

Appendix E Influences on productivity

This appendix summarises the main influences on firm and industry productivity, which ultimately impact economy-wide productivity.

Numerous studies have documented differences in productivity over time, across countries and across industries. Some have found large and persistent differences in productivity across firms in the same industry. Research has identified many influences on productivity, but there are many questions that still need answers. Influences on firm productivity can be roughly divided into two groups: influences that firms have some degree of control over (internal influences) and influences from firms' external operating environment (external influences). Influences can operate together. Some influences can operate internally and externally (Syverson, 2010).¹ The relationships found in research do not apply in every situation.

E.1 Internal influences

Internal influences are actions by management or workers that impact their firm's productivity. While firms seek to maximise their profitability, their actions also impact their productivity. In many cases, actions by management and workers to improve firm profitability also increase productivity.

Table E.1 Factors within a firm that influence productivity

| Influence | Description |
|--------------------------|---|
| Human capital investment | <p>Human capital is the set of knowledge, abilities and skills that a person brings to a job. Human capital is important for labour productivity and multi-factor productivity (MFP) through its positive impact on job performance, levels and adoption of innovation and entrepreneurship.</p> <p>Studies have shown a link between human capital and productivity. However, some studies indicate that human capital only explains a small proportion of the variation in productivity between firms (Syverson, 2010).</p> <p>Managerial human capital is particularly important as managers organise firms' production processes. Some studies have found links between the quality of management and firm productivity (Syverson, 2010).</p> |
| Capital investment | <p>Capital refers to equipment, machinery, vehicles, land improvements, structures and fittings used to produce goods and services.</p> <p>Capital investment can increase the amount of capital per labour input (capital deepening), including substituting capital for labour input, which raises labour productivity. Some studies have found capital investment can also raise MFP, for example, when new equipment enables workers to improve their work practices and to gain new skills (New Zealand Treasury, 2008a; Syverson, 2010).</p> |
| ICT investment | <p>ICT investment is a subset of capital investment that covers hardware (IT equipment), software and communication equipment.</p> <p>Studies have shown that ICT is important in explaining productivity growth, such as the US's relatively strong productivity growth over the past couple of decades and the EU's comparably low productivity growth over the same period (Timmer, Inklaar, O'Mahony & van Ark, 2011).</p> <p>The use of ICT can increase labour productivity through capital deepening. The use of ICT can also increase MFP by enabling innovation in products, processes and organisational structures (Australian Productivity Commission, 2004).</p> <p>Studies have shown that productivity gains from the use of ICTs generally arise when combined with complementary investments in training and innovation in products,</p> |

¹ For example, knowledge spillovers (called 'learning-by-doing' within a firm) and capital investment (called 'infrastructure' when external to the firm).

| Influence | Description |
|-------------------------------|--|
| | processes, organisational structure and supplier and customer relationships. Skilled staff and management skills are also required (Australian Productivity Commission, 2004; Banks, 2002; Pilat, 2004). |
| R&D investment | Many studies positively link firms' R&D investment and their productivity. Investment in R&D can result in improvements in production processes and product quality and lead to new products (New Zealand Treasury, 2008b). |
| Learning-by-doing | Doing the same or similar tasks can raise firms' MFP. Firms can identify process improvements that increase the speed of production (reduce input costs) and improve quality (Levitt, List, & Syverson, 2012). Workers can also increase their labour productivity by repeating the same and similar tasks (Syverson, 2010). |
| Workplace culture | The culture of a firm has been identified as an important influence on its productivity. Features of a firm's culture that can aid firm productivity include a shared strategy for the firm; good relationships between management and employees; a commitment by workers to quality and improvement; a push for innovation and the use of technology; the use of networking and collaboration; and robust performance measurement and reward structures (Department of Labour, 2009). |
| Business models and processes | Business models and processes have also been identified as important influences on a firm's productivity. These include the firm's organisational structure, leadership and management; business and strategic planning; and processes for decision making, human resources, communication and production (Department of Labour, 2009). |

E.2 External influences

External influences do not directly affect firms' productivity. Instead, they affect firms' incentives to apply internal tools that impact their productivity, as well as how responsive firms' market share and survival are to productivity differences between firms. External influences impact both individual firms' productivity and industry productivity (Syverson, 2010).

