CONNECTED NEW ZEALAND:

Our digital path forward

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Foreword

We are going through one of the most challenging periods in living memory. The COVID-19 pandemic is taking a devastating toll on human life and exerting extreme pressure on health systems and economies right across the Globe. While New Zealand's collective actions have seen us hopefully avoid the worst of the tragic health impacts, the cost of our efforts to fight the virus is clearly going to be considerable and felt for many years to come.

While we work through the initial impacts of the virus, our minds are now turning to the longer-run effects. A realisation is growing that our world-leading response to the pandemic could mark a turning point in New Zealand's economic history. Is now the time to progress our long-held aspiration of improving our economic performance for the betterment of all New Zealanders?

Many good ideas on New Zealand's future direction are emerging, with most focusing on our potential to develop specialised clusters of world-leading firms right here on our shores. New Zealand has many strengths that could be harnessed and developed into the world-leading centres of excellence that we know we are capable of. Whether it is building an economy that runs on renewable energy or being a safe place to restart the international film industry, we now have an opportunity to redefine New Zealand's future and prominence on the world stage.

Redefining our future is essential in achieving our aspiration of building a stronger economy that delivers for all New Zealanders. However, we will still fall short if we fail to add the other key ingredient, which is working to encourage our small and medium sized enterprises (SMEs) to lift their own productivity. Without the SME part of the puzzle, we run the risk of creating a 'two-speed' economy that worsens inequality.

As outlined by Paul Conway in this paper, digital tools and technologies, when adopted effectively, have strong potential to lift productivity and wellbeing in New Zealand. At BNZ, we have long seen the promise of the digital economy and have been accelerating the digitisation of our business and working with our customers to help them do likewise. Like many, we also work in the communities in which we operate to help give people the confidence and skills they need to fully participate in our changing economy. This is now work that we all must continue to deliver at pace.

With the work laid out in this paper, we are increasing our efforts to help lift the performance of New Zealand SMEs. We know this work is only one aspect of improving digital capability and lifting productivity. For this reason, we are building a partnership of likeminded organisations focused on the goal of improving the digital capabilities of New Zealanders. In working together, we hope to coordinate our efforts and maximise our effectiveness.

To date, perhaps the most obvious silver lining of the COVID-19 pandemic is that it has fast tracked digital adoption in ways we could not have foreseen even just a few months ago. BNZ is working to build on this serendipity to help drive widespread improvements in the digital skills of New Zealanders. We see this as critical in building a resilient and future-proofed New Zealand economy that is adaptive to change. As we continue moving towards a greater use of digital technology, our hope is that this will help spread the benefits and help create better outcomes for all New Zealanders.

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Key Points

- We are living through one of the most challenging periods in New Zealand's economic history. COVID-19 is severely testing our economy, with many businesses shutting their doors for the last time and jobs disappearing like never before. Our border is closed and likely to remain so for some time. International trade has slumped as the global economy goes into recession.
- But we are in a strong position to weather the storm. Prior to the pandemic, our Government's net debt as a share of GDP was the second lowest in the OECD. This allows for an unprecedented fiscal stimulus to cushion the blow of the pandemic for the many New Zealanders who have lost their livelihoods.
- Rebuilding our economy is a huge challenge. But in meeting that challenge we have a unique opportunity to build a better economy that delivers for all New Zealanders.
- Lifting productivity growth and ensuring the benefits are widely spread across New Zealanders needs to be an overarching objective of the rebuild. By lifting incomes and improving work-life balance, better productivity would contribute to higher wellbeing for many.
- In turn, improving productivity requires a strong focus on digital technologies as we reboot our economy. Digital technologies have transformed the way people interact, live, work and learn. Digital tools and data encourage innovation, generate efficiencies and improve products.
- New Zealand's economic geography – isolation from large global markets and small fragmented domestic markets – is the root cause of our poor productivity. Fortunately, digital technologies are steadily reducing the cost of being far away and making it more likely that good ideas get noticed internationally. This has the potential to speed up the spread of new ideas, improve market access for small New Zealand firms and allow productive firms to grow and invest.
- It follows that digital technologies can help improve our productivity by offsetting the negative aspects and accentuating the positive aspects of New Zealand's economic geography.
- New Zealand has already invested in digital infrastructure, with 75% of Kiwis now having access to fibre broadband. Courtesy of the COVID-19 lockdown, we have also had a crash course in going digital, giving us a glimpse of its potential to improve our productivity and to reduce our environmental footprint.
- The virus has also highlighted the digital divide, with people in jobs amenable to digitalisation more able to keep working remotely during lockdown. The fact is, digital technologies improve the wellbeing of people with the capability to use them. So, the digital divide is not just about access to ICT, but also about the differing abilities of people to make the most of it.
- To encourage widespread use of digital technologies, we need to build equal digital opportunities, strong digital literacy and robust digital security. Investing in digital skills is key. Skilled workers adopt innovations earlier and are associated with greater firm investment in knowledge-based assets such as strong management capability and more effective business models. In contrast, if people lack digital skills, then the digital transformation carries the threat of greater inequality.
- Encouraging the use of digital technologies as we rebuild our economy requires a comprehensive and coordinated agenda, with digital skills training at its centre to futureproof New Zealand workers.
- New Zealand's current digital inclusion agenda would benefit from a stronger evidence base and unifying framework. To help with this, BNZ intends to use its unique data, its branch network and community reach to drive a digital skills movement aimed at improving productivity, financial capability and societal wellbeing in New Zealand.

1. Introduction

COVID-19 has cut a swathe through the New Zealand economy. Our Gross Domestic Product is no doubt taking a huge hit while unemployment is likely to spike well above levels seen during the Global Financial Crisis. International trade is in retreat as the global economy slumps into recession. For the first time in modern history, we have closed our borders. A lot of New Zealand businesses have gone under, with many unlikely to be seen again.

We face an unprecedented challenge in rebuilding our economy. However, with this challenge comes a unique opportunity to build a new and improved New Zealand economy that is ultimately stronger and delivers greater wellbeing to more New Zealanders. This requires a long-term focus and courage to make substantial changes, as opposed to tinkering at the margin.

Digital technologies need to be front and centre in this economic rebuild. The digital transformation is changing the way people live, work and learn and carries tremendous potential to enrich lives by lifting productivity and wellbeing (Box 1). In the case of New Zealand – a small and remote economy – there are good reasons to think that digital technologies can lessen the economic forces that have contributed to our poor productivity performance. These technologies are also clearly very important in our efforts to combat climate change and to improve our environmental performance.

