City Research Online

City St George's, University of London

Citation: Bewley, H., Forth, J. & Robinson, C. (2010). Evaluation Methodology: Measurement of Drivers of Business Success and Failure (10/1118). London, UK: Department for Business, Innovation & Skills.

This is the published version of the paper.

This version of the publication may differ from the final published version. To cite this item please consult the publisher's version.

Permanent repository link: https://openaccess.city.ac.uk/id/eprint/20812/

Copyright and Reuse: Copyright and Moral Rights remain with the author(s) and/or copyright holders. Copies of full items can be used for personal research or study, educational, or not-for-profit purposes without prior permission or charge, unless otherwise indicated, provided that the authors, title and full bibliographic details are credited, a hyperlink and/or URL is given for the original metadata page and the content is not changed in any way. For full details of reuse please refer to City Research Online policy.

City Research Online: http://openaccess.city.ac.uk/ publications@citystgeorges.ac.uk

BIS | Department for Business Innovation & Skills

EVALUATION METHODOLOGY

Measurement of Drivers of Business Success and Failure

AUGUST 2010

Evaluation methodology: measurement of drivers of business success and failure

Helen Bewley, John Forth and Catherine Robinson

The views expressed within this BIS Paper are those of the authors and should not be treated as Government policy.

Contents

Acknowledgements ..... **iv**

Executive Summary ..... **v**

1. Introduction **1**

2. The focus of the review **2**

3. Theories of the firm **5**

4. Inputs **9**

4.1 Financial capital 9

4.2 Physical capital 11

4.3 Labour / human capital 15

5. The internal organisation of the firm **20**

5.1 Product strategy 20

5.2 Product innovation 22

5.3 Market diversification 26

5.4 Management practices 28

5.5 Firm size and age 34

5.6 Ownership 36

5.7 Internationalisation 38

5.8 Past performance 41

6. The external environment **44**

6.1 Alliances and networks 44

6.2 Location 47

6.3 Product market structure 50

6.4 Product market regulations 51

6.5 Labour market regulations 53

7. Summary and conclusions **57**

References **61**

List of Tables and Figures

Figure 1: Impact of BIS Support Programmes 3

Figure 2: Analytical framework for a review of the drivers of business success and failure.....8

Table 1: Indicators of the drivers of business success or failure.....58

Authors

Helen Bewley	Research Fellow, National Institute of Economic and Social Research (NIESR)
John Forth	Research Fellow, NIESR
Catherine Robinson	Lecturer, Wales Institute of Social and Economic Research and Visiting Fellow, NIESR

Catherine Robinson's contribution to the paper was made whilst a Research Fellow at NIESR

Acknowledgements

The authors gratefully acknowledge the support of the Department for Business Innovation and Skills. We are particularly grateful for the comments provided on an earlier draft of the paper by Natalia Chivite-Matthews, Georgina Mills and Ben Winkley.

Executive Summary

Introduction

1. This report seeks to identify the key drivers of business success and failure through a review of existing literature. The review is intended to inform future work undertaken by the Department for Business Innovation and Skills (BIS) to evaluate the impact of government interventions on the business community. Such evaluations rely on the analysts' ability to take adequate account of any differences between participants and non-participants which may explain any observed variation in their performance (other than the fact of being subject to the intervention). Accordingly, the review aims to identify those performance-related business characteristics which provide the strongest basis on which to compare participants and non-participants within the context of an impact evaluation. It also comments on their ease of observation or measurement. The overall aim is to assist in the identification of a set of business characteristics that would ideally be employed as matching variables or control variables within future evaluations commissioned by BIS.

2. The framework for the review is informed by a variety of theoretical perspectives on firm performance. The neo-classical perspective draws attention to the nature and degree of competition in product markets as a possible explanation for heterogeneity in firm performance. The resource-based view focuses one's attention more directly on the nature of the inputs to the firm (financial and physical capital, and human resources) and on the internal features of the firm (working practices and structural attributes), noting that firms may vary in their performance either because of resource gaps or because of variations in their capabilities to make use of acquired resources. Evolutionary models of the firm are also useful in emphasising the dynamic capabilities of firms, particularly in respect of innovation, and in emphasising the role of outside institutions and networks in influencing a firm's progress.

3. The review focuses primarily on the literature concerned with firm productivity, profitability and survival. Performance indicators such as employment growth are also covered, but are given somewhat less prominence. The review also centres its attention on the micro-economic evidence based on firm or plant-level observations, and concerns itself primarily with factors that vary across firms (primarily the nature of inputs and the form of production technology). The broader macro-economic environment does not come within the scope of the review.

4. The review begins with a focus on inputs: financial and physical capital and human resources. The review then moves to focus on the internal attributes of the firm: its strategies, work processes and organisation. The focus then moves to the interface between the firm and its external environment, through a consideration of the role of networks and affiliations. This proceeds one step further with a review of the importance of the market in which the firm operates and of the regulatory environment. The figure provided at the end of this summary (Figure 2 in the main body of the report) presents this analytical framework in visual form.

Inputs

5. Access to adequate **financial capital** is an important prerequisite for business entry and, equally, financial distress is a key reason for business failure. This latter notion has been formalised in some financial models intended to predict the probability of bankruptcy, in which the financial health of a firm is partly a function of the level of working capital. Elsewhere, liquidity constraints are most commonly referred to in the literature on entrepreneurship and small firms, where there is some evidence that liquidity constraints serve primarily as a signal for low stocks of human capital.

6. Firms will benefit from greater intensity of **physical capital** if capital and labour are substitutable at favourable cost. Financial performance will also be enhanced if there are economies of scale, and firms may further benefit from high levels of capital intensity if this creates a barrier to entry into the industry. Firms ought also to benefit from improvements in the quality of their physical capital. However only weak effects are observed, which may be because the impact of capital is mediated by other factors, such as the stock of workforce skills. Much of the recent literature focuses on ICT capital, with most studies finding a positive and significant association with firm performance. Yet, again, there is clear evidence that firms differ in their ability to make use of new technology, depending upon complementary investments in skills and work organisation.

7. The empirical evidence suggests that having a **highly-skilled workforce** is generally associated with greater productivity and a greater chance of organisational survival. The ability of the firm to meet skills needs in the local labour market is also a driver of business success or failure. However, it is not clear that making a greater investment in skills always raises productivity. Investing in skills is only likely to reap benefits in terms of improved productivity if this is consistent with the competitive strategy of the firm.

Internal factors

8. `At the firm level, **innovation** forms part of 'the strategic influences' on growth, contributing to the dynamic capabilities of a firm. Successful innovation provides firms with a competitive advantage over other incumbent firms, which may enable them to access new markets and may help them to comply with, or mitigate, the negative effect of regulations. However, the relationship between innovation and performance is complex, aggravated by the inherent riskiness of innovation, problems of measurement and the time lag in reaping benefits from successful innovations. The majority of empirical studies of innovation and its impact on growth focus on the manufacturing sector, primarily because of data constraints, yet there is increasing evidence that innovation is particularly important in the service sector.

9. **Market diversification** may provide a means of maximising efficiency by utilising excess capacity in respect of assets such as research and development (R&D), managerial ability, customer relationships and brand reputation. Diversifying firms may also be better than newly-created firms at exploiting existing resources or knowledge, and may further have the potential to enter markets at a smaller scale than new start-ups. Nonetheless, the choice to diversify may also be detrimental to firm performance if prompted by managerial motives relating to prestige. The general message that emerges from the empirical literature is that diversification is associated with inferior performance on average. However, the nature and scale of diversification is also shown to be an important factor determining the probability of success.

10. **Management practices** form a prominent part of the set of 'organisational resources' referred to in the resource-based theory of the firm. The term is potentially very wide-ranging but it is typical to focus on 'operations management' (OM) and 'human resource management' (HRM). There are good reasons to expect that OM and HRM practices may benefit firm performance. The evidence-base in respect of OM is somewhat limited, but there is an extensive array of studies of the impact of HRM on firm performance and the weight of opinion arising from these studies is that the impact is positive. Nevertheless, there remain some reasons to be cautious, including the methodological limitations of many studies. In addition to the literature on HRM practices, there is an extensive literature on the effect of trade unions on firm performance. The weight of empirical evidence points to a negative effect of unions on firm profits. This arises because, in general, unions are successful in extracting a union wage premium whereas their effects on productivity tend to be zero or negative.

11. **Firm size** is likely to proxy for a number of firm characteristics, including successful past performance. Probabilities of exiting are greatly reduced as firms grow, but being part of a larger organisation may also be

hazardous for branch plants furthest away from the head office. **Firm age**, which is highly correlated with size, is also an indicator of the probability of exit, with very young firms having particularly high exit rates.

12. It is generally anticipated that the performance of a plant or firm will improve after a **change of ownership**, principally due to an enhancement in the efficiency with which resources are used, but also because of the potential for savings through economies of scale. Nonetheless, adjustment costs and agency motives are likely to weaken the relationship between performance and acquisition, possibly reversing its sign. The empirical evidence is mixed. Much research evidence points to the relatively poor performance of firms following merger or acquisition.

13. Two aspects of **internationalisation** are discussed in the review: exporting and foreign direct investment (FDI). Firms which operate internationally are generally found to be more productive than plants belonging to firms which focus solely on their domestic market. However, this is partly due to a process of 'cherry picking' whereby multi-national enterprises (MNEs) acquire the best performing plants. Nevertheless, the evidence on the *impact* of exporting and FDI on firm performance is increasingly indicative of a positive effect. There is also some evidence of spillovers to domestic firms operating in industries in which other firms are engaged in exporting or FDI.

External factors

14. **Alliances** may take a number of forms, including exporting (see point 13). A further form of alliance is out-sourcing the provision of intermediate goods or services (also termed sub-contracting). If intermediate inputs can be purchased at lower cost than if produced in-house, outsourcing can provide a means of reducing total costs and thus raising the performance of the contracting firm. There is some evidence that outsourcing has a positive impact on plant productivity, but the benefit is not obtained in all sectors or by all types of firm. The evidence of the impact on profitability is more limited.

15. **Networks** may also aid firm performance, by aiding the diffusion of best practice, reducing uncertainty about the nature and scale of demand in the market for new products or services, and by facilitating innovation. Networks can be particularly important for smaller firms, because of their more limited internal capacities. However, the impact of external links depends on the firm's ability to acquire and utilise new, external knowledge (its absorptive capacity). The empirical evidence on the impact of networks suggests that they can promote innovation, but the broader evidence base is limited.

16. In terms of **location**, there are advantages to firms in locating alongside businesses using similar technologies, inputs and types of workers, known as localisation economies. Firms also benefit from locating in areas with a diverse industrial structure, or where the mass or density of economic activity is high. However, differences in infrastructure are also relevant; for instance, a good transport network can enable effective competition even when economic activity is geographically dispersed.

17. The importance of the **product market structure** in which firms operate has long been recognised. There is strong evidence in the literature of a positive relationship between competition and the level of productivity. Competition puts pressure on firms to raise their internal efficiency, has an additional effect through market reallocation mechanisms and also serves to promote innovation. Competition is also found to negatively affect the dispersion of productivity.

18. Finally, the review considers the role of **product market and labour market regulations**. In the recent international growth literature, regulation has been identified as one of a number of factors that is likely to assist or hinder the successful implementation of new technology. Many studies have argued that product market regulations may indeed have a positive impact on performance and growth, for example by promoting innovation. It is also argued that that greater intervention in the labour market to raise labour standards can improve competitiveness. However, alternative viewpoints highlight the importance of regulatory costs. In practice, it is difficult to make a conclusive link between changes in the degree of regulation and economic performance because of the problem of identifying the counterfactual.

Measurement

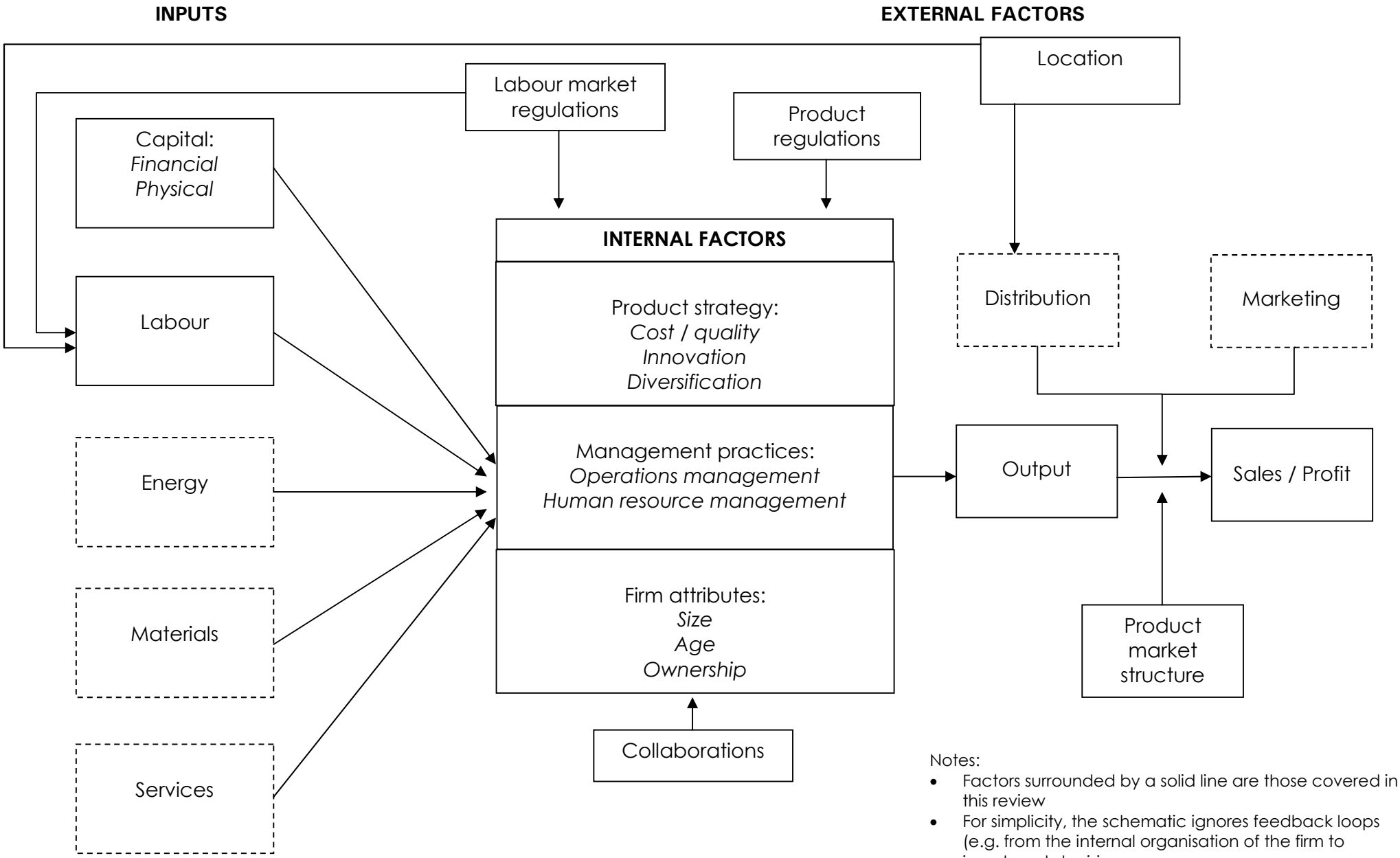
19. In seeking to identify possible matching variables, the emphasis within the review is on drivers of business success or failure which can be shown to be measurable to some extent. A wide range of factors have been identified. They range from measures of inputs (such as the stock or nature of ICT capital), through to measures of the internal organisation of the firm (including indicators of product innovation or market diversification), and measures of the external environment (including the structure of the product market and features of the local economy). The review indicates those instances in which such measures are already collected in publicly-available business datasets.

20. It is difficult to rank these factors on the basis of their likely importance in helping one to obtain an unbiased estimate of the impact of a programme. However, it is likely to be important that any analysis seeks to cover a *wide range* of determinants of firm performance, rather than focusing specifically on one dimension or another. To that extent, some

of the factors cited in this review that have been less commonly incorporated into existing analyses – such as measures of labour quality, management practices or network affiliations - might be considered priority areas. However, data limitations will play a part in determining how much progress can be made.

21. Finally, it is also important to note that the relative importance of individual factors will depend crucially upon the nature of the intervention. A case-by-case appraisal is therefore also necessary.

Analytical framework for a review of the drivers of business success and failure



Notes:

- Factors surrounded by a solid line are those covered in this review
- For simplicity, the schematic ignores feedback loops (e.g. from the internal organisation of the firm to investment decisions

1. Introduction

This report provides a review of the determinants of business success or failure. The review forms part of a broader exercise with the aim of improving the quality of evaluations undertaken by the Department for Business Innovation and Skills (BIS) to assess the impact of government interventions on the business community. Such evaluations commonly seek to compare firms which have been subject to an intervention ('participants') with firms that have not been subject to the intervention ('non-participants') in order to establish a counter-factual, i.e. the outcome that would have occurred in the absence of an intervention, and thereby to estimate the independent impact of the intervention on a business-related outcome. However, such comparisons rely on the analysts' ability to take adequate account of any differences between participants and non-participants which may explain any observed variation in their performance (other than the fact of being subject to the intervention). If adequate account is not taken of these other factors, it is possible that the estimated impact of the intervention will be biased.[1] The review therefore attempts to provide a comprehensive account of the literature on the drivers of business success or failure, but also to identify the relative importance of the factors that are identified. Nevertheless, it is also the case that some of these factors may be difficult to observe or measure. Accordingly, a further objective is to identify those performance-related business characteristics which can be more easily observed or measured in practice, and which would thereby provide a strong basis on which to compare participants and non-participants within the framework of an impact evaluation. The overall aim is to assist in the identification of a set of business characteristics that would ideally be employed as matching variables or control variables within future evaluations commissioned by BIS.

The review is structured as follows: Section 2 outlines the focus and the broad approach adopted; Section 3 goes on to consider the theories of the firm which underpin the framework of analysis; in Section 4 we discuss inputs into the production process whilst Section 5 considers the internal organisation of the firm; Section 6 outlines the role of the external environment in determining firm performance; finally, Section 7 summarises the findings and concludes.

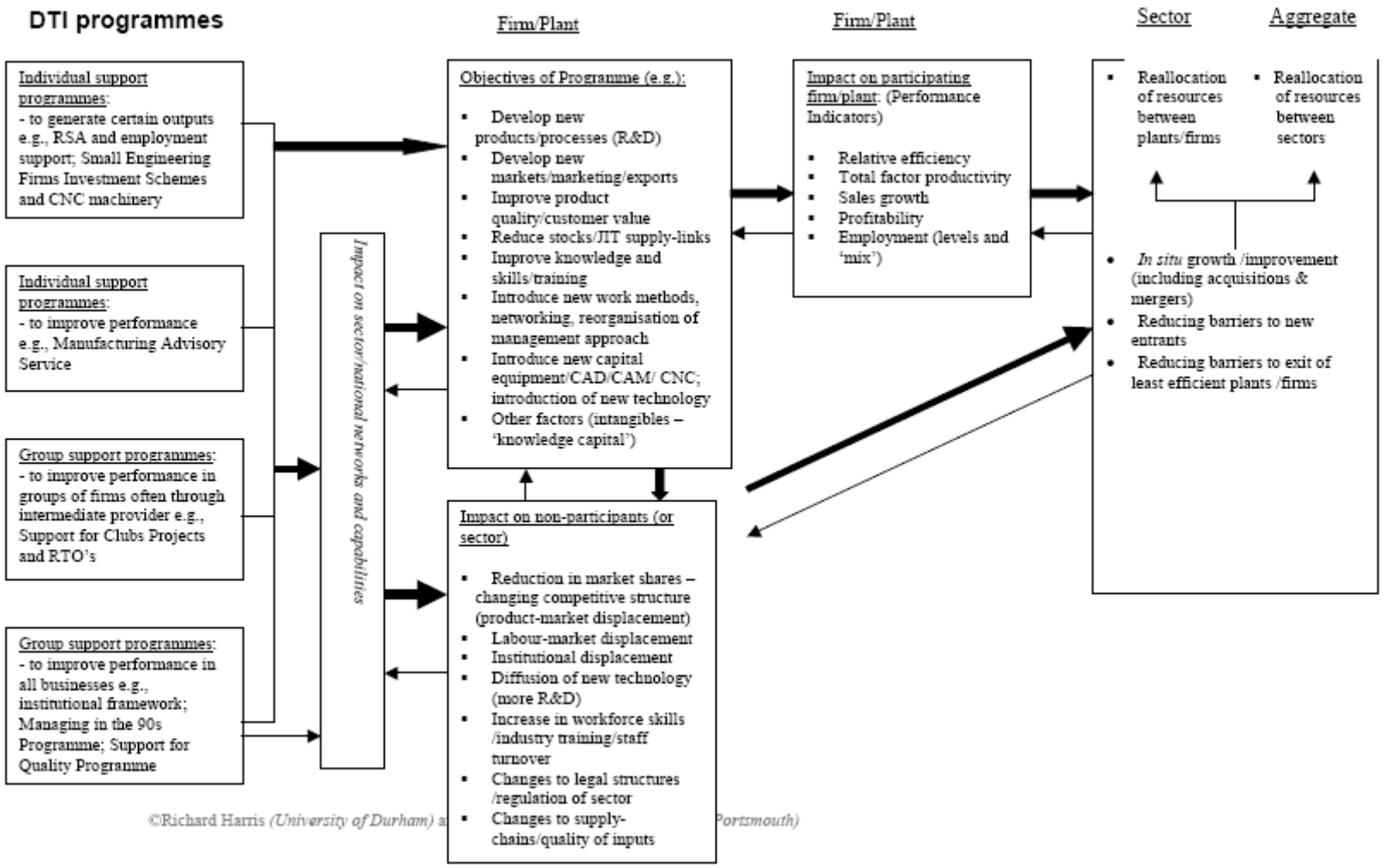
[1] In practice, bias will only be present if the omitted factor is correlated both with business performance and with the probability of participation in the intervention. However, since the nature of the intervention cannot be easily prescribed due to the varied and changing nature of the business support activities in which BIS is engaged, it is relevant to focus more broadly on the determinants of business success or failure.

2. The focus of the review

The business support programmes operated by BIS form a critical part of the background to this review. Figure 1 provides an overview of how BIS activities are intended to impact upon firms. As noted by Harris and Robinson (2001), each programme is intended to promote specific actions, such as innovation or capital investment, which are in turn expected to deliver specific economic benefits to participating firms (whether individual firms or groups of businesses). The economic benefits to participating firms include increases in total factor productivity (TFP) or profitability. The impacts on participants and non-participants in turn have an influence on the dynamics of the product market, resulting in a reallocation of resources both between firms and between industries.

The specific focus of this review is on what happens in the second and third columns of Figure 1, namely the extent to which the different resources, activities and capabilities of a firm contribute towards its economic performance. The ultimate concern in terms of measures of economic performance is with firm survival and thus with the firm's ability to make profits in its chosen product market. However, it is known that productivity is a key determinant of firm survival (see, for example, Baily *et al.*, 1992; Olley and Pakes, 1996; Griliches and Regev, 1995). Furthermore, the maximisation of efficiency – producing the most output from the least inputs – is an important economic objective in its own right, and so the determinants of productivity are also given primary attention. The review is also concerned with economic performance indicators such as employment growth. However, these are given less prominence because, although it is typical to find a positive relationship between employment growth and other measures of business success such as profitability (Coad, 2007), there are also reasons why a positive relationship may not hold – for example if a firm extends itself beyond a level at which it can cover its costs.