Table E.2 Influences on firms' productivity from the external operating environment

| Influence | Description |
|----------------------|--|
| Knowledge spillovers | <p>Firms can experience productivity gains by learning from other firms and adopting their practices and innovation.</p> <p>Studies show firms can experience knowledge spillovers through many mechanisms, such as clustering of firms in an area (geographic clustering), having a multi-national presence, locating R & D facilities in a strong research area and through foreign direct investment by multi-nationals. The large and persistent productivity differences between firms within industries indicate, however, that there are significant barriers to less productive firms fully emulating their industry leaders' practices (Syverson, 2010).</p> |
| Economic geography | <p>Economic geography refers to the location, distribution and spatial organisation of economic activities. Examples are the size of an economy, its distance from markets and the density of the population and firms within an area.</p> <p>The size of a country's domestic market impacts productivity through economies of scale, competition and the geographic clustering of firms (McCann, 2009). A small domestic market acts to restrict these positive factors. International trade can compensate for a small domestic market.</p> <p>Geographic clustering of firms in an industry can create knowledge spillovers. Clustering of an industry's firms, their suppliers or customers can reduce transaction costs (search costs, transport costs) and generate knowledge spillovers. Clustering of firms and employees in an industry can improve job and employee matching (McCann, 2009).</p> <p>Distance from major markets impacts productivity by increasing transaction costs. While</p> |

| Influence | Description |
|---------------------------|--|
| | <p>technological advances have reduced the impact of distance, there are still significant costs (New Zealand Treasury, 2008b).</p> <p>New Zealand's small economy, located far away from major markets, with only one large city by global standards, reduces firm productivity (Ellison, Glaeser & Kerr, 2007). Some research indicates that New Zealand's small size and distance to its trading markets may explain as much as 75% of its per-capita income gap with the OECD average (New Zealand Treasury, 2008b).</p> |
| Competition | <p>The threat or presence of competition can positively affect productivity levels within an industry through Darwinian selection and by encouraging productivity improvements (Syverson, 2010).</p> <p>Competition can increase the market share of more productive firms and reduce the market share, or force the exit of, relatively high-cost firms (creative destruction). Competition can also increase the productivity level required for a firm to successfully enter a market (Syverson, 2010).</p> <p>Competition can incentivise firms to adopt innovative business practices and to take other actions to raise productivity to reduce costs. However, under some conditions such as a market of fixed size, competition can decrease a firm's incentives to invest in productivity improvements (Syverson, 2010). Some evidence points toward an intermediate level of competition being the most conducive to innovation (OECD, 2013).</p> |
| International linkages | <p>Studies have shown a strong positive relationship between firm and industry productivity levels and their level of trade exposure. The presence or threat of imports is a form of competitive pressure. Exporting can also increase productivity. While studies show that exporting firms were already more productive than their domestic-only competitors before they began to export, firms also show increases in productivity after they begin to export – 'learning-by-exporting' (Syverson, 2010).</p> <p>Other international linkages have positive effects on productivity. These include people, knowledge and capital flows which can all give rise to valuable knowledge transmission and diffusion (New Zealand Treasury, 2009).</p> |
| Regulation | <p>Effective regulation can support firm and industry productivity by working to ensure there are rewards for enterprise and innovation, resources are available, and firms have the flexibility to take advantage of economic opportunities (New Zealand Treasury, 2008b). Poor regulation can create perverse incentives that reduce productivity (Syverson, 2010).</p> |
| Macroeconomic environment | <p>A stable macroeconomic environment is an important foundation for firm and industry productivity. Uncertainty creates costs for firms and influences their production and investment decisions (New Zealand Treasury, 2008b).</p> |
| Quality institutions | <p>Quality institutions, such as property rights, are an important foundation for firm and industry productivity. Property rights enable firms to focus on production, rather than protecting their resources. They also encourage the use of resources for maximum value. Intellectual property rights such as patents and copyright increase incentives for firms and individuals to innovate by ensuring rewards are captured by creators (Parkin, 2005).</p> |
| Infrastructure | <p>Firms can benefit from the availability of infrastructure provided by the government and other firms, such as roads and communication networks.</p> |

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