates, for example, that data on turnover per employee (often referred to as ‘average labour productivity’) or gross value-added per employee are available for 868 (97 per cent) of 894 trading sector workplaces. A rudimentary measure of profits per employee (calculated as gross value-added minus employment costs and capital expenditure) is similarly available for 868 trading sector workplaces. Each of these measures is based on a simple headcount since, in contrast to the WERS Financial Performance Questionnaire (described below), the ABI does not provide separate numbers of full and part-time employees. It is also noteworthy that the employment data collected in the ABI relates to a single point-in-time (December of the survey year), and so some imprecision is invariably introduced when combining this with data on outputs.¹⁰ Finally, it is also noted that the construction of production functions is inhibited since the ABI does not directly provide data on capital stocks, though ONS provide estimates of the latter in a separate database, derived using the historic pattern of net capital expenditure (see Martin, 2002).

* Table 3 about here *

Further investigation of the periods covered by matched ABI returns shows that 700 workplaces in the WERS 2004 Cross-Section Survey can be matched to an ABI return covering a period that includes the date of the WERS 2004 Management interview. Some 685 of these returns derive from ABI 2004 and a further 15 derive from ABI 2003, the latter being some of the first WERS interviews conducted in February or March 2004. In 132 of these 700 cases, the ABI return covers a single establishment.

In summary, the process of matching the WERS 2004 Cross-Section Survey to ARD2 has been successful in yielding a matched dataset that is significantly larger than the equivalent matched dataset arising from WERS 1998. By including a broader consent question, WERS 2004 has provided an opportunity to match across to a much broader sample of ABI returns, including both production and service sectors. The revised consent question has also permitted matching to take place across multiple years of ARD2. This has not only provided some flexibility in the choice of ‘match year’ in ARD2, it also seemingly opens up the possibilities for longitudinal analysis of workplace performance. Investigation shows that some 725 of the 894 trading-sector workplaces with a matched ABI return for 2003 also have a return for 2004, suggesting that it will be

¹⁰ One would ideally have data on average employment over the period of the financial return. Table 2 shows that, for ABI 2003, the central date of most matched returns precedes December 2003.

possible to build a reasonable sample of workplaces with productivity data for two, three or more years as subsequent years of ABI data become available in the future.

Another positive attribute of ARD2 is the low degree of item non-response recorded in the ABI data. The implications of missing data are therefore largely limited to those arising from survey sampling or survey level non-response in both WERS and the ABI. One important question that remains, however, is the extent to which one can reliably employ data from the numerous ABI returns that have not been completed at establishment level but relate to some wider organisational unit. We return to this issue in Section 4.

b) The WERS 2004 Financial Performance Questionnaire

The development of the Financial Performance Questionnaire arose out of an appreciation within the WERS Research Team and Specialist Team that many organisations do hold data on the performance of individual establishments, though they may not always choose to supply such detailed information in response to the Annual Business Inquiry. This view has subsequently been supported by ONS' own research (Mills and Ursachi, 2006). Nonetheless, there were a variety of different ways in which one might attempt to collect such data in a voluntary survey such as WERS.

One option, similar to that pursued in the telephone-based National Employer Surveys conducted in the United States in the 1990s, was to attempt to collect quantitative financial data about the establishment via questions inserted into the existing face-to-face Management interview. However, this option raised obvious concerns about likely rates of item non-response, and about levels of data quality, particularly in cases where the WERS management interview was conducted with a personnel specialist who may not have the answers to hand. A further option was to add questions to the Employee Profile Questionnaire (a two-page questionnaire that currently covered the composition of the workforce and which was issued to management respondents in advance of the face-to-face interview). But it was thought that the inclusion of financial questions within this document might prompt wholesale survey non-response among those unable or unwilling to provide such financial information. The preferred option therefore was to develop a dedicated Financial Performance Questionnaire that could be issued at end of the face-to-face management interview (thus minimising interference with that instrument) and passed on by the main management respondent to someone with responsibility for financial matters, who would then post the completed paper form to the survey administrators.

Most of the questions that were included in the Financial Performance Questionnaire were based on those used in the short-form versions of the ABI. The main alteration was to shorten some of the very detailed ABI instructions about what should be included or excluded in the totals, recognising that an overly technical questionnaire may provoke non-response from workplaces without specialised financial managers or accountants. Further departures from the ABI were to include questions on the numbers of full and part-time employees, the value of assets and the extent of research and development

activity. Research economists and professional accountants were consulted over the range and wording of questions prior to piloting.

The level of response that could be expected was uncertain. The ABI could not provide a reasonable benchmark as the Inquiry is mandatory under the Statistics of Trade Act 1947. The attempt to collect objective data in WIRS 1990 had been abandoned at the pilot stage after a poor response (Airey et al, 1992: 20). However, the return of 22 of the 38 FPQs issued during the piloting of WERS 2004 provided a tentative indication that a response rate of 50-60 per cent might be feasible.

In the main stage of fieldwork, FPQs were distributed in 2,076 of the 2,295 workplaces that participated in the Cross-Section Survey (Chaplin et al, 2005: 63).¹¹ Following a three-stage reminder process, FPQs were obtained for 1,070 of these workplaces, representing a response rate of 52 per cent among workplaces accepting placement of the questionnaire and a rate of 47 per cent among all Cross-Section workplaces (*ibid*). Establishments were more likely to complete the Financial Performance Questionnaire if the respondent to the management interview had responsibility for financial matters, if the workplace was a single independent establishment (i.e. not part of a larger organisation), if the organisation was not listed on a stock exchange, and if the workplace participated in the Survey of Employees. There were also variations by workplace size and industry. As those establishments with an FPQ did not constitute a random sample of all participating establishments, weights were computed to adjust for these observable biases in the sub-sample of establishments with FPQ returns (Chaplin et al, 2005: 95-99).¹²

Respondents were asked to complete the questionnaire for the workplace that had been the subject of the main management interview, but were given the option to report on a more widely-defined unit if establishment-level data were not available. In the latter case, they were asked to indicate the total number of workplaces covered by the return and the approximate share of turnover accounted for by the surveyed workplace, in order to provide some means of disaggregating the totals provided in the questionnaire. The number of site-level FPQ returns obtained in main fieldwork was particularly encouraging. Some 834 of the 1,070 FPQ returns (78 per cent) contained site-level data, compared with around one-fifth in the matched ABI dataset.¹³

One inevitable disadvantage compared to the ARD was that the data obtained in the FPQ referred to a single year. In order to promote some consistency in the periods covered by the FPQ returns, respondents were invited to provide figures for the calendar year 1st

¹¹ Questionnaires were issued to workplaces in the private and public sectors. Public sector establishments were asked to report on the value of their overall budget, rather than levels of turnover.

¹² The FPQ weight is the cross-product of the Cross-Section establishment weight (ESTWTNR) and an adjustment factor, with the latter being computed as the inverse of the predicted odds of participation, derived from a logistic regression model including a range of establishment characteristics taken from the management interview.

¹³ These figures include 78 cases in which the scope of the return was either recoded (58 cases) or imputed (20 cases) after comparing FPQ and MQ employment and studying comments made at Note 2 on the FPQ. These imputations are identified on the variable XCODE1.