Figure 1: Impact of BIS Support Programmes



Source: Harris and Robinson (2001)

In view of the focus on the determinants of *firm* performance, the review centres its attention on the micro-economic evidence based on firm or plant level observations, largely ignoring the broader literature on the determinants of sectoral performance or the performance of the economy at large. It also concerns itself primarily with factors that vary across firms (primarily the nature of inputs and the form of production technology). The regulatory environment is relevant in so far as regulations typically impact to different degrees upon different firms because of varying levels of eligibility. The broader macro-economic environment does not come within the scope of the review. Whilst macro-economic conditions, such as the level of interest rates, do affect firms' prospects of survival, such conditions are uniform for all firms in the economy at a particular point in time and so do not form a useful means of controlling for differences in performance between firms, except in a longitudinal context when one may wish to account for firms' differing positions within the business cycle.

3. Theories of the firm

A neo-classical model of firm behaviour would view firms as profit-maximising entities which make decisions in response to price signals from perfectly competitive markets, and do so in an environment in which it is possible to quantify all future risks. This neo-classical perspective implies that competitive pressures will induce firms in an industry to converge to a common level of performance, termed 'normal economic performance' (Tirole, 1989). Within this framework, any divergence from normal economic performance can only be explained by the existence of barriers to perfect competition, arising for example from regulatory barriers to entry.

The virtue of the neo-classical perspective is that it rightly draws attention to the nature and degree of competition in product markets as a possible explanation for heterogeneity in firm performance. However, there is plentiful evidence that levels of firm performance are heterogeneous *within* industry sectors as well as between them. For example, Martin (2008: 16) shows that that the dispersion in average labour productivity (measured by the log of the difference between the plants at the 90th and 10th percentiles) averages 1.08 across 3-digit sectors. The dispersion in total factor productivity averages 0.41. Moreover, this dispersion is more than a transitory phenomenon: Delbridge *et al.* (2006) presents estimates from the Annual Respondents Database (ARD) which show that, among manufacturing plants, the ratio of the 90th to the 10th percentile in average labour productivity was very similar in 1980 and 2000. Alternative estimates by Faggio *et al.* (2007), which are based on the FAME database (including services), suggest that the degree of dispersion may even have increased over the period. Benito and Vlieghe (2000) similarly show substantial dispersion in firm profit margins (measured as the return on turnover) through the 1980s and 1990s.

Measurement error is one possible explanation for such heterogeneity but, as Bartlesman and Doms (2000: 579) acknowledge, careful case study research highlights wide productivity differences within particular industries. Moreover, Griffith *et al.* (2006a) document sustained differences in productivity between the branches of a single firm. And so there are very good reasons to consider that a substantial part of the dispersion observed in survey data is real.

Alternative theoretical perspectives have emerged in an attempt to make sense of this heterogeneity and these help to identify other factors – besides the competitive environment - which may affect the performance of individual firms. Resource-based approaches build on work by Penrose (1959), Teece (1982) and others. These approaches see firms as distinctive bundles of resources and capabilities. These resources and capabilities comprise all of the attributes that

enable a firm to conceive and implement strategies, and may be divided into four types (Barney, 1991): financial resources (e.g. equity capital, debt capital); physical resources (machinery, buildings and other tangible assets); human resources (e.g. the knowledge and experience of managers and employees); and organisational resources (e.g. forms of work organisation, innovative work practices and social relations). The two basic assumptions are that these resources and capabilities can vary significantly across firms and that these differences can be stable over time (Barney and Hesterley, 1996). Various reasons may be put forward to explain this potential stability. Two possibilities are that the resources and capabilities are either rare or costly to imitate. Another possibility is the presence of uncertainty, which breeds experimentation (Foster *et al.*, 1998). Different rates of diffusion of knowledge from outside may also be a factor (*ibid.*), perhaps related to differing degrees of integration in knowledge-enhancing networks.

In contrast to the neo-classical approach, the resource-based view therefore focuses one's attention more directly on the nature of the inputs to the firm (financial and physical capital, and human resources) and on the internal features of the firm (working practices and structural attributes). Firms may perform below the level of others in their industry either because of a resource gap, in which firms have fewer managerial, technological and other resources than better-performing competitors, or because of a capability gap, in which firms have adequate resources but lack the capabilities to use these resources with maximum effectiveness (Harris and Robinson, 2001: 5). Teece and Pisano (1998) place a particular emphasis on a firm's dynamic capabilities: a subset of its competences and capabilities which allow it to create new products and processes and to respond to changing market conditions. This approach places the innovation process in a prominent position alongside the complementary assets of the firm.

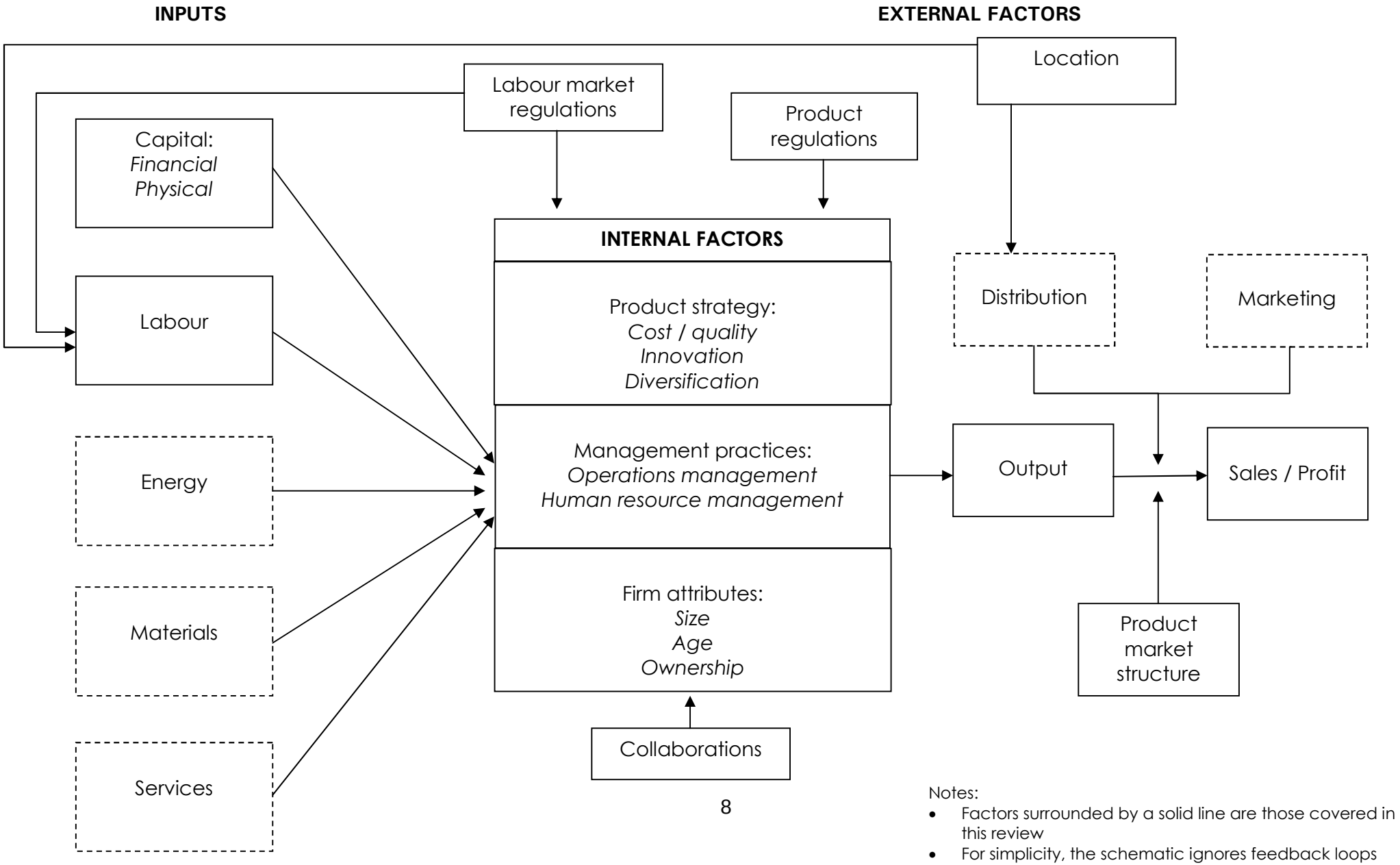
Alternative, evolutionary models of the firm have also been put forward which put innovation and knowledge at their centre. Under these models the firm is identified as the key agent for technical change, which takes place in three phases (Metcalfe and Giorghiou, 1997): the innovation; the diffusion of the innovation; and the feedback of information, knowledge and experience into the innovation process. The approach sees innovative activity as a selection process which is dynamic and which leads to diversity. The approach also emphasises the role of outside institutions and networks in influencing the processes of selection and discovery (Carlsson and Jacobsson, 1997: 300). The firm is thus less central than in the resource-based approach.

Under both the resource-based and evolutionary approaches, the model of path dependency as developed by David (1985) and Arthur (1989) offers a popular explanation for why firms and markets may become locked-in to sub-optimal technology in the long run. Firm-specific attributes (resources and capabilities) may be path dependent in nature. Equally, in the process of innovation, there may be any number of possible technology choices at the beginning of a

product's life and, with the presence of increasing returns to scale, it is possible to find that the dominant solution is not the most efficient. Once the trajectory has been chosen, the economy becomes locked-in to the solution, which may be sub-optimal.

These various theoretical approaches each point to particular aspects of the firm and its environment which may prove instructive in attempts to understand business success or failure. The schematic presented in Figure 2 attempts to identify these various elements, and thereby to provide a framework for the remainder of the review. The review proceeds by examining the various factors outlined in the figure. It begins with a focus on inputs: financial and physical capital and human resources. It then moves to focus on the internal attributes of the firm: its strategies, work processes and organisation. The focus then moves to the interface between the firm and its external environment, through a consideration of the role of networks and affiliations. This proceeds one step further with a review of the importance of the market in which the firm operates and of the regulatory environment.

Figure 2: Analytical framework for a review of the drivers of business success and failure



Notes:

- Factors surrounded by a solid line are those covered in this review
- For simplicity, the schematic ignores feedback loops (e.g. from the internal organisation of the firm to investment decisions

4. Inputs

4.1 Financial capital

Financial capital is a key part of the resource base for any firm. Access to adequate financial capital is an important prerequisite for business entry (Hotlz-Eakin *et al.*, 1994a) and, as we discuss below, financial distress is documented to be a key reason for business failure. This latter notion has been formalised in some financial models intended to predict the probability of bankruptcy. The model proposed by Altman (1968) is one example, in which the financial health of a firm is partly a function of the level of working capital (alongside profitability, operating efficiency, equity value and turnover).

Liquidity constraints are most commonly referred to in the literature on entrepreneurship and small firms. Bessant *et al.* (2005: 56) note that a lack of venture capital has been a particular barrier to small firms in Europe, with many technology-intensive firms being either self-financed or financed by loans. Storey (1994) also highlights the problems that small and medium-sized enterprises (SMEs) face in terms of credit rationing as a result of banks' failure to lend (on the evidence for credit rationing, see also Hay and Mole, 2004). This is partly the result of banks' inability to separately identify low-risk and high-risk SMEs, but SMEs may also have insufficient collateral on which to secure any borrowed finances. Hoffman *et al.* (1998) note that the proportion of small firms which seek finance yet fail to find it is small. However, a report by Hutchinson and McKillop (1992) indicated that borrowing SMEs could expect a mark up of 3 per cent above national base rates, compared with 1 per cent for large firms. Whilst these results will be very sensitive to the point in the business cycle at which the research was carried out, the clear implication is that small start-ups are likely to face different financial constraints to other types of entrant.

Whilst many small and medium-sized enterprises may not represent a good investment because of issues related to managerial competence, project viability and market potential, the lack of access to capital for some small businesses is usually deemed to be a market failure or institutional failure. Caballero and Hammour (1998) argue that, if firms fail because of (imperfect) financial constraints, more efficient firms may be forced to leave the market. Firms with better access to capital may be able to stay in the market even though they are less efficient, because of the financial barrier to entry. This provides one rationale for government intervention in the form of programmes to provide grants or subsidies, although care is needed to focus on the identified market failures and to avoid supporting inefficient businesses in a way which interferes with the beneficial churn process.

The research evidence suggests that liquidity constraints do limit the survival of small firms (e.g. Fairlie and Robb, 2007a; Saridakis *et al.*, 2008). However, the evidence base is limited in part because of the difficulty of addressing the potential endogeneity of liquidity constraints in any analysis of firm behaviour (Hall, 1992). The study of US entrepreneurs in the mid-1980s by Holtz-Eakin *et al.* (1994b) addressed this issue by using data on inheritance wealth obtained from income tax returns. They found that a £150,000 inheritance increased the probability that the individual would continue in self-employment by 1.3 percentage points and raised the receipts of surviving enterprises by almost 20 per cent. Taylor (1999) reached a similar conclusion when studying exits from self-employment in Britain. He found that high annual interest or dividend receipts prior to becoming self-employed significantly reduced the rate of bankruptcy. However, individual wealth had no impact on the overall exit rate from self-employment. The overall exit rate includes exits to employment which might also be prompted in some cases by financial distress. This latter result is consistent with the analysis by Cressy (1996) who found that the correlation between financial capital and firm survival in a bank database of 2,000 start-ups could in fact be explained by differences in the stock of human capital (measured by the relevant work experience and vocational qualifications of the proprietors). Businesses with lower human capital are less likely to obtain finance and, once the human capital structure of the firm is controlled for, Cressy finds that "the econometric 'marginal product' of financial capital is zero" (p.1254).

Measurement of financial capital

The most general measure of financial capital, which may be applied to all sizes of firm, would be some form of financial ratio. Altman (1968) used data from balance sheets and income statements to compute the ratio of working capital (current assets minus current liabilities) to total assets. Altman obtained his data from annual reports, but such data are more broadly available on financial databases such as EXSTAT, Datastream or FAME. Linkages have been established between enterprises on the ONS' Inter-Departmental Business Register (IDBR) and companies in the FAME database, however the link is not wholly straightforward as a single enterprise may account for more than one company. Balance sheet data may also be obtained from firms via survey enquiries: the Financial Performance Questionnaire in the 2004 Workplace Employment Relations Survey provides one example (see Forth and McNabb, 2007). However, high response rates are not easy to obtain when seeking to collect financial data in voluntary surveys.

Other potential measures of financial capital used in the literature are more suited to smaller firms. These include the total amount of borrowed finance (as obtained by Cressy, 1996, from the records of a high street bank) and, for very small businesses, the wealth of the business owner (as proxied by Taylor, 1999, using data on the annual value of bank interest recorded in the British Household Panel Survey). A further possibility is to identify whether businesses have

experienced difficulties in obtaining finance in the past year, as is done in the Annual Small Business Survey.

There are thus a number of potential measures of financial capital which may be employed in an empirical study of firm performance. However, the usefulness of financial ratios is somewhat limited by concerns about potential endogeneity. Moreover, in view of the important role which human capital appears to play in explaining the observed association between liquidity constraints and survival in small firms, such measures would appear to be most relevant in SME-focused analyses when measures of human capital are unavailable.

4.2 Physical capital

Sectoral data indicates that the UK has lower levels of capital intensity (capital per worker) than other countries such as the United States, Germany, France and Japan (O'Mahony, 1999), although some sectors do perform well in other international comparisons (e.g. Mason and Osbourne, 2007). Capital intensity is also shown to vary across firms within the same industry (e.g. Oulton, 1998). One reason is that capital and labour are to some extent substitutes for one another. An increase in capital intensity will necessarily raise average labour productivity (subject to the law of diminishing returns). However, it will not necessarily raise total factor productivity and thus may not necessarily raise firm performance. Thus Foster *et al.* (1998) show a positive correlation between capital intensity growth and labour productivity growth, but not total factor productivity. Whether a firm will benefit from greater capital intensity will depend upon the relative costs of labour and physical capital. Financial performance may also be enhanced if there are economies of scale arising, for example, from greater efficiencies in the use of operating or maintenance staff or in the use of energy. Firms may also benefit from high levels of capital intensity if this creates a barrier to entry into the industry, by virtue of the substantial investments that may be required to operate at the minimum efficient scale.

Capital is not a homogenous input, however, and is variable in its productivity. Some firms will use the best available technology whilst others will use older, more limited equipment. Firms ought therefore to benefit from improvements in quality of their physical capital, all other things constant. This notion is embodied in vintage capital models, in which new firms adopt the latest – and thus most productive – technology. They are thus predicted to enter at the top of the productivity distribution and exit when their productivity relative to the latest new entrants becomes too low. However, research tends to show that the productivity of entering plants is below that of the average, being determined by a range of other factors. More direct investigations of the impact of capital vintage have shown some effects on performance. Baily *et al.* (1992), for example, found some evidence that plants' productivity declined with age. However, Power (1998) found that the productivity growth of manufacturing

plants did not increase faster than average after periods of substantial investment.

One possible reason for these weak effects is that the impact of capital is mediated by other factors. Foster *et al.* (1998) suggest, for example, that it may not be the vintage of capital but the vintage of the manager or the organisational structure that induces heterogeneity between plants. Skill levels are also likely to be important. If technology and skills are complements (Doms *et al.*, 1997), then firms that have above-average skills within the workforce are likely to be better able to adopt and gain maximum benefit from new technologies. We return to some of these factors in later sections.

ICT capital

One particular form of physical capital that has attracted much attention in the literature is information and communication technology (ICT). Much of the initial evidence came from industry-level studies which showed that ICT-related capital deepening had raised total factor productivity, particularly in the US (see Forth *et al.*, 2002, for a review; also O'Mahony and Vecchi, 2005). As noted by Draca *et al.* (2006), concerns about the limitations of aggregate industry data in picking up heterogeneous effects on firms within the same industry have subsequently led to a greater focus on firm-level studies. The more recent evidence tends to confirm the view that ICT has a positive impact on productivity, with most studies finding a positive and significant association. However, there is considerable variation in the estimated magnitude of this effect. Stiroh (2004) reports a meta-analysis of 20 studies (mainly US-focused) which econometrically estimated production functions to identify the impact of ICT on firm value-added. The estimated output elasticities with respect to ICT ranged from -6 per cent to +24 per cent with a median of +4.6 per cent. This range of estimated returns suggests that the productivity effects may be large enough to create 'excess returns'.[2]

Conventional neo-classical economics largely views output growth as deriving from input accumulation and technical progress in a world of roughly constant returns to scale. However, an alternative view suggests that there are additional sources of growth arising from the adoption of ICT, which leads to increasing returns to scale, network economies and externalities that spill over from one firm to another. Thus it is more in the spirit of endogenous-growth models. Those emphasising network effects recognise that the utility of many forms of ICT grows with the number of users. As the base of users grows, more non-users find adoption of the technology worthwhile, providing 'positive feedback' to the existing network (Economides, 1996; Shapiro and Varian, 1998).

[2] The estimated share of ICT capital in US value-added in 2000 was estimated at 5.5 per cent (Basu *et al.*, 2004).

Stiroh (2004: 6) determined that around one third of the variation in ICT-related output elasticities observed in his meta-analysis could be attributed to differences in econometric specifications and empirical methodologies. First differencing, using firm-level rather than industry-level data, focusing on manufacturing, including fixed effects, and using less-recent data all tended to lower the estimated ICT-elasticity. Stiroh argues that this identification of some predictability among the wide range of empirical estimates in the literature is suggestive of some consistency, which strengthens the belief that there is an underlying relationship between ICT and output. However, the degree of residual variation also implies that one should be cautious in attempting to quantify the effect precisely. Indeed, Stiroh presents a range of industry-level estimates produced under a variety of specifications, some of which are consistent with normal returns and some of which are consistent with possible excess returns.

Further examination of the firm-level literature reveals some considerable evidence that firms have not only adopted ICT at different rates, but have also have been successful to different degrees. Faggio *et al.* (2007), for example, find that an increase in the share of ICT capital in an industry is positively associated with an increase in the dispersion of productivity in the industry. Bloom *et al.* (2008) show, both in an establishment-level dataset comprising 11,000 UK establishments and in their own firm-level panel covering firms in seven European countries, that US multinationals obtain higher productivity from ICT than non-US multinationals in Europe. This is particularly so in ICT-intensive sectors. Furthermore, they show that the productivity of ICT increases in establishments that are taken over by US multinationals, whereas the same effect is not seen in equivalent establishments taken over by non-US multinationals. There is thus clear evidence that firms differ in their ability to make use of new technology. There may be a variety of reasons.

One strand of the literature argues that there is a complementarity between ICT and skills (see Bresnahan, 1999; O'Mahony *et al.*, 2008). Many ICT-using jobs (e.g., in word processing and repetitive data processing) do not require high levels of cognitive skill. However, the development of ICT-enabled products and services and the organisational adaptations required to make use of ever-greater amounts of data place increasing skill demands on managers and professionals – for example, high levels of cognitive skill combined with interpersonal skills. Accordingly, firms may experience delays in achieving the expected productivity pay-off to ICT investments because of the time and cost required to develop the specific skills and knowledge needed to make best use of the technology. A further implication is that is a lack of skilled personnel may constitute a significant barrier to the adoption and effective use of ICT capital (OECD, 2001a, 2001b). Indeed, Hempell (2003) presents firm-level evidence from Germany suggesting that ICT and skills training are complementary.

Empirical studies of the impact of new work practices on firm performance further suggest that productivity performance is highest in firms where investments in ICT equipment and skills training have been supported by

complementary changes in work organisation – for example, permitting greater employee involvement in decision-making (e.g. Bresnahan *et al.*, 2002). Furthermore, Bloom *et al.* (2008) explain the higher output elasticity of ICT in US multinationals with reference to an apparent complementarity between ICT and people management practices relating to promotions, rewards, hiring and firing. Abramovsky and Griffith (2006) find, using the ARD, that the elasticity of output with respect to ICT is higher for firms that make greater use of outsourced services than other firms within their industry. There is thus growing evidence that impact of ICT on firm-level productivity is linked to the internal and external re-organization of firms.

It should be noted, however, that there may be substantial direct and indirect costs associated with investment in ICTs. This is more so if effective use of ICT requires the need for complementary investments. Draca *et al.* (2006: 9) report anecdotal and empirical evidence which indicates that the total cost of ICT investment may be four or five times the cost of hardware and software, because of costs incurred by reorganisation, which may come in the form of fees paid to consultants, management time, or expenditure on the retraining of workers. The net effect on firms' financial performance (as opposed to their productivity) is an empirical question which, to our knowledge, has yet to be comprehensively addressed in the mainstream literature.

Sunk costs

Finally in this section on physical capital, it is relevant to consider the role of sunk costs in firm survival. Sunk costs – costs which are irrecoverable after entry (such as specialised assets) - are an important determinant of whether firms choose to exit. When making the decision to close, a business will take into account the scrap value of the physical capital stock, as well as the anticipated value of future profits or losses. Following this logic, firms that have invested considerably in specialised physical capital will endure losses in the short run, particularly when product demand is volatile. Kleijweg and Lever (1996) show that sunk costs serve as a barrier to exit in Dutch manufacturing industries.

Of course, sunk costs may not only refer to physical capital. Other forms of sunk cost include research and development (R&D) spending and advertising. These forms of sunk cost may be used strategically in industries where firms have substantial market power as a means of creating barriers to exit, which then create barriers to entry by making it difficult for new firms to enter without substantial investment (Harris and Robinson, 2001). This activity thereby reinforces the existing market structure, so that lower exit probabilities persist.