Our starting point is strong. New Zealand has invested in digital infrastructure and now has an excellent ultrafast broadband network that has served us well during lockdown. New Zealand businesses have also invested, with investment in information and communications technology (ICT) as a share of total investment among the highest in the OECD. Cross-country surveys also tell us that the skill levels of New Zealand adults are above the OECD average, suggesting a good base for lifting digital capability.

This has facilitated a growing high-tech sector in New Zealand with a "born digital, born global" mind-set. However, while some firms and people are making the most of ICT, we could be doing much more to use these technologies to our advantage.

Importantly, physical access to ICT is not enough to unlock the potential of the digital world. For individuals, digital inclusion also requires motivation to engage with the digital world and a certain level of trust that digital tools can be accessed and used safely. For firms, successfully adopting digital technology requires complementary investment in knowledge-based assets, such as strong management capability, improved business models and R&D. Of course, both individuals and firms need the requisite skills to use digital technology if more aspects of life and work are to successfully move into the digital realm.

Digital technologies improve wellbeing and lift productivity for the people and businesses that know how to use them effectively and safely. As digital technologies become ever more ubiquitous, people and firms that lack the motivation, trust or appropriate skills face a heightened risk of missing out. As such, the digital transformation carries with it the threat of greater inequality if people lack digital capability. For this reason, the digital divide – which was previously all about physical access to ICT – is now increasingly defined by the ways in which firms and people use digital tools and the benefits that flow from that use.

This paper outlines the role digital technologies can play as we rebuild the New Zealand economy following the COVID-19 pandemic. The next section charts the development of New Zealand's fibreoptic broadband network and the associated strong improvements in internet access. Section 3 discusses the opportunities and risks for the wellbeing of New Zealanders from the increased use of ICT in everyday life. Section 4 assesses the potential for the greater use of digital tools and technologies in the workplace to contribute to higher wellbeing by improving the productivity performance of New Zealand businesses. This includes a discussion on why the New Zealand economy has generally suffered from low productivity and the role digital technologies can play in helping to turn that around.

Section 5 makes the case that training people to use digital tools safely is critical in ensuring that the benefits of these technologies are spread widely across New Zealand workers. This section also briefly assesses New Zealand's skills system, including the provision of digital skills. It concludes that a stronger focus on improving digital skills would enhance wellbeing and futureproof New Zealanders for ongoing technological change. The section finishes by outlining of the role BNZ intends to play in helping build a digital skills movement in New Zealand.

Finally, some concluding comments are offered in Section 6 of the paper.

Box 1. What is the digital transformation?

Digitisation is the conversion of analogue data and processes into a machine-readable format.
Digitalisation is the use of digital technologies and data that result in new activities or changes in existing activities.
Digital transformation refers to the economic and societal impacts of digitisation and digitalisation.

Source: OECD

2. The rise of ICT in New Zealand

In 2009, the Government announced a $1.5 billion investment in a national broadband network. This initiative – the Ultra-Fast Broadband Initiative – was undertaken as a public-private partnership and was one of the largest infrastructure projects ever undertaken in New Zealand. It has also been one of the most complex, with New Zealand being a long skinny country with much hilly and mountainous terrain spread over islands, making it a challenging place for infrastructure investment.

The first phase of the Ultra-fast Broadband Initiative was completed in 2019. Due in large part to this project, growth in access paths to the internet in New Zealand has been among the strongest in the OECD (Figure 1). While total fixed broadband subscriptions are now a little above the OECD average, almost half of these subscriptions are to the fibre network (Figure 2). The share of fibre subscriptions in total broadband subscriptions in New Zealand is now almost twice the OECD average, but still well short of leading countries such as Korea and Japan.

Mobile broadband subscriptions are a little under the OECD average, while data usage per mobile subscriber is among the lowest in the OECD.

As well as good growth in internet use by households, ICT has also become increasingly important to New Zealand firms. As discussed in Section 4 below, total investment in New Zealand has been comparatively weak given how fast the labour force has grown. However, the ICT share of total investment is among the highest in the OECD (Figure 3).[1] In addition, employment growth in industries that use ICT intensively has been stronger than in other parts of the New Zealand economy (Figure 4). Both these observations are consistent with a growing high-tech sector that has been performing well given a "born digital, born global" mind-set.

While the Ultra-fast Broadband Initiative has been very successful in improving internet access, some pockets of exclusion still exit. Recent work has shown that people living in social housing and people with disabilities do particularly poorly when it comes to internet access.[2] Other groups identified as having relatively low internet access include Māori, Pasifika, people living in larger country towns, people aged over 75 years and the unemployed.

Figure 1. Growth in internet access paths, 2005-20015

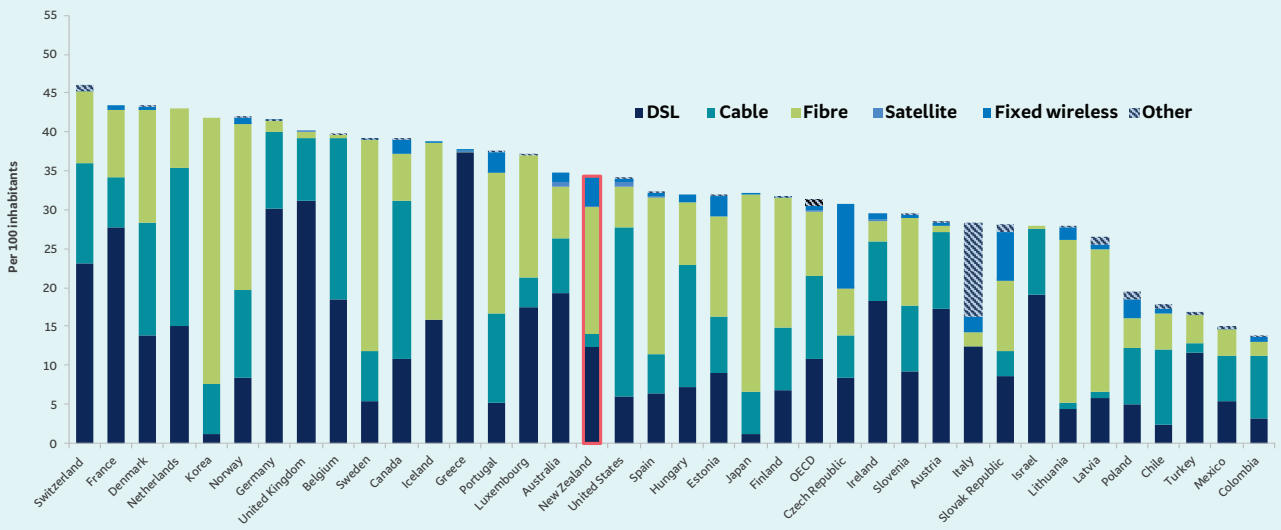
Note: Total communication access paths = Total access telephone lines + total fixed broadband + mobile subscribers.