January -31st December 2003. If this was not possible, they were invited to respond about the most recent business year for which figures were available. In total, 406 (38 per cent) of the 1,070 FPQ returns covered the default period, with a further 325 (31 per cent) reporting on the financial year April 2003 – March 2004 (Table 4).¹⁴ The data collected in the FPQ is therefore historical in nature: only 58 returns cover periods that include the date of the main management interview, with the remaining returns covering periods that ended, on average, 6 months prior to the interview date. The median number of days between the end of the FPQ return period and the date of the management interview in these cases was 154 days (mean 182 days; standard deviation 118 days). But this is a necessary consequence of administering the questionnaire alongside the management interview and, indeed, a similar charge can be laid against the subjective rating (which is inevitably based on some historical comparison), other quantitative measures collected in WERS such as absenteeism or disputes (which invariably refer to the past 12 months) or the quantitative performance data collected in other workplaces surveys (such as the US National Employer Survey).¹⁵

* Table 4 about here *

Completion rates for the individual items contained within the FPQ were high, averaging around 90 per cent, but were inevitably somewhat below the completion rates in the ABI, reflecting the voluntary nature of the WERS instrument. The highest response rates in the FPQ were for the questions on employment levels, employment costs and R&D activity, with the lowest rates being observed on questions about asset valuations, particularly rented or leased assets (Table 5). In some circumstances, missing values could be inferred by comparing with data from the sample file or Management interview. Another approach involved inserting zeros in empty cells in cases where the respondent appeared to have ignored the general instruction to write NIL rather than leaving entries blank. The latter approach requires some rather bold assumptions about patterns of non-response, and so all imputed values are identified via flag variables to give users discretion over the use of such data in their analysis.

* Table 5 about here *

Clearly, much of the analysis of the FPQ data on workplace performance will be restricted to establishments operating in the trading sector of the economy. Restricting the sample in this way yields a sample of 792 FPQ returns from a total of 1,757 workplaces (an overall response rate of 45 per cent). Some 626 of these returns (79 per cent) are at site-level. Table 5 shows that data on average labour productivity is available for 715 (41 per cent) of the 1,757 trading sector workplaces, whilst data on value-added per employee

¹⁴ It was not possible to use April 2003 – March 2004 as the default period for the questionnaire, since fieldwork began in February 2004.

¹⁵ In retrospect, it may have been preferable to request data from the most recent period that the establishment could provide, particularly in view of the eventual length of the fieldwork period. There is, of course, the option of repeating the FPQ at a later date for the same establishments, in order to obtain longitudinal data on financial performance akin to that available in the ABI.

is available for 665 (38 per cent). Data on ‘profits’ per employee is available for 569 (33 per cent).

In summary, whilst one would naturally have valued higher response rates both at questionnaire and item level in the WERS FPQ, the rates achieved seem creditable given the experimental nature of the exercise and the rather limited resources expended in its administration. The high proportion of site-level returns would also appear to be a notable advantage when compared with most other sources of financial data, such as the ABI or company accounts databases.

One important question that remains, however, concerns the quality of the data collected in the FPQ. An initial investigation of the construct validity of the data, presented in the WERS 2004 sourcebook, was encouraging (Kersley et al, 2006: 294-303). But one might also wish to see some comparison of FPQ values with those obtained from another source, such as the Annual Business Inquiry. We turn to this issue in the next section.

4. A Preliminary Analysis of the Objective Performance Data in WERS 2004

Our preliminary analysis of the objective performance data in WERS 2004 has three strands. First, we examine the mutual availability of objective data from the FPQ and ABI for workplaces that participated in the WERS 2004 Cross-Section Survey. Second, we focus on workplaces that have productivity data from both the FPQ and ABI and assess the degree of convergence in those two objective sources. Finally, we assess the degree of construct validity in the objective data by looking at the association between measures of productivity and profitability and a small number of workplace characteristics. A further investigation of the degree of convergence between the objective and subjective measures of productivity and profitability will be provided in a companion paper (Forth and McNabb, 2007).

a) Data availability

A comparison of Tables 3 and 5 indicates that the number of workplaces with ABI and FPQ returns are available is quite similar. However, the cases do not always overlap and a number of workplaces have returns from only one of these sources. The total number of workplaces with objective performance data is therefore somewhat larger than indicated in Tables 3 or 5. One gets a sense of this from Table 6, which focuses on the sub-sample of 1,757 trading sector workplaces. Only 482 of these workplaces (27 per cent) do not have either a return in either the FPQ dataset or ABI 2003. In contrast, 411 workplaces have a return in both datasets.

* Table 6 about here *

b) Correspondence

The correspondence between productivity values in the FPQ and the ABI provides an important indication of the quality of the data collected in the FPQ (the ABI being the

official source of data on business performance). Since some returns are at site level and others are not, it can also provide an insight into the reliability of data in returns that cover more than one workplace. This section investigates these two separate, but related, issues.

In making such a comparison, it is not necessarily the case that data from ABI 2003 provides the most appropriate comparator for the data obtained in the FPQ. Instead, we would like to be able to take returns from any year of the ABI if they provide us with a closer match in the timing of the ABI and FPQ data. Broadening our sights to include returns from ABI 2002 and 2004, we find that 514 trading-sector workplaces with an FPQ have an ABI return in 2002, 2003 or 2004 (compared with 411 in Table 6). A comparison of the periods covered by these various returns shows that, for 76 of these workplaces, the data provided in ABI 2004 constitutes the closest match (in terms of timing) to the reporting period of the FPQ. For a further 364 workplaces, the closest match is with a return from ABI 2003 and for the remaining 74 it is with a return from ABI 2002.

Nevertheless, we would like to ensure that our comparison of FPQ and ABI data is based on returns that cover substantially over-lapping periods (and not simply two periods that are reasonably close together). Thus we restrict our attention to the 401 trading-sector workplaces with FPQ and ABI returns whose periods overlap by at least 6 months. Of these, around 40 take their data from ABI 2004, 350 obtain it from ABI 2003 and around 10 take their data from ABI 2002. This sample of 401 workplaces is our preferred basis for the comparison of productivity/profitability values obtained in the FPQ and ABI. The mean distance between the mid-dates of the ABI and FPQ returns is just 15 days in this sample. For 58 per cent of the sample the mid-dates coincide, for 74 per cent they are no more than one day apart and for 86 per cent they are no more than 31 days apart.

The first panel of Table 7 shows the mutual availability of FPQ and ABI returns for these 401 trading sector workplaces. The table indicates that there are 92 workplaces with a site-level return in both of the surveys, 229 workplaces with a site-level return in only one of the two surveys (usually the FPQ) and 80 workplaces with no site-level return in either survey. The subsequent panels of Table 7 show the mutual availability of data on average labour productivity (turnover per employee), value-added per employee and 'profits' per employee within the same sub-sample of 401 workplaces.

* Table 7 about here *

Our investigation focuses first on the correspondence between the FPQ and ABI values of average labour productivity. At the outset, we exclude 21 cases with large, outlying values in either survey. The approach adopted was to exclude all values in either survey that exceeded the value at the 95th percentile in the FPQ distribution of average labour productivity within the sample of 357 workplaces. Most of the 21 extreme values arise from the FPQ return, rather than the ABI return, and may relate to punching errors (e.g. instances in which the respondent ignored instructions to give financial values in thousands).

The upper-left quadrant of Figure 1 contains a scatter-plot based on the remaining 336 workplaces. The scatterplot presents average labour productivity from the ABI on the y-axis and the equivalent measure from the FPQ on the x-axis. It is clear from the scatterplot that there is a divergence in the two measures for a substantial proportion of workplaces. The correlation between the two measures stands at 0.74.

* Figure 1 about here *

Some of this non-correspondence may naturally be due to measurement error in either survey. However, it is also possible that it may arise from a mis-match in the units of observation; for example, if the FPQ return refers solely to the workplace surveyed in WERS but the ABI return has been completed on behalf of the whole organisation, of which that site is just a part. The scatter-plots contained in the next two quadrants of Figure 1 investigate this question. First, in the upper-right quadrant, we restrict the plot to those 76 workplaces with a site-level observation in both the FPQ and ABI. The points are much more closely located on the diagonal and the correlation rises to 0.89 (or 0.96 after further exclusion of one clearly deviant case). The contrast with the plot in the lower-left quadrant is clear. This third quadrant is restricted to those workplaces for which only one of the FPQ or ABI observations is at site level: here we see a more considerable spread of points and a substantially lower correlation of 0.70. These comparisons clearly indicate a close correspondence between the FPQ and ABI values when both returns are completed at site level. However, when one return is completed for multiple sites, it does not appear to represent a robust proxy for site-level data.

