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About Skills in Focus

The Skills in Focus series is intended to support informed debate around current and future skills issues. The Skills Committee is jointly sponsored by the Scottish Funding Council and Skills Development Scotland. The Committee works closely with the Scottish Government, employers, business organisations and students to ensure that Scotland has the right high-level skills and an employable and adaptive workforce.

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Foreword

Dr. Janet Lowe CBE is Chair of the Skills Committee and a board member of both SFC and SDS.

The Skills Committee is a statutory committee of the Scottish Funding Council and is central to the work of Skills Development Scotland, advising both boards on skills needs of and policies for Scotland. In particular, the Skills Committee has been tasked with stimulating debate on skills issues and policy.

Professors David Ashton and Johnny Sung are internationally renowned experts on workforce development. In this Skills in Focus paper, they bring their expertise and knowledge to bear on the relationship between skills and productivity.

Prof. Ashton and Sung begin with a run through some fundamentals of skills and productivity:

- Nations with a highly-skilled population are generally more productive.
- Skills are only one of the drivers of productivity. For many firms, it is changes to the product market strategy which will influence skills demand and therefore productivity.
- The introduction of new technology is not necessarily guaranteed to increase skills levels – there are potential issues around deskillining in some sectors as employers seek to make some jobs more routine. Crucially it is the dynamic interaction of increases in skills and technology that drives forward productivity.
- Skills are important both in economic terms and in social terms. Increasing the basic skills of workers has a limited effect on productivity, reflected in the poor return to individuals in terms of wages. But they’re vital to enable people to participate in society.
- There are often significant time lags between a company’s adoption of new production techniques or its investment in technology and the impact on company productivity.

But the paper then brings us a profound insight. Drawing from the literature and based on their own extensive case-study work in Scotland, Prof. Ashton and Sung suggest that there is a strong sectoral dimension to the factors which influence productivity. That is, there is no ‘one size fits all’ approach which is likely to succeed.

Following on from this, they suggest that this has potential implications for policymakers’ attempts to influence companies’ productivity. Exhortation is simple, but unlikely to be effective. Rather, Prof. Ashton and Sung argue, deeper engagement is required, which may be supplemented by procurement policies, regulation and a coordinating role (such as collective branding for tourism initiatives). Within this approach, they suggest that the sectoral dimension is of critical importance.
Profs. Ashton and Sung are international experts in this area. They have brought their knowledge and experience to bear on a topic of crucial importance to Scotland. I would like to thank them for their challenging and constructive contribution to the debate.

Dr. Janet Lowe
Chair of the Skills Committee
June 2011

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Introduction

It is widely recognized that skills are an important driver of productivity, but our knowledge of the relationship between productivity and skill is weak both at the theoretical and empirical levels. In spite of this the assumptions derived from the theories about this relationship continue to underpin important policy deliberations. Yet recent research evidence suggests that these assumptions could be flawed in important respects. At a time when international competition is intensifying and there is pressure on public finances to adopt smarter solutions to policy problems, there is an urgent need to clear the ground and identify where policy actions can be more effectively implemented in using skills to enhance productivity.

Productivity and skills at the national level

For some time now in policy circles skills have been seen as a key to increased productivity and economic growth (UKCES, 2009: 35). In 2006 the DTI paper “UK Productivity and Competitiveness Indicators” highlighted skills as one of five drivers of productivity (DTI, 2006: 11). Since the 1960s human capital theory has been telling us that a more qualified workforce will produce higher levels of productivity. As the same DTI paper documents, the endogenous growth literature suggests that human capital is a major factor of production and that differences in human capital stocks may explain differences in prosperity between countries (Mankiw et al, 1992). Indeed, since the pioneering work of Lucas, (1988) differences in growth rates between countries have been partly explained by differences in the rate of human capital accumulation. Thus, Bassanini and Scarpetta, (2001) in a study of 14 OECD countries found that those countries with literacy scores 1 % above average had 2.5 per cent higher labour productivity and 1.5 % higher GDP per capita than average. The message that increases in human capital will result in higher levels of productivity has been given a further impetus from skill-bias technological change theory which underlies much of the literature on the impact of new technologies on the workplace and wage inequalities. This suggests that technological change generates an increase in skill levels (Berman and Machin, 2000).