Source: OECD Digital Economy Outlook, 2017

[1] Note that the data in Figure 3 is from 2016, which, unfortunately, is the most recent data currently available from the OECD.

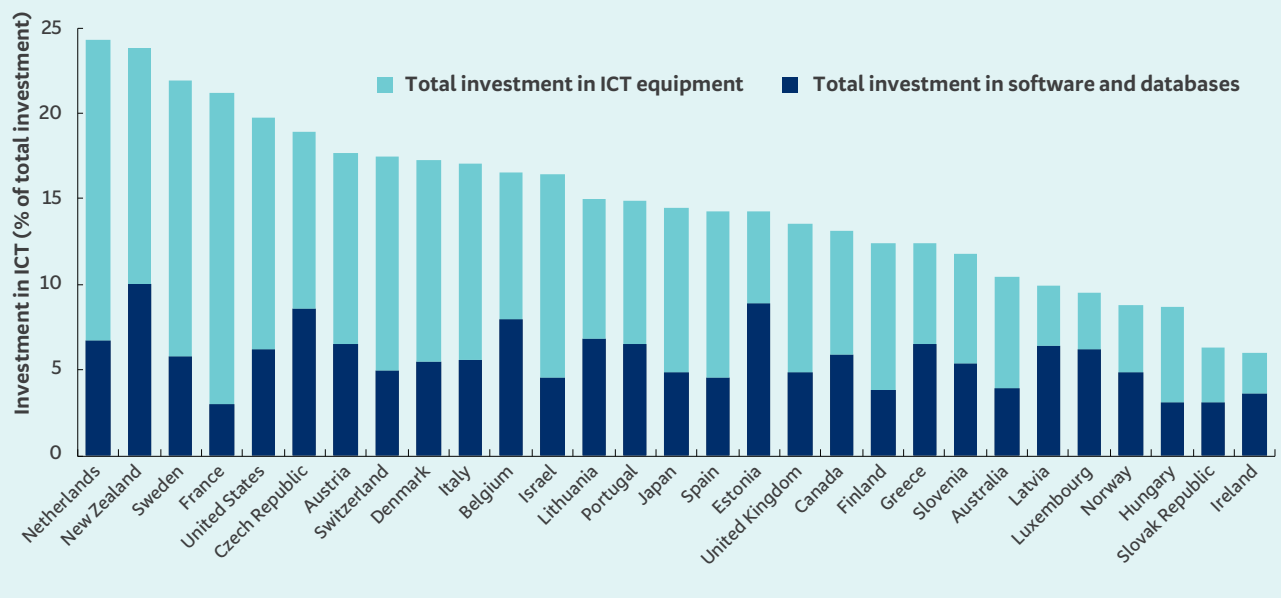
[2] Specifically, 69% of people living in social housing report having internet access at home compared to 91% across the population. Based on a different data set, 17% of people living with disabilities have no internet access, compared to only five percent of all people included in that survey. See Grimes and White (2019), Digital inclusion and wellbeing in New Zealand, Motu Working Paper 19-17.

Figure 2. Fixed broadband subscriptions, June 2019



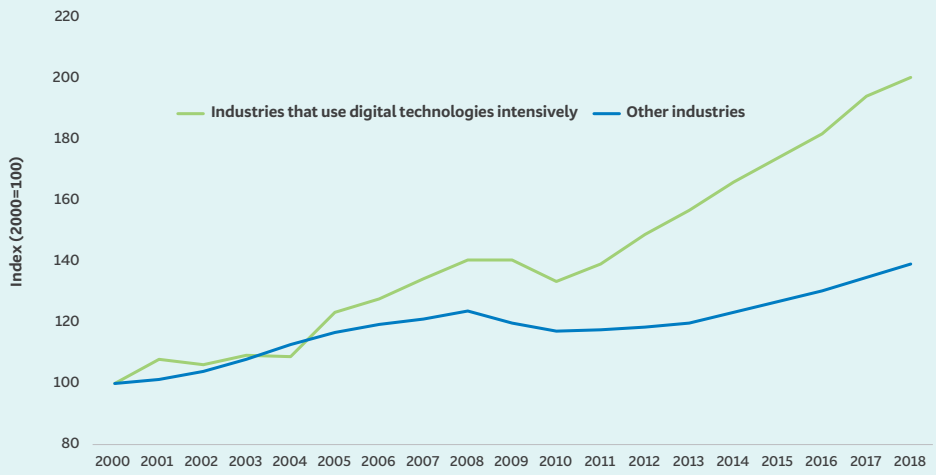
Source: OECD, Broadband Portal: www.oecd.org/sti/broadband/oecdbroadbandportal.html

Figure 3. ICT investment, 2016



Source: OECD, Annual National Accounts Database and national sources

Figure 4. Employee growth in "digital" and other sectors



Source: Stephenson (2019) "Firm dynamics and job creation: Revisting the peptual motion machine", New Zealand Productivity Commossion Research Note, Feburary 2019.

3. Digital technologies and wellbeing

Improving the wellbeing of New Zealanders has become increasingly important for policymaking, with Treasury's living standards framework providing a wide lens for setting policy and assessing its impacts. This is a welcome development – policy should aim to improve the things that matter most to New Zealanders, including things outside the ambit of traditional economic indicators.

New Zealand performs well in cross-country comparisons of many areas considered important for wellbeing. According to the OECD's Better Life Indicators, we have the lowest level of air pollution in the OECD and perform well above average on social interactions and employment (Figure 5). Where we don't do so well is on household incomes and work-life balance – New Zealanders work long hours with little time off in return for (net tax adjusted) disposable household incomes that are below the OECD average. In addition, we are among the poorest performing in the OECD on housing affordability and on cross-gender differences in feeling safe walking alone at night.

Although efforts to measure wellbeing are clearly welcome, assessing the impact of policy changes or economic events on wellbeing is far from straightforward. For example, in the current context, unravelling the impact of digital technologies on the wellbeing of New Zealanders is a formidable task beset with conceptual and practical limitations. For a start, the digital transformation encompasses many different innovations that collectively influence many areas of most people's lives. There is also often no clear counterfactual against which to measure the direct and indirect impacts of digital technologies and other major changes may well be occurring at the same time.