We can further examine the degree of non-correspondence between site-level and aggregate returns by examining how the correlation coefficient between the ABI and FPQ varies with the number of sites covered by the aggregate return. In fact we find that, where site-level returns are compared with aggregate returns covering 2-9 sites, the correlation coefficient is approximately the same as when both returns are at site level (0.91; $n=74$). But it falls to 0.39 when the aggregate return covers 10-99 sites ($n=64$) and stands at 0.70 when the aggregate return covers 100 or more sites ($n=66$).¹⁶

The lower-right quadrant in Figure 1 is included for completeness but does show that, when both returns cover multiple sites, the correspondence is in fact reasonably good. This may be because the scope of both returns is actually equivalent (e.g. both returns completed about the whole enterprise) although this has not been directly investigated.

Figure 2 repeats the analysis with the measures of value-added per employee, whilst Figure 3 does so with the measures of 'profit' per employee. In both cases, the pattern is broadly similar to that which has been described in the case of average labour productivity. For both measures, the points are reasonably scattered on the plots that

¹⁶ We should add that the cut-offs used here were chosen primarily for their convenience in dividing those workplaces with aggregate returns into three fairly evenly-sized groups, and were not identified by any more detailed investigation of break points in the relationship between the correlation coefficient and the number of sites.

include all values, but this scatter is found to be primarily evident among those cases where there is a mis-match in the unit of observation. Where both returns are at site level, the correspondence is generally good: we observe correlation coefficients of 0.81 in the case of value-added per employee and 0.78 in the case of 'profits' per employee. The correspondence in either case is lower than for average labour productivity, but this probably reflects the fact that our measures of value-added and 'profits' are compiled from greater numbers of individual data items, so that measurement errors in any one data item combine to generate a greater degree of measurement error in a composite variable.

* Figures 2 and 3 about here *

As with average labour productivity, we can examine how the correlation coefficients between the ABI and FPQ vary with the number of sites covered by the aggregate return. In the case of value-added per employee, the overall coefficient of 0.41 arises from a correlation of 0.68 when the aggregate return covers 2-9 sites (n=72), 0.32 when it covers 10-99 sites (n=62) and 0.09 when it covers 100 or more sites (n=37). In the case of 'profits' per employee, where the overall coefficient is 0.35 (n=141), the individual coefficients are 0.40 for 2-9 sites (n=64), 0.21 for 10-99 sites (n=53) and 0.58 for 100 or more sites (n=18).

From these various comparisons of FPQ and ABI values, it seems reasonable to make the following conclusions:

1. The FPQ data closely corresponds to that collected in the ABI in cases where the two returns have both been completed at site level.
2. The data do not compare as well when there is a mis-match in the unit of observation, i.e. if one return is completed at site-level and the other at some more-aggregate level (e.g. enterprise).
3. The degree of non-correspondence between site-level and aggregate returns is generally lower if the aggregate return covers only a small number of units than if it covers a larger number of units, although the relationship only appears to be linear in the case of value-added.

The first of these conclusions gives us confidence in the overall quality of the data collected in the FPQ. However, the second and third conclusion confirm our expectation that productivity is not necessarily homogenous across plants within the same firm, which in turn indicates that aggregate returns do not necessarily provide good estimates of plant-level productivity. The further conclusion then, is that using data from wider returns in conjunction with site-level data on workplace practices may run the risk of biases caused by measurement error in the dependent variable. A more robust approach would appear to involve focusing on site-level observations. Nevertheless, the close correspondence in FPQ and ABI values would imply that such site-level observations could reasonably be taken from either dataset. We explore this possibility in the following section.

5. Compiling a site-level dataset

There are two apparent advantages of compiling a site-level dataset of objective performance measures that takes values from either the ABI or FPQ. The first is that one is likely to be able to increase the number of surveyed workplaces for which site-level objective performance data is available, since we have already seen in Table 6 that some workplaces have data in only one of the two datasets. The second advantage is that, by having a choice of which data set to call upon for workplaces where both ABI and FPQ data is on offer, one is likely to be able to minimise the chronological distance between the return period for the objective performance data and the interview date on which the workplace practices data were collected in the main part of the WERS survey. For example, the data presented in Tables 2 and 4 suggest that, if site-level returns were available from both ABI 2004 and the FPQ, it would be likely that a return from ABI 2004 would cover a period that is closer to the WERS interview date. In this case, it would be sensible for an analysis of the relationship between workplace practices and performance to utilise data from the ABI return in preference to that available from the FPQ.

Looking for matches in the ABIs of 2002, 2003 or 2004, we find that some 1,111 of the 1,757 trading sector workplaces in the WERS 2004 Cross-Section Survey have an ABI return in at least one of these years. By expanding our view to encompass all three years, we are thus able to expand the pool of available ABI returns beyond that which would be available if we restricted ourselves to just one year (say 2004).¹⁷ We then compute the distance in days between the WERS interview date (NINTDATE) and the central date for this closest available ABI return. This serves two purposes. First it enables us to reliably identify which of the ABI returns is closest to the interview date. For 829 of the 1,111 workplaces the closest return comes from ABI 2004, for a further 183 it comes from ABI 2003 and for the remaining 99 it comes from ABI 2002. Second, computing the distance enables us to compare it with the corresponding distance between the WERS interview data and the central date of any FPQ return. In cases where site-level returns are available from both sources, we are then able to identify whether it is the FPQ return or the ABI return that is chronologically closer to the WERS interview date. We undertake this last step separately in respect of the measures of productivity and profitability, since the presence of missing data for either measure means that we may prefer to choose the more distant source if the proximate source has missing data on the item in question.

When we combine the ABI and FPQ data, we find that 653 of the 1,757 trading sector workplaces have a site-level measure of productivity in either the FPQ or the ABI. In 114 of these cases, a measure is available from both sources and so we take the one closest to the WERS interview date. In 82 cases it is the ABI, rather than the FPQ. We thus obtain a dataset containing 653 site-level observations on labour productivity, 451 of which derive from the FPQ and 202 of which derive from the ABI.

Among these 653 observations, the central date of the return period precedes the date of the MQ interview date by an average of 310 days. The inclusion of performance data that

¹⁷ Table 1 shows that just 847 trading sector workplaces have a return in ABI 2004.

precedes the interview data by some considerable distance will impair our ability to identify robust associations, and so we restrict the sample to those workplaces with returns that end no more than one year prior to the interview date. In this sub-sample of 597 observations (423 from the FPQ and 174 from the ABI), the management interview has taken place during the financial year immediately following the available return, and so we can surmise that the data available to us covers the most recent *completed* financial year.¹⁸

Following the same principles in respect of the site-level data on ‘profits’ per employee, we initially obtain a dataset containing 578 site-level observations on profitability, 370 of which derive from the FPQ and 208 of which derive from the ABI. Among these observations, the central date of the return period precedes the date of the MQ interview date by an average of 306 days. Restricting the sample to workplaces with returns that end no more than one year prior to the interview date brings the sample down to 526 observations (351 from the FPQ and 175 from the ABI).¹⁹

These data manipulations have therefore produced objective site-level data on productivity and/or profitability for just under one-third of the trading sector workplaces in the WERS 2004 Cross-Section Survey. There has been a clear benefit in being able to call upon both the FPQ and ABI within this process. The FPQ has contributed substantially to the number of site-level observations, which would have been available for little more than one tenth of the sample had we relied solely on the ABI. The ABI, for its part, has contributed a further 100 or so site-level observations for workplaces not featuring in the FPQ dataset. It has also enabled us to maximise the proximity of the interview data and the performance data, reducing the distance between the return period for the objective data and the management survey interview date by around 40 days on average.

Two primary questions remain. The first concerns the representativeness of the sub-samples of workplaces with site-level performance data. The second concerns the behaviour of the data when used in statistical analysis.