Measurement of physical capital

Measurement of the stock of physical capital is typically done in value terms, given the variety of asset types within and across firms. Even so, measures of the value of physical capital are sensitive to assumptions about depreciation rates and the length of life of different assets, and so estimates may only be comparable to an approximate degree across firms. In accounting terms, the appropriate measure is the value of tangible fixed assets (which include land and buildings, plant and machinery and vehicles).

Tangible fixed assets must be separately classified in company accounts. Such values are available in company financial databases such as FAME. The Annual Business Inquiry (ABI) does not collect data on the stock of physical capital, and other survey inquiries which have attempted to obtain estimates have met with relatively low response rates on this particular item (see Forth and McNabb, 2007). However, researchers have used historical data on capital investments from the ABI to construct estimated capital stocks at both the firm-level (Martin, 2002; Gilhooly, 2008) and the plant-level (Harris, 2005) using the perpetual inventory method. These estimates are available for units appearing in the ARD.

In the case of the measurement of ICT capital, two alternative paths may be followed. The first is to estimate the value of ICT capital stocks in the same way as outlined above, through the use of historic data on capital investments. For instance, Bloom *et al.* (2005a) use data from three specialised surveys by the Office for National Statistics (ONS) (the Business Survey into Capitalised Items; the Quarterly Inquiry into Capital Expenditure, and the Fixed Asset Register) along with data from the Annual Business Inquiry (which has collected information on software investments since 2000) to this end. However, there are a number of practical difficulties which must be overcome relating to data limitations and so on (see Bloom *et al.*, 2005a, for an extensive discussion). The second option is to obtain measures of ICT use from surveys of firms or plants. This is done, for example, in the annual ONS E-Commerce Survey, administered among around 8,000 businesses with 10 or more employees. The survey includes questions on the use of ICT networks, back-office systems and business planning software. It also collects data on the volumes of purchases and sales conducted over the internet and non-internet ICTs. Abramovsky and Griffith (2006) use data from the ABI on software investments (not stocks) and from the E-commerce Survey on internet use and find that both measures are positively related to firm productivity in their analysis.

4.3 Labour / human capital

The contribution of human capital to business success is much debated. The resource-based view of the firm argues that sustained competitive advantage is due to the careful management of internal resources, rather than external positioning within the industry and the relative balance of competitive resources (Stiles and Kulvisaechana 2003: 3). Human capital can be a source of sustained

advantage if some firms are able to acquire and retain the talent they need and others are not (Snell *et al.*, 1996: 65; Stiles and Kulvisaechana 2003: 4). An alternative view is that the choice of competitive strategy determines whether a greater investment in the training of employees will improve the likelihood of business success. In some circumstances spending money on training will be wasteful for the firm and so skills development needs to be carefully targeted (Ashton and Sung 2006: 17; Keep *et al.*, 2006: 551).

The empirical evidence suggests that having a highly-skilled workforce is generally associated with greater productivity, increased profits and a greater chance of organisational survival, but it is not clear that making a greater investment in skills actually raises productivity (Reid 2000; Scottish Government Social Research 2008: 1, 5, 62). The link between the levels and types of skills of employees and the productivity of an organization is complex as it is difficult to separate the impact of training and skills from the many other factors which influence firm performance. This is explored further in Section 5.1, but investing in skills is only likely to reap benefits in terms of improved productivity if this is consistent with the competitive strategy of the firm. The 2005 interim report produced as part of the Leitch Review of Skills found that, at the national level, improvements in qualification levels only had a small impact on annual productivity growth (0.2 percentage points) (Leitch, 2005: 87). Whilst this may have been due to a time lag in realizing the benefits of investing in skills, it is also possible that a failure to capitalise on the benefits of having a more highly-qualified workforce explains the lack of association (Keep *et al.*, 2006: 546).

Examples of improvements to organizational performance through an investment in skills may not be representative or generalisable and may be industry or organization-specific (Lloyd and Payne 2006; Scottish Government Social Research 2008: 71; Keep *et al.*, 2006: 547). Also, the tendency to assume that someone who has been trained or has a qualification will be more productive than someone who has not received the same training ignores the importance of informal learning to productivity within the workplace (Scottish Government Social Research 2008: 76; Fuller *et al.*, 2003: 14-15; Keep *et al.*, 2006: 552). Nevertheless, training is associated with an increased likelihood of establishment survival (Collier *et al.*, 2005: 730). Training may also make an indirect contribution to motivation and retention, which, if ignored, means that some of the positive impact of training on productivity is missed (Tamkin 2005: 37; Scottish Government Social Research 2008: 71).

The implications of seeking to enhance the human capital of the firm also depend on whether the training needed to improve the productivity of employees is general or firm-specific. If productivity is most likely to be increased by general training, there is a danger that the employee will leave the company in search of higher wages once they have completed the training. However, in this case, the employer can seek to offset the risk that they will not ultimately benefit from the investment they have made by reducing the wages of the employee whilst they are undergoing training. The offer of higher wages

on successful completion of the training gives the employee an incentive to participate. Firm-specific training would be less likely to raise the wage rate that the employee could command in the labour market, and so there would be less reason for them to wish to participate, or to accept lower wages whilst undergoing training. As a result, there would be a need for the firm to pay the costs of training on the grounds that this would be offset by the resulting increase in productivity (Stiles and Kulvisaechana 2003: 10). These judgements about the productivity increases likely to accrue to different types of training, the risks of staff turnover and the wage rates which the firm would need to offer at each stage affect the contribution that training makes to business success.

The difficulty of measuring human capital is another reason why it is hard to establish the link between human capital and firm performance empirically (Stiles and Kulvisaechana 2003: 18). This measurement difficulty is particularly acute in respect of leadership and management skills: whilst good management is likely to positively affect firm performance, it is difficult to define 'good management' in a way that is consistent across jobs and industries (Department for Business Enterprise and Regulatory Reform, 2008a). Economic theory suggests that under perfect competition, firms pay wages which are equal to the marginal product of the employee (which depends on their human capital) and so wages reflect human capital and productivity. However, in reality, wages often diverge from those that would be expected through the application of economic theory, and so their suitability as a measure of human capital is questionable (Bryson and Forth 2008: 506).[3]

For smaller firms, the human capital of the owner appears to be associated with business success. As noted in Section 4.1, Cressy (1996: 1266) concludes that for business start-ups, it was the human capital of the owner that determined firm survival, rather than financial capital. Saridarkis *et al.*, (2008: 33) found that new firms were more likely to survive where the owner was educated to a higher level whilst Fairlie and Robb (2007b: 232) found a positive correlation between the education level of the owner and the success of small businesses across a range of measures. Other human capital factors which are associated with business success include prior work experience in family member's business or previously working in a business with goods and services similar to that provided by the current business (Fairlie and Robb 2007b: 234-235). Having past managerial experience is less strongly associated with the success of small businesses (Fairlie and Robb 2007b: 235). There is also a link between the gender and ethnicity of the owner and the likelihood of business success, with female-owned and black-owned businesses less successful and smaller on average than male, or white-owned firms (Fairlie and Robb 2007b: 232-233). Earlier studies have shown that female-owned firms have a lower likelihood of survival, a lower probability of growth, and lower sales, profits and employment,

[3] If one sought to use wages as an indicator of human capital in an analysis of firm performance, one would also have to take account of the likely endogeneity of wages with respect to firm productivity or profiitability.

than firms owned by men (Boden and Nucci 2000; Srinivasan *et al.*, 1994). However, Fairlie and Robb (2008: 20-21) found that this was because businesses owned by women tended to have a smaller amount of start-up capital and less experience of working in a similar business. They also suggest that differences in the goals of female and male-owned business may explain some of the performance gap between them (Fairlie and Robb 2008: 26). Therefore, to some extent the gender of the owner may act as a proxy for human and financial capital.

The ability of the firm to meet skills needs in the local labour market is a driver of business success or failure. There is some evidence that productivity is higher in areas where a greater proportion of the population are of working age (Rice and Venables 2004). The proximity of workers to economic centres also raises productivity (Rice and Venables 2004: 10). Rural areas can suffer from a shortage of skilled workers, which can only be countered by offering higher wages, or offering more training, in order to compete with urban areas (Winter and Rushbrook 2003: 20). However, there is a positive correlation between occupational composition and productivity, consistent with efficiency wages theory, so that where employees are higher paid, their productivity is also higher, suggesting that having to offer higher pay may not have a negative impact on firm success (Rice and Venables 2004). Locating in a remote location with labour shortages can limit the ability of the firm to expand however, and so have a negative impact on the prospects of the business by constraining growth (Winter and Rushbrook 2003). Lower skilled workers tend to be less mobile than other groups, whilst shortages of managers limit the prospects for firm growth (DTZ Consulting 2006: 16, 18; Winter and Rushbrook 2003). This may explain why firms are more likely to locate new plant in regions with higher wages for skilled workers and lower wages for unskilled workers (Devereux *et al.*, 2007: 430). On the other hand, Fairlie and Robb (2007b: 233-234) found that firms in urban areas were more likely to close and less likely to have employees than those in non-urban areas, and that in the past, rural SMEs experienced faster employment growth than those in urban areas, suggesting that the local labour market was not a significant constraint on firm success. However, there is evidence that this went into reverse in the 1990s, whilst urban firms had larger profits and higher sales (Fairlie and Robb 2007b: 233-234; Winter and Rushbrook 2003: 19). Factors which affect the location decisions of firms are discussed in Section 6.2.

Measurement of labour inputs

The discussion above indicates that there are a variety of indicators which may be used in an attempt to capture the quality of labour inputs. These include workers' qualifications, their level of experience (often proxied by age), the occupational profile within a firm, the amount or type of training that workers may have received and finally, the wages that workers command. Each have their own limitations, however. Qualifications, for instance, provide only a proxy measure of worker skill, as they do not capture skills acquired in the labour

market (Tamkin, 2005: 4). Measures of the age profile of the workforce, such as those collected in the Workplace Employment Relations Survey (WERS), give only a crude indication of experience. Training measures, occupation and wages, also provide only an imperfect measure of skills and the likely productivity of employees. Nonetheless, each of these measures provides some form of proxy for human capital.

Data on these types of measures are not typically publicly available at firm level, except in employer surveys such as WERS and the Employers Skill Survey. Both surveys provide sub-samples of workplaces that can be linked to the Annual Business Inquiry. However, they may also be useful in providing examples of questions that may be used in new data collection exercises. In respect of human capital measures for local areas, the ONS supplies information which can be used to calculate the proportion of the local population of working age, whilst the Labour Force Survey (LFS) can be used to derive information on the local labour market, such as occupational composition, in order to control for differences between firms located in different areas in access to the human capital likely to shape business success.

Other factors which have been shown to have a link with business success, such as the experience of the owner, may be relevant in specific contexts, such as when seeking to compare the impact of an intervention on SMEs, but are not relevant to all firms. Since detailed information on the experience of owners is not currently available on nationally representative datasets, proxies for owner human and financial capital, such as gender or ethnicity, could provide an alternative indicator of human capital. Such characteristics are collected, for example, in the Annual Small Business Survey.

5. The internal organisation of the firm

The following sections concentrate on the evidence that the internal features of the firm affect its success or failure. The discussion begins by giving a overview of the types of product strategy commonly followed by businesses and explains why the choice of strategy is not thought to have an independent impact on performance. It then moves on to consider whether decisions made inside the firm, to innovate, operate in diverse markets, or to use particular management practices, have a bearing on business performance. It also assesses the link between firm characteristics – such as the size and age of the firm, its ownership, whether it operates in international markets and past performance – are associated with business success or failure.

5.1 Product strategy

The strategy that a business follows depends on the market segment in which the organization wishes to compete and a choice about how best to achieve competitive advantage in that particular segment (Keep *et al.*, 2006: 550). Ashton and Sung (2006: 11) identify two distinct elements in the firm's competitive strategy: the technical and interpersonal relations of production. Technical relations define the nature of the goods or services produced by the firm and range from mass production and standardization to highly differentiated and customized products or services. Social or interpersonal relations are concerned with the approach that the firm takes to people management, which can range from having a tight focus on the fulfilment of a narrowly-defined task to an emphasis is on people-development (Ashton and Sung 2006: 12, 19; Keep *et al.*, 2006: 551).

Ashton and Sung (2006: 13) argue that it is possible to apply the techniques of mass production to the service sector by competing on costs and using low cost, low-skill labour. Changes to the production system are likely to result in a need for more training, which raises costs and reduces profit margins. As a result, firms with a strategy of mass production are unlikely to be successful if they seek to be innovative or make technical or organisational changes (Ashton and Sung 2006: 13-14).

Whether pursing a low-skill/low-quality strategy results in business success is shaped by the demand for the goods produced, which itself depends on the competition from newly industrializing countries with lower wages (Mason *et al.*, 1996: 177). Low import penetration, a favourable exchange rate, or advertising

expenditure offer protection against competition, but low skills reduce productivity even where the product is low-quality and where firm is operating in a sector with a low value-added product. However, low labour costs can offset low labour productivity (Mason *et al.*, 1996: 190).

Differentiated production is associated with higher levels of innovation and the skills of employees are seen as part of the competitive advantage. Again, firms following this strategy can be found in the manufacturing or service sector. (Ashton and Sung 2006: 14). There is a general assumption that low skills are associated with a product market strategy of mass production, whilst high skill levels are associated with a differentiated product market strategy (Ashton and Sung 2006).

Turning to the interpersonal relations of production, if there is a task focus, management systems and rewards are designed to ensure that there is control over those aspects of employees' behaviour which are relevant to the performance of this role. Skills are minimised as part of the process of cost minimisation and training is only used when staff join the company or when training problems arise (Ashton and Sung 2006: 15-16). Alternatively, if the firm focuses on people-development, the aim is to ensure that employees achieve their maximum potential. Managerial control is derived from the commitment of employees to the objectives of the organisation. Management systems support employees and there is on-the-job training and mentoring as competitive advantage is dependent on the skills of the entire labour force. As a result, continuing development is essential (Ashton and Sung 2006: 18).

Ashton and Sung (2006: 15) argue that innovation in product and services are essential to sustaining competitive advantage for firms offering differentiated good and services. This means that investing in skills is essential to maintaining future competitiveness. However, Boxall (2003: 11-12) questions whether product differentiation is sufficient to produce superior performance on the grounds that small firms operating in niche markets may accept lower levels of profits than larger firms or, alternatively, that a large share of rents may be captured by executives. Also, he argues that whilst cost-based, low-margin competition in mass services reduces the possibility of gaining an advantage through the development of human resources, it is possible to combine mass and differentiated production (Ashton and Sung 2006: 15). Even within the mass market sector, there may be customer segments where it is worthwhile to invest in human resources. This might be the case for premium brands, in knowledge-intensive sectors, or where it is possible to put in place barriers to imitation (Boxall 2003: 16). Certainly, the likelihood of firm survival may be improved if the business can differentiate itself by offering a higher quality product in the face of competition from foreign mass producers with lower labour costs (Mason *et al.*, 1996: 177). Saridarkis *et al.*, (2008: 32) found that new firms which claimed to compete on grounds other than price were more likely to survive than those where the primary focus was on price competition. Also, training resources may be wasted on mass production/task-orientated

firms and not contribute to business success unless the company has a strategy which sees skills as a source of competitive advantage (Ashton and Sung 2006: 25).

Measurement

An 'enterprise product strategy' may be conceived as referring to the positions occupied by an enterprise on a series of spectra relating to inter alia product innovativeness, complexity, customisation and price dependence (see Mason, 2004). In broad terms, one would expect firms pursuing high value-added strategies to score higher on each of these dimensions than firms pursuing low value-added strategies.

Attempts at measuring firms' or workplaces' strategic orientations in this way have been made in the Employer Skills Surveys. A managerial respondent is asked to rate their firm/workplace on a series of four or five-point scales (one scale per dimension); Mason reports some results. One acknowledged problem, however, is that many firms/workplaces adopt a 'segmented' approach to product or service delivery, such that the strategic orientation varies across products or services within the same business unit. The limits the usefulness of a firm or workplace-level characterisation.

The preceding discussion further indicates that strategic orientations can be expected to be manifest to a large extent in the more tangible features of the internal organisation of the firm: the extent of spending on R&D; the amount of skills training; and the approach to work organisation. Accordingly, the value of measuring product strategy is reduced when measures of these aspects of the firm are also present. We discuss the measurement of such practices in the following sections.

5.2 Product innovation

Along with investment, skills, enterprise and competition, innovation is one of the five drivers of productivity, identified by HM Treasury (2000). At the firm level innovation forms part of 'the strategic influences' on growth (Blackburn *et al.*, 2008), or put another way, contributes to the dynamic capabilities of a firm. As noted earlier, in Section 3, if we take a resource-based view of the firm one needs to make the distinction between operational capabilities (Winter 2003) and dynamic capabilities (Teece *et al.*, 1997). The former relates to the necessary capabilities that a firm must possess in order to carry out the day-to-day activity of 'making a living'. The latter are the characteristics that a firm possesses that make it possible for the firm to compete successfully in a changing market, for example, skills and knowledge that lead to the ability for firms to identify and make effective use of relevant new knowledge. It is by this set of assets that innovation is driven. The idea of 'absorptive capacity' put

forward by Cohen and Levinthal (1989) links innovation and the use of knowledge.

Successful innovation provides firms with a competitive advantage over other incumbent firms. It may also enable them to access new markets and may help them to comply with or mitigate the negative effect of regulations (Department for Business Enterprise and Regulatory Reform, 2008b). In an aggregate analysis, Crafts and O'Mahony (2001) demonstrate the importance of innovation in a comparison between the UK and France. They show that, even with the same skill and capital inputs, the UK still lags significantly behind France in terms of productivity. The relationship between growth and innovation is a complex one, aggravated by the inherent riskiness of innovation, problems of measurement and the time lag in reaping benefits from successful innovations (Coad, 2007). Combinations of these factors are thought to contribute to the lack of overwhelmingly supportive evidence of a positive link between innovation and growth., although evidence suggests that it holds at the extremes of the growth distribution.

Defining innovation in its broadest Schumpeterian sense encompasses activities that enable firms to combine inputs in more efficient ways than their competitors. Innovation can take the form of product or process innovation, which directly affect the production process, as well as more indirect forms of innovation. Griffith *et al.* (2006b) consider that in some sense, all firms in an industry exert some sort of innovative effort. In terms of measurement however, a broad definition can obstruct the identification of a clear link between innovation and growth. Coad and Rao (2007) find that, for only a handful of the most rapidly growing firms, is there a positive correlation between innovation and growth. The review of the literature by Bishop *et al.* (2009) highlights the importance of the complementarities between different intangible assets.

Reviewing the evidence of hindrances to business growth, Harris and Robinson (2001) focus on research that identifies characteristics of firms that innovate. Love and Ashcroft (1999) point to a number of factors, including larger, multiplant firms and those firms that have in-house R&D facilities. Geroski and Machin (1992) look at UK manufacturing and find that firms that undertake innovation are generally more flexible and adaptable as a result of going through the process of R&D, regardless of whether it led to innovation. Davis and Geroski (1997) show that market share is correlated with innovation. Martin and Scott (2000) make the point that innovative behaviour differs and as a result, one policy programme is unlikely to assist all modes of innovative behaviour. In summary, Harris and Robinson (2001) highlight the diversity amongst innovative firms.

Griffith *et al.* (2006b) consider the drivers of innovation using a cross sectional analysis of the Community Innovation Survey for four European countries, including the UK. Their findings point to a number of environmental factors that can improve the probability of firm-level innovation investment (measured as

R&D spend). These include active protection of innovations and the receipt of government funding. In addition, they identify that firms operating in an international market (i.e. exporters) are more likely to engage in R&D. They also point to the fact that investment in innovation is more likely to be undertaken by large firms. In terms of the overall impact of R&D on productivity, the evidence across the four countries in Griffith *et al.* (2006b) is more mixed; process innovation is found to be associated with higher labour productivity only in France, and on product innovation, Germany fails to display a corresponding rise in labour productivity.

In earlier work, Griffith *et al.* (2004b) estimate the impact of R&D on total factor productivity growth, exploring a panel of 13 countries from 1970 onwards. They highlight two channels through which R&D is able to impact on productivity, firstly, directly through stimulating innovation, discussed above, and secondly through increasing a firm's ability to learn – its absorptive capacity – thus facilitating technology transfer. In their analysis, they find evidence in support of both channels, and also find that human capital is crucial. The role of trade, on the other hand, was much less evident.

Other evidence that considers the relationship between business performance indicators and innovation is reviewed in Harris and Robinson (2001), particularly in relation to small and medium-sized firms. Lööf and Heshmati (2006) highlight the fact that the level of R&D capital is a statistically significant factor determining firm's productivity differences. Their analysis is based on medium-sized Swedish firms, and they find it is particularly true of medium-sized firms in capital intensive industries. Aghion *et al.* (2005) examine the relationship between competition and innovation and find there to be an inverted-U shaped relationship between the two. At low and high levels of product market competition, innovation is low. Love *et al.* (2008) use CIS data for Northern Ireland, and provide further indication of the factors that might proxy for absorptive capacity. In their analysis, they include R&D, which they argue, as well as having a direct effect on knowledge generation, reflects a firm's ability to absorb external knowledge. They also include the level of graduate employment in the firm, as well as investment in innovation specific training. In an analysis of the role of tax credits in raising R&D, Bloom *et al.* (2002) raise the point that in an internationally open economy, free riding on others innovative efforts might also be a rational option.

The ability to free-ride is dependent on the notion of spillovers, particularly knowledge spillovers in relation to innovation. Harris and Robinson (2001) describe spillovers as being technical, commercial and/or organisational (Eliasson, 1997). Spillovers are effectively ideas 'borrowed' from others and they tend to increase with the degree of relatedness between firms' products and geographical location (Klette *et al.,* 2000). Despite the breadth of this definition of spillovers, much of the literature concentrates on looking for spillovers in the heavier manufacturing industries and in high-tech industries, which results in an emphasis on R&D spending as the indirect indicator of

spillovers, with the underlying assumption that such spending will lead to unavoidable spillovers (on the part of the investing firm), potentially within the same firm, market and vertically.

The majority of empirical studies of innovation and its impact on growth focus on the manufacturing sector, primarily because of data constraints. However there is increasing evidence that innovation is particularly important with respect to the service sector, not only as its relative contribution to overall productivity growth increases, but also because there are thought to be substantial spillovers from service innovation into manufacturing, particularly at a regional level (Love *et al.*, 2008; Wood, 2005). Indeed, it is argued by Love *et al.* (2008) and others that the very nature of innovation differs in services compared with manufacturing sectors. In their analysis they find that the probability of undertaking innovation is positively associated with size and newness but can find little evidence of a direct productivity effect. However, they argue that innovation has an indirect effect through the extent and growth of exports. Considering labour productivity in services, Abreu *et al.* (2008) find that the impact of introducing product, service and process innovation are all significantly positive. There is evidence of the u-shaped effect of innovation on labour productivity when differentiating by high, medium and low technology sectors (p.51).

Recent European research by Holzl (2008) looks at R&D behaviour amongst SMEs using the CIS data for 16 countries. They find a great deal of heterogeneity in the characteristics of fast growing firms across the countries considered, suggesting that 'gazelles' are not a common unit of analysis across countries. Firms in countries that are closer to the technological frontier are more likely to invest heavily in R&D to improve their performance. They argue that this is due to opportunities being related to innovation for firms in countries close to the frontier, whereas in catch up countries, improvements can be made using known solutions. They conclude that there is no single recipe for fostering high growth firms.