For the purpose of this paper, it is enough to note that the rise of digital technologies implies both opportunities and risks for wellbeing. On the former, as highlighted by the COVID-19 lockdown, the internet has reduced the costs of interacting across distance, allowing people to 'telecommute' and be less tied to the physical location of their work. It has also facilitated social connection and opportunities to engage in civic and political debates. Digital technologies have drastically reduced the cost of people accessing information on a vast array of topics – including educational resources, health information and their finances – while on-line shopping has increased the size of markets and consumption opportunities. These and many other changes are having major positive impacts on how we work, learn, consume and communicate.

However, for every upside from digital technology, there is also the risk of a potential negative impact on the wellbeing of some members of society. For instance, people who are unable to navigate the online world may struggle in applying for jobs, as recruitment processes increasingly move online. Increased digital connectivity with the workplace could result in increased employer expectations of constant connectedness and working outside regular hours. Or online social media can create an echo-chamber effect that increases ideological divides and political polarisation. The digitally excluded may also become isolated from friends and family who increasingly

communicate via social media. Online threats, such as cyber-bullying and exposure to disinformation, can also detract from wellbeing, as can prolonged and excessive use of the internet.

Given the risks, the expansion of the digital world can create or worsen inequalities, as people on the wrong side of the digital divide are increasingly marginalised. As mentioned in the Introduction, this idea of the digital divide is not just about physical access to ICT, but also captures the differing abilities of people and businesses to take the opportunities and avoid the risks that come with digital technologies. It follows that widespread access to ICT is a necessary but insufficient condition for benefiting from digital transformation. In other words, digital technologies improve the lives of those who have the capability to use them effectively and safely. Unfortunately, we currently know very little about where this digital divide lies across New Zealand society.

Figure 5. The OECD's Better Life indicators, 2020

Note: The graph shows New Zealand's position in the OECD distribution of each Better Life indicator, measured in standard deviation units. So, for example, we are 1.5 standard deviation units above the OECD average on exposure to outdoor air pollution and 2 standard deviation units below the OECD average on housing affordability and the gender gap in feeling safe. "Average" indicators capture New Zealand's performance relative to other OECD countries. "Inequality" indicators are based on differences in indicator value across different cohorts in the New Zealand population relative the rest of the OECD.

Source: OECD's Better Life Indicators, 2020

4. Digital technologies and productivity

Notwithstanding the methodological difficulties mentioned above, there is an obvious way in which digital technologies could substantially lift Kiwi wellbeing. The fact that New Zealanders work long hours for below-average household incomes reflects the poor productivity performance of our economy over recent times. It follows that productivity improvements could help to "fill the gaps" in New Zealand's wellbeing profile – as identified in the OECD's Better Life Indicators – and deliver higher wellbeing for many.

Productivity improvements are about 'working smarter' and making better use of our resources to deliver a combination of higher incomes and/or less time working. Of course, productivity improvements are not the only way to drive economic growth and societies can also lift incomes by 'working harder' – that is, by increasing hours worked per capita.[3]

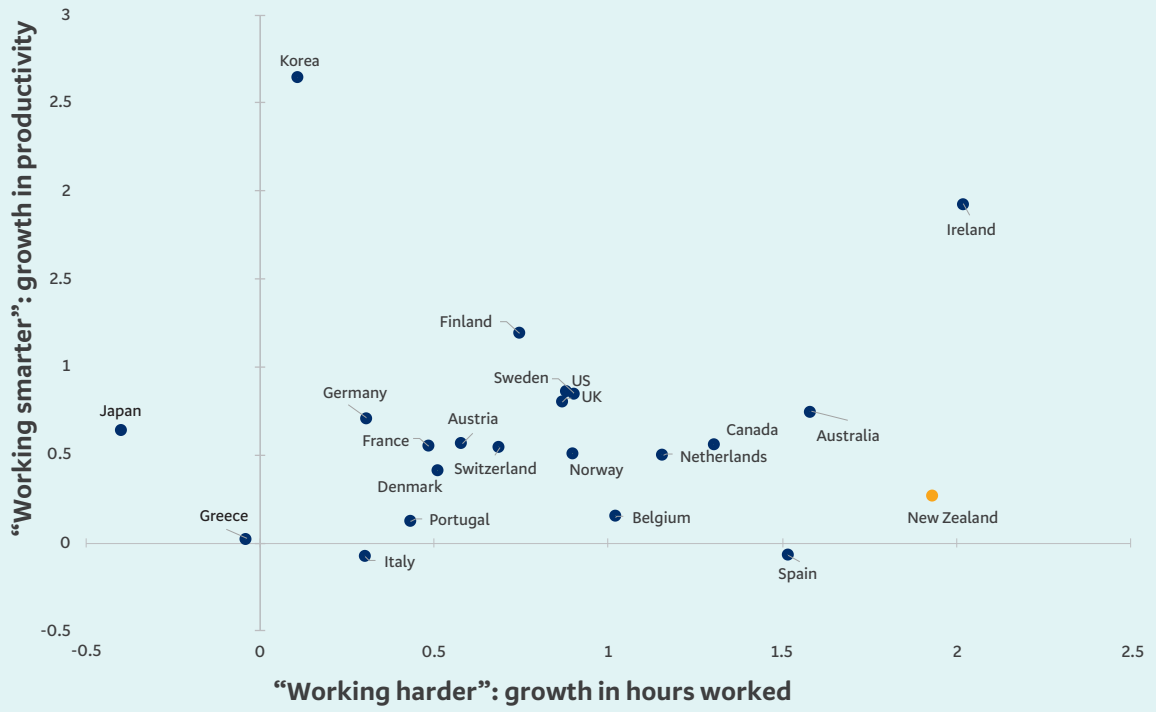
In contrast to our relatively poor productivity performance, increases in hours worked per capita in New Zealand have been the key driver of economic growth (Figure 6). In fact, growth in the New Zealand labour market has been about twice the OECD average since 2000, mainly as a result of rapid migration inflows.[4] Unfortunately, with productivity on the low side, many of these jobs are not particularly well paid.

From a wellbeing perspective, we cannot continue to rely on growth in the labour force as the key driver of economic growth. For a start, the work-life balance of New Zealanders is already poor, reducing the scope for future growth to come from 'working even harder'. Population ageing also implies a natural limit to future labour force growth. In theory, strong migration inflows could keep adding to New Zealand's working-age population, as has been the case over recent years. However, with our international border effectively shut as part of our response to COVID-19, migration into New Zealand will most likely be extremely restricted for some time.

It follows that New Zealand's key economic challenge is to move from a model of economic development based on 'working harder' to one based on 'working smarter'. This would not only deliver improvements in incomes and work-life balance, but it is also essential in our efforts to combat climate change. Rebuilding large swathes of our economy following the COVID-19 pandemic and adjusting to virtually no inward migration means that now is the time to seriously advance this agenda.