6. Preliminary investigation of site-level data

As we have observations for only one-third of trading sector workplaces, there is an obvious concern that this sub-sample may not be representative, and that this may affect the robustness of any conclusions one might wish to draw from any statistical analysis. To investigate this issue, we have assessed the representativeness of the sub-sample on a small selection of variables – largely those which were found to be associated with non-response to the FPQ (see Chaplin et al, 2005, Section 7).

¹⁸ Restricting the sample to cases in which the management interview date lay within the return period for the objective performance data would reduce the sub-sample to only 151 observations.

¹⁹ There are 144 cases in which the date of the management interview lays within the return period for the objective performance data.

Following the methodology outlined in the Technical Report, we run a logistic regression to identify variables that are significantly associated with the likelihood of having a site-level observation in our two sets of performance data (productivity and profitability). The dependent variables are coded 1 if the performance data is present and 0 otherwise. Positive coefficients therefore indicate that workplaces with the particular characteristic were more likely to have site-level performance data than workplaces without the characteristic. Negative coefficients naturally indicate the reverse. The results are presented for both productivity and profitability in Table 8. In both cases, workplaces are more likely to have site-level performance data if they are: larger (rather than smaller); located in manufacturing (rather than services); a single-independent establishment (rather than part of a larger organisation); foreign-owned (rather than domestically-owned); listed on a stock exchange (rather than not listed); took part in the Survey of Employees (rather than refused to participate); agreed to external data linking (rather than refused it); and provided a below average rating on the subjective performance measure (rather than an average or above-average rating).

* Table 8 about here *

We use the predicted values from these regressions to compute a weight that can compensate to some degree for these match biases.²⁰ The weights reduce the most severe sample biases and bring the profile of the matched sub-samples considerably closer to that of the full trading-sector sample. It is worth noting, however, that the weights do not bring the profile perfectly into line with the full sample, thus indicating that the weights could be improved with further work (a fact also indicated by the relatively low values for R^2 in Table 8). However, the weights we have computed are considered sufficient for this preliminary analysis, which is merely indicative of what might be done with the data.

We use the matched data in a preliminary analysis in which we regress the natural log of each of the three performance variables (average labour productivity, value-added per head and 'profits' per head) on a small number of independent variables, including union recognition, foreign-ownership and the use of incentive pay. We have prior expectations about the sign of each association, and so the analysis is intended to provide a basic test of the construct validity of the objective data.²¹ Our expectations are as follows:

²⁰ The method is the same as that employed in the weighting of the FPQ (see page 95 of the WERS 2004 Technical Report). Specifically, we multiply each establishment's main weight (ESTWTNR) by the inverse of the predicted value from the logistic regression, after truncating the distribution of the predicted values at the 10th and 90th percentiles in order to limit the variance of the resultant weights.

²¹ A preferable specification, at least in respect of the productivity variables, might involve the estimation of a production function with the capital-labour ratio being added on the right-hand side. We have not attempted that here, due to the added complexity of bringing in data on capital stocks for observations that derive from the ABI. However, we note that such a specification performed reasonably well in tests conducted with the FPQ alone as part of the primary analysis of WERS 2004 (Kersley et al, 2006: 299).

<i>Independent variable:</i>	<i>Expected association:</i>	<i>Reason:</i>
Organisation size	Positive	Economies of scale and knowledge-sharing across sites
Foreign-ownership	Positive	Economies of scale and knowledge-sharing across countries
Union recognition	Negative	Restrictions on work practices and union influence on pay bargaining
Training	Positive	Skill-enhancing
Incentive pay	Positive	Impact on employee motivation and effort

Investigations lead to the exclusion of around 20 observations with outlying values on the dependent variables prior to in each of the three analyses. This leaves 576 observations for the analyses of average labour productivity, 570 for the analysis of value-added per employee and 507 for the analysis of ‘profits’ per employee. A summary of the results is presented in Table 9. The associations that are observed in each analysis are broadly in line with prior expectations. The sole exceptions are the variable identifying workplaces that belong to large organisations, which is negative in the labour productivity regressions (although it does not reach statistical significance in any of the three equations), and the variable identifying extensive use of training, which is negatively associated with profitability (although again non-significant in each equation).

To summarise, our matched dataset of objective, site-level measures of productivity or profitability appears to perform reasonably well. It is clear that there are notable match biases among the sub-sample of workplaces with objective site-level data. However, we have identified a number of these biases through regression analysis and we have demonstrated that weights can be compiled to account for the most severe biases that are found to be present. Further, we have been able to conduct regression analysis of the objective performance measures themselves, and have identified that a number of key workplace characteristics are associated with these measures in ways that we might expect.

7. Performance data in the 1998-2004 Panel Survey

The 1998-2004 Panel Survey also includes a subjective measure of workplace performance, in this instance referring solely to financial performance. The nature of the subjective measure is somewhat different to that which appears in the Cross-Section, as the intention is to collect data on the relative performance of the establishment over the period since 1998. Accordingly, the subjective measure attempts to identify the average trajectory of the industry as a whole, and then seeks to identify how the performance of the surveyed establishment has fared relative to that average trajectory.²² The question text and resulting data are presented in Appendix C.

²² The alternative would be to ask the simple Cross-Section rating question at both time points. But a change in relative performance can then only be identified if workplaces switch categories.

Clearly, this longitudinal subjective rating is subject to similar disadvantages as those summarised above in respect of the subjective measures included in the Cross-Section Survey, as well as the additional possibility of recall error on the part of the 2004 respondent. And so attempts were made to link the 1998-2004 Panel data to ARD2, as a means of obtaining objective measures of performance over time. Panel workplaces were not issued with a Financial Performance Questionnaire, as no such questionnaire had been issued in Wave 1 (1998).

In order to facilitate the link to ARD2, the 2004 Panel interview included an identical consent question to that included in the Cross-Section Survey (see Appendix A). During fieldwork, consent to link the WERS Panel data to other databases was obtained from 896 (96 per cent) of the 938 workplaces that were re-interviewed for Wave 2 of the Panel. The data were subsequently linked to ARD2 by staff at ONS, following the same procedure as was used to match the Cross-Section data (see above). The extent and nature of the resultant matches are presented in Table 10.

* Table 10 about here *

The smaller initial sample (896 workplaces) inevitably means that the process of data linking would offer fewer matches than the equivalent linking of the Cross-Section with ARD2. But the number of matches is further restricted in the Panel because the IDBR local unit reference numbers for all 896 Panel workplaces date back to 1997, when the sample for the 1998 Cross-Section was initially drawn from the Register. We have already mentioned that IDBR reference numbers may change over time (e.g. through company takeover) and this limits one's ability to trace workplaces. In the event, ONS were able to match 245 of the 896 Panel workplaces to ABI returns for 1998, whilst 281 could be matched to ABI returns for 2004. Some 166 (18 per cent of all 938 Panel workplaces) had ABI returns for both years. Alas, only 27 of these offered site-level returns for both 1998 and 2004. The opportunities for longitudinal analysis of ABI data via the 1998-2004 Panel Survey therefore appear to be extremely limited.

8. Summary and conclusions

The Workplace Employment Relations Survey series has provided the basis for a wide range of empirical investigations into the relationships between workplace practices and performance. However, its reliance on subjective ratings of workplace productivity and financial performance has raised questions over its adequacy to meet the demands that are often placed upon it. This paper describes attempts made as part of WERS 2004 to augment the performance data collected in the survey with objective (accounts-based) measures.

The developments in WERS 2004 took two forms. The first comprised attempts to link the Cross-Section and Panel Survey data to the Annual Respondents Database, in order to link the WERS data with responses to the ONS Annual Business Inquiry. The second comprised an attempt to collect establishment-level performance data directly within the

WERS Cross-Section Survey, through the administration of a Financial Performance Questionnaire.

