PICKING UP SPEED: DOES ULTRA-FAST BROADBAND INCREASE FIRM PRODUCTIVITY?

An Executive Summary

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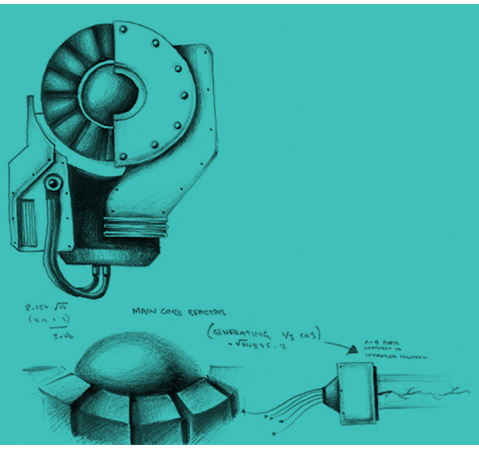

UFB alone
is not the path to success.
Organise, you must.

INTRODUCTION

Since the turn of the millennium, the importance of the internet has been touted as a factor to improve firm performance. The New Zealand Government's Ultra-fast Broadband Initiative is designed to make fibre optic cable available to 80% of the population by 2022. The roll out was prioritised to connect all schools and hospitals by the end of 2015.

Between 2010 and 2014, ultra-fast broadband (UFB) usage more than doubled from 9% to 22% of all private sector firms with 6 or more employees. 62% of firms with more than 100 employees had fibre-to-the-door by 2014.

An earlier study (Grimes et al. 2012) looked at the impact on productivity of firms which adopted broadband and found benefits accruing from its adoption. This new paper uses a different methodology to test the relationship specifically between adoption of UFB and firm performance.

METHODOLOGY

All data are drawn from Statistics New Zealand's Longitudinal Business Database (LBD), which brings together survey and administrative data on business practices and performance. This paper uses two components of the LBD the:

- Fabling-Maré labour and productivity datasets, and
- Business Operations Survey which contains data relating to firm-level ICT use.

The UFB connection type category on which the analysis relies was only introduced in the 2010 survey form. The final dataset of 2,031 firms used in this research have broadband and productivity data in both 2010 and 2012.

The paper uses an instrumental variables (IV) strategy based on proximity to schools (that were targeted in the ultra-fast broadband roll-out). School proximity is unlikely to directly affect firm performance and firms are unlikely to have sorted into locations on this basis.

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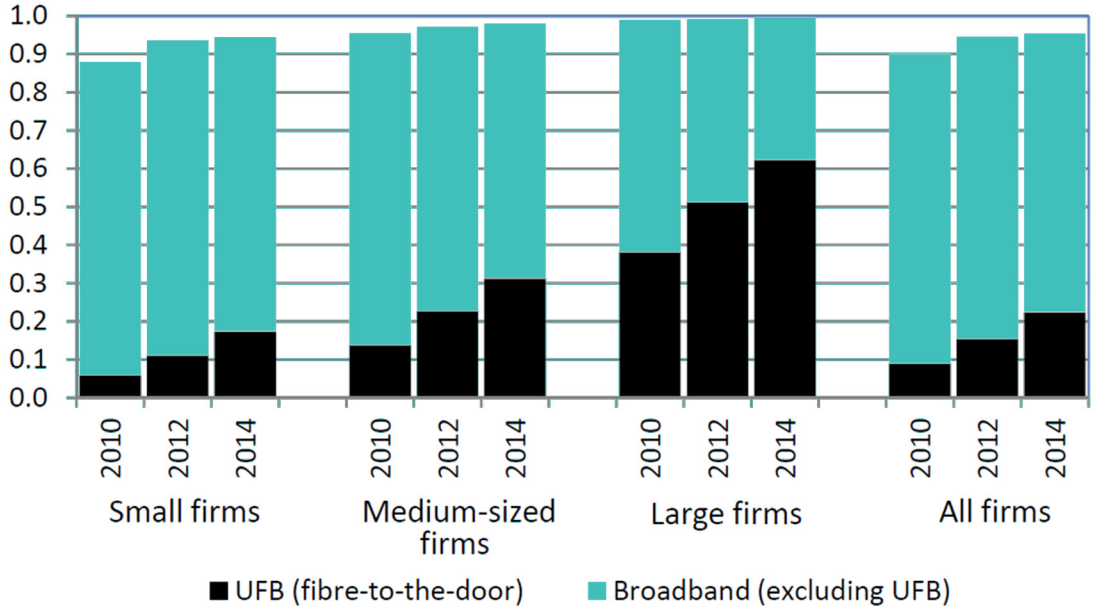
DISCLAIMER: Access to the anonymised data used in this study was provided by Statistics New Zealand in accordance with security and confidentiality provisions of the Statistics Act 1975, and secrecy provisions of the Tax Administration Act 1994. The results in this paper are the work of the authors, not Statistics NZ, and have been confidentialised to protect individuals and businesses from identification. See the paper for the full disclaimer.