Digital technologies have a key role to play in this transition. To understand why, we need to know the underlying reasons for New Zealand's poor productivity performance and the role that digital technologies can play in lessening the economic forces that have kept our productivity low. The rest of this section discusses each of these in turn.

Figure 6. Working smarter vs working harder, 1995-2018



Source: OECD

[3] Improvements in a country's terms of trade can also drive income growth.

[4] See: Culling, J. and H. Skilling (2018) "How Does New Zealand Stack Up? A Comparison of Labour Supply Across the OECD", Reserve Bank of New Zealand Bulletin, Vol. 81, No. 2.

Why productivity growth is low in New Zealand...

There are two fundamental reasons why New Zealand has a poor productivity track record.[5] The first is that we are situated a long way from major global markets. As a result – and despite what we often like to tell ourselves – the New Zealand economy is not very well connected into the global economy. For example, for a small economy, the intensity of international trade in New Zealand is low and falling while foreign direct investment has gone sideways as a share of the economy for decades (Figure 7).

This lack of international connection limits the exposure of New Zealand firms to new technologies and learning opportunities that come from engaging with leading international firms. For example, global value chains play an important role as conduits for technology transfer across firms in different countries. However, New Zealand firms currently participate to a minimal extent in global value chains. As with weak international connection in general, this slows the diffusion of new technologies and better ways of doing things into the New Zealand economy.

The second fundamental reason for our poor productivity record is that domestic markets are often small and fragmented across the country. This reflects the small size of our economy and the geographic fragmentation of domestic markets. This is probably more of an issue here compared to other countries, given that New Zealand is a long, thin, mountainous and sparsely populated country.

New Zealand's small and localised domestic markets compound the challenge of weak connection into large international markets. Because the size of the market conditions the size of the firm, most New Zealand businesses are very small, with few or even no employees. There is also evidence that many firms face limited competitive pressures and can survive in small regional markets essentially doing the same thing year after year. As a result, the spread of new technologies and better ways of doing things across firms in the domestic economy can also be slow.

In addition to slowing the spread of new technologies and better ways of doing things across firms, the effects of New Zealand's economic geography resonate through the economy in many other ways. For instance, small domestic markets can sometimes limit the ability of productive New Zealand firms to grow and employ more people. This contrasts with the pattern in larger or more internationally connected economies in which strong growth in relatively productive firms is an important driver of aggregate productivity growth.

A preponderance of small firms operating in small and insular domestic markets may also partly explain why New Zealand firms tend not to invest much in capital. It might simply be that these firms lack the sales volumes needed to justify significant capital outlays. Instead, they prefer to take on more workers, who can be dismissed if orders dry up. As a result, many New Zealand firms operate with low capital intensity compared to firms serving larger markets. However, new technologies are often embedded in capital equipment, so low capital intensity contributes to low productivity.

In addition to weak investment in tangible capital, New Zealand firms have also been slow to invest in knowledge-based assets. Perhaps most obviously, investment in R&D is low across New Zealand firms (Figure 8). There are also indications that some New Zealand firms have been slow to investment in management capability and new business models. If these firms are slow to learn, they will lack the capacity to successfully absorb new technologies and efforts to lift productivity will have only limited impact.

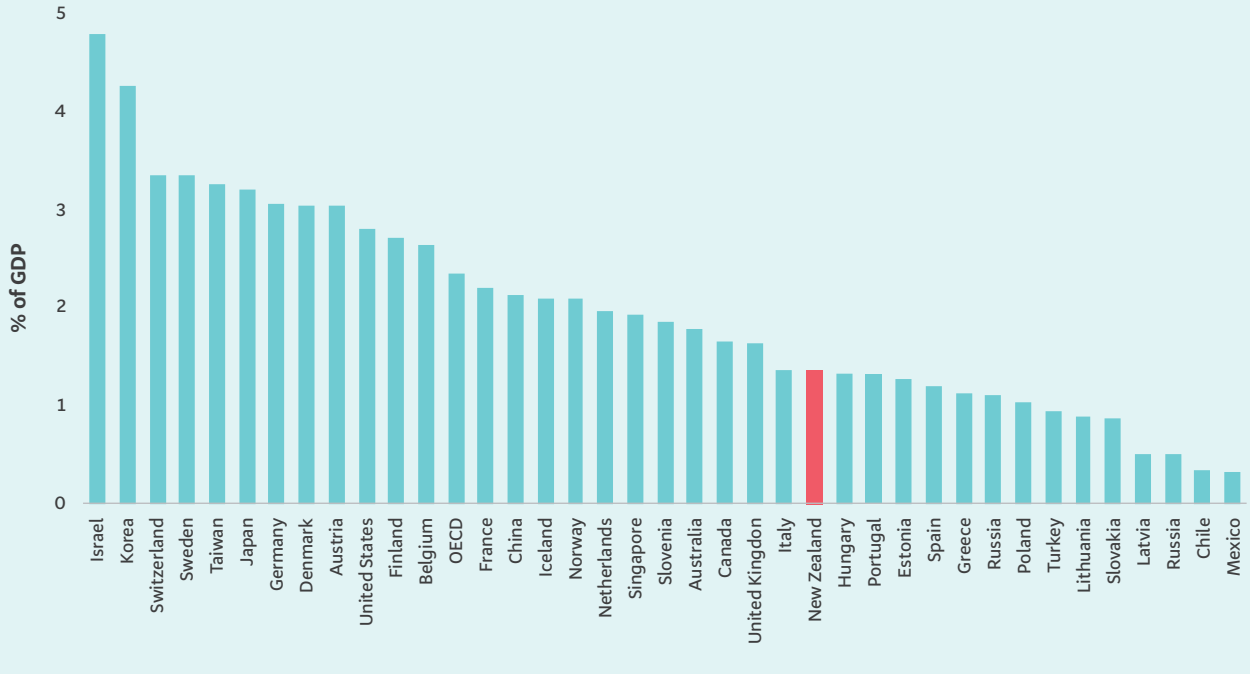
In sum, although there is wide variation in the performance of New Zealand firms, parts of our economy are dominated by small firms operating in local markets and insulated from international, and in some cases, national competition and learning opportunities. As a result, the incentives to invest in new technologies and better ways of doing things can be weak, with negative consequences for productivity.

[5] For a detailed synthesis on the reasons for New Zealand's productivity issues and the role of policy in turning it around see: Conway (2016), "Achieving New Zealand's Productivity Potential", NZPC Research Paper 2016/1; Conway (2018), "Can the Kiwi Fly: Achieving Productivity Liftoff in New Zealand", International Productivity Monitor, Number 34, Spring 2018.