Both exercises have been completed with some success. The link between the WERS Cross-Section Survey and ARD2 has produced a matched dataset containing around 1,000 observations with very low rates of item-non-response and the prospect of obtaining longitudinal observations on the same workplaces for a number of years into the future. The disadvantage, however, is that the majority of these ABI returns are not completed for the workplace surveyed in WERS, but for a larger unit, typically the whole organisation to which it belongs. The WERS Financial Performance Questionnaire, for its part, has provided around 1,000 observations, with around 80 per cent relating to the surveyed establishment. Apart from small numbers of outlying values, the data appear to correspond well to figures provided within the ABI, for cases in which such a comparison is possible. But this dataset does not currently contain any longitudinal dimension.

Taking account of some of the strengths and weaknesses of both datasets, we have compiled a site-level dataset containing objective measures of productivity and profitability for around one-third of the trading-sector workplaces in the WERS 2004 Cross-Section. After weighting to account for observed match biases on a small selection of variables, we run some preliminary analyses, finding that a number of key workplace characteristics are associated with these measures in ways that we might expect.

A companion paper (Forth and McNabb, 2007) will provide an investigation of the degree of correspondence between the objective measures of performance contained in this site-level dataset and the traditional subjective ratings of performance.

9. Postscript

The syntax used in the compilation of this paper is to be made available within the VML, along with the combined ABI-FPQ data file discussed in Sections 5 and 6. All syntax and data are in Stata format.

Appendix A: WERS 2004 Cross-Section Survey questions to obtain subjective evaluations of workplace productivity and financial performance

KESTPER1

Compared with other establishments in the same industry how would you assess your workplace's ...READ OUT.

...financial performance :

	<i>Frequency</i>	<i>Per cent</i>
1. A lot better than average,	240	10
2. Better than average,	820	36
3. About average for industry,	801	35
4. Below average,	163	7
5. A lot below average,	12	1
6. No comparison possible,	100	4
7. Relevant data not available	58	3
<i>Not answered</i>	<i>101</i>	<i>4</i>
<i>All workplaces</i>	<i>2295</i>	<i>100</i>

KESTPER2*

...labour productivity :

	<i>Frequency</i>	<i>Per cent</i>
1. A lot better than average,	136	6
2. Better than average,	833	36
3. About average for industry,	880	38
4. Below average,	121	5
5. A lot below average,	7	<1
6. No comparison possible,	137	6
7. Relevant data not available	61	3
<i>Not answered</i>	<i>120</i>	<i>5</i>
<i>All workplaces</i>	<i>2295</i>	<i>100</i>

Note: In both cases, the respondent was given a show-card displaying the first five response options.

Appendix B: Consent question used in WERS 2004

MLINKDAT

It is sometimes possible to link the data we have collected from you with other surveys or datasets, to which we have authorised access. Would you be content for us to do this, as it can provide us with the potential for further analysis? In doing this, we assure you that your confidentiality will be respected and the linked data will be anonymised and used for statistical and analytical purposes only, with only authorised researchers having access to the linked data.

- 1) Yes
- 2) No

Appendix C: WERS 2004 Panel Survey questions to obtain subjective evaluation of workplace financial performance

KOPTB

Generally speaking, in establishments in your industry or field has the financial performance...READ OUT...":

- 1) Improved
- 2) Stayed the same,
- 3) Or deteriorated since 1998?

{If financial performance has improved (KOPTB=1)}

KIMP*

Looking at this card, would you say that, compared with the improvement in the average financial performance of establishments in your industry or field, your own establishment has...READ...

- 1) Improved at a faster rate
- 2) Improved at a similar rate
- 3) Improved at a slower rate
- 4) Remained static, or
- 5) Actually deteriorated?

{If financial performance stayed more or less the same (KOPTB=2)}

KTable

Would you say that, compared with the stability in the average financial performance of establishments in your industry or field, your own workplace has...READ OUT...

- 1) Improved
- 2) Remained stable like the rest of the industry
- 3) Actually deteriorated?

{If financial performance deteriorated (KOPTB=3)}

Kdeti

Would you say that, compared with the deterioration in the average performance of establishments in your industry or field, the financial performance of your **own** workplace has...READ OUT...

- 1) Actually improved,
- 2) Remained stable,
- 3) Deteriorated at same rate as the rest of the industry, or
- 4) Deteriorated at a faster rate than the rest of the industry?

Resultant data (after manipulation):

<i>Establishment performance 1998-2004:</i>	<i>Frequency</i>	<i>Per cent</i>
1. Above industry average	318	34
2. About average for industry	446	48
3. Below industry average	97	10
<i>Not answered</i>	77	8
<i>All workplaces</i>	938	100

Appendix D: Access to performance data in WERS 2004

Until April 2007, data from the Financial Performance Questionnaire is available only via the Virtual Micro-Data Laboratory (VML) operated by the Business Data Linking section at the Office for National Statistics (<http://www.statistics.gov.uk/about/bdl/>). In April 2007, these data will be added to the WERS 2004 data on general release at the Economic and Social Data Service (<http://www.esds.ac.uk>).

The linked WERS-ABI data is also currently available via the VML. ONS restrictions mean that it will not be deposited at ESDS or elsewhere.

Summary of access arrangements at ONS:

The ONS Virtual Micro-data Laboratory can be accessed at any of the five ONS offices, namely: London, Newport, Titchfield and Southport. Dumb terminals are provided at each of these locations to enable access to the central servers on which the micro data is held. ONS have plans to extend access to other government offices in the future, in order to reduce travelling times for researchers located some distance away from ONS sites, but these plans were not confirmed at the time of writing.

To gain access to the VML, researchers must first complete an application form outlining the nature of the proposed research. Each application is approved by both ONS and the WERS Sponsors. Successful applicants are then required to then enter into a secondment arrangement with ONS, whereby their home institution formally seconds them to ONS for the purposes of conducting research in the lab. This is a purely contractual process and does not indicate any desire on the part of ONS to direct the research. The application process is usually completed within a few weeks.

Researchers are also required to attend an introductory seminar before gaining access to the lab. The seminar covers, amongst other things, the form of disclosure control that is applied to research undertaken within the lab. It should be noted that researchers are not permitted to remove any data from the lab: all analyses must be undertaken on ONS premises. Similarly, all research output must be manually checked by ONS staff prior to its removal from the lab, in order to ensure that it is not disclosive (i.e. does not contain results that may enable the identification of a survey respondent). The process of disclosure checking is usually completed within 48 hours.

Users should also note a charge of £52 per day has traditionally been levied on those using the lab, in order to cover ONS administration costs. New arrangements that come into place in January 2007 will mean that researchers using the lab for academic research (i.e. not funded by government departments or private organisations) will have these costs paid by ESRC, even if they are not working under an ESRC grant.

Further details on the operation of the VML are provided at:
<http://www.statistics.gov.uk/about/bdl/>

Table 1 Number of matches between the WERS 2004 Cross-Section Survey and the Annual Respondents Database (ARD2)

	ARD 2002	ARD 2002	ARD 2003	ARD 2003	ARD 2004	ARD 2004
	<i>Full sample</i>	<i>Trading sector</i>	<i>Full sample</i>	<i>Trading sector</i>	<i>Full sample</i>	<i>Trading sector</i>
		(<i>ASTATUS1^W <=8</i>)		(<i>ASTATUS1^W <=8</i>)		(<i>ASTATUS1^W <=8</i>)
Total number of observations	2,295	1,757	2,295	1,757	2,295	1,757
Consent given for data linking (MLINKDAT ^W =1)	2,166	1,651	2,166	1,651	2,166	1,651
Identified on ARD2 using IDBR Local Unit Ref. No. (MATCH ^A =3)	1,535	1,381	1,979	1,612	1,855	1,503
ABI return provided (SOURCE ^A =1)	855	825	932	894	882	847
ABI return covers single workplace (LIVELU ^A =1)	178	171	175	167	149	142

Notes:

W: Indicates a variable contained in the WERS 2004 Cross-Section Survey Management data file (XS04_MQ.*)

A: Indicates a variable contained in ARD2 or the matched WERS-ARD data file

Table 2 Period covered by matched returns from ABI 2003

Period	Number	Per cent
March 2002 – February 2003	*	*
April 2002 – March 2003	32	3.4%
May 2002 – April 2003	11	1.2%
June 2002 – May 2003	29	3.1%
July 2002 – June 2003	79	8.5%
August 2002 – July 2003	*	*
September 2002 – August 2003	39	4.2%
October 2002 – September 2003	43	4.6%
November 2002 – October 2003	10	1.1%
December 2002 – November 2003	46	5.0%
January 2003 – December 2003	359	38.6%
February 2003 – January 2004	50	5.4%
March 2003 – February 2004	54	5.8%
April 2003 – March 2004	172	18.8%
May 2003 – April 2004	*	*
June 2003 – May 2004	*	*
TOTAL	929	100.0%

* Fewer than 10 observations; actual counts suppressed in accordance with ONS disclosure control rules.