Measurement

A number of alternative measures may be used to identify innovative activity. The Oslo Manual (OECD, 2005), which provides guidelines for the development of comparable innovation indicators among OECD countries, concentrates on activities which lead to the development of new and significantly improved products (goods and services) or processes. Recommended measures seek to identify whether a firm has engaged in innovation-related activities within a particular period (the previous two years in the Community Innovation Survey) or seek to identify the share of new improved products in total turnover. Whilst the identification of 'innovations' in this manner is necessarily somewhat subjective, being dependent upon a respondent's view of what may be 'new and significantly improved', analyses based on CIS results suggest that the results are nevertheless meaningful (Griffith *et al.*, 2006b; Love *et al.*, 2008).

An alternative – also discussed in the Oslo Manual – is to identify expenditure on innovative activities within a particular period, say the previous year. This would cover expenditure for implemented, potential and aborted product/process innovations. One part of this would comprise R&D expenditure and, indeed, R&D expenditure alone is often used as a measure of innovative activity, even though R&D expenditure is only one input into the innovative process, which means the correlation between R&D and innovation is weaker than one would like.

5.3 Market diversification

There may be several reasons why firms that diversify into a new market may be at an advantage over entirely new entrants. Jovanovic and Gilbert (1993) suggest that the obvious reason for firms to diversify is to maximise efficiency – where managerial and R&D inputs can be better exploited among various activities. The choice to diversify is thus resource based, to utilise excess capacity of assets such as R&D, managerial ability, customer relationships and brand reputation. Existing firms may have a wide base of resources from which to diversify and may not be confounded by barriers to entry which deter new entrants. In addition, they may enter and exploit their existing brand name enabling them to capture a larger market share than a new firm without an existing reputation.

Diversifying firms may also be better than newly created firms at exploiting existing resources or knowledge (Hines, 1957), for reasons which include:

1. information about opportunities for profitable entry (as firms usually diversify into related industries, exploration of potential opportunities may be easier, and existing methods/procedures may be applied to a new industry)
2. access to productive resources (firms may shift equipment/processes from one product to another more quickly than a new firm could establish them)
3. ability to overcome immobilities and other frictions (by relying on existing and known brands).

Diversifying firms also have the potential to enter markets at a smaller scale than new start ups. While entrants need to be competitive with industry incumbents, they will also want to enter at the lowest scale possible to minimise investment and commitment (Hariharan and Brush, 1999). Under uncertainty and where resources can easily be transferred between parent and diversified firms, diversifying firms may choose to enter at a smaller scale than is competitively viable, i.e. below their Minimum Efficient Scale (MES), until uncertainty over their market performance is resolved. New entrants on the other hand have to enter at, or close to, their MES in order to remain competitive (usually at the minimum point on their average total cost curve).

Diversifying firms may instead use 'factors' already available to minimise fixed/sunk costs and operate at the point where average variable cost is at its lowest. This gives the new entrant through diversification an advantage, at least in the short run.

Others suggest, however, that the choice to diversify may be agency based, where diversification is related to the relationship between shareholders and managers and there is prestige associated with managing a larger firm or because it increases demand for managerial skills (Smith and Cooper,1988; Gourlay and Seaton, 2004). Under this scenario, diversification may even be detrimental to firm performance.

The general message that emerges from the empirical literature is that diversification is associated with inferior performance on average. In respect of the impact on firm survival, in a study of US manufacturing Dunne *et al.* (1988) identify diversifying firms as those which produce in a different manufacturing industry from the previous year. Their empirical results show that firms which enter an industry through diversification account for a smaller proportion of exits than newly-created firms. There are few studies of the impact on total factor productivity but Lichtenberg (1992), using plant-level data from the US Census Bureau, found that plant-level productivity was inversely correlated with the number of industries in which the parent firm operated. There are a greater number of studies evaluating the impact on profitability (e.g. Tobin's q or price-cost margins). For example, Montgomery and Wernerfelt (1988) found that firm profitability decreased as the degree of diversification increased. However, these studies have typically used continuous measures of diversification which have not differentiated between types of diversification. Rumelt (1982) classified firms into nine diversification categories ranging from 'single business' (i.e. no diversification) to 'unrelated diversifier' (i.e. less than 70 per cent of firm revenues attributable to the largest group of related businesses). He found that firms pursuing 'related constrained diversification' (i.e. diversification built around a core capability) were more profitable on average than single-line businesses or highly-diversified firms. Montgomery (1994: 169) notes that these 'curvilinear' results have been widely replicated.

Measurement

Following Lichtenberg (1992), one simple means of measuring diversification at firm level is to identify the number of different industry sectors in which a firm operates. A measure could be obtained for multi-plant firms by summing the number of different four-digit Standard Industrial Classification (SIC) codes that are recorded across all of the plants belonging to the firm; such a measure could be derived for all firms recorded on the Inter-Departmental Business Register (IDBR). FAME also records the list of SIC categories in which a firm operates.[4] An extension to this approach, proposed by Montgomery (1994), is to

[4] The limitation of SIC categories is that they do not map perfectly across to product markets.

operationalise the degree of diversification as a continuous variable analogous to the Herfindahl index, e.g. one minus the sum of the squared percentages of a firm's total revenues/employment in each of its markets. However, Montgomery also notes that such general indices are insufficiently discerning of the nature of the diversification.

More detailed classifications which identify the type of diversification can be expected to be more informative. Rumelt (1992) developed a nine-category typology relying on the computation and comparison of four separate ratios:

1. the fraction of revenues accounted for by the firm's largest single business unit;
2. the fraction of its revenues attributable to its largest group of businesses which share or draw on the same common core skill, strength, or resource;
3. the fraction of a firm's revenues attributable to its largest group of somehow-related businesses;
4. and the fraction of its revenues attributable to its largest group of products.

As noted in the earlier discussion, Rumelt found the firms pursuing a medium-level of diversification around a core capability were most successful. The replication of Rumelt's classification will be impractical in most settings. However, it may nonetheless be possible to pursue the spirit of his approach and to identify the scale of diversification in a qualitative sense in survey data through the use of a small number of well-chosen questions.

5.4 Management practices

Management practices form a prominent part of the set of 'organisational resources' referred to in the resource-based theory of the firm, as discussed earlier in this review. Within this framework, there is much emphasis placed in some quarters on the potential for specific management practices to improve the performance of a business (see for example the extensive consultancy industry that has grown up around the 'business of management'). The term 'management practices' is potentially very wide-ranging but, as in the review by Siebers *et al.* (2008), it is typical to focus on two specific areas of management practice: 'operations management' (OM), which includes lean production, total quality management and just-in-time inventory management; and 'human resource management' (HRM), which includes hiring practices, methods of work organisation and payment systems.

Operations management focuses on the nature of the production system and, in particular, the combination of technical routines that combine to create value in production processes or service delivery. Lean production, for instance, requires the firm to 'precisely specify the value of each product, identify the value

stream for each product, make value flow without interruptions, let the customer pull value from the producer, and pursue perfection' (Womack and Jones 2003 p.10). In practical terms, the adoption of a lean production approach comprises a variety of different practices focused on adding value through cost reduction, employee empowerment, customer focus and product innovation. Just-in-time (JIT) production is one focus of the 'lean' approach. It comprises an approach to the management of material inputs whereby the ordering of additional materials is directly triggered by the consumption of existing stock, so that warehousing costs can be kept to a minimum. Total quality management (TQM) focuses on the maximisation of value by attempting to anchor the quality of products and services in the fundamental principles and processes of the firm. So it is as much a firm-level strategy but, as in the case of lean production, it is one which has implications for all of the firm's practices since the aim is to involve everyone in the firm – managers and employees – in an integrated effort to raise product/service quality, and thus customer satisfaction, whilst reducing real costs.

Human resource management focuses on the skills, empowerment and motivation of a firm's workforce. Practices in these areas may improve productivity through a variety of mechanisms (see, for example, Ichniowski *et al.*, 1996; Lazear, 1995). First, it is argued that giving employees autonomy over the design and execution of work tasks and greater variety in their work will increase their motivation and increase their commitment, both to the task and to the organisation. Similar effects can also be obtained through the use of variable payment systems which, unlike time-based payment systems, explicitly link rewards to the performance of the individual or a wider group. It is argued that raising motivation and commitment will in turn lead to the employee providing greater amounts of discretionary effort. Second, it is argued that collaborative methods of working, such as teamwork, give more opportunities for employees to share private knowledge (tacit knowledge) about the work process. Such arguments therefore focus on the value of asymmetric information and co-operation within the workplace. When coupled with practices that enhance communication between employees (such as quality circles and team briefings), and with sophisticated recruitment and training practices which ensure that employees have the necessary skills to work in an autonomous and collaborative way, collaborative working methods can lead to better problem solving and thus to improvements in quality. A less optimistic viewpoint would also see team-based methods as a means of reducing monitoring costs through peer-pressure effects.

Notwithstanding these propositions, there are also reasons as to why such practices may not yield the anticipated benefits. One is that there are inevitably risks for employees in sharing private knowledge about how work processes can be improved, if this may lead to labour-saving efficiencies. Cohesiveness and reciprocity are therefore important (Thompson, 2003). Another is that the implementation of such management practices is likely to be complex and to involve some costs arising from additional training, wage/effort bargaining and

short-term disruption. There is clear evidence from case-studies that performance gains can be obtained from the adoption of such practices (see, for example, Ichniowski *et al.*, 1996). But the more generalised statistical evidence is somewhat less conclusive, particularly in respect of operations management, where the evidence-base is more limited. .

Siebers *et al.* (2008) review twelve recent empirical studies of the impact of operations management on firm performance, including studies of productivity and profitability. The indicators used for lean production, JIT and TQM vary across the studies, as do other aspects of the methodology. Some of the studies cited indicate that OM may improve firm performance (e.g. Brox and Fader, 1997 in respect of JIT; Kaynak, 2003 in respect of TQM). Others indicate no effect (e.g. Kleiner *et al.*, 2002, in respect of TQM). The results are therefore mixed.

There is a larger empirical literature on the impact of HRM practices on firm performance (see, for example, the many citations provided by Wood and Wall, 2005, and Boselie *et al.*, 2005). Within this literature, there are a considerable number of studies which suggest a positive link between HR practices and firm performance; for instance, 19 of the 25 studies cited by Wood and Wall report some statistically significant positive associations. However, there are some notable studies which do not find any statistically significant association (e.g. Capelli and Neumark, 2001; Guest *et al.*, 2003). There also remain some limitations with much of the existing empirical evidence. First, it is typically based on cross-sectional data, limiting the extent to which causal effects may reliably be inferred. There are few studies based on longitudinal data and these yield divergent results. Cappelli and Neumark (2001), for instance, find no positive association. Birdi *et al.* (2008) find a positive association (but notably, no impact of OM). A second limitation is that few studies adequately address the likely endogeneity of HRM practices with respect to firm performance, i.e. the likelihood that better-performing firms implement innovative HRM practices to a greater degree than worse-performing firms because of their greater ability to shoulder the initial sunk costs of such an investment. One might expect this to lead to an upward bias in the estimated impact of HRM practices on firm performance. A recent attempt to address the endogeneity of equal-opportujnities practices has shown that a positive association with workplace productivity may disappear once these practices are treated as endogenous (Riley *et al.*, 2008). Equal-opportunities practices are not the focus here. However, the number of studies which have attempted to address the endogeneity of practices relating to work organisation is small (see Hamilton and Nickerson, 2003). The studies by De Varo (2006, 2008), which focus on teamworking arrangements, are notable exceptions. He shows that the benefits of teamworking on productivity – and the benefits of autonomous teamworking on profitability - are inflated if teamworking is treated as exogenous. Nevertheless, there remain positive effects from teamworking on both productivity and profitability in his studies once endogeneity is accounted for. A third limitation of the literature is that there is an insufficient focus on the

intermediate outcomes of implementing innovative HR practices (such as the impact on levels of employee motivation or the quality of problem-solving) – Purcell and Kinnie (2006) provide a discussion. A greater focus on the chain-linkages through which HR practices generate behavioural outcomes would give rise to greater confidence that the positive association which is typically shown to exist between HR practices and business performance reflects a truly causal effect.

Questions have also been raised about the extent to which the performance effects of HR practices might vary between firms, prompted by the observation that the diffusion of innovative HR practices has been both slow and uneven (see Bloom *et al.*, 2005b; Bryson and Wood, 2009). If the performance benefits were contingent on other factors, this would help to explain why some firms have eschewed such practices despite the generally-positive associations with performance shown in the literature.[5] De Varo's studies, cited above, provide some evidence of heterogeneous performance effects, showing a clear dispersion in the benefits of teamworking. There are a number of theories as to why this may occur. One is that HR practices complement product strategies: Youndt *et al.* (1996), for example, indicate that innovate HR systems are most effective when coupled with a competitive strategy based on quality rather than cost, whilst Mohrman and Ledford (1995) and MacDuffie (1995) argue that HR practices are integral to the effectiveness of TQM and lean production. Another theory is that the performance benefits may only be obtained when a mutually-reinforcing set of HR practices is introduced. Individual practices may therefore be insufficient if implemented without attention to the broader HR system (Barney, 1995). For example, Pfeffer (1994), Godard (2004) and others have pointed to the important role of job security provisions in creating an environment of trust in which employees feel free to share ideas about process improvement. Bloom *et al.* (2005b: 13-14) also show, more generally, that firms in which there is consistent degree of sophistication across different types of management practice are more productive than firms in which the degree of sophistication is inconsistent.

In summary, there are good reasons to expect that OM and HRM practices may benefit firm performance. And whilst the evidence-base in respect of OM is somewhat limited, there is an extensive array of studies of the impact of HRM on firm performance and the weight of opinion arising from these studies is that the impact is positive. Nevertheless, there are some reasons to be cautious, namely: the methodological limitations of many studies, and the fact that the estimated effects tend to be smaller (or even zero) in the more rigorous investigations; and the lack of evidence which clearly shows the causal-linkages between HR practices, the behaviour of individual employees and aggregate firm performance. Wood and Wall (2005) aptly characterise the existing evidence as 'cautiously positive'.

[5] Other reasons have been proposed for the uneven diffusion of management practices, besides 'contingency theories'. Bloom and Van Reenan (2007) indicate a role for variations in the degree of product market competition and in the extent of family ownership.

One further aspect of the HR system not yet considered here is the role of trade unions. Trade unions may have a variety of effects on workplace performance. The most obvious, and oft-cited, is that they may bid up wages for unionised employees through the process of collective wage bargaining, using their monopoly power over the supply of labour to raise wage costs in comparison with non-union firms (Lewis, 1986; Booth 1995), and thereby reducing firm profits all other things equal. However, this effect may be ameliorated to some degree if the act of bargaining with a trade union reduces transaction costs for the firm, who would otherwise need to negotiate contracts with each individual employee. Freeman and Medoff (1984) also note that unions may have a positive effect on productivity if the 'collective voice' supplied by the union helps to reduce labour turnover (through the more efficient communication of workers' views) and to 'shock' complacent managers into the adoption of more efficient production processes.

There is an extensive literature on the effect of trade unions on firm performance. The weight of empirical evidence points to a negative effect of unions on firm profits (Addison and Hirsch, 1989; Metcalf, 2003; Doucouliagos and Laroche, 2009). This arises because, in general, unions are successful in extracting a union wage premium whereas their effects on productivity tend to be zero or negative (Hirsch, 2003). Research has also observed a negative impact of unions on employment growth (Bryson, 2004), although some have debated whether the effect is truly causal or simply reflects unobserved heterogeneity with unions being more likely to be present in declining industries and in workplaces that have experienced employment-reducing organisational change (Metcalf, 2005).

It has been suggested that the negative impact of trade unions on workplace profits has been waning in recent years, as unions struggle to maintain the organisational strength within workplaces that they enjoyed in earlier decades (see Metcalf, 2005; Blanchflower and Bryson, 2009). However, Brown *et al.*, (2009) show that the pace of union decline in Britain has been slowest among workplaces with the highest profits, suggesting unions are focusing their energies on organizing highly profitable workplaces and are focusing on industries characterized by imperfect product market competition. This development would be likely to induce an upward bias in any positive estimates of the effects of unions on workplace performance, yet has largely been unaccounted for in the empirical literature seeking to estimate the impact of unions on workplace profits. A recent study for Britain (Bryson *et al.*, 2009) explicitly accounts for the endogeneity of unions with respect to workplace profits and finds that workplace unionization does still have a negative impact on workplace profitability – an effect which is under-estimated if unionization is treated as exogenous.

Measurement

Measures of OM and HRM practices would ideally focus on the identification of specific practices or working arrangements. In respect of OM, one would seek to identify the use of lean production, total quality management and just-in-time inventory management, whilst in respect of HRM one would focus primarily on the identification of autonomous team-working arrangements, quality circles, team briefings, performance appraisal and variable payment systems (and also on the extent to which these practices are co-existent). This practice-by-practice approach is the one taken in WERS. The principal focus is on HRM practices, but OM practices are also covered. The data from the 2,500 workplaces which participated in the 2004 WERS may be linked to other business datasets in the ONS Virtual Micro-data Laboratory (VML). This includes the Annual Business Inquiry, although the number of matches is small and the match is compromised by the mis-match in observational units between WERS and the ABI (Forth and McNabb, 2007).

A second approach is to identify the recent adoption of such OM and HRM practices. This is the approach taken in the Community Innovation Survey, although the measure included there is rather general. Specifically, it identifies the 'implementation of **advanced management techniques** within your enterprise e.g. knowledge management systems, Investors in People' and the 'Implementation of major changes to your **organisational structure** eg. Introduction of cross-functional teams, outsourcing of major business functions' [original emphasis]. A third approach – taken by Bloom *et al.* (2005b, 2007) – is to identify the intensity of a wide range of management practices through semi-structured interviews. However, this approach is not easily replicable because of the intensive investment required.

Obtaining a measure of union activity within a firm is more straightforward: one needs only to identify whether wages are negotiated with trade unions. Example questions are again available in WERS. It is also possible to aggregate responses from use the Annual Survey of Hours and Earnings to the firm level in order to obtain an approximate indicator of whether a firm engages in wage bargaining with unions, although the measure will obviously be more reliable for larger firms, since they are more likely to have workers featured in the ASHE sample.

Notwithstanding these various options, there remains the difficulty of adequately addressing the potential endogeneity of management practices with respect to firm performance. One solution is to identify instrumental variables, and this is less difficult in respect of union activity than is the case for some other management practices. Bryson *et al.* (2009) use establishment age and location, which are typically available on business datasets. This point – and the greater ease with which union activity may be measured – suggest that this particular aspect of management practices should be a greater priority for measurement than OM or HRM practices. This point can be further justified by

noting that unionisation typically accounts for part of the variation in the presence of OM and HRM practices (see Bryson and Wood, 2009).

5.5 Firm size and age

As discussed in Section 4.2, and in relation to product diversification, theory tells us that there are economies of scale to production in many industries, and therefore, there is a tendency for industry-specific factors to determine an optimal size of a firm. Given this, neoclassical theory would predict a tendency for firms to converge on an optimal size. However, in the dynamic market; there is not an 'industry standard' to which all firms tend. Whilst we discuss in greater detail elsewhere in this review the models of firm life, here we concentrate on the characteristics of the firm. Within industries, the nature of the distribution of firms has been the subject of considerable discussion, from Gibrat (1931) and Hart and Prais (1956) to Bartelsman *et al.* (2005). Coad (2007) notes that there is great persistence in firm size over time, so what factors determine size, and for the purpose of this review, what does size tell us about performance and/survival?

In their cross-country comparison of firm dynamics, Bartelsman *et al.* (2005) note considerable heterogeneity in firms across countries along a number of dimensions. They find that size varies widely across countries and across industrial sectors. This is a reflection of the economies of scale that are associated with certain industries and which are are largely pre-determined, although with technological changes over time, they may alter. Whilst Bartelsman *et al.* (2005) note that some of their findings may be attributed to sectoral specialisation, they argue that differences in size are driven by within-industry factors. The size of the market seems to be important since they find that the average size of firms within specific industries tends to be smaller within smaller countries, although they point out that the relationship does not map precisely. Bartelsman *et al.* (2005) also conclude that market selection processes are harsh on new entrants, and that around 20 to 40 per cent of entrants will fail within their first two years. They conclude that differences in size composition should at least be controlled for in any analysis of firm dynamics.

Allied to the characteristic of size is its relationship with growth and Gibrat's Law of Proportion Effect. This is often summarised as firm growth being independent of firm size. A vast amount of empirical research on the nature of this relationship has been carried out. However, Coad (2007) demonstrates that the findings are very much dependent upon the market sector under consideration, defined by size, country, industry and time. Still, he argues, the Law is a good first approximation to the relationship between growth and size. The policy implications for the acceptance of Gibrat's Law are that policies directed at small firms are called into question (Hart and Oulton, 1996). In contrast to Coad's general findings, Harris and Trainor (2005) consider the case

of 26 4-digit manufacturing sectors in the UK using the ARD and find strong evidence to reject Gibrat's Law in these cases at the plant level, arguing in favour of mean reversion.

Size is likely to proxy for a number of firm characteristics, not least successful past performance. Firms are more often than not likely to become multi-plant organisations as they grow. The relationship between the headquarters and its 'branch-plants' has been the focus of regional development literature, particularly in relation to foreign entry and exit. Probabilities of exiting are greatly reduced as firms grow, but being part of a larger organisation may also be hazardous. Empirical findings suggest that the smallest branch-plants and those furthest away from the head office are most likely to be closed (Fothergill and Guy, 1990). Harris and Hassaszadeh (2002) find, in UK manufacturing, a general trend for multi-plant organisations to close 'branch-plants' rather than for single plants to exit.

Firm age, which is highly correlated with size, is also an indicator of when a firm has a high probability for exit. Harris and Hassaszadeh (2002) estimate, for example, that a single plant enterprise in UK manufacturing that is less than a year old and which is taken over by a US multinational during the 1980s is 165 times more likely to exit than the average plant. Older plants, they argue are more likely to be able to withstand the process of creative destruction.

Small young firms that are new to a market experience the most rapid growth. Recent evidence for the UK is provided by Bishop *et al.* (2009) who demonstrate that surviving firms aged between two and three years are much more likely to experience high growth (growth rates greater than 20 per cent) than firms over the age of six years. Firms new to a market face a high probability of exit and growth is one strategy adopted to avoid exit. As illustrated in Section 5.3, a more prudent and lower-cost way of entering a market may be through diversification rather than start-ups. Often, young and small firms are policy targets because of the innovation young firms are thought to bring to the market in the spirit of Schumpeterian creative destruction. Small firms are also thought to contribute disproportionately to employment generation in the economy. Firms in new industries are likely to be younger on average, and so industries in the more mature stages of their life cycle are likely to be dominated by older, larger firms. In their preliminary analysis of UK high growth firms, Bishop *et al.* (2009) find that as many as half the high growth firms they have identified are older than 10 years and point out that mature high growth is often ignored because of a strong policy focus on 'gazelles'.