Figure 7. Exports and imports

Source: Statistics New Zealand

Figure 8. R&D spending, 2017



Source: OECD

… and how digital technologies could help

Digital technologies are fundamentally changing the world around us. The costs of searching for information and communicating on digital platforms have plummeted, driving strong gains in the efficiency of innovation and economic transactions. Highly relevant for New Zealand, digital technologies are also driving dramatic falls in the costs of communicating and doing business over distance, enabling firms to engage in markets that are far from their geographic location.

On the one hand, separating firms from the geographic location of their markets has allowed multi-national firms to agglomerate in large cities and serve their global markets from afar. For example, digital communications have enabled the agglomeration of currency markets in London and in a small number of other major financial centres. Somewhat paradoxically, these agglomeration forces have most likely increased the economic cost of New Zealand's geographic isolation.

On the other hand, in some areas of economic activity, low-cost digital communications are supporting a greater geographic spread of production across the planet and enabling firms situated in remote locations to engage internationally. This is likely to continue as a growing part of production is digitised and delivered remotely through fibre-optic cables. Reflecting this trend, international trade in services has been growing more quickly than trade in goods for the last decade or so.

As well as reducing the cost of distance and opening new areas of economic activity to international trade, digital technologies are also making it easier for small firms to engage internationally. For example, cloud services have increased the affordability of ICT, allowing small firms to rent it as and when needed rather than having to incur the fixed cost of buying it outright. Platforms like Alibaba and Amazon also provide fast and easy ways for small firms to operate internationally.

These massive changes in international trade are creating opportunities for greater international connection and global visibility for typically small and remote New Zealand firms. Indeed, increasing export diversity and a growing high-tech sector in New Zealand indicate the types of economic activities that small and remote firms can now successfully engage in internationally.

Reductions in the cost of doing business over distance also have the potential to increase the effective size of New Zealand's domestic markets, bringing improvements in competition and in the scope for productive firms to grow.

These changes have the potential to encourage the spread of new technologies and new ideas into our economy. They could also give productive firms greater scope to invest for growth and encourage low-productivity firms to improve their performance or to exit the market. In short, digital technologies have the potential to lessen the economic forces that have kept productivity growth low in New Zealand for decades.

5. The key importance of strong management and digital skills

The previous section outlined how digital technologies could help transform the New Zealand economy from one driven by 'working hard' to one driven by 'working smart'. Importantly, despite the benefits, digital transformation does not simply happen automatically as firms work to lift their performance. Instead, digital adoption depends on a host of economic, legal and social factors. As a result, the uptake of digital technologies differs markedly across firms. For example, while most firms in OECD countries now use broadband, more advanced digital tools – such as cloud computing or customer relationship management tools – have diffused to far fewer firms (Figure 9).

This "breakdown in the diffusion machine" is a key reason why productivity growth has slowed recently in many OECD economies, despite the emergence of productivity-enhancing, general-purpose digital technologies (Figure 10). So, while some firms are reaping the benefits of digital technologies, others are being left behind and the "productivity gap" between leading and lagging firms has widened.

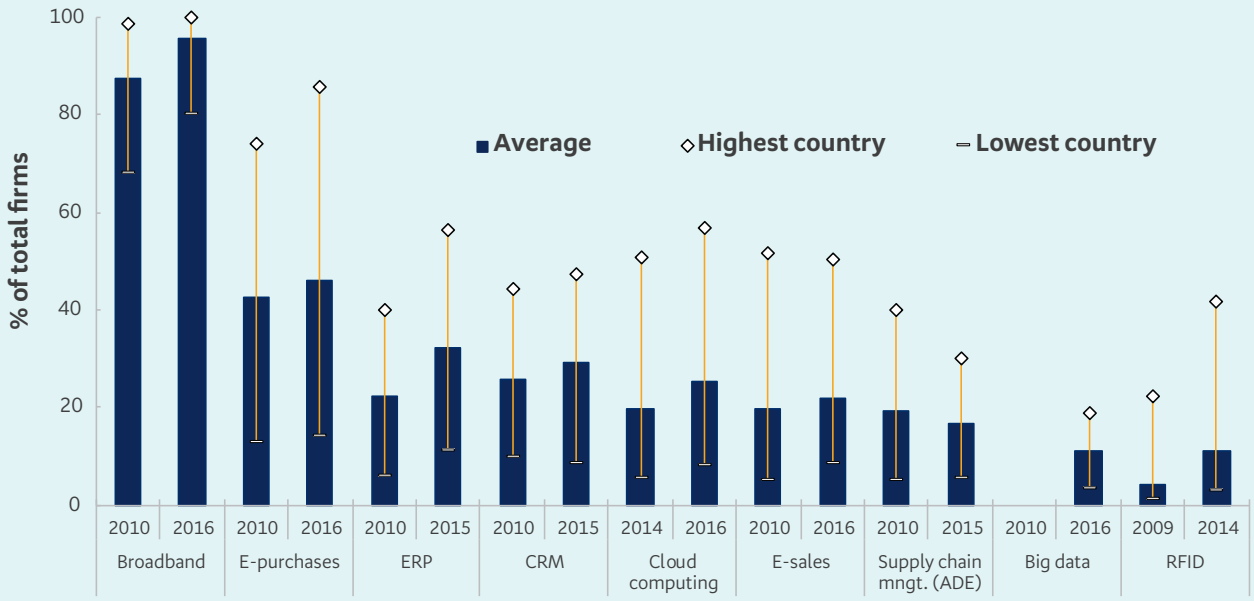
An important reason for this uneven spread is that the effective use of digital tools requires big changes in the way firms operate. For example, adopting digital technologies to improve productivity requires complementary investments in process innovation, organisational changes, new systems and new business models, etc. Getting this right is a major management challenge, especially for firms with a large existing base of assets and a workforce with a given set of skills configured to work in a particular way.

As well as a major management challenge, making the most of digital technologies also depends on a firm's employees having the right mix of skills. Indeed, the capacity of a firm or an economy to discover and absorb new technologies critically depends on the skill base of its people. Skilled workers adopt innovations more quickly and easily and are associated with greater firm investment in knowledge creation. It follows that digital technologies have a bigger impact on productivity when workers have strong digital skills.

As well as being critical for firms, digital skills also shape the impact the digital transformation has on workers. Technological change does not affect all workers in the same way, with some finding their skills fit well with new technologies while others find their jobs have been automated and that they are redundant. So, as well as bringing great potential for higher productivity and living standards, new technologies also carry a risk of increased inequality if innovation runs ahead of people's capacity to adjust.