In the UK the evidence supporting the importance of this relationship between productivity and skills has been clearly marshaled by Garrett, Campbell and Mason, (2010) in the recent UKCES publication, ‘The Value of Skills’. Using a range of measures of skills, years of schooling, school enrollment rates, the proportion receiving training in the workforce and the adequacy of basic skills, they report strong evidence of a link with national economic performance, wealth and prosperity. In view of this there can be little doubt of the strength of the relationship between skills and productivity at the national level.

Yet if we dig deeper there is also a growing body of evidence which suggests that these relationships do not always hold at the level of the individual firm. Starting with Adam Smith’s famous case of the pin making factory, research on how employers use technology has long revealed that they can use it to either upskill or deskill their la-
bour force. For example, research based on labour process theory (Braverman, 1974) has shown how much of the gains made in productivity through the introduction of mass production in the automobile industry and other areas have come about through the use of technology to deskill what was once the work of skilled craftsmen. As Wood (1989) pointed out over twenty years ago, there are processes of deskilling as well as upskilling constantly in operation within capitalist societies. In terms of deskilling, there is recent evidence emerging to suggest that companies are attempting to capture much of the new professional and technical knowhow in new software applications in both the service and manufacturing industries (Brown et al, 2010). This is enabling them to routinise some of the knowledge that was previously held in the heads of technical and professional staff by embedding that knowledge in computer programmes. This means that they can employ lower skilled staff in the execution of tasks previously performed by professional and technical personnel, thereby lower skill levels and costs. Thus, whereas technological change often requires the staff to adopt new and more complex skills, this is clearly not necessarily always the case.

At the level of the individual, the danger of transposing the assumptions about the links between productivity and skills derived from human capital and derivative theories have recently been demonstrated by the work of Wolf et al (2010). Notwithstanding the research findings that have demonstrated a positive return on earnings to individuals with basic literacy skills (Dearden, et al, 2002), Wolf et al, (2010) using longitudinal data, found that government schemes designed to increase basic skill levels did not have an immediate impact on performance and that once the subsidies were withdrawn the employers ceased to support the development of these skills. Although the article provides little information on the nature of the workplaces, it is likely that these were jobs which had been designed to utilise unskilled labour and therefore any increase in skill would have been virtually irrelevant to performance and productivity.

In Scotland, Dickerson’s (2010) recent work using the UK Skills Survey, has highlighted the fact that although Scotland has a more highly educated population, its productivity levels are lower. This is seen to be a result of lower skill utilisation in jobs within industries and occupations, especially in computing and IT. The problem is not one of the low level of individual qualifications, but rather one of demand, the jobs just do not require the individuals to utilise these skills. Again, this suggests a complexity in the relationship between productivity and skills which is not evident in current policy thinking with its emphasis on trying to increase productivity through operating just on the supply side.

**Sector differences in productivity and skills**

Another reason why it is dangerous to transpose assumptions derived from these national studies to the level of the individual firm has recently been highlighted in work sponsored by the SSDA. This has revealed the importance of sector variations in productivity, which suggests that the rela-
All this suggests that productivity is therefore likely to be ‘sectorally’ defined. For example, in advanced manufacturing, where the technology is capital intensive, major improvements in productivity tend to come from investments in R&D, the creation of new products and investments in new technology. Here, as we shall show, skills play a complementary role in some respects. They ensuring that such investments are translated into an effective competitive advantage in the market, but they are not necessarily the main driver of productivity. It is not at all clear what the balance of influence is between these two drivers of productivity.

In the USA, the work of Crespi et al. (2007) found that US-owned firms operating in the UK implemented more productivity enhancing business practices than their UK-owned counterparts. Similarly, Bloom et al. (2007) found that US-owned multinational establishments in the UK were more productive than UK-owned counterparts, as were establishments taken over by US-owned multinationals, and that this was due to their ability to use IT. What evidence there is suggests that while investments in new technology may be a precondition for major improvements in productivity, they are not necessarily sufficient, you need to develop skills in how to use it.