Notes:

- (i) Period data is held in variables Q801 (start date) and Q802 (end date) on ARD2.
- (ii) Around 10 per cent of returns did not cover a 12-month period. Such cases were coded in the above table by identifying the 12-month period around the central date of the return.

Table 3 Availability of key data items in matched returns from ABI 2003

	Full sample	Trading sector
All matched returns	932	894
Turnover (to) *	925	888
Total purchases of goods and services (totpurch) *	929	892
Gross value-added (to-totpurch) *	925	888
Employment (emp_pt) *	909	872
Total labour costs (totlabcost) *	929	892
Net capital expenditure (ncapex)	932	894
Average labour productivity – derived (to/emp_pt) *	904	868
Value-added per employee – derived ((to-totpurch)/emp_pt) *	904	868
Profits per employee – derived ((to-totpurch-totlabcost-ncapex)/emp_pt)	904	868

Notes:

ARD2 variable names are indicated in brackets

* after excluding zero values

Table 4 Period covered by WERS Financial Performance Questionnaires

Period	Number	Per cent
July 2001 – June 2002	1	0.1%
October 2001 – September 2002	1	0.1%
November 2001 – October 2002	1	0.1%
January 2002 – December 2002	3	0.3%
March 2002 – February 2003	2	0.2%
April 2002 – March 2003	27	2.5%
May 2002 – April 2003	8	0.8%
June 2002 – May 2003	10	0.9%
July 2002 – June 2003	11	1.0%
August 2002 – July 2003	47	4.4%
September 2002 – August 2003	20	1.9%
October 2002 – September 2003	27	2.5%
November 2002 – October 2003	15	1.4%
December 2002 – November 2003	9	0.8%
January 2003 – December 2003	406	38.2%
February 2003 – January 2004	18	1.7%
March 2003 – February 2004	44	4.1%
April 2003 – March 2004	325	30.5%
May 2003 – April 2004	21	2.0%
June 2003 – May 2004	6	0.6%
July 2003 – June 2004	10	0.9%
August 2003 – July 2004	20	1.9%
September 2003 – August 2004	6	0.6%
October 2003 – September 2004	6	0.6%
November 2003 – October 2004	2	0.2%
January 2004 – December 2004	12	1.1%
February 2004 – January 2005	2	0.2%
April 2004 – March 2005	4	0.4%
TOTAL	1,064	100.0%

Notes:

Period data is held in variables NPERIOD (whether default or custom reporting period), YRSTART (start date if NPERIOD=2) and YREND (end date if NPERIOD=2).

Around 5 per cent of returns did not cover a 12-month period. Such cases were coded in the above table by identifying the 12-month period around the central date of the return.

Table 5 Availability of key data items in the WERS Financial Performance Questionnaire data

	Full sample	Trading sector
All returns	1,070	792
Turnover [or budget if non-trading sector] (nturnpa)	994	763
Employment – full-time (nempft) ¹	1040	778
Employment – part-time (nemppt) ²	998	742
Value of owned buildings (nownbld) ³	828	638
Value of rented buildings (nrentbld) ⁴	756	595
Value of other owned assets (nownoth)	860	667
Value of other rented assets ⁵ (nrentoth)	695	546
Capital acquisitions (nacqpa)	949	716
Capital disposals (ndispa) ⁶	861	642
Purchases (npurpa)	974	724
Employment costs (necpa)	1039	775
Any R&D at the establishment (anyrdest)	1047	786
% of total expenditure on R&D (anyrdest, rdestpc)	1008	759
Any R&D elsewhere in the organisation (anyrdorg)	1017	772
<i>Selected derived variables:</i>		
Gross value-added (nturnpa-npurpa)	-	705
Average labour productivity (nturnpa/(nempft+nemppt)) ⁷	-	715
Value-added per employee ((nturnpa-npurpa)/(nempft+nemppt)) ⁸	-	665
Profits per employee ((nturnpa-npurpa-nempcost+nacqpa-ndispa)/(nempft+nemppt)) ⁹	-	569

Notes:

FPQ variable names are indicated in brackets

1: Full sample figure includes 37 values imputed by reference to SCOPE, MQ and sample file (XCODE2=2,4,5)

2: Full sample figure includes 55 values by imputed reference to SCOPE, MQ and sample file (XCODE2=1,2,4)

3: Full sample figure includes 98 values recoded from missing to zero (XCODE4=1)

4: Full sample figure includes 184 values recoded from missing to zero (XCODE4=2)

5: Full sample figure includes 176 values recoded from missing to zero (XCODE5=1)

6: Full sample figure includes 136 values recoded from missing to zero (XCODE6=1)

7: Trading sector figure includes 50 imputed values on employment (XCODE2=1,2,4,5)

8: Trading sector figure includes 47 imputed values on employment (XCODE2=1,2,4,5)

9: Trading sector figure includes 29 imputed values on employment (XCODE2=1,2,4,5) and 81 imputed values on capital disposals (XCODE6=1).

Table 6 Co-availability of returns from the FPQ and ABI 2003 among trading sector workplaces

	FPQ for workplace (NSCOPE=1)	FPQ for wider unit (NSCOPE=2)	No FPQ	All
ABI exact match (LIVELU=1)	93	7	67	167
ABI non-exact (LIVELU>1)	228	83	416	727
No ABI, but matched to ARD2	267	66	385	718
No match	38	10	97	145
All	626	166	965	1757

Table 7 Mutual availability of data from the FPQ and ABI among trading sector workplaces where the return periods overlap by at least 6 months

A. Overall availability of FPQ/ABI returns:

	FPQ at site-level	FPQ for wider unit	All
ABI at site-level	92	7	99
ABI for wider unit	222	80	302
All	314	87	401

B. Availability of data on average labour productivity:

	FPQ at site-level	FPQ for wider unit	All
ABI at site-level	82	6	88
ABI for wider unit	200	69	269
All	282	75	357

C. Availability of data on value-added per employee:

	FPQ at site-level	FPQ for wider unit	All
ABI at site-level	81	6	87
ABI for wider unit	185	69	254
All	266	75	341

D. Availability of data on 'profits' per employee:

	FPQ at site-level	FPQ for wider unit	All
ABI at site-level	72	6	79
ABI for wider unit	149	67	216
All	221	73	294

Table 8 Assessing match bias within sub-sample of trading sector workplaces with site-level performance data