The OECD estimate that over the next two decades 14% of jobs in member countries are highly likely to be automated and another 32% are likely to change significantly. However, over the previous decade, around 40% of new jobs were created in parts of the economy that use digital tools intensively. This suggests that technological change will ultimately create as many or more jobs than it destroys. However, these new jobs will have very different skill requirements than the old jobs they replace. This implies a massive training challenge in OECD economies to ensure that firms can access the skills they need and that workers can secure rising incomes in an environment of ongoing technological progress.

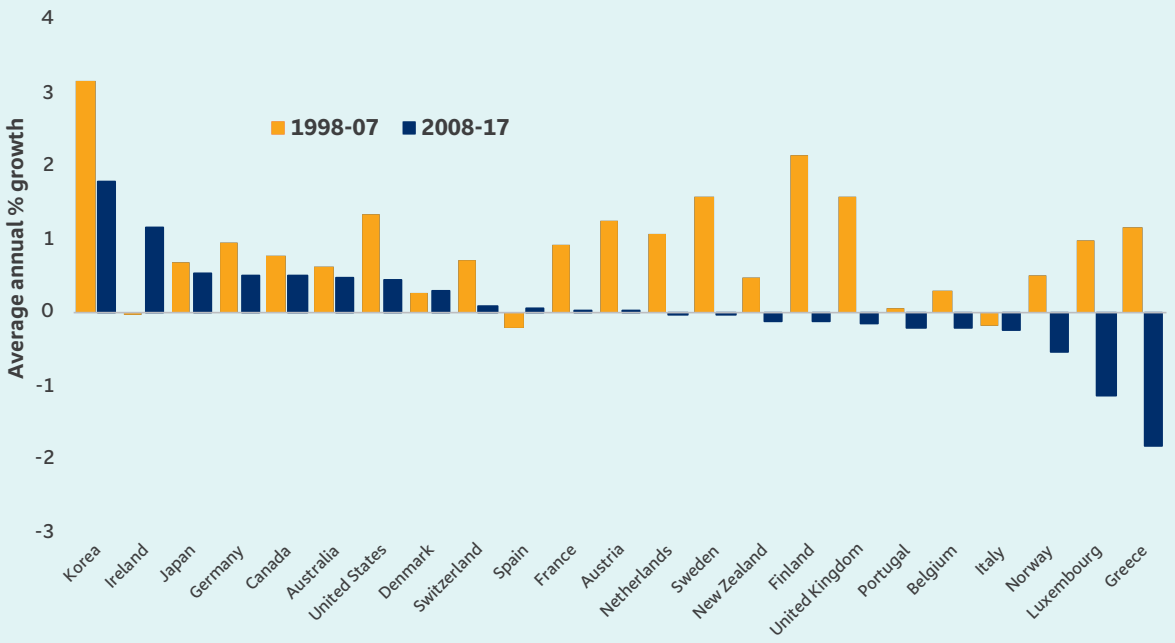
Figure 9. Diffusion of digital tools in firms, (10+ employees)



Note: The upper and lower bar denote the minimum and maximum average values across countries. ERP refers to enterprise resource planning. CRM is customer relationship management. RFID is radio frequency identification.

Source: OECD, ICT Access and Usage by Businesses Database, July 2017

Figure 10. Multi-factor productivity growth



Note: Multifactor productivity growth is measured as a residual, i.e. that part of GDP growth that cannot be explained by growth in labour and capital inputs assuming a Cobb-Douglas production function.

Source: OECD Productivity Statistics Database; and OECD Compendium of Productivity Indicators.

Digital skills in New Zealand

Benefiting from digital technologies requires smart adaptive firms and workers. This is the key to firms lifting their productivity and to workers lifting their incomes as the digital transformation rolls on. If more widespread use of digital technologies is to play a part in improving New Zealand's productivity, then a large share of the working population will need to be equipped with the skills and experience necessary to work with these technologies. Accordingly, our education system has a key role to play in "winning the race between skills and technology" and ensuring that the benefits of new technologies are widely spread across New Zealanders.

On one hand, there are encouraging signs. Results from an OECD survey show that New Zealand workers are highly proficient at problem-solving in technology-rich environments (Figure 11). Further, in its Skills Strategy (2019), the OECD concludes that New Zealand does well in delivering foundational skills and in creating a good culture for adult education.[6]

On the other hand, the evidence implies considerable room for improvement. Results from another OECD survey show that the skills of young New Zealanders have declined over recent years, both in absolute terms and relative to other countries. In its Skills Strategy, the OECD also point to "important" imbalances between worker skills and the requirements of the New Zealand labour market. Indeed, survey data indicate that New Zealand has one of the worst records for matching skills to jobs in the OECD.

Some level of skills mismatch is inevitable, especially in the context of a small New Zealand economy largely made up of small firms and with limited scope for highly specialised workers. However, the OECD paint a picture of a serious disconnect between our education system and the skill requirements of New Zealand firms. They conclude that although structural change in our economy is increasing the demand for highly skilled workers, this has largely been met through migration, rather than through developing the skills of New Zealanders. While this approach to

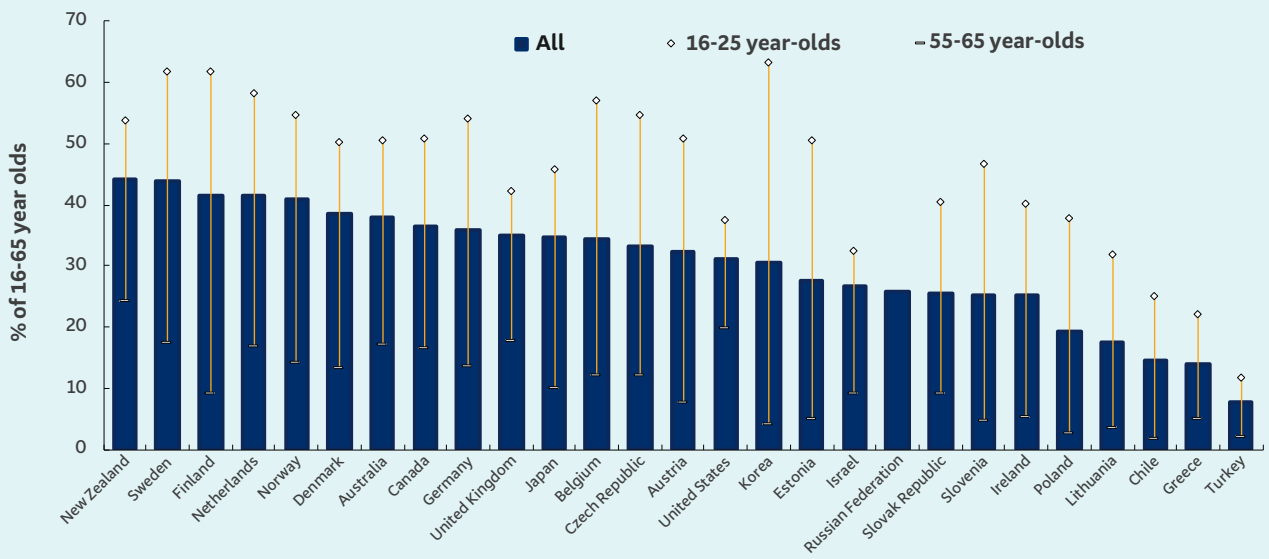
[6]OECD Skills Strategy 2019: Skills to Shape a Better Future – New Zealand. https://www.oecd.org/newzealand/Skills-Strategy-NewZealand-EN.pdf.