Nineteen years ago Osterman (1991) cited the case of General Motors spending $650 million dol-
lars on upgrading technology in one of its plants in the 1980s without making any changes to labour practices. As a result there were no significant improvements quality or productivity. This year, international consultants McKinsey are still making the same point (Brink et al, 2010). They highlight the need for senior management to make the ‘right decisions’ with regard to the management practices and processes that are introduced to enable investments in new information technology to be productive. They cite the case of a company that had spent more than a year implementing the software and installing the hardware for a new system, equipping all of their engineers with GPS-enabled handheld devices, and spending months training engineers and dispatchers to use these new systems. Yet the productivity gains did not materialise, response times did not improve and the number of jobs each engineer could handle in a day did not increase. This they see as typical of many attempts to use IT to increase productivity. They argue that “When IT-enablement projects in service operations go awry, it’s often because these systems require processes and work practices different from those used in non-IT-enabled situations. These processes and work practices are best designed and implemented before companies roll out the new IT.” (Brink et al, 2010: 33)

Writing in 2009, Brynjolfson and Saunders, on the basis of their extensive research in the US, argue that companies with the highest returns on their technology investments did more than just buy technology. They invested in what they call “organizational capital”, by which they mean productivity enhancing business practices such as incentive systems, training and decentralised decision-making. These are what others would refer to as high performance working practices (HPWP). However, what they also point to is the fact that it is the combinations of these practices that matter more than the implementation of any single practice.

In an attempt to illustrate how these factors operated, Hughes and Scott Morton (2005) use a case study of the introduction of a standard ICT package into a US transport firm, Schneider. They find that “... it was not the technology that made a competitive difference, it was the technology applied in a very focused way to enhance the organization’s strategy and this was then combined with major investments in human capital and other complementary assets.” (Hughes and Scott Morton 2005:24) The authors conclude that “The ability to absorb and benefit from this investment depends upon the competence of management in recognising and implementing appropriate technologies, and building the required complementary assets. ... This lesson is that investment in physical and software capital and investment in human capital and managerial and technical skills are required (p. 32). In many respects this is what Mason et al (2007) in their cross-country analysis of skills refer to as the “absorptive capacity” at sector level, that is the capacity to make effective use of knowledge, ideas and technologies that become available through spillovers between firms and sectors.

In other sectors the part played by skills is very different. In labour intensive sectors such as restaurants and care homes, technology, at this point
in time, has a minimal role to play in driving productivity improvements. There, improvements in productivity are more incremental and stem from changes in management and working practices. For example in restaurants, it may come from the use of high performance working practices delivering higher standards of service, creating more repeat business and lower staff turnover, thereby producing cost savings in recruitment and training (Kakavelakis, 2008). In the hotel sector, Sung et al, (2009) report the case of a company using similar HPWP to delivered higher levels of customer retention and very high levels of bed occupancy. These productivity improvements required little or no investment in new technology. Here skills alone provide the main driving force behind attempts to increase productivity.

We can observe similar relationships in the more knowledge intensive industries. For example in advertising firms, there is only a relatively small investment in technology, productivity improvements come from the handling of relationships with consumers. Similarly, in parts of the financial services industry such as personal wealth management, improvements in performance come from the ways in which relationships are managed with wealthy clients. However, in other knowledge intensive companies such as W. L. Gore and Data Connection (now known as Metaswitch Networks) studied by Sung and Ashton, (2005) and Eng-Con studied by Storey and Salaman (2008), performance improvements come from the ways in which staff are developed and managed, contributing to productivity through advances in research and development and innovation.

In addition to these clear industry variations in the relationship between skills and technology, there is also emerging a new level of analysis in countries such as Singapore and to a lesser extent Scotland. Here the issues become more complex when we think about productivity for the tourism industry. In Singapore the productivity of the tourism industry has been enhanced by the ability of industry level organisations to co-ordinate the activities of a range of different providers, with the aim of not only attracting wealthy (high income) tourists but to deliver them a package which encourages them to prolong their stay (and spending) in Singapore. For example, “medical tourism” providers and conference organisers are linked with a range of other providers, such as Formula 1, high end hotels resorts, health farms and casinos to provide packages which will entice those visiting the country to stay longer. There is the genesis of a similar situation starting in Scotland as VisitScotland seeks to brand Scotland as a unique tourist experience. Here productivity does not depend on the work of any single worker or company, but the effort of the industry to co-ordinate activities and create a unique 'experience' which encourages tourists to prolong their stay. Developments such as these mean that we will need to rethink what we mean by productivity and how technology and skills can be combined to deliver this ‘experience’. It points to the need for a better understanding of how productivity is defined, how skills relate to other drivers of productivity and how productivity varies in different sectors of the economy.