	Productivity (1=597; 0=1,160)			Profitability (1=526; 0=1,231)		
	Coeff.	Std. err.	Sig.	Coeff.	Std. err.	Sig.
<i>Position within organisation: (ref. Head office)</i>						
Single independent site	0.837	0.174	***	0.827	0.177	***
Branch site	-0.509	0.164	***	-0.571	0.169	***
<i>Job title of management resp.: (ref. All other titles)</i>						
Financial manager/ company secretary	0.125	0.137		-0.038	0.143	
Workplace took part in SEQ	0.910	0.137	***	0.791	0.141	***
Management respondent agreed to data linking	0.945	0.276	***	1.001	0.295	***
Foreign-owned	0.304	0.151	**	0.286	0.158	*
Listed on a stock exchange	-0.601	0.163	***	-0.701	0.173	***
<i>Subjective rating: (ref. At least 'average')</i>						
Below average	0.786	0.218	***	0.170	0.201	
Not available	0.373	0.210	*	0.311	0.230	
Private sector	0.862	0.428	**	0.994	0.471	**
<i>Workplace size (ref. 5-9 employees)</i>						
10-24	-0.193	0.200		0.052	0.214	
25-49	-0.064	0.218		0.277	0.231	
50-99	0.083	0.224		0.358	0.238	
100-499	0.227	0.213		0.627	0.227	***
500 or more	0.558	0.245	**	0.971	0.259	***
<i>Industry sector (ref. Manufacturing)</i>						
Electricity, gas and water	-0.903	0.438	**	-0.986	0.460	**
Construction	-0.448	0.257	*	-0.392	0.257	
Wholesale and retail	-0.726	0.191	***	-0.829	0.200	***
Hotels and restaurants	-0.559	0.262	**	-0.403	0.266	
Transport and communications	-0.761	0.252	***	-0.776	0.261	***
Financial services	-1.235	0.302	***	-1.178	0.314	***
Other business services	-0.668	0.189	***	-0.603	0.191	***
Public administration	-0.043	0.719		0.124	0.736	
Education	-0.403	0.330		-0.324	0.333	
Health	-0.656	0.229	***	-0.701	0.234	***
Other community services	-0.057	0.251		-0.135	0.236	
Pseudo-R ²	0.135			0.138		
Number of observations	1,757			1,757		

Table 9 Preliminary analysis of match site-level performance data

	Average labour productivity			Value-added per employee			'Profits' per employee		
	Coeff.	Std. err.	Sig.	Coeff.	Std. err.	Sig.	Coeff.	Std. err.	Sig.
Foreign-owned	0.576	0.155	***	0.340	0.063	***	0.195	0.049	***
Large organisation (1,000 or more employees)	-0.061	0.163		-0.023	0.039		0.024	0.029	
Union recognition	-0.444	0.197	**	-0.161	0.053	***	-0.139	0.047	***
Off-the-job training for 60% or more of core employees	0.108	0.182		0.057	0.040		-0.020	0.028	
Performance-related pay	0.461	0.149	***	0.117	0.037	***	0.067	0.028	**
Number of observations	571			566			502		
R ²	0.34			0.40			0.36		

Additional controls: workplace size (5 dummies); industry sector (11 dummies).

Coefficients are weighted to account for match bias. Standard errors have been adjusted to take account of the complex sample design in WERS 2004.

Table 10 Number of matches between the WERS 1998-2004 Panel Survey and the Annual Respondents Database (ARD2)

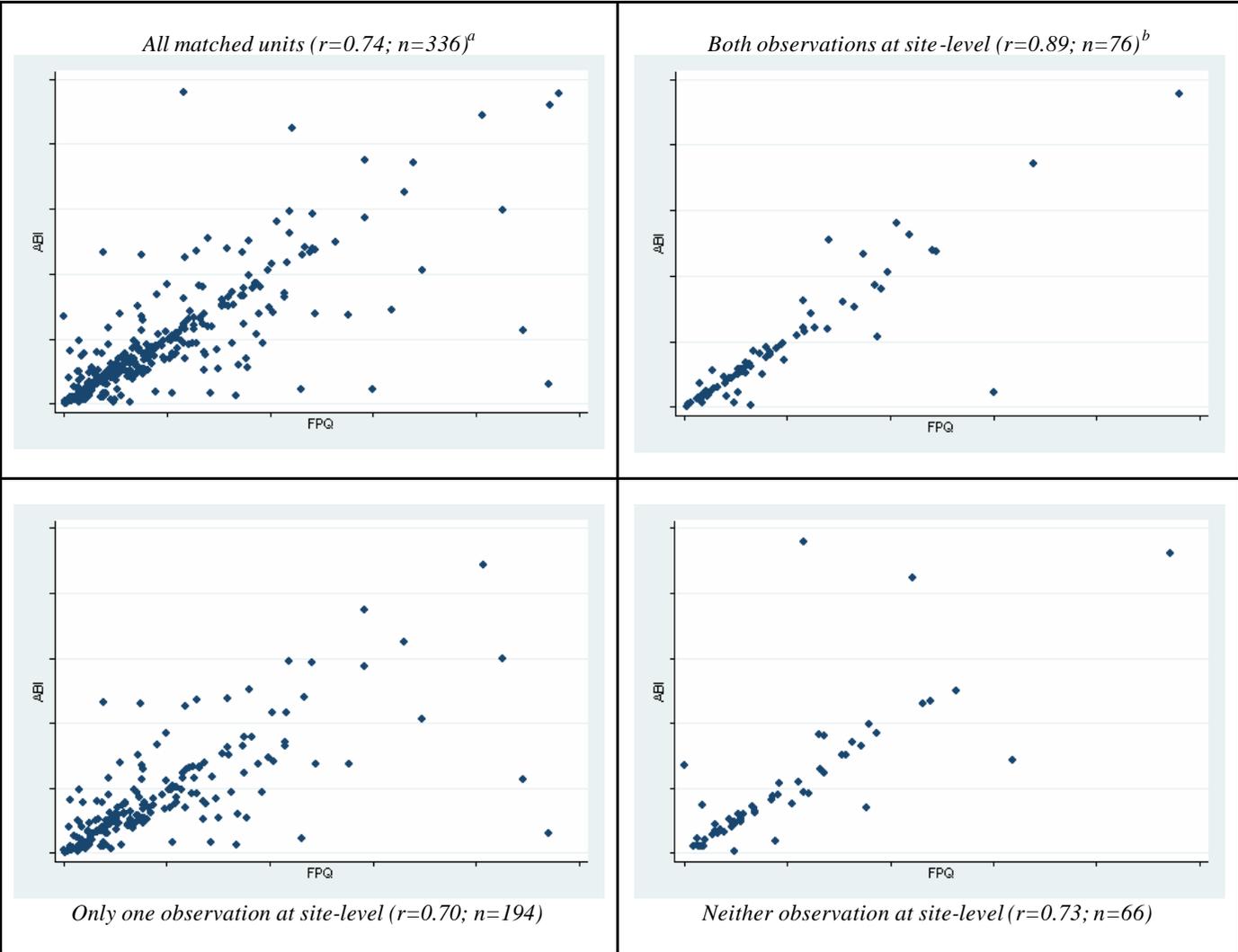
	<i>ARD 1998</i>	<i>ARD 2004</i>	<i>ARD 1998 and 2004</i>
Total number of observations (full sample)	938	938	938
Consent given for data linking (MLINKDAT ^W =1)	896	896	896
Identified on ARD2 using IDBR Local Unit Ref. No. (MATCH ^A =3)	421	586	396
ABI return provided (SOURCE ^A =1)	245	281	166
ABI return covers single workplace (LIVELU ^A =1)	72	66	27

Notes:

W: Indicates a variable contained in the WERS 2004 Panel Survey data file (PS9804_PQ04.*)