Measurement

Size and age capture similar but different attributes of the firm, linked to life cycle stages and both are generally regarded as essential control variables since they proxy for many other firm-specific characteristics, some of which are likely to be unobserved. What is more, size in particular is easy to measure since most

employers will be able to provide a reasonable estimate of the size of their total workforce. The size of the workforce is also typically recorded in existing datasets. Both points are also true of firm age to some extent. However, both Bartelsman *et al.* (2005) and Bishop *et al.* (2009) highlight the problems that are likely to be encountered in trying to access meaningful information on age from existing firm level surveys as a result of mergers and takeovers and sampling procedures, particularly for smaller firms.

The ONS' Inter-Departmental Business Register (IDBR) provides data on the size of the workforce of all plants and enterprises (although some plant-level figures are estimated). The Business Structure Database (Office for National Statistics, 2006) provides a useful starting point for the construction of an age variable which takes into account mergers and takeovers.

5.6 Ownership

There is a varied literature on the impact of ownership on firm performance. One part of the literature on SMEs, in particular, focuses on the demographic characteristics of business owners. It shows, for example, that female-owned SMEs tend to perform less well than male-owned SMEs (Fairlie and Robb, 2008) and that those owned by ethnic minorities tend to perform less well than those owned by whites (Fairlie and Robb, 2007a). However, as noted in Section 4.3, these associations are found to reflect underlying differences in human capital and heterogenous financial constraints. Another part of the literature focuses on corporate governance arrangements (see Department for Business Enterprise and Regulatory Reform, 2008c, for a discussion), but the evidence on the causal links with firm performance is limited. The broader literature – summarised below – concentrates on the impact of changes in ownership (takeovers and mergers). There is also a focus on foreign ownership in the literature; however, this is considered in the following section on internationalisation.

There are competing theories about the motivation for changes in ownership and these have different implications for the impact that ownership change is likely to have on firm performance. The neoclassical approach assumes that takeovers and mergers are a form of natural selection (Meade, 1968) whereby poorly-managed and poorly-performing plants are taken over by more efficient firms. Much of this literature focuses on the role of the market for corporate control where, it is reasoned, the threat of takeover acts as a check on the managerial pursuit of maximising growth to the detriment of shareholder returns (Scherer, 1988). Attempts by managers to deviate too far from the objective of maximising stockholder returns are kept under control by the threat of takeover: the 'managerial discipline' theory.

A similar perspective is presented in the literature centred on resource-based theories of the firm, suggesting that acquisitions are an important part of the process of redeploying resources into more productive uses (Anand and Singh,

1997), since they enable firm-specific assets housed within one organisation to be merged with equivalent assets in other organisations. Lichtenburg and Siegel (1990) couch this in terms of matching theory, suggesting that a plant's efficiency lapses when it is inappropriately matched with an enterprise, and that plant acquisitions are part of search processes carried out by enterprises.

Both approaches anticipate that the performance of a plant or firm will improve after takeover, principally due to an enhancement in the efficiency with which resources are used, but also because of the potential for savings through economies of scale. For instance, merged firms are likely to be able to combine and rationalise some support functions (such as personnel). Nonetheless, there are costs associated with acquiring existing organisational structures and management practices (Penrose, 1959). These adjustment costs are thought to be short term but are likely to weaken the relationship between performance and acquisition that is predicted by the managerial discipline hypothesis. Berkovitch and Narayanan (1993) also cite other perspectives on takeovers which entail less optimistic expectations. The first is the agency motive, which relates to the growth-maximising goal thought to be pursued by management to maximise their personal welfare (Baumol 1959; Firth 1980), possibly at the expense of the firm in general. The second is termed 'hubris', and refers to the mistakes that management make in evaluating target firms, undertaking acquisitions that do not reap any synergy gains. This may arise because of unrealistic expectation about the cost of assimilation as well as incorrect estimates of the potential gains. Under these perspectives, takeovers may potentially have a negative effect on firm performance.

The empirical evidence on the nature of takeovers and the consequences for acquired and acquiring firms is mixed. Much research evidence points to relatively poor performance by firms following merger or acquisition (surveyed in Caves, 1989, and Coad, 2007). For example, in studies of US firms, Ravenscraft and Scherer (1987) and Matsusaka (1993) both find that acquired firms were highly profitable before acquisition with little or no gain to the acquiring firm post-acquisition. Ravenscraft and Scherer (1987) also find that there is no clear evidence of a productivity-enhancing effect for the acquired plant. Studies of UK takeovers generally support the view that takeovers are not beneficial. For example, Dickerson *et al.* (1997) studied a large panel of UK-quoted companies through the 1960s, 1970s and 1980s and found that acquisitions had a detrimental impact on company profitability and that company growth through acquisition yielded a lower rate of return than growth through internal investment. More recently, Powell and Stark (2005) and Cosh *et al.* (2006) have found that profits may increase after takeover, but that the findings are sensitive to the particular measure of profit used.

Measurement

When seeking to measure ownership change, it is relevant to focus on the identification of: (a) enterprise concentration (either through merger, in which

both enterprises lose their identity, or takeover, in which one retains it); (b) enterprise de-concentration (either through breaking-up or splitting-off, the counterparts of merger and takeover respectively); and (c) the more straightforward sale of businesses. Each form part of a general typology of demographic events provided by Eurostat (2003).

It is possible to identify changes in ownership for all units on the IDBR by reference to information which enables the analyst to identify a range of demographic events. These include transfer of enterprises between enterprise groups, as well as mergers/takeovers or the transfer of local units between enterprises. The Office for National Statistics recently constructed the Business Structure Database from annual extracts of the IDBR and compiled measures which identified demographic events of this kind (Office for National Statistics, 2006).[6]

5.7 Internationalisation

Two aspects of internationalisation are prominent in the literature: exporting and foreign direct investment (FDI). Economic theory would suggest that the two are substitutes for one another, with the choice between exporting and FDI dependent upon the relative costs of market entry under either scenario. The decision entails, among other things, a comparison of the transportation and transaction costs involved in dealing with intermediaries (under the exporting model) and the fixed costs and possible returns to scale associated with establishing or acquiring one's own overseas production and distribution facilities (see Helpman *et al.*, 2004). Process models would see the process as incremental, with firms initially opting to export, as a means of limiting sunk costs, but later progressing to FDI. Evidence in support of the model is summarised by Harris and Li (2005). In contrast, the literature on firms that are 'born global' (see Rennie, 1993; Rialp *et al.*, 2005) emphasises the ability of some firms to internationalise early in their development because of the sophistication of their knowledge base, which provides the competitive advantage that is necessary to compete in overseas markets.[7]

These various perspectives each help to explain the observed pattern whereby plants belonging to firms which operate internationally are found to be more productive than plants belonging to firms which focus solely on their domestic market (Girma *et al.*, 2004; Harris and Robinson, 2002; Greenaway and Kneller, 2004; Griffith *et al.*, 2004a; Martin and Criscuolo, 2009). Part of this arises through a process of 'cherry picking' whereby multi-national enterprises (MNEs)

[6] The ONS no longer produce this demographic variable, due to doubts as to whether it was wholly reliable in all cases, but it is still possible to reproduce the variable from the underlying data held in the VML.

[7] 'Technology sourcing' may provide a further motivation for FDI. It has been argued that many foreign firms have established R&D labs in the USA in order to benefit from technological innovation in that country (Serapio and Dalton, 1999, cited in Griffith *et al.*, 2004a). For evidence in support of this hypothesis, see Griffith *et al.* (2006c).

acquire the best performing plants. However, there is a further question as to whether the process of internationalisation itself brings further benefits in terms of firm performance.

There are specific benefits which a firm may obtain through exporting (see Harris and Li, 2005; Bartelsman and Doms, 2000). First, the firm may benefit from economies of scale; second it may benefit from the diversification of risk (see also Section 5.3); third exporting may improve organisational efficiency by exposing the firm to international competition; and fourth, the firm may benefit from knowledge acquired in international markets (the 'learning-by-exporting' hypothesis). Broadening the view to foreign direct investment, MNEs are expected to perform better than domestically-owned non-MNE plants because they are assumed to possess individual intangible assets that provide them with a competitive advantage vis a vis competitors in the host market (Hymer, 1976; Caves, 1996). The intangibles may take the form of specialised knowledge (including patents) or superior marketing capabilities (including branding). Such assets enable the MNE to overcome the advantage that local plants would otherwise have in terms of knowledge of local markets. MNE plants may also benefit if there are multi-plant economies of scale and if there are network spillovers that may occur between plants (see Section 5.5).

The evidence on the benefits of exporting and FDI is increasingly indicative of a positive effect. Girma *et al.* (2004) note that the majority of studies fail to find evidence of benefits arising from export activity. However, they use propensity score matching to address the fact that high-productivity firms self-select into exporting, and find that TFP growth in exporting firms is 1-2 percentage points higher in the first two years after export entry than it would have been had they remained non-exporters. Harris and Li (2007) also use matching, along with an instrumental variables approach and the Heckman two-stage selection model, and find that, under each approach, productivity rises in exporting firms after they enter export markets. These studies are in contrast with the US evidence provided by Bernard and Jensen (1999), for example, which showed little evidence that productivity growth increased among US firms after entry into an export market. However, Greenaway (2004: 338) posits that the benefit of exporting may be larger for UK firms because they are further from the technology frontier and thus have more to gain from entering world markets. It is also notable that, in common with Girma *et al.*, Bernard and Jansen's most recent study did find that employment rose in exporting firms after they began to export (Bernard and Jansen, 2004), suggesting that, irrespective of whether exporting actually raises productivity, exporting is associated with a process of reallocation in favour of the most productive firms.

In respect of FDI, Harris and Robinson (2002) examined the total factor productivity of manufacturing plants that changed ownership over a five year period in the late 1980s/early 1990s, using the ARD, and compared those acquired by UK-owned firms and those acquired by foreign-owned firms. They found that plants with higher productivity tended to be more likely to be

acquired by foreign-owned firms (in support of the operating efficiency thesis discussed in Section 5.6). However, their evidence suggested that post-acquisition productivity tended to decline slightly, particularly for those plants acquired by UK-owned enterprises. Nevertheless, they were unable to distinguish plants belonging to UK MNEs from other UK-owned plants. Martin and Criscuolo (2009) were able to do so by reference to ONS register of Annual Foreign Direct Investment (AFDI). They found that manufacturing plants belonging to foreign-owned and domestically-owned MNEs were more productive than domestic non-MNE plants (i.e. the foreign-owned advantage noted by Harris and Robinson is in fact an advantage shared by all MNEs). They also demonstrated that MNEs have superior assets which benefit the performance of any plant they acquire, although this may take some time to materialise. Griffith *et al.* (2004a) conducted a similar investigation for service sector plants. In common with both studies mentioned above, they found evidence of 'cherry picking', although the evidence on whether plants improved their performance after being takeover by an MNE was not conclusive.

The discussion above focuses on the benefits to those firms involved in exporting or FDI. However, it is also proposed that there may be benefits for domestic firms operating in industries in which other firms are engaged in exporting or FDI. Such spillovers may occur if international trade brings domestic firms into closer contact with international best practice and thereby facilitates learning (Grossman and Helpman, 1991; Harris and Li, 2005). In a single industry study, Girma and Wakelin (2001, cited by Haskel *et al.*, 2007) found a positive correlation between the productivity of domestic firms and regional Japanese FDI in the UK electronics industry. Haskel *et al.* (2007) extended their assessment to the whole of manufacturing and found a positive correlation between the TFP of domestic plants and the share of industry employment accounted for by foreign-owned firms, consistent with the notion of spillovers. Their estimates suggest that a 10 percentage point increase in the share of employment in foreign-owned firms in an industry raised the TFP of domestic plants in that industry by around 0.5 per cent. Studies of less developed countries have failed to find evidence of spillovers from FDI, which Haskel *et al.* (2007) suggest may be explained by the UK having a higher level of absorptive capacity.[8]

Measurement

As indicated by the preceding discussion, one key measure of internationalisation is exporting activity, i.e. whether the firm sells goods or services outside the UK. A more refined measure would identify the share of exports in total turnover. Data of this nature is collected in the Community Innovation Survey. These data are used, in combination with data from the ARD, by Harris and Li (2009) in a study of the determinants of export activity.

[8] Absorptive capacity is discussed in more detail in Section 6.1 in the context of inter-firm collaboration.

Data on the value of overseas sales are also collected in the FAME database: these data are used by Harris and Li (2007) in a study of the impact of export activity on firm productivity.

As regards FDI, one relevant measure would identify whether a firm or plant is partly or wholly foreign-owned. However, as noted in the discussion above, one would ideally also identify whether a firm or plant belongs to a UK-owned MNE, so that outward FDI is also captured. The nationality of ownership of individual firms is recorded on the IDBR, enabling one to identify inward FDI. The problem of identifying outward FDI can be resolved (as in the case of Martin and Criscuolo, 2009) by reference to the ONS' AFDI register, which contains information on all UK firms which are either engaged in, or in receipt of, FDI that gives the investor a share of at least 10 per cent of the recipient firm's capital. The matching of the AFDI and ARD is discussed by Gilhooly (2007).

In respect of measures to identify possible spillover effects from FDI, it is possible to follow Haskel *et al.* (2007) in constructing a measure of the share of total employment accounted for by foreign-owned plants in particular industries, as a means of identifying spillovers to domestic firms. Haskel *et al.* did so within each of 22 two-digit industries using the ARD. One possible extension would be to combine information from the AFDI so as to be able to measure the share of total employment accounted for by MNE-owned plants.

5.8 Past performance

Past performance is thought to be one of the strongest predictors of future performance, not least because from one period to the next, firms are unlikely to change all of their existing attributes, firm specific or otherwise. Past performance may be considered within the context of existing models of firm growth and development.

In their lengthy reviews of the growth and performance literature, Bessant *et al.* (2005), Coad (2007) and Blackburn *et al.* (2008) all highlight the tension in existing literature on firm development between the life cycle models, many of which implicitly assume a relative smooth and linear progression through the various stages of firm life, and the more idiosyncratic, stochastic growth patterns that the empirical literature suggests is more a representation of reality. This has led empirical research to concentrate on the stochastic nature of growth, for which there is no theoretical underpinning (Bishop *et al.*, 2009). Coad (2007) points to the fact that neoclassical theory suggests firms will tend towards some 'optimal' size – a conclusion that is not borne out in reality. He prefers the approach of Penrose (1959), describing growth as 'a constructive application of spare resources'.

One of the more influential life cycle models is that of Churchill and Lewis (1983), who identify five stages of growth:

1. existence
2. survival
3. success
4. take-off towards large-firm status
5. resource maturity

According to Blackburn *et al.* (2008) the transition from one stage to another is difficult to observe, and they find that growth is highly episodic in nature, which suggests the process is much less controlled and more volatile – affected by an array of factors, including the business cycle. In their qualitative research, Blackburn *et al.* (2008) compare a number of fast growing firms in the UK and US, discussing the process of growth with owner/managers. Their findings highlight how difficult it is for firms to sustain high growth over a long period. They also point to the fact that fast growth is often associated with new to the market products, particularly in the IT sector, thus demonstrating the importance of innovation in the growth process. Ultimately though, Blackburn *et al.* (2008) point out that growth is a choice.

Bessant *et al.* (2005) argue that there is a preoccupation in the literature in detailing the number of phases or stages that a firm has in its life. They firmly root their discussions in relation to the knowledge capabilities of the firm. They consider growth as a series of management challenges arguing that crises precipitate change from one stage to the next. From their perspective, managerial capacity is therefore the limit to growth. They conclude that a firm's ability to absorb new knowledge is dependent on existing knowledge, the nature of what is being transferred, the extent of ability, motivation and access to external knowledge.

Delmar *et al.* (2003) in their analysis of Swedish firms demonstrate the importance of sector specific factors in determining the progress through the various stages of growth and identify through cluster analysis seven distinct 'types' of growers. Acquisition growers were mainly found in the traditional manufacturing industries such as pulp and paper (cited in Bishop *et al.*, 2009). Blackburn *et al.* (2008) point to the educational level of the owner/manager as being a key determinant of growth. This study also finds very little evidence of regulation hindering growth, nor does it find evidence to suggest growth is dominated by small and medium sized enterprises.

In a recent review Bishop *et al.* (2009) consider the perceived policy preoccupation with fast growing small firms ('gazelles') in an attempt to understand whether it matters which sorts of firms are fast growing. The review considers the factors that are important in determining success and the barriers

that firms may face pursuing growth (see also Department of Business Enterprise and Regulatory Reform, 2008a). Innovation is one key factor. Holzl (2008) looks at the European CIS for 19 countries and finds that 'gazelles' are exceedingly heterogeneous across Europe and that the innovative position of the country has a strong influence on whether innovation-based growth strategies pay off. In attempting to define what makes a gazelle, Holzl (2008) concludes that innovation is only part of the answer; gazelles are successful because of their ability to exploit a comparative advantage and only in cases where countries are close to the technological frontier is innovation significant.

Measurement

It is particularly important to include measures of past performance when seeking to match firms, as a means of controlling for otherwise unobserved factors. One way in which this may be done is to focus on measures of change (growth) rather than on current levels of performance. By growth, we specifically mean employment, output and ultimately productivity growth (the latter capturing the improved efficiency with which inputs are combined). A distinction is often made between relative and absolute growth, and this is an important consideration when comparing large and small firms together. The Birch index is a weighted average of the two and is often employed instead, proposed in Birch (1981, 1987) and takes account of absolute as well as proportional growth:

(1) $$g_{it} = (N_{it} - N_{it-1}) * (N_{it} / N_{it-1})$$

However there are problems with this approach too (for further information see Hizjen *et al.*, 2007) and, as an alternative, Davis *et al.* (1996) advocate reducing the bias towards small firms by defining the base size group as an average of the starting and ending size groups for the time period under consideration:

(2) $$g_{it} = (N_{it} - N_{it-1}) / (0.5*(N_{it-1} + N_{it}))$$

Clearly, computation of either index will require data on performance in a prior period, as well as in the current period. However, such data are typically available in existing databases such as the ARD and FAME.

6. The external environment

This section assesses the extent to which factors external to the firm shape the likelihood of business success or failure. It begins by considering the evidence that business alliances and networks influence performance. The section then reviews the evidence on the role of the structure of the product market. The importance of the location in which the firm operates is also considered. Finally, the question of whether product and labour market regulations affect the performance of firms, and whether any impacts vary by firm characteristics, is addressed.

6.1 Alliances and networks

Inter-firm alliances are one form of collaboration between the firm and its external environment. Such alliances may themselves take a number of forms and offer a number of specific benefits, some of which have already been discussed elsewhere in this review. For instance, alliances may be formed with international partners, in order to facilitate entry to a new market: exporting is discussed in Section 5.7.

A further form of alliance is out-sourcing (sub-contracting) the provision of intermediate inputs. As with other forms of alliance, outsourcing involves a decision as to whether the firm should make intermediate inputs itself or purchase them from the market place (the intermediate inputs here comprising either goods or labour services). The decision rests essentially on the relative cost of in-house production versus the cost of purchasing the input from another source. This will in turn depend inter alia on transaction costs and the degree of competition between potential partners in the market to supply those inputs (Grossman and Helpman, 2002). Firms may also be motivated by the opportunity to benefit from the specialisation of other firms or by the chance to smooth the demands on its regular workforce by outsourcing tasks in peak periods (Abraham and Taylor, 1996). If inputs can be purchased at lower cost, outsourcing can provide a means of reducing total costs and thus raising the productivity and profitability of the contracting firm.

There is some evidence from case studies that firms over-estimate the production cost benefits of outsourcing and under-estimate the transaction costs (see Heshmati, 2003). The evidence from large-scale empirical studies is more positive, however. For instance, Girma and Gorg (2004) use the ARD to study

the impact of outsourcing of 'industrial services' on plant productivity in three sectors (chemicals, engineering and electronics). Their measure of outsourcing includes the part-processing of inputs, maintenance activities and engineering services, but does not include services such as accountancy, cleaning or transportation. They find that outsourcing generally has a positive impact on plant productivity, but that the benefit is not obtained in all sectors.

Outsourcing may involve the sourcing of inputs from firms in other countries (commonly termed 'off-shoring'). In this case, the firm may benefit from access to inputs at a lower ratio of cost to quality than is available domestically. Gorg *et al.* (2008), using data on manufacturing plants in Ireland, identify productivity gains from international outsourcing of materials and services.[9] However, the benefits were only found to accrue to foreign MNEs or exporters. This suggests that contacts in foreign markets may be important for capturing the benefits of outsourcing in foreign markets. One possible reason, posited by Gorg *et al.*, is that firms which are members of international production or supply networks may possess extensive knowledge on where to procure competitively-priced inputs.

Surprisingly, there do not appear to be many empirical studies of the impact of outsourcing on firm profitability. An exception is provided, however, by Gorg and Hanley (2004) who consider whether outsourcing (whether domestic or international) raises profitability within the electronics sector in Ireland. In common with a study for Germany by Gorzig and Stephan (2002), they find clear evidence that the outsourcing of materials and components benefits profitability in larger plants, whilst this is not the case for smaller plants. They suggest that this may reflect larger plants' superior bargaining power or their more extensive networks which may reduce search costs. In respect of services outsourcing, they similarly find benefits for large plants, but these are no longer evident after controlling for materials outsourcing, and so the results are not clear cut.

Alliances may also be formed with partners offering specific technical abilities (Delbridge *et al.*, 2006: 100-103). For instance, Teece (1996) argues that strategic alliances are highly important when seeking to develop new technologies because of the need for open channels of information and high levels of trust. Formal collaboration may also help to fund expensive R&D, to pool specialisations and to spread the risk of failure. Collaborations between firms and university research departments represent one form. Indeed, Abramovsky *et al.* (2007) note that the research base is an important source of knowledge for businesses, and that one means by which firms may seek to benefit is through formal collaboration agreements. Keeble *et al.* (1998) assert that firms in the early stages of development may benefit particularly from location within a formal or informal networking environment, because of the potential for collaboration in research, labour recruitment and facilities location.

[9] The measure of outsourced services was broader than that available to Girma and Gorg (2004), comprising all services inputs.

However, knowledge and technology transfer can equally take place outside of contractual relationships, through more informal mechanisms. The research by Abramovsky *et al.* (ibid) provides evidence which is suggestive of broader mechanisms of knowledge transfer, including direct personal interactions, which are made possible by co-location. Indeed, there is a broader literature on the importance of formal and informal networks as a source of knowledge which can contribute positively to productivity and firm performance. These networks may take a variety of forms, including: supply-chain networks in which suppliers and customers interact to exchange information; industry groups, through which companies share information and experience; and networks uniting practitioners across organisations ('communities of practice'). Pittaway *et al.* (2004) provide a comprehensive typology.

Such networks may contribute to the diffusion of best practice. External links may also reduce uncertainty about the nature and scale of demand in the market for new products or services. Furthermore, networks may also have positive implications for innovation (see Freeman, 1991). In an extensive review of the literature on networks and innovation, Pittaway *et al.* (2004: 34) note that the involvement of firms in professional, industry and inter-industry networks has been found to promote the diffusion of technological innovations and innovative work practices. They further note that networks can be particularly important for smaller firms, because of their more limited internal capacities. Networks may not always be beneficial, however. There are costs associated with involvement in a network. Moreover, it is acknowledged that firms are heterogeneous in their capacity to acquire and utilise knowledge (Cohen and Levinthal, 1990). This 'absorptive capacity' depends on the firm's ability to recognize the value of new, external knowledge, to assimilate it internally and to apply it to commercial ends (ibid.; Zahra and George, 2002).