One other consequence of these differences in the relationship between the drivers of productiv-
ity in the different sectors, are major differences in the time it takes before improvements in skills pay off in terms of higher levels of productivity. Research into the impact of ICT on productivity found that because the effective implementation of new IT systems requires the build up of new processes and procedures (organizational capital), the pay-off from investments in skills takes a long time. Brynjolfsson and Hitt (2000) found that in the manufacturing sector it took between 4 and 7 years before the full productivity gains from the introduction of IT systems was achieved, precisely because of the time required to introduce these changes in business practices and skills. This is very different from the hotel and restaurant sector where the introduction of high performance working practices can improve productivity in months rather than years. Again we can see major differences across the sectors.

One final point about the role of skills and technology as drivers of productivity is to note that the dynamics of the relationship change through time. Relationships between skills and productivity established in one period may soon be transformed by economic and social change in an industry. In retail distribution, the relationship between skills and productivity was until relatively recently similar to that observed in hotels and restaurants. Improvements in productivity came from the introduction of self-service systems and employee skills, in the form of customer service. However, with the development of new ICT systems, companies such as Wal-Mart have been able to make huge improvements in productivity albeit with associated changes in the skills of their operatives. The result is that customer service skills, while still important, play a far less important role in raising productivity than the successful implementation of new technologies in controlling, sourcing and distributing products. Similar changes are now underway in the transport and distribution sector as the work of Hughes and Scott Morton (2005) mentioned above testify. Thus, not only are sectors important in shaping these relationships between skills and productivity, so too are the changes currently underway in these relationships and the types of skills employees require to implement productivity changes.

Implications for skills policy

Given the complexities of the relationship between skills and the other drivers of productivity, it is clear that there can be no uniform policy measures to address the issues we have identified. This is because there are at least two separate dimensions to the problem. First, there are sector variations in the relationship between technology and skills. In the capital intensive industries the problem, as the McKinsey research discussed above makes clear, is to help the CEOs make the “right” decisions. To make them aware that the introduction of new technological innovation, without the appropriate changes in business processes, the devolution of authority and training of management and workers in new practices, what Brynjolfsunn refers to as organizational capital, will not generate the improvements in productivity they seek. In the labour intensive industries, where new technologies are not as important in generating productivity improvements, the problem is one of making them aware of the possibilities HPWP provide for improving...
their productivity and how these might be implemented. Here the problem is less complex as employers are only concerned with introducing changes in people management practices.

The second dimension concerns the level at which interventions have to be made to be effective. As the McKinsey report cited above makes clear, at the executive level there is the need to ensure that executives make the “right decisions” when it comes to implementing technological change and/or the new technologies. At middle management level there is the need to ensure that managers have the appropriate skills and attributes to implement these changes in business processes effectively. At the level of the operative there is the need to ensure that they have both the soft skills and, if necessary, the hard technical skills required to utilise new technologies and working practices.

At the chief executive level policy makers face what is perhaps the most difficult task in helping ensure that the “right decisions” are made, these are the decisions as to whether innovations in technology and management practices are to be pursued. These are skills required of the most senior managers which many clearly do not possess (Brink, 2010). However, here we have to be careful about generalising because recent research has revealed big differences in multinational companies between the productivity which companies expect from senior management, defined as those with “talent”, as opposed to that expected from middle management, (Brown et al. 2011). For these multinational companies the big gains in performance are seen to come from the “talented” senior managers who can “think outside the box” as opposed to the middle managers who are there to implement strategy and for whom the emphasis is on conforming to company competences. These differences can be illustrated through a case study of leading UK financial services organisation (Ross, 2008). There “talent” was seen as innate, the ability to think outside the box, to see the bigger picture, to communicate vision, to gain buy-in, to make a difference, a can do attitude, to actively seek feedback, to communicate with employees all levels, to get the best out of people, and to inculcate a desire to win. It was these attributes that enables the senior managers to identify and exploit new opportunities for productivity gains.