A: Indicates a variable contained in ARD2 or the matched WERS-ARD data file

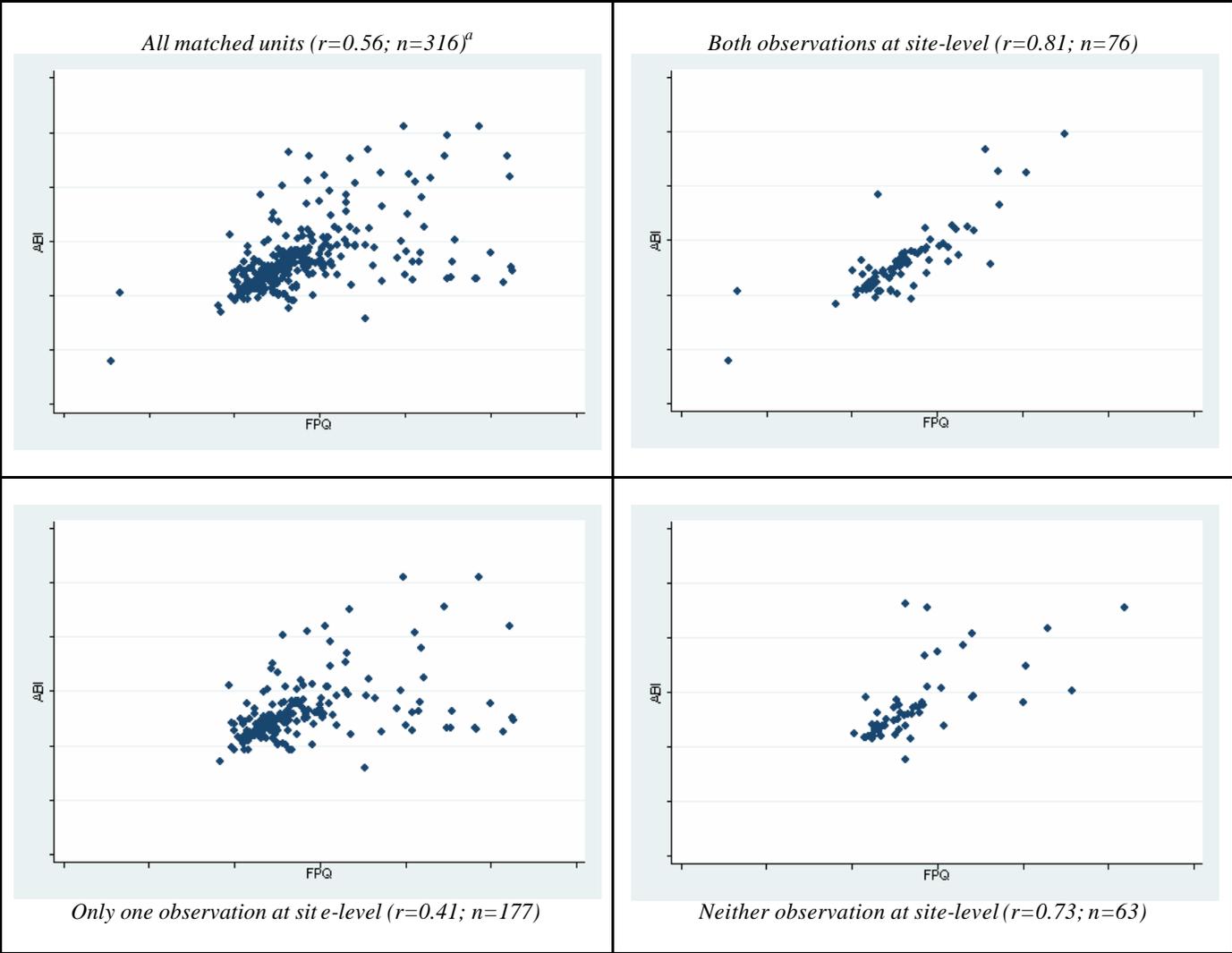
Figure 1 Correspondence between measures of average labour productivity in the ABI and FPQ



Notes:

- a. Sub-sample excludes observations with values in excess of the 95th percentile in the FPQ distribution
 - b. The correlation rises to 0.96 after excluding the single outlying observation with a high value in the FPQ relative to the ABI.
- Axes are unscaled so as to comply with ONS rules which prohibit the disclosure of specific values from the ABI.

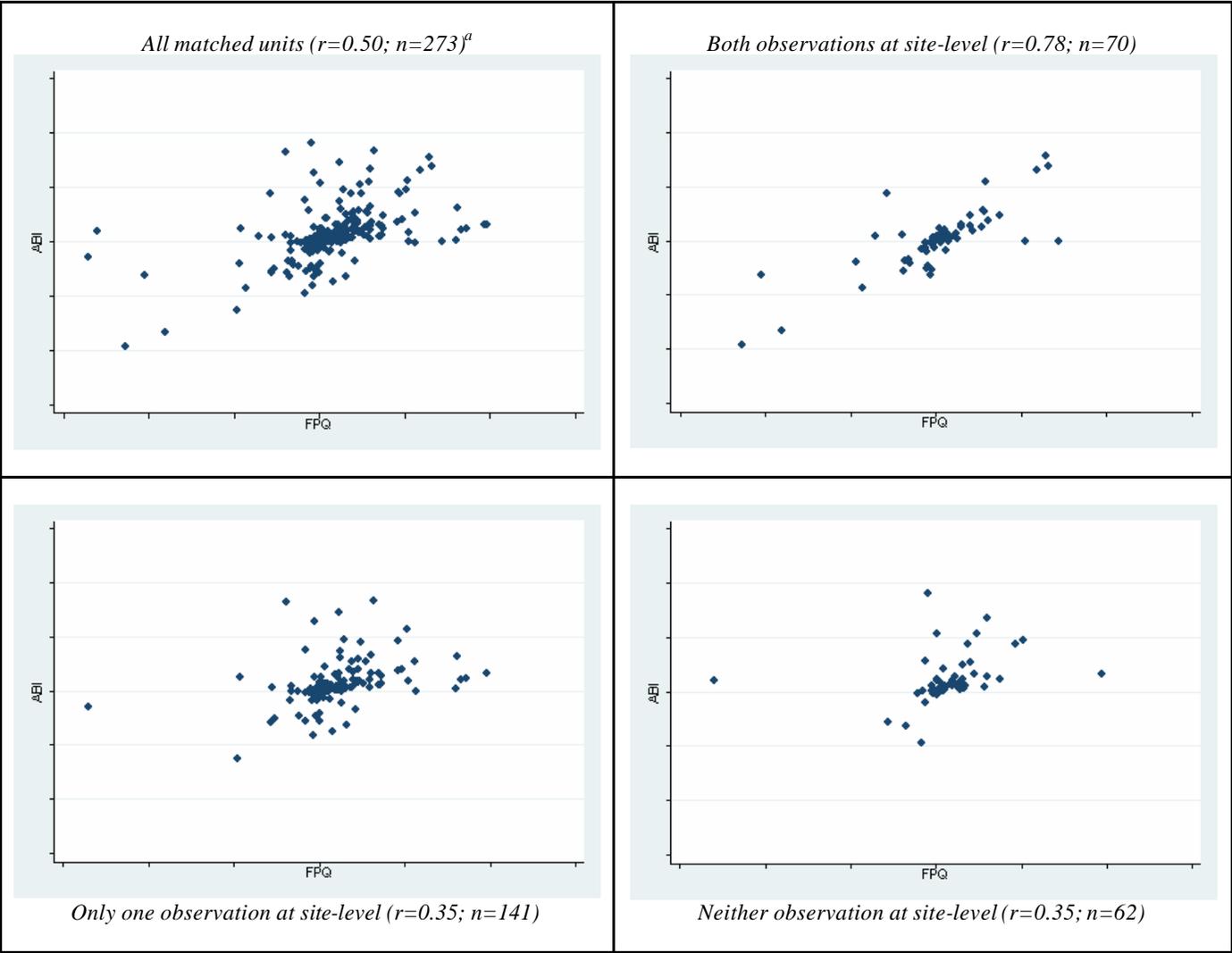
Figure 2 Correspondence between measures of value-added per employee in the ABI and FPQ



Notes:

a. Sub-sample excludes observations with values in excess of the 95th percentile in the FPQ distribution
 Axes are unscaled so as to comply with ONS rules which prohibit the disclosure of specific values from the ABI.

Figure 3 Correspondence between measures of ‘profit’ per employee in the ABI and FPQ



Notes:

a. Sub-sample excludes observations with values below the 1st percentile or in excess of the 95th percentile in the FPQ distribution
Axes are unscaled so as to comply with ONS rules which prohibit the disclosure of specific values from the ABI.

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