Despite the literature on the benefits of networks and alliances, there is little empirical evidence of the impact of networks on firm performance. Huggins (2001) is one example, however, focusing on the evaluation of the network initiatives of the TECs, Business Links, and other public and private support agencies. Huggins finds that participation in such inter-firm networks has been low but that, where they have been successful, they have resulted in substantial gains for a small number of participants. Romijn and Albaladejo (2002) found in a study of innovative activity among small electronics and software firms that proximity to suppliers had a positive impact on product innovation. And Conway (1995) found that customers were important in helping to generate ideas and that suppliers also played a role in promoting innovation. However, the broader evidence base is limited.

Measurement

In respect of outsourcing, one possible set of measures would identify whether specified activities (e.g. production, accounting, cleaning) were undertaken in-

house or by suppliers, as is done in the 2004 WERS. An alternative 'intensity' measure might compute the ratio of the cost of out-sourced services relative to the firm's total wage bill. Girma and Gorg (2004) derived an intensity measure of outsourcing from the ARD. The data on offer in the ARD is partial however. Whilst it includes activities such as processing of inputs, maintenance of production machinery and the provision of engineering or drafting services, it does not include 'non-industrial services' such as accounting, consulting, cleaning or transportation services.

Involvement in networks and alliances may be measured by identifying whether a firm has specific relationships or ties with suppliers, distributors, customers, competitors, consultants, professional associations, industry associations and others. The typology provided by Pittaway *et al.* (2004: 40) could be useful in framing questions. Involvement in networks and alliances is not currently measured in a comprehensive manner in official business data, as far as we are aware, although data may reside in registers held by the co-ordinators of individual networks. CIS does include information on external sources of knowledge used in innovation and on partnerships with external bodies for the purposes of innovation (see Harris and Li (2009) for one application). However, membership of networks and alliances for a broader range of purposes would need to be measured through a new survey enquiry. More indirectly, the scope for personal networking activity may be proxied by data on location. For instance, Abramovsky *et al.* (2007) use data on the physical proximity of R&D plants to university research departments. See also Section 6.2 on location.

The importance of 'absorptive capacity' is noted in the discussion above. However, this is necessarily difficult to capture in quantitative datasets. Harris and Li (2009) seek to obtain a proxy measure from the CIS, using data on organizational, learning and networking processes. An alternative approach would be to focus on the extent and nature of a firm's knowledge management practices. This would require a new survey instrument, but the Knowledge Management Practices Survey conducted by Statistics Canada may provide a useful benchmark.

6.2 Location

Section 4.3 touched on the notion that conditions in the local labour market, such as the proportion of the population of working age, can affect firm performance and so it is clear that the location of a business is expected to have a bearing on its success. It is argued that there are advantages to firms in locating alongside businesses using similar technologies, inputs and types of workers, known as localisation or agglomeration economies (Rosenthal and Strange 2004: 2122). However, firms also benefit from locating in areas with a diverse industrial structure, or where the mass or density of economic activity is high (Ciccone and Hall, 1996; Henderson, 1986, 2003; Rice and Venables 2004). The empirical evidence supports the idea that there are localization

economies. A study by Devereux *et al.*, (2007), which looked at the location decisions of foreign-owned multinationals and existing UK-owned firms applying for Regional Selective Assistance showed that the location of greenfield plants was affected by their proximity to large markets (Devereux *et al.*, 2007: 429).

There is some evidence that whether the firm is located in an urban or a rural area affects the likelihood that it will be successful. Fairlie and Robb (2008: 10) found that firms located in urban areas are more likely to close and less likely to have employees, but had higher profits and sales than those in non-urban areas. Differences in infrastructure are a factor in this, although there are also some sectoral differences in the location of firms. For example, manufacturing firms tend to cluster together away from urban areas, whereas services cluster in urban areas (Eddington, 2006: 28). North and Smallbone (2000: 146, 151, 155) found that SMEs in regions with weakly developed learning infrastructures were less innovative than similar firms in better-provided areas due to an absence of higher education and research institutes and relative lack of local business support services and training. There are also sectoral differences in the decision of firms to locate near universities which may be driven by knowledge spillovers which arise from informal networks, as well as formal collaboration (Abramovsky *et al.*, 2007: 136-137). As well as the scarcity of research institutes, rural regions are at a comparative disadvantage due to the lower density and more dispersed distribution of the business population and a lack of opportunities for trading and subcontracting (Winter and Rushbrook, 2003: 21). The natural environment can also contribute to business success in some areas (Winter and Rushbrook, 2003: 27).

As well as the fact that the success of a business can vary by whether it is located in an urban or a rural area, there is some evidence to suggest that there are differences between rural areas which are accessible, and those which are remote. The difficulties associated with being located in a less accessible area may place firms under pressure to be more adaptable and stimulate innovation as businesses strive to overcome some local constraints, such as increased transport costs, thus contributing to business success in remote rural regions (North and Smallbone, 2000: 146). Keeble and Tyler (1995: 41) also found that companies in accessible rural areas displayed enterprising behaviour associated with business success, although this may be partly because some areas have characteristics which make it possible for firms to be enterprising. For example, a ready availability of floor space or lower operating costs make it easier to expand the business (Winter and Rushbrook, 2003).

Accessibility may also make it possible for the firm to overcome some of the difficulties associated with the constraints imposed by tightness in the local labour market. A good transport network gives access to labour through commuter travel and may also affect productivity at work and the willingness of workers to travel (Eddington, 2006: 22). There is evidence that high local housing costs make it difficult for private sector businesses to recruit staff, particularly those at the lower end of payscales. Housing costs are also thought

to restrict business growth in the more expensive parts of the country (DTZ Consulting, 2006: 39, 43). Transport improvements which result in savings of time and cost, and which increase journey reliability, could be expected to result in cost savings for businesses and overcome some of these labour market problems. Targeting improvements at congested routes is likely to be particularly beneficial.

Transport can enable effective competition even when economic activity is geographically dispersed (Eddington, 2006). Although transport costs only typically account for 4-5 per cent of total input costs for firms, transport is necessary to most businesses, so poor provision can have a disproportionate impact on variable costs and profit margins (Eddington, 2006: 20). North and Smallbone (1996) found that the majority of rural firms did not believe that they suffered any competitive disadvantage as a result of supplying customers in other parts of the UK, or other countries, so long as they were within one hour of a motorway, but journey reliability is also an important factor for some businesses (Winter and Rushbrook, 2003; Eddington, 2006: 21).

Measurement

Measures of location may focus at a variety of different levels, from Government Office Region (level one in the Eurostat Nomenclature of Units for Territorial Statistics: NUTS) down to counties (NUTS level three) and, beyond that, to local administrative units (districts and electoral wards). ONS Output Areas (clusters of adjacent postcodes with similarly-sized and socially-homogenous populations) are typically used in the determination of whether an area is urban or rural, with the convention being to define output areas where at least 50 per cent of the population live in settlements with less than 10,000 inhabitants as rural (North and Smallbone, 2000: 148). Travel to work areas (TTWAs) are commonly used when commuting is a relevant consideration.

Regional identifiers tend to be aggregated at a fairly high level on publically available datasets. However, where postcodes are available, the National Statistics Postcode Directory can be used to map postcodes to a range of geographies, including travel-to-work areas and NUTS levels one to three. The NSPD also includes a measure which shows whether the postcode is located in an urban or a rural area. This makes it possible to obtain detailed geographical information for establishments found on the IDBR.

The expectation that there are localisation economies suggests that the presence of similar firms within an area will raise the likelihood that a business is successful. This means that information on the mass or density of similar firms in the locality indicates the probability that there are localisation economies. Rice and Venables (2004: 9) use the population of working age within each NUTS3 area – available from NOMIS - as a measure of the general mass or density of economic activity. A similar measure was used by Devereux *et al.*, (2007: 429-430) to indicate the proximity to a large market. They also used driving times

between NUTS3 population centres as an indicator of the availability of labour within an area. The National Travel Survey contains detailed information on household and individual travel patterns along with a unitary authority identifier.

6.3 Product market structure

The importance of the structure of the market in which firms operate has long been recognised. The Structure-Conduct-Performance paradigm, introduced by Bain (1959) and subsequently extended to allow for feedback (for a detailed overview see Sutton, 1991), provides us with a framework for considering the way firms behave. Crucially, we are interested in the degree to which industries operate competitively. Whilst there is generally an expectation that competition is good for growth, supported by empirical evidence (Nickell, 1996), one cannot dismiss the importance of intellectual property rights, patent protection and other forms of 'anti-competitive' legislation that are likely to foster innovation and encourage growth (Aghion *et al.*, 1997). Thus, there is an antagonism between fostering innovation on one hand and encouraging competition on the other when considering the role that product market structure plays in determining productivity performance.

A detailed report by the Office for Fair Trading (OFT) (2007) on competition and productivity highlights a number of key findings from their review of the literature. They find strong evidence in the literature of a positive relationship between competition and productivity. In an attempt to clarify the relationship between competition and productivity in the context of the consumer, they point out that productivity gains will feed through to consumers only if the competitive structure of the industry ensures that cost reductions and quality improvements are passed on. They cite three mechanisms through which competition affects productivity – firstly, within-firm effects, since competition puts pressure on firms to improve their internal efficiency; and secondly, between-firm effects (market reallocation mechanisms), since market shares vary in response to performance, and lagging firms exit, allowing new firms to enter (the Schumpeterian view). Finally, they cite the importance of innovation (discussed in greater detail in Section 5.2). Whilst the relationship between performance and innovation is undoubtedly a complex one, the relationship between competition and innovation appears even more finely balanced. The OFT review states that there is 'no universally applicable rule for maximising innovation in the market', which highlights the need for sector-specific research.

Competition is thought also to affect the dispersion of productivity. Evidence from UK manufacturing (Haskel, 2000) suggests that there is a very wide and persistent dispersion of productivity. Martin (2008) explores the relationship between competition (measured as the degree of product substitutability) and productivity dispersion and concludes that there is a negative correlation between the two. Competition should result in lower costs, lower managerial slack, and generate incentives for efficient organisation of production (Nickell

1996: 725). However, despite finding a clear indication, regardless of the measure of competition chosen, that firms are more productive in more competitive industries, Nickell (1996: 741) argues that this focus on the effect of competition on incumbents may to some extent be misguided. The importance of competition he argues is that it allows for 'many flowers to bloom', but ensures that only the most productive survive.

Measurement

In terms of measurable variables that reflect market structure, the concentration of a market is perhaps the clearest indicator of how firms are likely to behave, since this determines the competitive pressures within the industry. A measure of market concentration is particularly useful when seeking to explain variations in profitability. The Herfindal-Hirschmann index is perhaps the most notable form of concentration ratio, and may be computed as follows:

$$H = \sum_i (S_i)^2$$

where S is the share of firm i in industry sales (turnover). The closer the index is to 1, the more concentrated the industry. Herfindahl indices may be constructed for industry sectors using the ARD/BSD data held at the VML. However, whilst the computation of the ratio at sector level facilitates the ease of matching of the data to firm-level observations, such ratios would ideally be computed within product markets (which do not map precisely to SIC categories). The ONS also is restrictive in the exporting and publication of such numbers.

Nickell (1996) uses three measures of competition; market share at the firm level, a concentration measure and import penetration. Other measures that would give some indication of the extent of competition may be to record the degree of productivity dispersion and the rate of firm entry in an industry. These variables reflect the dynamic qualities of an industry. Clearly, the competitive environment is likely to be very sector specific.

6.4 Product market regulations

Allied to the nature of the product market (discussed in Section 6.3) is the extent to which the market is allowed to function naturally. In the recent international growth literature, regulation has been identified as one of a number of factors that is likely to assist or hinder the successful implementation of new technology (van Ark *et al.*, 2008). Regulations differ in the extent to which they impact on competition, firm dynamics, capital deepening and technology adoption. All of these factors will affect firm productivity and financial performance.

Regulation is generally implemented to correct for some form of market failure or to achieve a socially desirable outcome (although it may not always achieve that objective). A recent review of the influence that regulation has on innovation (Department for Business Enterprise and Regulatory Reform, 2008b) highlights four areas of market failure in which regulation might be applied; these include market power, public goods, externalities and asymmetric information. In international comparisons of regulatory levels, the UK emerges favourably, which has raised questions about the importance of regulations as a negative force on productivity and growth, indeed, many studies have argued that regulations may have a positive impact on performance and growth. Ang *et al.* (2005) for example cite the role of performance-based building regulations as a means of promoting innovation in design and building technology. The question of whether regulation promotes or hinders innovation is directly addressed in the aforementioned review. The key areas for consideration are the timing of the regulation, the role of compliance costs, the degree of uncertainty and possible interactions with other government policies.

Whilst labour market regulation and reform is relatively well documented, this is less true for product market regulations. Sources of empirical findings come mostly from the OECD which, in order to make international comparisons of regulation and reform programmes has commissioned a number of surveys. Schiantarelli (2008) reviews much of this evidence and summarises four main routes for regulation affecting economic performance: affecting factor demand and the input mix; affecting the efficiency of existing firms; affecting firm dynamics; and influencing the introduction of new products and processes. However he points to a number of ambiguities about the magnitude and direction of these effects. Griffith and Harrison (2004) find that whilst an increase in competition generally stimulates factor demand in services, this is not true for manufacturing. The implicit assumption in here is that product market reforms affect the economy only through mark-up variations and not directly. Nicoletti and Scarpetta (2003) look at the impact of anti-competitive regulation on productivity growth and find some evidence of a positive effect of privatisation and entry liberalisation on total factor productivity growth, particularly in the services sectors. They also find that acceleration in total factor productivity growth is negatively correlated with three economy-wide measures of regulation, with a higher correlation for the indicators of administrative burdens which represent a uniform barrier to entry for business in most industries.

Not all regulations apply to all industries. For this reason, a number of the more influential empirical studies focus on individual industries (Haskel and Sadun 2008). Equally, not all regulations fall evenly upon all firms within the industry; a criticism often levelled at regulations is that they fall unreasonably heavily on small and medium sized enterprises (Bickerdyke and Lattimore, 1997).

One area of sector-specific research that has received significant attention in the UK is the effect of planning laws on the productivity of the retail sector. Haskel

and Sadun (2008) start their investigation from the McKinsey (1998) observation that the average size of a grocery store in the UK is typically half that of the average in the US and two-thirds the size of an equivalent French store. They observe also a shift towards smaller stores in the UK brought about by planning law changes in 1996 and, using micro-data from the ARD, they explore whether these changes in the law have brought about a fall in productivity performance. This may come, they argue from a loss of scale advantages, or scope advantages if existing resources do not easily transfer to a smaller store. They find that switching to smaller locations to comply with changes in planning law effectively cost the retail sector around 40 per cent of its TFP growth – around £88,000 per small store created. More recently Martin *et al.* (2009) have been exploring the impact of the climate change levy on the behaviour of businesses and find no discernable negative impact on employment or productivity.

Measurement

Measuring the extent of product market regulation is complicated by a number of factors, such as the fact that many regulations are not 'horizontal' across all sectors, but are vertically organised applying specifically to certain industries. Also, regulation does not fall evenly on all businesses in the size distribution. By controlling for sector and size, one should be able to account for much of the effect of product market regulation on performance indicators.

6.5 Labour market regulations

It is argued that the pursuit of competitiveness does not determine the approach that governments take to labour market regulation (Collins 2001). In the past, there has been a tendency for governments to deregulate in order to enhance competitiveness. However, an alternative view is that greater intervention in the labour market to raise labour standards can improve competitiveness, rather than only increasing production costs (Dickens *et al.*, 2005: 38-39; Deakin and Wilkinson, 1994).

Much of the evidence on the impact of labour regulation on firm performance relies on self-assessment by owners or managers (Small Business Research Centre, 2005: 4). However, it is questionnable whether this gives an accurate picture of the impact of regulation as it depends on the respondent being able to weigh up all the short-term and long-term costs and benefits to the firm of an intervention (Small Business Research Centre, 2005: 8). Whilst complying with legislation may have short-term costs which are unwelcome, the longer-term benefits may be difficult to foresee. Research by the Federation of Small Businesses (2004) showed that the longer the owner had been in business, the more dissatisfied they were likely to be with legislation, but this may be because those who have been in business longer have a greater awareness of regulations, or have larger businesses and so are more likely to be affected by

legislation (Small Business Research Centre, 2005: 5). Ram *et al.*, (2001: 848) suggest that employment regulations may shock employers into implementing practices which enhance efficiency and business performance, although there is some debate over whether this is true in every case (Small Business Research Centre, 2005: 11). Regulation can give employers guidance on employment conditions, according to Blackburn and Hart (2002). It can also increase the amount of external advice and support available (Blackburn and Hart, 2003; Small Business Research Centre, 2005: 12). There is some evidence that regulations can be beneficial to the long-term interests of the employer, for example, by encouraging employers to develop more innovative working practices (Barnard *et al.*, 2003b; Dickens *et al.*, 2005).

Ram *et al.*, (2001: 458) noted that where a firm was in a vulnerable market position, the impact of employment regulation combined with market pressures could aggravate this. Employers in low-paying sectors with tight margins were more likely to expect negative effects from legislation. Whilst some firms did adjust their labour and product market strategies as a result of legislation, this was not always to increase quality (Dickens *et al.*, 2005: 90). Also, the legislation could encourage SMEs to try to use less labour and reduce their propensity to create jobs in order to stay below size thresholds (Harris 2002; Dickens *et al.*, 2005: 91). However, Ram *et al.*, (2001: 859) and Edwards *et al.*, (2004) conclude that overall, the law has a limited impact on decision-making and business competitiveness. Dickens *et al.* (2005) also concluded that the evidence that labour market regulations since 1997 have increased competitiveness and innovation is limited. This was because often the changes that were required to comply with legislation were minimal, the product market position was strong enough to ensure that the competitive position was not seriously undermined, and the informality of working practices meant that changes could be made at minimal costs (Small Business Research Centre, 2005: 10). Other factors such as lack of business, low turnover and competition have been found to have a greater impact on business performance than regulation (Small Business Research Centre, 2005: 5).

Regulation can be targeted at particular types of business, or can be expected to vary in impact so that the costs and benefits are unevenly distributed between different groups (Small Business Research Centre, 2005: 14). Health and safety legislation tends to apply to all firms within a given industry, so that any differences in the impact of health and safety regulations on performance are likely to be reduced when firms are matched on sector (Sheikh *et al.*, 2006: 12). However, employment rights apply only to firms with employees (Small Business Research Centre, 2005: 11). A survey of its members by the Institute of Directors (2004) found that 82 per cent of the sample claimed that employment law was a major or significant distraction from core business activities (cited in Small Business Research Centre, 2005: 7). Dickens *et al.*, 2005 mention that the perceived effects of employment regulations varied with the business sector and the size of the enterprise in the Blackburn and Hart 2002 study. It is fairly common for a size threshold to be applied to the application of employment

regulations. For example, the requirement to make reasonable adjustments to the workplace to accommodate disabled employees was initially concentrated on firms with 20 or more employees, and was gradually lowered to cover all workplaces. The Information and Consultation Regulations only apply to firms with 50 or more staff and the statutory trade union recognition procedure can also only be invoked where there are more than 20 employees in a bargaining unit.

In addition, there may be benefits to those seeking to invoke the legislation to target larger firms. For example, analysis of the impact of the statutory union recognition procedure has shown that unions have tended to focus recognition campaigns on larger bargaining units, since these are likely to yield a more substantial increase in the number of union members (Trades Union Congress, 2005). Unions also play a role in ensuring that regulations are implemented within workplaces by negotiating with employers to ensure compliance with forthcoming legislation and by providing legal support to members who need to take their employer to an Employment Tribunal to get the legislation enforced (Brown *et al.*, 2000). Therefore, by seeking to enforce regulations, unions can be expected to have an impact on the performance of firms.

A review of the costs of complying with regulations by Chittenden *et al.*, (2002: 26) suggested that small firms experience higher costs per employee of complying with legislation than larger businesses, but that it is difficult to draw conclusions about the impact of legislation on business performance based on compliance costs (Small Business Research Centre, 2005: 9). Estimates of compliance costs tend to only include costs which are easy to measure and exclude the benefits of regulation. They also fail to explain how regulations constrain the behaviour of business owners so that this restricts or improves business performance and growth (Small Business Research Centre, 2005: 10).

Analysis of the Small Business Service Annual Survey showed that owners are more likely to believe regulations were a barrier to growth if they do not aim to grow the firm in the future, or expectefuture resource constraints; if they have a turnover of £250,000-£1.5m rather than being below the VAT threshold; if the firm is located in a rural area; or if the firm is more than 10 years old. Firms are less likely to believe that regulations are a barrier to growth if they are in the production, construction or service sector rather than the primary sector; if the business is led by women, rather than only some women, or all men; if the owner is a member of a minority ethnic group; if the owner is a sole proprietor; and if the firm has not experienced past growth, compared to having had sustained growth (Small Business Research Centre, 2005: 4-5).

Regulations interact with the environment in which they are implemented (Dickens *et al.*, 2005: 29). Pierre and Scarpetta (2004: 24-25) in a study which looked at 81 countries, found evidence that medium-sized firms and innovating firms in countries with 'strict' employment protection legislation were most likely to have their performance restricted. There is a need to examine the

interaction between regulations and other factors in specific business settings to determine outcomes (Small Business Research Centre, 2005: 14).

It is difficult to make a conclusive link between changes in the degree of labour market regulation and economic performance because of the problem of identifying the counterfactual (Card and Freeman 2004: 53, 55). The UK had some of the least restrictive employment protection legislation between 1980 and 2000 and there was evidence that the relationship between productivity and collective bargaining changed over the 1980s and 1990s, so that the productivity disadvantage in unionised workplaces disappeared (Card and Freeman 2004: 25, 48). Also, there were increases in productivity associated with employees having a stake in firm performance, but a rise in self-employment was associated with lower productivity if we assume that the lower earnings of self-employed workers indicated that they are less productive than employees (Card and Freeman 2004: 49-50).

Measurement

The impact of regulations on firm performance is likely to be specific to a particular piece of legislation. The heavily reliance on self-assessment by business owners or managers in much of the literature on the link between firm characteristics, regulation and business performance means that it is difficult to be certain whether the purported associations exist. Nevertheless, the literature suggests that firm size and industrial sector shape the impact of regulations on firm performance and are likely to be the most important control variables in matching firms when seeking to determine the impact of other interventions. They also have the advantage that they are available in business datasets.

There is a body of evidence which suggests that the impact of regulations on firm performance is likely to be determined by past performance, with firms in a more vulnerable position prior to the introduction of legislation more likely to experience negative effects. Sources of information on past performance are detailed in Section 5.8.

The role that unions play in ensuring that employment protection legislation is implemented in the workplace means that the association between regulations and firm performance is likely to vary between firms with, and without, recognised unions. For a discussion of the impact and measurement of union activity, see Section 5.4.

7. Summary and conclusions

This report has sought to determine the key drivers of business success and failure. The intention was that this would make it possible to identify firms which are likely to have similar performance in the absence of a treatment in order to use those not subject to an intervention as a counterfactual against which to judge the impact of a government programme. For example, since the extent of innovative activity undertaken within a firm is likely to influence its performance, it is necessary to account for variations in innovative activity between firms when seeking to compare firms subject to an intervention with untreated firms and, thereby, to obtain an unbiased estimate of the impact of a programme.

The literature review has discussed some of the theoretical contributions on the determinants of business outcomes as well as summarising the available empirical evidence. In some cases it has not been possible to establish the direction of causation of the links observed in the empirical data. Whilst this means that the characteristics identified cannot be said conclusively to drive business success or failure, there is evidence that these factors are important when seeking to match firms on the basis of performance.