Similar findings have recently been published by Tamkin et al, (2010) who identified some of the basic qualities of outstanding leaders as: having the ability think and act systematically on behalf of organisations, to think and act in ways that join up different dimensions of the organization and the ability to connect with and empower employees. These senior managers are expected to grasp new business opportunities and how to make best use of them, including the alignment of business processes with new technologies. As the research cited above on the impact of multinational ownership on productivity suggests such firms are already leading in delivering productivity gains. Here there is no need for policy interventions, indeed as these companies transcend national boundaries there is little policy makers can do, apart from encouraging national based companies to learn from them.
In other (national) companies the work of Guest et al, (2001) has shown how, even when confronted with solid research based evidence of the gains to be derived from introducing HPWPs, senior managers were reluctant to accept the evidence, let alone act on it. More recently Storey and Salaman (2008) has taken our understanding of this resistance further by showing how it is deeply embedded in the mental models and mindset of directors and senior managers. Researching the commercial cleaning industry they encountered firms whose directors were aware of the possibility of moving from the delivery of low value-added to higher value-added activities, of moving from simply supplying services to taking responsibility for planning and co-ordinating these services and expanding the range of services they delivered. This was a golden opportunity to move up-market and increase productivity and profitability yet they failed to respond to these opportunities. In the words of Storey and Salaman: 37:

“... they remained imprisoned by their historic mental models and assumptions, constrained not only by their unwillingness or inability to think in new ways about what their relationship with and propositions to clients and indeed to staff – but also limited by historic and organisational arrangements (management styles and professionalism, staff capacities, organisational systems and cultures) – which seriously limited the capacity of the organisation and its staff to deliver anything other than low-cost, low-skill, provision of conventional and limited cleaning services.”

All this suggests that one of the most difficult tasks policy makers face is finding ways to help these senior members of companies improve their ability to perceive and act on appropriate opportunities in their business environment to improve the productivity of their organisations. Of course there is only a limited amount of research into these problems, but what there is suggests important barriers to improving productivity that policy needs to address.

At the level of middle management the literature suggests a different problem. Here it is one of ensuring that managers have the appropriate skills and attributes to enable them to implement change in organisational processes. What the evidence suggests at present is that many managers not only lack such skills, for example the proportion of UK managers with degrees tends to be lower that found among our major competitors (Bosworth and Wilson, 2004), but that their existing jobs do not provide the opportunity to develop the leadership skills required to implement change. In their study of the comparative capabilities of UK managers, Tamkin et al (2006) found the UK companies were less advanced at linking HR and business strategies, and less advanced at convincing line managers that management development is taken seriously, all of which had been shown to be linked to performance. Indeed, recent work in the retail sector Grugulis et al (2009) found that manager’s behaviour was tightly prescribed by performance targets and competences.

In the four store sites where research was carried out, the work of managers was heavily prescribed, with ordering, product ranges, stock levels, store
layouts, pricing, special offers and staffing policies all set out by respective functional divisions at head office. Their work was also closely monitored, and their personal performance assessed through the constant and close inspection of the sales, profit and customer service performance scores of the stores and departments they were responsible for. In line with Hales’ (2005) observations, these managers were not entrepreneurial visionaries, but links in a chain with little real influence over policies and procedures. ...Their work was generally confined to striving to meet a range of very demanding performance targets over which they themselves had little, if any, control. (p.1)

Such results have not been confined to the retail sector, as Ross (2004), found in her case study of a major financial services company. There she found that middle managers are constrained by performance targets, results, standards and judgments. Their performance was assessed through results delivered against key performance indicators. Competences were defined as those behaviours desired by the company and development needs identified where there were ‘gaps’ in competency. Standards of expectation were defined in an attempt to raise levels of performance. “The advantage of this approach is that where management capability is inconsistent across a business, defining a standard helps to provide a framework for identifying those characteristics which describe poor, solid and excellent performance.” Such competency based systems are now widely used with the result that middle managers are not encouraged to exercise the kind of initiative and imagination required to implement the kind of organisational changes required to drive up productivity.