dealing with a widespread skills shortage is dubious at the best of times, the scope for migration into New Zealand is now severely constrained as part of our response to COVID-19.

Unfortunately, given a lack of data, it is impossible to assess the success or otherwise of the New Zealand skills system in matching the demand for digital skills in the labour markets. However, a recent audit of digital skills providers suggests that the sector lacks scale and resources.[7] At the time of the audit – late 2018 to early 2019 – there were around 150 digital inclusion initiatives in New Zealand, 80% of which were active. Many were very small community organisations, trusts or not-for-profits employing one or two people. Almost none of these initiatives evaluated the effectiveness of their programmes, at least in part due to a lack of resources. Indeed, given funding constraints, many of these initiatives reported being on the cusp of ceasing to operate. Obviously, the COVID-19 pandemic will have significantly worsened the situation.

On balance, New Zealand's skills system needs to do more to improve skills matching, including in the area of digital skills. Given the promise of digital technologies to lift wellbeing in New Zealand and constraints on migration following Covid-19, our skills system needs to become much more effective at equipping all New Zealanders with relevant skills and the ability to update their skills as demand out of the labour market changes into the future.

Figure 11. Proficiency in problem solving in technology-rich environments, 2018



Source: OECD calculations based on Survey of Adult Skills Database, September 2018

Building a digital skills movement in New Zealand

Digital technologies have strong potential to improve New Zealand's productivity and clearly need to be front and centre as we rebuild our economy in the wake of the COVID-19 pandemic. Enhancing the digital skills of New Zealanders is critical if we are to take this opportunity and ensure that the benefits are widely spread across the population. However, there are legitimate concerns about the ability of New Zealand's skills system to deliver meaningful improvements in digital capability.

For these reasons, BNZ intends to drive a digital skills movement aimed at improving productivity, financial capability and societal wellbeing in New Zealand. We will use our network reach, rich data and resources to measure and help improve the digital skills and capabilities of New Zealanders.

[7] https://www.digital.govt.nz/dmsdocument/152-digital-inclusion-stocktake-what-digital-inclusion-looks-like-in-nz-communities/html#4.-informal-takeaways-from-stocktake-engagement

Our starting point is to build and estimate indicators of digital capability across New Zealand SMEs, charities and consumers. BNZ is already working with Lloyds Banking Group to adapt their indicators of digital capability to the New Zealand context. Lloyds Banking Group have used these indicators very successfully over the past six years to track digital capability in the United Kingdom and to target digital skills training initiatives to where they are most needed.[8]

Replicating this work programme in New Zealand is a practical and applied contribution that BNZ is well placed to make as part of our efforts to enable a high achieving New Zealand. These indicators will give us a rich picture of digital skills and inclusion and provide a unifying framework to align and target the efforts of investors in digital inclusion initiatives. We will estimate these indicators annually, allowing us to identify new demands for digital skills emerging in the labour market and to monitor the social and economic impacts of programmes aimed at developing digital skills.

BNZ also intends to form a partnership of organisations aligned on the common goal of improving the digital capabilities of New Zealanders. The experience in the United Kingdom has been that partnerships between government, businesses, philanthropists and the community sector can be very effective in delivering digital inclusion programmes. The objective of this partnership will be to create a drum beat of shared information and news to support the agenda of improving the digital capability of New Zealanders.

Conclusion

Many aspects of New Zealand life are wellbeing enhancing. However, relatively low incomes and a poor work-life balance clearly drag on the wellbeing of New Zealanders. Our poor productivity performance is the reason why incomes are low and hours worked per capita are long.

In turn, low productivity growth largely reflects our economic geography. Being small and distant means that New Zealand firms tend not to be outward looking, leading to a "technology disconnect" and limited scope for productive firms to grow. In the domestic economy, firms focused on small insular local markets are less likely to be exposed to new technologies and productivity-enhancing competitive pressures.

This diagnosis is undertaken against a backdrop of rapid technological change. This is creating opportunities for international connection in areas of activity that are relatively less constrained by distance, firm size and past investment choices. Digital technologies can also make New Zealand's domestic markets less insular and geographically fractured. This window of opportunity will continue to widen, as a growing part of production is digitised and delivered remotely through fibre-optic cables and the scope for communicating, learning and interacting from a distance keeps improving.

In a rapidly digitising world, our overarching challenge is to improve the flexibility and resilience of our economy, with an emphasis on embracing change rather than resisting it. Improving digital skills is critical in meeting this challenge. A highly skilled labour force improves the ability of firms and the economy to acquire and absorb new knowledge and ensures that productivity improvements translate into widespread wellbeing improvements for New Zealanders. A skilled workforce also attracts global frontier firms to, and encourages top domestic firms to remain in, New Zealand.

Digital technologies can also help in our transition to a low-emissions economy. There is considerable overlap between agendas aimed at improving productivity and at combatting climate change. For example, during our COVID-19 lockdown, digital technologies enabled some people to work from home while also reducing the emissions content of their output.

We are already invested in digital, in the form of our excellent ultrafast fibre broadband network. Courtesy of the lockdown, some of us have also had a crash course in going digital, giving us a glimpse of its potential to improve our productivity and to lower our greenhouse gas emissions. Building on this will deliver widespread wellbeing improvements and futureproof Kiwi workers for ongoing technological change.

In many ways, our uniqueness as a country and an economy make us uniquely suited to a digital future. It follows that embedding digital technologies in our economy and building digital skills need to be a cornerstone in our recovery efforts. BNZ intends to play its part in this agenda by supporting a digital skills movement aimed at enabling a high achieving New Zealand.

[8] See: Lloyds Banking Group (2019), "UK Consumer Digital Index" and Lloyds Banking Group (2019), "UK Business digital Index".