Figure 1: **Firm broadband and ultra-fast broadband penetration rates**

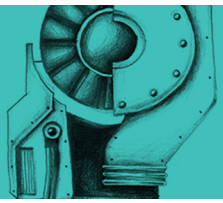


Population-weighted statistics derived from Statistics New Zealand

UPTAKE OF FIBRE

Over the period, 15.1% of firms adopted ultra-fast broadband. DSL/ADSL was initially used by 78.1% of firms, but by 2012, 14.3% of firms no longer had a DSL/ADSL connection. Cellular connections continued to grow but other technologies - cable, wireless and satellite - started from relatively low bases and were in net decline by 2012.

Adoption of ultra-fast broadband is more likely amongst large firms. It is also more prevalent in more capital-intensive firms. Firms operating from a single physical location in 2010 are 8.1 percentage points less likely to have adopted ultra-fast broadband between 2010 and 2012 than multi-location firms. This relationship is partly due to the fact that single location firms are less likely to be in places with good ultra-fast broadband access.



As expected, connection speed requirements have a positive relationship with adoption. Start-up costs appear to inhibit adoption, which may reflect the direct start-up costs associated with getting a connection, and may reflect the additional cost of adopting business practices to maximise the return from adoption.

EFFECTS ON FIRM PERFORMANCE

The research did not find any effect of ultra-fast broadband adoption – when considered by itself – on firm performance. It could be, however, that effects are positive for certain subgroups of firms. This was tested by restricting estimation to firms in industries where fibre usage may have particularly high returns, namely industries:

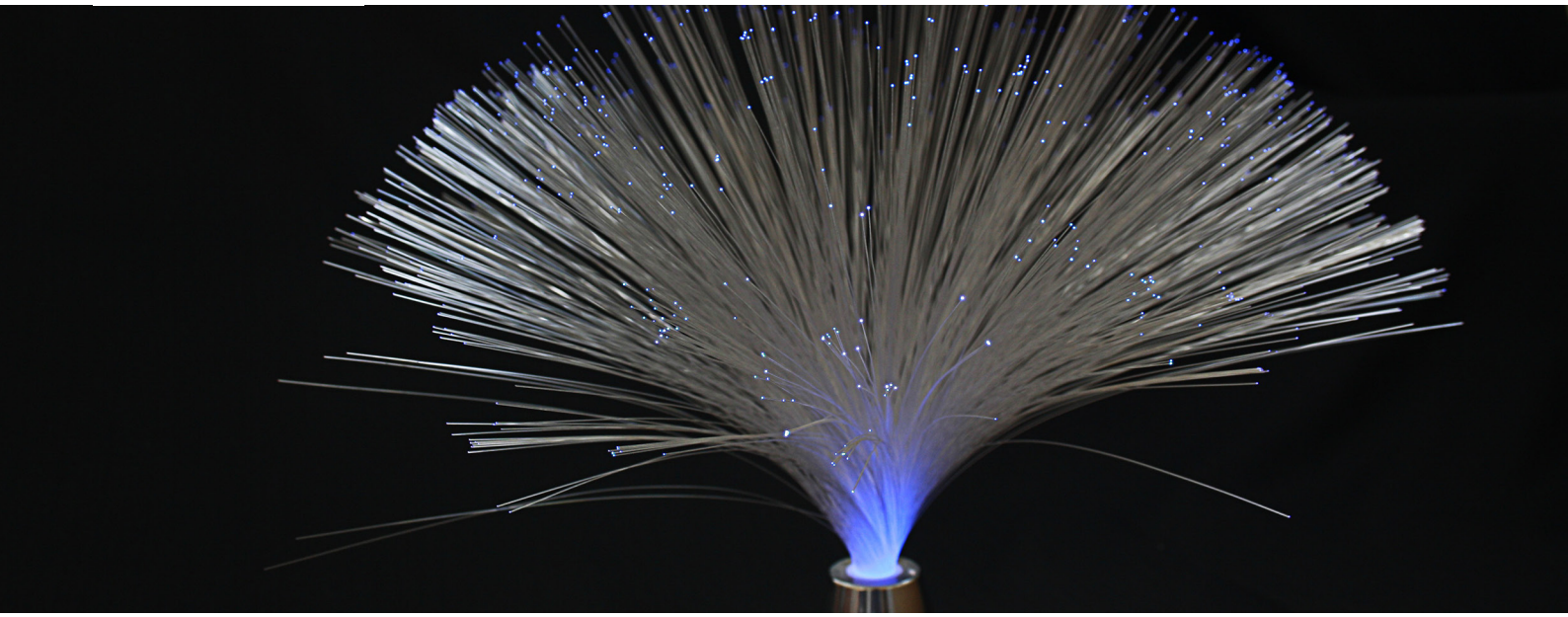
- where ultra-fast broadband uptake is high, or
- where more firms say connection speed is important, or
- with higher average computer capital intensity.

Even in these industries, no effects were found. Overall, these results do not support the hypothesis that ultra-fast broadband adoption has an effect on productivity, at least when adopted in isolation.

Prior research shows that complementarities may exist between ICT investments and organisational decisions. It is possible, therefore, that UFB adoption coupled with changes in organisational procedures may yield productivity improvements.

We find that UFB-adopting firms were more likely than other firms to make a range of complementary investments to extract benefits from their ICTs (e.g. by shifting production towards more ICT-intensive products). Furthermore, we find evidence of a relationship between improved productivity and investments in complementary investments by firms that adopt UFB.

For statistical reasons (a lack of suitable instrumental variables), we are unable to test directly whether this relationship is causal or not. However, we find that UFB-adopting firms making these complementary investments have an increased



likelihood of achieving a range of improved business outcomes such as better sales and marketing methods and improved efficiency of production processes.

The strength and consistency of these results coupled with the systematic patterns in the self-reported outcomes suggest that there is a causal impact on firm productivity from joint adoption of ultra-fast broadband and complementary organisational investments.

CONCLUSION

Using an instrumental variable (IV) strategy, we find that the average effect of ultra-fast broadband adoption on employment and (labour and multifactor) productivity is insignificantly different from zero. Even focussing on industries where we might expect these effects to be more likely to be positive, we fail to find any impact on firm performance. Conversely, and consistent with the complementary investments literature, we find that firms making concurrent investments in organisational capital specifically for the purpose of getting more from their ICTs appear to experience higher (labour and multifactor) productivity growth from UFB adoption.

While we cannot confirm that this is a causal relationship because the available instruments only weakly identify the joint investment decision, supplemental summary statistics suggest that a causal relationship is present. Firms that adopt UFB and that make concurrent organisational investments are significantly more likely to report other positive outcomes from their ICT investments, consistent with a causal relationship with productivity.

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