Such innovative behaviour is more likely to be found among middle management in organizations that utilise HPWPs (Ashton and Sung, 2002; Sung, et al, 2005). There managers have to develop leadership qualities, skills in supporting teams and individual learning as well as committing employees to organisational goals. At the moment we do not know how these skills vary by sector. However, some sectors such as automobiles have been more proactive than others in learning from multi-national companies and develop new qualifications in high performance management in order to help develop them among middle management.

Finally, at the operative level there is the need to ensure that employee have the skills required to put into practice the new business processes and processes associated with the use of HPWPs. For example, the technical knowledge, problem solving skills and teamworking skills required to implement cellular systems of production, the commitment, communication and teamworking skills required to implement systems of continuous improvement and so on. Here again there will be sector differences with the emphasis on technical skills and knowledge of the production process in manufacturing and on teamworking, communication and customer service skills in the service sector.
Policy conclusions

The first policy conclusion is that it is misleading to hope that one-off programmes such as those delivering higher levels of literacy and numeracy can hope to deliver significant improvements in workplace productivity. Such programmes are without doubt valuable as a means of developing individuals and providing them with the building blocks through which to acquire higher level skills and enhance their participation as citizens of the wider society. However, such initiatives and the skills they deliver are only going to make marginal contribution to overall productivity and performance.

The most important level at which initiatives designed to improve productivity should be directed is that the Chief Executive Officer and the most senior management. This is because these are the people who have to make the “right decisions” about entering new higher value-added markets and aligning business processes with new technology to take advantage of new business opportunities. These are the sources of major productivity gains. Here blanket approaches are likely to be ineffective, as we have seen, the large multinational corporations are already developing such skills among their senior management. The problem lay with the directors and senior management of national corporations. Here there is a clear sector dimension to the problem. In manufacturing and transportation it is a problem of combining new technologies with the appropriate business and HR processes and procedures and aligning them with business strategy. In parts of the service sector such as hotels and restaurants, it is question aligning the HR processes and procedures with business strategy.

To stimulate such change among business leaders is, as we have seen, a difficult task, as many of the target audience are almost impervious to exhortation from the public sector or even from consultants (Storey and Salaman, 2008). Here there is a role for other forms of policy lever such as procurement policies and forms of regulation and direct government action that can be used to influence business strategy (Sung et al, 2009a). These place pressure on employers, through the use of legal regulations and other means, to change their mindset and modify their business strategy. There may be other mechanisms, such as those used to award grants for the introduction of new technology in the public sector, that could be used to specify that appropriate business processes are implemented as a condition of such awards. These are much more powerful levers than mere exhortation. Moreover, once such pressure has been placed on directors and senior managers to change, then they would be more likely to accept advice from colleagues and/or appropriate public agencies.

At the level of middle management and operatives public policy can help through the provision of appropriate management qualifications such as the N/SVQ in high performance working mentioned above. In Scotland, this would mean ensuring that the various SVQs incorporate these skills. For middle/line management this would mean the skills in leading and implementing organisational
change, for operatives, the skills in operating the new procedures and practices.

The second policy conclusion is that the sector would be the most appropriate level from which to direct policy intervention. As we have seen there are crucial differences in the relationship between skills and other drivers of productivity at the sector level. If limited public resources are to be used more effectively to improve productivity then we need to target skills interventions differentially across sectors, because their pay off in terms of productivity improvements will be very different. Therefore the message and advice delivered to employers will need to be specific to that sector. As we have seen this is the case for the delivery of advice at all three levels, directors middle management and operatives, all of which will have important sector specific components.

What is also crucial is that the agencies delivering such sector-based advice and help to employers should have credibility in the eyes of the leaders within the industry. This in turn calls for expertise rooted in the business experience of the sector. There is already some such expertise in the area of skills available in the various sector skills councils but there are also other agencies that already have this type of expertise, or ready access to it, such as the FiSAB in financial services or the Scottish Tourism Forum. These could form the basis for the establishment of viable sector based organisations across Scotland, at least for those sectors seen as essential for future economic growth. Such an approach is not inconsistent with the fact that Scotland’s low skill problem, as identified by Dickerson, is a feature of the general economy and not specific to any sector or sectors. Rather, it is to argue that the best point at which to tackle this problem would be the sector level. This is because the policy measures required to tackle the problem and raise productivity, and thereby the demand for skills, vary by sector.
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