In seeking to identify possible matching variables, the emphasis has been on items which are measurable to some extent, rather than on those which may contribute to business success or failure, but are likely to present significant problems in data collection. The review has indicated possible measures where appropriate. It has also sought to highlight those measures which are widely collected on publicly-available business datasets, since those datasets / surveys may provide either a source of data or serve to illustrate viable questions for new data collection. Table 1 lists the factors which this review has found to be linked to the success or failure of a firm, alongside suitable measures, and possible sources of information.

Table 1: Indicators of the drivers of business success or failure

Factor:	Possible measures:	As found in:
Financial capital	Financial ratios	Company accounts data (e.g. FAME)
	Difficulties in obtaining finance	Annual Small Business Survey
Physical capital	Value of fixed assets	Annual Respondents Database (estimated)
	Value of ICT capital	Annual Respondents Database and specialist ONS surveys (estimated)
	Types of ICT capital and volumes of e-commerce	ONS E-commerce Survey
Labour/human capital	Education / qualifications of workforce	
	Age of workforce	WERS
	Occupational profile of the workforce	WERS
	Training e.g. amount/financial commitment by employer/skills shortages	WERS/Employer Skills Surveys
	Wages	Annual Respondents Database
	Labour shortages	Census projections/LFS/Employer Skills Surveys
	Gender of owner	Annual Small Business Survey
	Ethnicity of owner	Annual Small Business Survey
Product strategy	Innovativeness, complexity, customisation, price-dependence	Employer Skills Surveys
Product innovation	Innovative activities	Community Innovation Survey
	Expenditure on innovation (inc R&D)	Community Innovation Survey
Market diversification	Operation in multiple SIC categories	Annual Respondents Database, FAME
	Share of turnover deriving from different markets	
	Multi-category typology	
Management practices	HR practices (esp. teamwork)	WERS, Community Innovation Survey
	Union bargaining over wages	WERS
Firm size and age	Number of employees	Commonly available on business datasets
	Age of firm	Business Structure Database

Continued over page

Table 1 continued

Factor:	Possible measures:	As found in:
Ownership	Recent change in ownership	Business Structure Database
Internationalisation	Exporting	Community Innovation Survey
	Foreign direct investment	Annual Respondents Database with Annual register of Foreign Direct Investment
Past performance	Recent growth in employment, output and productivity	Annual Respondents Database, FAME
Alliances and networks	Purchases of industrial services	Annual Respondents Database, WERS
	External sources of knowledge / partnerships for innovation	Community Innovation Survey
Product market structure	Market share (firm-level)	Annual Respondents Database
	Concentration (industry-level)	Annual Respondents Database
	Import penetration (industry-level)	Annual Respondents Database
Location	Area identifiers	National Statistics Postcode Directory
	Urban/rural identifier	National Statistics Postcode Directory
	Mass/density of similar firms within area	Inter-Departmental Business Register
	Mass/density of economic activity within area/proximity to large market, measured by population of working age	NOMIS
	Driving times between population centres within region	
	Average wage levels within region	ASHE
	Regional household expenditure on transport costs	Expenditure and Food Survey
	Regional household and individual travel patterns	National Travel Survey
Product market regulation	Proxied by firm size and industry sector	Commonly available on business datasets
Labour market regulation	Proxied by firm size and industry sector	Commonly available on business datasets
	Union recognition	WERS

It is difficult to rank these factors on the basis of their likely importance in obtaining an unbiased estimate of the impact of a programme. From an empirical point of view, there are few studies which are sufficiently comprehensive in their coverage of the factors discussed here to enable us to compare their relative explanatory power. From a theoretical point of view, however, one can argue that it is likely to be important for any analysis to cover a wide range of determinants of firm performance, rather than focusing specifically on one dimension or another. In other words, priority should be attached to incorporating at least some measure of physical capital, human capital, innovative activity, market diversification and so on. Some of the factors cited in this review which are less commonly incorporated into existing analyses include: use of ICT capital; labour quality; management practices; network affiliations; and detailed characteristics of the local area. To that extent, these might be considered priority areas. However, data limitations play some part in explaining this, and must be borne in mind when seeking to expand the list of items that can be incorporated into future analyses.

Finally, it is also important to note that the relative importance of individual factors will depend crucially upon the nature of the intervention. In a matching framework, it is only those factors which affect both programme participation and firm performance that need enter the matching process. Equally, when seeking to specify econometric models to explain the variation in a particular outcome, one must consider the potential endogeneity of the outcome with respect to each potential covariate. A case-by-case appraisal is therefore necessary.

References

Abraham K and Taylor S (1996) 'Firms' use of outside contractors: theory and evidence', *Journal of Labor Economics*, 14, 3: 394-424.

Abramovsky L and Griffith R (2006) 'ICT, Corporate Restructuring and Productivity', Institute for Fiscal Studies, mimeo.

Abramovsky L, Harrison R and Simpson H (2007) 'University research and the location of business R&D', *Economic Journal*, 117: C114-C141.

Abreu M, Grinevich V, Kitson M and Savona M (2008), Taking services seriously: How policy can stimulate the 'hidden innovation' in the UK's services economy, NESTA Research Report, London: National Endowment for Science Technology and the Arts.

Addison J and Hirsch B (1989), 'Union effects on productivity, profits and growth : Has the long run arrived ?', *Journal of Labor Economics*, 7: 72-105.

Aghion P, Dewatripont M and Rey P (1997) 'Corporate governance, competition policy and industrial policy', *European Economic Review*, 41: 797-805.

Aghion P, Bloom N, Blundell R, Griffith R and Howitt P (2005) 'Competition and Innovation: An Inverted-U Relationship', *Quarterly Journal of Economics*, 120, 2: 701-728.

Altman E (1968) 'Financial ratios, discriminant analysis and the prediction of corporate bankruptcy', *Journal of Finance*, 23, 4: 589-609.

Anand J and Singh H (1997), 'Asset redeployment, acquisition and corporate strategy in declining industries,' *Strategic Management Journal*, Summer Special Issue. 18: 99-118.

Ang G, Groosman M and Scholten N (2005) "Dutch performance-based approach to building regulations and public procurement" *Building Research & Information* 33, 2.

Ashton D and Sung J (2006) 'How competitive strategy matters? Understanding the drivers of training, learning and performance at the firm level', SKOPE Research paper 66, Oxford: SKOPE.

Arthur B (1989) 'Competing technologies, increasing returns and lock-in by historical events', *Economic Journal*, 99: 116-131.

Baily M, Hulton C and Campbell D (1992) 'Productivity dynamics in manufacturing plants', *Brookings Papers on Economic Activity: Macroeconomics*, pp.187-249.

Bain J (1959) *Industrial Organization*, New York, Wiley.

Barnard C, Deakin S and Hobbs R (2003) 'Opting Out Of the 48-Hour Week: Employer Necessity Or Individual Choice? An Empirical Study Of The Operation Of Article 18(1)(B) Of The Working Time Directive In The UK', *Industrial Law Journal*, 32, 4: 223-252.

Barney J (1991) 'Firm resources and sustained competitive advantage', *Journal of Management*, 17: 99-120.

Barney J (1995) 'Looking inside for competitive advantage', *Academy of Management Executive*, 9: 49-61.

Barney J and Hesterley W (1996) 'Organizational economics: understanding the relationship between organisations and economic analysis', in S Clegg, C Hardy and W Nord (eds) *Handbook of Organization Studies*, London: Sage.

Bartelsman E and Doms M (2000) 'Understanding productivity: lessons from longitudinal microdata', *Journal of Economic Literature*, 38: 569-594.

Bartelsman E, Haltiwanger J and Scarpetta S (2005), Measuring and analysing cross-country differences in firm dynamics, Paper presented to NBER Conference on Research in Income and Wealth, April 8-9, 2005.

Basu S, Fernald J, Oulton N and Srinivasan S (2004)' 'The Case of the Missing Productivity Growth: Or, Does Information Technology Explain Why Productivity Accelerated in the United States but not the United Kingdom?', pp.9-63 in M. Gertler and K. Rogoff (eds) *NBER Macroeconomics Annual 2003*. Cambridge, MA: MIT Press.

Baumol J (1959) *Business Behaviour, Value and Growth*, New York: McMillan.

Benito A and Vlieghe G (2000) 'Stylised facts on UK corporate financial health: evidence from mico-data', *Bank of England Financial Stability Review*, June, pp.83-93.

Berkovitch E and Narayanan M (1993) 'Motives for Takeovers: An Empirical Investigation', *Journal of Financial and Quantitative Analysis* 28, 3: 347-362.

Bernard A and Jensen J (1999) "Exceptional Exporter Performance: Cause, Effect or Both?", *Journal of International Economics* 47: 1-25.

Bernard A and Jensen J (2004) "Exporting and Productivity in the USA", *Oxford Review of Economic Policy* 20: 343-357.

Bessant J, Phelps B and Adams R (2005) *A Review of the Literature Addressing the Role of External Knowledge and Expertise at Key Stages of Business Growth and Development*, Report to the Department of Trade and Industry.

Bickerdyke I and Lattimore R (1997) 'Reducing the Regulatory Burden: Does Firm Size Matter?' Australian Industry Commission Staff Research Paper, AGPS, Canberra

Birch D (1981), 'Who creates jobs?' *Public Interest*, 65, pp3-14.

Birch D (1987) *The Job Generation Process*, MIT Cambridge.

Birdi K, Clegg C, Patterson M, Robinson A, Stride C, Wall T and Wood, S (2008). "The impact of human resource and operational management

practices on company productivity: A longitudinal study", *Personnel Psychology*, 61: 467-501.

Bishop K, Mason G and Robinson C (2009) *Firm Growth and its effects on Economic and Social Outcomes: Literature and Statistical Review*, Report to the National Endowment for Science Technology and the Arts (NESTA).

Blackburn R and Hart M (2002) *Small Firms' Awareness and Knowledge of Individual Employment Rights*, DTI Employment Relations Research Series No. 14, London: Department of Trade and Industry.

Blackburn R and Hart M (2003) 'Employment Rights in Small Firms: Some New Evidence, Explanations and Implications', *Industrial Law Journal*, Vol 32, No 1, March, pp 60-67.

Blackburn R, Kitching J, Hart M, Brush C and Ceru D (2008) *Growth Challenges for Small and Medium-sized Enterprises:A UK-US Comparative Study*, Report for HM Treasury and BERR.

Blanchflower D and Bryson A (2009) 'Union effects', in W Brown, A Bryson, J Forth and K Whitfield (eds) *The Evolution of the Modern Workplace*, Cambridge: Cambridge University Press.

Bloom N and Van Reenan J (2007) 'Measuring and explaining management practices across firms and countries', *Quarterly Journal of Economics*, 122, 4: 1351-1408.

Bloom N, Griffith R and Van Reenan J (2002) "Do R&D tax credits work? Evidence from a panel of countries 1979-1997, *Journal of Public Economics*, 85: 1-31.

Bloom N, Sadun R and Van Reenan J (2005a) 'It ain't what you do it's the way that you do I.T. – testing explanations of productivity growth using US affiliates', Centre for Economic Performance, London School of Economics, mimeo.

Bloom N, Dorgan S, Dowdy J, Van Reenan J and Rippin T (2005b) 'Management practices across firms and nations', Special Paper No. 17, Centre for Economic Performance, London School of Economics.

Bloom N, Sadun R and Van Reenan J (2008) 'Americans do IT better: US multinationals and the productivity miracle', EDS Innovation Research Programme Discussion Paper No. 15, London School of Economics.

Boden R and Nucci A (2000) 'On the Survival Prospects of Men's and Women's New Business Ventures,' *Journal of Business Venturing*, 15, 4: 347-362.

Booth A (1995) *The Economics of the Trade Union*, Cambridge University Press.

Boselie P, Dietz G and Boon C (2005) 'Commonalities and contradictions in research on human resource management and performance', *Human Resource Management Journal*, 13, 3: 67-94.

Boxall P (2003) 'HR strategy and competitive advantage in the service sector', *Human Resource Management Journal*. 13, 3: 5-20.

Bresnahan T (1999) 'Computerisation and wage dispersion: an analytical reinterpretation', *Economic Journal*, 109, 456: F390-F415.

Bresnahan T, Brynjolfsson E and Hitt L (2002) 'Information technology, workplace organisation and the demand for skilled labour: firm-level evidence', *Quarterly Journal of Economics*, 117, 1: 339-376.

Brown W, Deakin S, Nash D and Oxenbridge S (2000) 'The employment contract: From collective procedures to individual rights', *British Journal of Industrial Relations*, 38, 4: 611-629.

Brown W, Bryson A and Forth J (2009) "Competition and the contraction of collective bargaining", in W Brown, A Bryson, J Forth and K Whitfield (eds) *The Evolution of the Modern Workplace*, Cambridge: Cambridge University Press.

Brox J and Fader C (1997). "Assessing the impact of JIT using the economic theory", *Journal of Operations Management*, 15, 4: 371-388.

Bryson A (2004) 'Unions and employment growth in British workplaces during the 1990s: a panel analysis', *Scottish Journal of Political Economy*, 51, 4: 477-506.

Bryson A and Forth J (2008) 'The theory and practice of pay setting' pp. 491-512 in Blyton, P., Bacon, N. Fiorito, J. and Heery, E. (eds). *The SAGE Handbook of Industrial Relations*. London: Sage Publications.

Bryson A and Wood S (2009) 'High involvement management', in W Brown, A Bryson, J Forth and K Whitfield (eds) *The Evolution of the Modern Workplace*, Cambridge: Cambridge University Press.

Bryson A, Forth J and Laroche P (2009) "Unions and workplace performance in Britain and France", NIESR Discussion Paper No. 327, London: National Institute of Economic and Social Research.

Caballero R and Hammour M (1998), 'Improper Churn: Social Costs and Macroeconomic Consequences', NBER Working paper 6717, National Bureau of Economic Research.

Capelli P and Neumark D (2001). Do 'high-performance' work practices improve establishment-level outcomes? *Industrial and Labour Reviews*, 54, 4: 737-775.

Card D and Freeman R (2004) 'What have two decades of British economic reform delivered?' in Card, D., Blundell, R. and Freeman, R. B. (eds) *Seeking a premier economy. The economic effects of British economic reforms, 1980-2000,* Chicago: University of Chicago Press.

Carlsson B and Jacobson S (1997) 'In Search of Useful Public Policies – Key Lessons and Issues for Policy Makers', p.299-315 in B Carlsson (ed) *Technological Systems and Industrial Dynamics*, London: Kluwer.

Caves R (1989), 'Mergers, takeovers, and economic efficiency,' *International Journal of Industrial Organisation*, 7: 151-174.

Caves R (1996) *Multinational Enterprise and Economic Analysis*, 2nd ed., Cambridge, MA: Cambridge University Press

Chittenden F, Kauser S and Poutzouris P (2002) *Regulatory Burdens of Small Business: A Literature Review*, London: Small Business Service.

Churchill C and Lewis V (1983) 'Five stages of small business growth', *Harvard Business Review*, 30-50.

Ciccone A and Hall R (1996) 'Productivity and the density of economic activity', *American Economic Review*, 86, 1: 54-70.

Coad A (2007) 'Firm growth: a survey', Working Paper on Economics and Evolution No. 0703, Max-Planck Institute of Economics.

Coad A and Rao R (2007) 'Innovation and firm growth in high-tech sectors: a quantile regression approach', *Research Policy*, 37: 633-648.

Cohen W and Levinthal D (1989) 'Innovation and Learning: The Two Faces of R&D', *Economic Journal*, 99: 569-596.

Cohen W and Levinthal D (1990) 'Absorptive capacity: a new perspective on learning and innovation', *Administrative Science Quarterly*, 35, 1: 128-152.

Collier W, Green F and Peirson J (2005) 'Training and establishment survival', *Scottish Journal of Political Economy*. 52, 5; 710-735.

Collins H (2001) 'Regulating the Employment Relation for Competitiveness', *Industrial Law Journal*, 30, 1: 17-48

Conway S (1995) 'Informal boundary-spanning communication in the innovation process: An empirical study', *Technology Analysis & Strategic Management*, 7(3).

Cosh A, Guest P and Hughes A (2006) Board share ownership and takeover performance. *Journal of Business Finance & Accounting*, 33: 459-510.

Crafts N and O'Mahony M (2001) 'A Perspective on UK Productivity Performance' *Fiscal Studies*, 9 (3)

Cressy R (1996) 'Are business start-ups debt rationed?', *Economic Journal*, 106, 438: 1253-1270.

David P (1985) 'Clio and the economics of qwerty', *American Economic Review*, 75: 332-337.

Davies S and Geroski P (1997) 'Changes in concentration, turbulence, and the dynamics of market shares', *Review of Economics and Statistics*, 79, 3: 383-391.

Davis S, Haltiwanger J and Schuh S (1996) 'Small businesses and job creation: dissecting the myth and reassessing the facts,' NBER Working Paper Series, No. 4492.

Deakin S and Wilkinson F (1994) 'Rights v. Efficiency? The economic case for transnational labour standards', *Industrial Law Journal*, 23, 3: 289-310.

Delbridge R, Gratton L and Johnson G (2006) *The Exceptional Manager*, Oxford: Oxford University Press.

Delmar F, Davidsson P and Gartner W (2003) 'Arriving at high firm growth,' *Journal of Business Venturing*, 18: p189-261.

Department for Business Enterprise and Regulatory Reform (2008a) *High Growth Firms in the UK: Lessons from an Analysis of Comparative UK Performance*, BERR Economics Paper No. 3.

Department for Business Enterprise and Regulatory Reform (2008b) *Regulation and Innovation: Evidence and Policy Implications*, BERR Economics Paper 4,

Department for Business Enterprise and Regulatory Reform (2008c) *BERR's Role in Raising Productivity: New Evidence*, BERR Economics Paper No. 1.

DeVaro J (2006) 'Teams, autonomy and the financial performance of firms', *Industrial Relations*, 45, 2: 217-269.

DeVaro J (2008) 'The effects of self-managed and closely-managed teams on labour productivity and product quality: an empirical analysis of a cross-section of establishments', *Industrial Relations*, 47, 4: 659-697.

Devereux M, Griffith R and Simpson H (2007) 'Firm location decisions, regional grants and agglomeration externalities', *Journal of Public Economics*, 91, 3-4: 413-435.

Dickens L, Hall M and Wood S (2005) *Review of Research into the Impact of Employment Relations Legislation*. Employment Relations Research Series Report No. 45. London: Department of Trade and Industry.

Dickerson A, Gibson H and Tsakalotos E (1997) The impact of acquisitions on company performance: Evidence from a large panel of UK firms. *Oxford Economic Papers*, 49: 344–361.

Doms M, Dunne T and Troske K (1997) 'Workers, wages and technology', *Quarterly Journal of Economics*, 112, 1: 253-90.

Doucouliagos C and Laroche P (2009), "Unions and Profits: A Meta-Regression Analysis", *Industrial Relations*, 48, 1: 146-184.

Draca M, Sadun R and Van Reenan J (2006) 'Productivity and ICT: a review of the evidence', Discussion Paper No. 749, Centre for Economic Performance, London School of Economics.

DTZ Consulting (2006) *Housing, economic development and productivity: Literature review*. Reading: DTZ Consulting and Research.

Dunne T, Roberts M and Samuelson L (1988) 'Patterns of firm entry and exit in US manufacturing industries', *The Rand Journal of Economics*, 19, 4: 495-515.

Economides N (1996) 'The economics of networks', *International Journal of Industrial Organization*, 14, 6: 673-699.

Eddington R (2006) *The Eddington Transport Study Main report: Transport's Role in Sustaining the UK's Productivity and Competitiveness*. Norwich: HMSO.

Edwards P, Ram M and Black J (2004) 'Why Does Employment Legislation Not Damage Small Firms?', *Journal of Law and Society*, 31, 2, 245-265.

Eliasson G (1997) 'General purpose technologies, industrial competence and economic growth – with emphasis on the diffusion of advanced methods of integrated production', pp.201-253 in B Carlsson (ed) *Technological Systems and Industrial Dynamics*, Kluwer, London.

Eurostat (2003) "A general overview of demographic events", in *Business Registers: Recommendations Manual*, Luxembourg: Eurostat.

Faggio G, Salvanes K and Van Reenan J (2007) 'The evolution of inequality in productivity and wages: panel data evidence', Disussion Paper No. 821, Centre for Economic Performance, London School of Economics.

Fairlie R and Robb A (2007a) 'Why are black-owned businesses less successful than white-owned businesses? The role of families, inheritances and business human capital', *Journal of Labor Economics*, 25, 2: 289-323.

Fairlie R and Robb A (2007b) 'Families, human capital and small business: Evidence from the characteristics of Business Owners Survey', *Industrial and Labor Relations Review*. 60, 2: 225-245.

Fairlie R and Robb A (2008) Gender differences in business performance: Evidence from the characteristics of business owners survey. Center for Economic Studies Discussion Paper 08-39. Washington: Center for Economic Studies.

Federation of Small Businesses (2004) *Lifting the Barriers to Growth in UK Small Businesses*, Blackpool: Federation of Small Businesses.

Firth M. (1980), 'Takeovers, Shareholders Returns and the Theory of the Firm', *Quarterly Journal of Economics*, 94, 2: 235-260.

Forth J and McNabb R (2007) 'Innovations in WERS 2004: The collection of objective data on financial performance', Technical Paper No. 1, London: WERS 2004 Information and Advice Service.

Forth J, Mason G and O'Mahony M (2002) *Industrial Performance, ICT Investments and Workforce Skills: Literature and Statistical Review*, Report to the DTI and DfES, London: NIESR.

Foster L, Haltiwanger J and Krizan C (1998) 'Aggregate productivity growth: lessons from microeconomic evidence', NBER Working Paper 6803, National Bureau of Economic Research.

Fothergill S and Guy N (1990) *Retreat from the Regions: Corporate changes and the Closure of Factories*, London: Jessica Kingsley.

Freeman C (1991) 'Networks of innovators: A synthesis of research issues', *Research Policy*, 20: 499–514.

Freeman R and Medoff J (1984) *What Do Unions Do?*, New York, Basic Books.

Fuller A, Ashton D, Felstead A, Unwin L, Walters S, and Quinn M (2003), *The Impact of Informal Learning at Work on Business Productivity*, London, Department of Trade and Industry.

Geroski P and Machin S (1992) 'Do Innovating Firms Outperform Non-Innovators?', *Business Strategy Review*, Summer: 79-90.

Gibrat R (1931) *Les inegalites economiques; ap plications: aux inegalite's des richesses, a la concentration des entreprises, aux populations des villes, aux statistiques des familles, etc., d'une loi nouvelle, la loi de l'effet proportionnel*. Paris: Librairie du Recueil Sirey.

Gilhooly R (2007) 'Globalisation and multinational enterprises: insights from the Annual Inquiry into Foreign Direct Investment', ONS Virtual Microdata Laboratory Data Brief No. 4, Newport: Office for National Statistics.

Gilhooly R (2008) 'Estimating capital stock at the firm level', ONS Virtual Microdata Laboratory Data Brief No. 8, Newport: Office for National Statistics.

Girma S and Gorg H (2004) 'Outsourcing, foreign ownership and productivity: evidence from UK establishment-level data', *Review of International Economics*, 12, 5: 817-832.

Girma S and Wakelin K (2001) 'Regional underdevelopment: is FDI the solution? A semiparametric analysis', mimeo.

Girma S, Greenaway D and Kneller R (2004) 'Does exporting increase productivity? A microeconometric analysis of matched firms, *Review of International Economics* 12: 855-66.

Godard J (2004) 'A critical assessment of the high-performance paradigm', *British Journal of Industrial Relations*, 42, 2: 349-378.

Gorg H and Hanley A (2004) 'Does outsourcing increase profitability?', *The Economic and Social Review*, 35, 3: 267-288.

Gorg H, Hanley A and Strobl E (2008) 'Productivity effects of international outsourcing: evidence from plant-level data', *Canadian Journal of Economics*, 41, 2: 670-688.

Gorzig B and Stephan A (2002) 'Outsourcing and firm-level performance', DIW Discussion Paper No. 309, DIW Berlin.

Gourlay A and Seaton J (2004), 'The determinants of firm diversification in UK quoted companies', *Applied Economics*, 36: 2059-2071.

Greenaway D (2004) 'The assessment: firm-level adjustment to globalization', *Oxford Review of Economic Policy*, 20, 3: 335-342.

Greenaway, D. and Kneller, R. (2004) 'Exporting productivity in the United Kingdom', *Oxford Review of Economic Policy* 20: 358-71.

Griffith R and Harrison R (2004) "The Link Between Product Market Reform and Macro-Economic Performance", *European Economy, European Commission,*

Directrate- General for Economic and Financial Affairs, Economic Papers No. 209.

Griffith R, Redding S and Simpson H (2004a) 'Foreign ownership and productivity: new evidence from the service sector and the R&D lab', *Oxford Review of Economic Policy*, 20, 3: 440-456.

Griffith R, Redding S and Van Reenen J (2004b) 'Mapping the two faces of R&D: Productivity growth in a panel of OECD Industries', *Review of Economics and Statistics*, 86, 4: 883-895.

Griffifth R, Haskel J and Neely A (2006a) 'Why is productivity so dispersed?', *Oxford Review of Economic Policy*, 22, 4: 513-525.

Griffith R, Huergo E, Mairesse J and Peters B (2006b) Innovation and productivity across four European countries, *Oxford Review of Economic Policy*, 22, 4: 483-498.

Griffith R, Harrison R and Van Reenan J (2006c) "How special is the special relationship? Using the impact of US R&D spillovers on UK firms as a test of technology", *American Economic Review*, 96, 5: 1859-1875.

Griliches Z and Regev H (1995) 'Productivity and firm turnover in Israeli industry, 1979-1988', *Journal of Econometrics*, 65: 175-203.

Grossman G and Helpman E (1991) *Innovation and Growth in the Global Economy*, Cambridge, MA: MIT Press.

Grossman G and Helpman E (2002) 'Integration versus outsourcing in industry equilibrium', *Quarterly Journal of Economics*, 117: 85-120.

Guest D, Michie J, Conway N and Sheehan M (2003) 'Human resource management and corporate performance in the UK', *British Journal of Industrial Relations*, 41: 291-314.

Hall B (1992) 'Investment and Research and Development at the Firm Level: Does the Source of Financing Matter?', NBER Working Paper No. 4096, National Bureau of Economic Research.

Hamilton B and Nickerson J (2003) 'Correcting for Endogeneity in Strategic Management Research' *Strategic Organization*, 1: 53-80.

Hariharan S and Brush T (1999), 'Plant Scale in Entry Decisions: A Comparison of Start-ups and Established Firm Entrants', *Managerial and Decision Economics*, 20, 7: 353-364.

Harris L (2002) 'Small firm responses to employment relation'. *Journal of Small Business and Enterprise Development*, 9: 296-306.

Harris R (2005) *Deriving Measures of Plant-level Capital Stock in UK Manufacturing*. Report to the Department of Trade and Industry.

Harris R and Hassaszadeh P (2002) 'The Impact of Ownership changes and age effects on plant exits in UK manufacturing', *Economics Letters*, 75, 309-317.

Harris R and Li Q (2005) *The Role of International Trade and Investment in Business Growth and Development*, Report to UK Trade and Investment.

Harris R and Li Q (2007) 'Learning by exporting? Firm-level evidence for UK manufacturing and service sectors', Department of Economics Working Paper No. 2007-22, University of Glasgow.

Harris R and Li Q (2009) 'Exporting, R&D and absorptive capacity in UK establishments', *Oxford Economic Papers*, 61, 1: 74-103.

Harris R and Robinson K (2001) *Review of the Literature on Hindrances to Business Growth*, Report to the DTI.

Harris R and Robinson K (2002) 'The effect of foreign acquisitions on total factor productivity: plant level evidence from UK manufacturing 1987-1992', *Review of Economics and Statistics*, 84, 3: 562-568.

Harris R and Trainor M (2005) "Plant-Level Analysis Using the ARD: Another Look at Gibrat's Law", *Scottish Journal of Political Economy*, 52, 3: 492-518.

Hart P and Oulton N (1996), 'Growth and Size of Firms,' *Economic Journal*, 106 (438): 1242-1252.

Hart P and Prais S (1956) "The Analysis of Business Concentration: A Statistical Approach", *Royal Statistical Society, Series A*, 119, 2: 150-191

Haskel J (2000) 'What Raises Productivity? The Microeconomics of UK Productivity Growth', mimeo.

Haskel J and Sadun R (2008) 'Regulation and UK Retailing Productivity: Evidence from Micro Data', CEPR Discussion Paper 7140.

Haskel J, Pereira S and Slaughter M (2007) 'Does inward foreign direct investment boost the productivity of domestic firms?', *Review of Economics and Statistics*, 89, 3: 482-496.

Hay G and Mole K (2004) 'An analysis of growth in new firms and the impact of liquidity constraints', Working Paper No. 84, Centre for Small and Medium-Sized Enterprises, University of Warwick.

Helpman E, Melitz M and Yeaple S (2004) 'Export versus FDI with heterogeneous firms', *American Economic Review*, 94: 300-16.

Hempell T (2003) 'Do computers call for training? Firm-level evidence on complementarities between ICT and human capital investments', ZEW Discussion Paper 03-20, Centre for European Economic Research.

Henderson J (1986) 'Efficiency of Resource Usage and City Size.' *Journal of Urban Economics*, 19, 1: 47-70.

Henderson J (2003) 'Marshall's scale economies', *Journal of Urban Economics*, 53: 1-28.

Heshmati A (2003) 'Productivity growth, efficiency and outsourcing in manufacturing and service industries', *Journal of Economic Surveys*, 17: 79-112.

Hines, H. (1957), 'Effectiveness of entry by already established firms', *Quarterly Journal of Economics*, 71: 132-150.

Hirsch, B.T. (2003), 'What do unions do for economic performance?', *Journal of Labor Research*, 25, 3: 415-456.

Hizjen A, Upward R and Wright P (2007) 'Job creation, job destruction and the role of small firms: firm level evidence for the UK', GEP Working Paper 2007/01, University of Nottingham

HM Treasury (2000) *Productivity in the UK 1: the evidence and the Government's approach*, HM Stationary Office.

Hoffman K, Parejo M, Bessant J and Perren L (1998), 'Small firms, R&D, technology and innovation in the UK: a literature review', *Technovation*, 18, 1: 39-55.

Holtz-Eakin D, Joulfaian D and Rosen H (1994a), 'Entrepreneurial decisions andliquidity constraints', *RAND Journal of Economics*, 25, 2: 334-347.

Holtz-Eakin D, Joulfaian D and Rosen H (1994b), 'Sticking it out: entrepreneurial survival and liquidity constraints', *Journal of Political Economy*, 102, 1: 53-75.

Holzl W (2008) 'Is the R&D Behaviour of Fast Growing SMEs Different?', WIFO Working Paper, 327/2008

Huggins R (2001) 'inter-firm network policies and firm performance: evaluating the impact of initiatives in the United Kingdom', *Research Policy*, 30: 443-458.

Hutchinson R and McKillop D (1992), 'Banks and small to medium sized business financing in the UK: some general issues', *National Westminster Bank, Quarterly Review*, 2, pp. 84-95.

Hymer S (1976) *The International Operations of National Firms: A Study of Foreign Direct Investment*, Cambridge, MA.

Ichniowski C, Kochan T, Levine D, Olson C and Strauss G (1996) 'What works at work: overview and assessment', *Industrial Relations*, 35, 3: 299-333.

Institute of Directors (2004) *The Real Impact of Red Tape: an IoD Survey*, London: Institute of Directors.

Jovanovic B and Gilbert R (1993), 'The Diversification of Production', *Brookings Papers on Economic Activity, Microeconomics*, 1 : 197-247.

Kaynak H (2003) "The relationship between total quality management practices and their effects on firm performance", *Journal of Operations Management*, 21, 4: 405-436.

Keeble D and Tyler P (1995) "Enterprising behaviour and the urban-rural shift", *Urban Studies*, 32: 975-997.

Keeble D, Lawson C, Lawton Smith H, Moore B and Wilkinson F (1998) 'Internationalisation Processes, Networking and Local Embeddedness in Technology-Intensive Small Firms', *Small Business Economics,* 11: 327-342.

Keep E, Mayhew K and Payne J (2006) 'From skills revolution to productivity miracle - not as easy as it sounds? *Oxford Review of Economic Policy*. 22, 4: 539-559.

Kleijweg A and Lever M (1996) "Entry and Exit in Dutch Manufacturing Industries", *Review of Industrial Organization*, 11: 375-382.

Kleiner M, Leonard J and Pilarski A (2002). How industrial relations affects plant performance: the case of commercial aircraft manufacturing. *Industrial & Labor Relations Review*, 55, 2: 195-219.

Klette T, Moen J and Griliches Z (2000) 'Do subsidies to commercial R&D reduce market failures? Microeconometric evaluation studies', *Research Policy*, 29: 471-495.

Lazear E (1995) *Personnel Economics*, Cambridge, MA: The MIT Press.

Leitch S (2005) *Skills in the UK: The long-term challenge. Interim report*. Norwich: HMSO.

Lewis H (1986), *Union Relative Wage Effects : A Survey*, Chicago, University of Chicago Press.

Lichtenberg F (1992) 'Industrial de-diversification and its consequences for productivity', *Journal of Economic Behaviour and Organisation*, 18: 427-38.

Lichtenberg F and Siegel D (1990), 'The effects of Leveraged Buy-outs on Productivity and Related Aspects of Firm Behaviour', *Journal of Financial Economics*, 27, 1: 165-194.

Lloyd C and Payne J (2006) Goodbye to all that? A critical re-evaluation of the role of the high performance work organisation within the UK skills debate, *Work Employment and Society*, 20, 1: 151-165.

Lööf H and Heshmati A (2006), On the relationship between innovation and performance: a sensitivity analysis, *Economics of Innovation and New Technology*, 15, 4&5: 317-344.

Love J and Ashcroft B (1999) 'Market Versus Corporate Structure in Plant-Level Innovation Performance', *Small Business Economics*, **13:** 97-109.

Love J, RoperS and Hewitt-Dundas N (2008) 'Service Innovation, Embeddedness and Business Performance: UK Regional Evidence', CSME, Working Paper 94, Warwick Business School.

MacDuffie J (1995) 'Human resource bundles and manufacturing performance: organisational logic and flexible production systems in the world auto industry', *Industrial and Labor Relations Review*, 48: 197-221.

Martin R (2002) 'Building the capital stock', Centre for Research into Business Activity, mimeo.

Martin R (2008) 'Productivity dispersion, competition and productivity measurement', Discussion Paper No. 692, Centre for Economic Performance, London School of Economics.

Martin R and Criscuolo C (2009) 'Multinationals and US productivity leadership: evidence from Great Britain', *Review of Economics and Statistics*, 91, 2: 263-281.

Martin R, de Preux J and Wagner U (2009) 'The Impacts of the Climate Change Levy on Business: Evidence from Micro Data', CEP Discussion Paper 917.

Martin S and Scott J (2000) "The nature of innovation market failure and the design of public support for private innovation", *Research Policy*, 12: 437-447.

Mason G (2004) "Enterprise Product Strategies and Employer Demand for Skills in Britain: Evidence from the Employers Skill Survey", SKOPE Research Paper No. 50, Oxford: SKOPE.

Mason G and Osbourne M (2007) 'Productivity, capital intensity and labour quality at sector level in New Zealand and the UK', New Zealand Treasury Working Paper 07/01.

Mason G, Van Ark B and Wagner K (1996) 'Workforce skills, product quality and economic performance', in A Booth and D Snower (eds) *Acquiring skills. Market failures, their symptoms and policy responses*, London: CEPR.

Matsusaka J (1993) 'Target profits and managerial discipline during the conglomerate merger wave', *Journal of Industrial Economics*, 41, 2: 179-189.

McKinsey (1998) *Driving Productivity in the UK Economy*, McKinsey Global Institute.

Meade J (1968) 'Is the New Industrial State Inevitable?' *Economic Journal*, 78, 2: 372-392.

Metcalf D (2003), 'Unions and productivity, financial performance and investment', pp. 118-171 in J.T. Addison and C. Schnabel, eds. *International Handbook of Trade Unions*. Cheltenham, UK: Edward Elgar.

Metcalf D (2005) 'Trade unions: resurgence or perdition? An economic analysis', in S Fernie and D Metcalf (eds) *Trade Unions: Resurgence or Demise?*, London: Routledge.

Metcalfe S and Georghiou L (1997) 'Equilibrium and Evolutionary Foundations of Technology Policy', CRIC Discussion Paper 3, University of Manchester.

Mohrman M and Ledford G (1995) *Creating High-Performance Organizations: Practices and Results of Employee Involvement and TQM in Fortune 1000 Companies*. San Francisco: Jossey-Bass.

Montgomery C (1994) 'Corporate diversification', *Journal of Economic Perspectives*, 8, 3: 163-178.

Montgomery C and Wernerfelt B (1988) 'Diversification, Ricardian rents and Tobin's q', *RAND Journal of Economics*. 19: 623-32.

Nickell S (1996) 'Competition and corporate performance', *Journal of Political Economy*, 104, 4: 724-46.

Nicoletti G and Scarpetta S (2003), "Regulation, Productivity and Growth", *Economic Policy,* 36, 11-72.

North D and Smallbone D (1996) "Small business development in remote rural areas: the example of mature manufacturing firms in Northern England", *Journal of Rural Studies* 12: 151-167.

North D and Smallbone D (2000) "The innovativeness and growth of rural SMEs during the 1990s", *Regional Studies*, 34, 145-157.

O'Mahony M (1999) *Britain's productivity performance 1950-1996*, London: NIESR.

O'Mahony M and Vecchi M (2005) "Quantifying the impact of ICT capital on output growth: a heterogeneous dynamic panel approach", *Economica*, 72, 288: 615-633.

O'Mahony M, Robinson C and Vecchi M (2008) "The impact of ICT on the demand for skilled labour: a cross-country comparison", *Labour Economics*, 15, 6: 1435-1450.

OECD (2001a) *A New Economy? The Changing Role of Innovation and Information Technology in Growth*, Paris: OECD.

OECD (2001b) *The New Economy: Beyond the Hype, Final Report on the OCED Growth Project*, Paris: OECD.

OECD (2005) *Oslo Manual: Guidelines for Collecting and Interpreting Technological Innovation Data*, 3rd edition, Paris: OECD.

Office for National Statistics (2006) *Business Structure Database User Guide*, Newport: Office for National Statistics.

Office of Fair Trading (2007) *Productivity and Competition: An OFT Perspective on the Productivity Debate*, OFT Research Report 887.

Olley G and Pakes A (1996) 'The dynamics of productivity in the telecommunication equipment industry', *Econometrica*, 64, 6: 1263-1297.

Oulton N (1998) 'Investment, Capital and Foreign Ownership in UK Manufacturing', NIESR Discussion Paper No. 141, National Institute of Economic and Social Research.

Penrose E (1959) *The Theory of the Growth of the Firm*, Oxford: Basil Blackwell.

Pfeffer J (1994) *Competitive Advantage Through People*, Boston, MA: Harvard Business School Press.

Pierre G and Scarpetta S (2004) 'Employment Regulations through the Eyes of Employers: do they matter and how do firms respond to them?', Discussion Paper No. 1424, IZA (Institute for the Study of Labour), Bonn, Germany, December 2004.

Pittaway L, Robertson M, Munir K, Denyer, D and Neely A (2004) *Networking and innovation in the UK: a systematic review of the literature*, Advanced Institute of Management Research.

Powell R and Stark A (2005) 'Does operating performance increase post-takeover for UK takeovers? A comparison of performance measures and benchmarks', *Journal of Corporate Finance*, 11: 293-317.

Power L (1998) 'The missing link: technology, investment and productivity', *Review of Economics and Statistics*, 80, 2: 300-313.

Purcell J and Kinnie N (2006) 'HRM and business performance', pp.533-551 in P Boxall, J Purcell and P Wright (eds) *The Oxford Handbook of Human Resource Management*, Oxford: Oxford University Press.

Ram M, Edwards P, Gilman M and Arrowsmith J (2001) 'The Dynamics of Informality: Employment Relations in Small Firms and the Effects of Regulatory Change, *Work, Employment & Society*, 15, 4: 845-861.

Ravenscraft D and Scherer F (1987) *Mergers, Sell-offs and Economic Efficiency*, Washington, DC., Brookings Institute.

Reid G (2000) *The development and survival or new small businesses*. Centre for Research into Industry, Enterprise, Finance and the Firm, St Andrews University.

Rennie M (1993) 'Born global'*, McKinsey Quarterly* 4: 45-52.

Rialp A, Rialp J and Knight G (2005) 'The phenomenon of early internationalizing firms: what do we know after a decade (1993-2003) of scientific inquiry, *International Business Review* 14: 147-66.

Rice P and Venables A (2004) 'Spatial Determinants of Productivity: Analysis for the Regions of Great Britain'. Centre for Economic Performance Discussion Paper No. 642. London: London School of Economics.

Riley R, Metcalf H and Forth J (2008) *The Business Case for Equal Opportunities: An Econometric Investigation*, Research Report No. 483, London: Department for Work and Pensions.

Romijn H and Albaladejo M (2002) 'Determinants of innovation capability in small electronics and software firms in southeast England', *Research Policy*, 31(7).

Rosenthal S and Strange W (2004), 'Evidence on the Nature and Sources of Agglomeration Economies', in Henderson, J.V. and J.F. Thisse,(eds.), *Handbook of Urban and Regional Economics*, Volume 4. Amsterdam: Elsevier, 2119-2172.

Rumelt R (1982) 'Diversification strategies and profitability', *Strategic Management Journal*, 3: 359-69.

Saridakis G, Mole K and Storey D (2008) 'New small firm survival in England', *Empirica*, 35: 25-39.

Scherer F (1988) 'Corporate Takeovers: The Efficiency Argument', *Journal of Economic Perspectives*, 2, 1, 69-81.

Schiantarelli, F. (2008) "Product Market Regulation and Macroeconomic Performance: A Review of Cross-Country Evidence", Working Paper 623, Boston College.

Scottish Government Social Research (2008) *Skills utilization literature review*. Glasgow: Scottish Government.

Serapio M and Dalton D (1999) "Globalization of industrial R&D: an examination of foreign direct investmentsin R&D in the United States", *Research Policy*, 28: 303-316.

Shapiro C and Varian H (1998) *Information Rules: A Strategic Guide to the Network Economy*, Cambridge, MA: Harvard Business School Press.

Sheikh S, Gardiner B and Brettell S (2006) *Health and safety management and business economic performance. An econometric study*. Health and Safety Executive Research Report 510. Norwich: HMSO.

Siebers P, Aickelin U, Battisti G, Celia H, Clegg C, Fu X, De Hoyos R, Iona A, Petrescu A and Piexoto A (2008) 'Enhancing Productivity: The Role of Management Practices, AIM Working Paper 062, Advanced Institute of Management Research.

Small Business Research Centre (2005) *Regulation and small firm performance and growth: A review of the literature*. Kingston University.

Smith C and Cooper A (1988) 'Established companies diversifying into young industries: A comparison of firms with different levels of performance', *Strategic Management Journal*, 9, 2: 111-121.

Snell S, Youndt M & Wright P. (1996) "Establishing a framework for research in strategic human resource management. Merging resource theory and organisational learning". In G.Ferris (Ed.) *Research in personnel and human resource management* , pp 61-90.

Srinivasan R, Woo C and Cooper A (1994) 'Performance Determinants for Male and female entrepreneurs', Working Paper 1053, Purdue University.

Stiles P and Kulvisaechana S (2003) *Human capital and performance: A literature review*. Cambridge: Judge Institute of Management.

Stiroh K (2004). 'Reassessing the impact of IT in the production function: a meta-analysis and sensitivity tests'. Federal Reserve Bank of New York, mimeo.

Storey D (1994) *Understanding the Small Business Sector*, London: Routledge.

Sutton J (1991) *Sunk Costs and Market Structure*, Cambridge, MA, MIT Press.

Tamkin P (2005) *The Contribution of Skills to Business Performance*, Brighton: Institute for Employment Studies.

Taylor M (1999) 'Survival of the fittest? An analysis of self-employment duration in Britain', *Economic Journal*, 109, 454: C140-C155.

Teece D (1982) 'Towards an economic theory of the multiproduct firm', *Journal of Economic Behaviour and Organisation*, 3: 39-63.

Teece D (1996) 'Firm organisation, industrial structure and technological innovation', *Journal of Economic Behaviour and Organisation*, 31: 193-224.

Teece D and Pisano G (1998) 'The Dynamic Capabilities of Firms: an Introduction', pp.193-214 in G. Dosi, D. J. Teece and J. Chytry (eds) *Technology, Organization and Competitiveness. Perspectives on Industrial and Corporate Change*., Oxford: Oxford University Press.

Teece D, Pisano G and Shuen A (1997), Dynamic capabilities and strategic management, *Strategic Management Journal*, 18, 7: 509–33.

Thompson P (2003) 'Disconnected capitalism: or why employers can't keep their side of the bargain', *Work, Employment and Society*, 17, 2: 359-378.

Tirole J (1989) *The Theory of Industrial Organisation*, Cambridge, MA: MIT Press.

Trades Union Congress (2005) F*ocus on recognition - Trade union trends survey*. London: Trades Union Congress.

van Ark B, O'Mahony M and Timmer M (2008) "The productivity gap between Europe and the United States: Trends and Causes", *Journal of Economic Perspectives*, 22, 1: 25-44.

Winter M and Rushbrook L (2003) *Literature review of the English rural economy*. Department for the Environment, Food and Rural Affairs.

Winter S (2003) 'Understanding dynamic capabilities', *Strategic Management Journal*, 24, 10: 991-996.

Womack J and Jones D (2003) *Lean Thinking: Banish Waste and Create Wealth in Your Corporation*, London: Simon and Schuster.

Wood S and Wall T (2005) 'The romance of HRM and business performance, and the case for big science', *Human Relations*, 58: 429-461.

Wood, P. (2005) 'A service informed approach to Regional Innovation or adaption?' *The Service Industries Journal*, 25, 4: 429-445.

Youndt M, Snell S, Dean J and Lepak D (1996) 'Human resource management, manufacturing strategy and firm performance', *Academy of Management Journal*, 39, 4: 836-866.

Zahra S and George G (2002) 'Absorptive capacity: a review, reconceptualisation and extension', *Academy of Management Review*, 27, 2: 185-203.

Department for Business, Innovation and Skills
www.bis.gov.uk
First published August 2010 © Crown Copyright.
URN 10/1118