

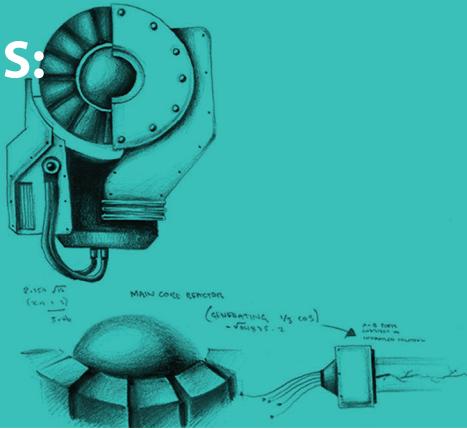
# ABSORPTIVE CAPACITY IN NZ FIRMS: MEASUREMENT AND IMPORTANCE

An Executive Summary of Motu Working Paper 18-01

Richard Harris and Trinh Le

Motu Economic and Public Policy Research

trinh.le@motu.org.nz, r.i.d.harris@durham.ac.uk



## INTRODUCTION

Business productivity has been a key concern for central government for some time in New Zealand. There are two common strategies used to improve firm productivity, the first is to improve economic conditions that influence the business environment, while the second works at a more individual organisation level.

Absorptive capacity is how a firm learns – usually by using knowledge from the external environment to improve their productivity. If firms are not able to learn, then new strategies or technology designed to help firms become more productive are likely to have only limited impact.

This paper uses data from the NZ Business Operation Survey (BOS) to:

- better understand what contributes to absorptive capacity,
- examine how firms' characteristics of firms differ across levels of absorptive capacity, and
- investigate the impact of absorptive capacity on how firms innovate, undertake R&D, and export.

It then discusses how government policy might have a more direct impact on increasing absorptive capacity and therefore productivity.

## METHODOLOGY

Absorptive capacity is usually measured through qualitative means, by surveying firms and getting them to assess their ability in general 'learning' areas. This paper instead uses objective data from the BOS that can be related to a firm's performance (e.g. external sources of knowledge used in innovation activities and co-operation with external bodies on these activities).

Pooled data from the BOS between 2005 and 2015 was put through factor analysis to examine the correlations between latent measures of absorptive capacity capturing the firm's capacity to exploit external sources of knowledge and build up partnerships with other enterprises or institutions at both the national and international level and the underlying data from which they are derived. The factor analysis was then confirmed by estimating a structural equation model, which also included 24 covariances between the endogenous variables modelled.

## CHARACTERISTICS OF FIRMS WITH HIGH ABSORPTIVE CAPACITY

Firms with overseas interests (New Zealand multinationals) generally had higher absorptive capacity throughout. Next highest were partly-foreign owned firms (less than 100% foreign ownership) and then fully-foreign owned firms. Finally, domestic firms had the lowest levels of absorptive capacity.

Firms that undertook research and development (R&D) had the highest levels of absorptive capacity, followed by firms with innovators/exporters. These firms ranked significantly above those that did none of these activities.

Larger firms had higher absorptive capacity, while firms employing greater relative numbers of professionals, managers, technicians and associate professional staff had significantly better absorptive capacity levels.

The patterns hold when we control for other factors in a multi-variate regression analysis. The regression analysis also found that agglomeration and operating in a concentrated industry had no impact.



Firms in most quintiles had a high probability of remaining in that quintile over time (e.g., 61.1% in the lowest quintile did not move, while nearly 44% in the highest remained in the same sub-group), or only moving up or down one sub-group. This suggests a considerable degree of stability over time, showing that it takes a considerable period to build absorptive capacity (or to see it erode).

## SECTOR-SPECIFIC RESULTS

Firms primarily engaged in manufacturing performed the best, followed by firms engaged in services, while the primary sector (dominated by agriculture) tended to have lower absorptive capacity. Over time, there has been a general decline in absorptive capacity in manufacturing but not in the primary or service sectors.

Employing 100+ employees increased the likelihood of being in the highest absorptive capacity quartile by 16% in manufacturing.

Being located in a travel-to-work area where there was higher diversity in terms of the breadth of industries represented had a strong positive impact on having higher absorptive capacity in manufacturing.

Being located in a metropolitan area was associated with lower absorptive capacity for manufacturing, while belonging to a NZ-owned firm with ownership interests overseas was strongly associated with higher absorptive capacity in manufacturing and services. Operating in monopolistically competitive markets (ie. “many competitors, several dominant”) increased the likelihood of higher absorptive capacity in manufacturing and services.

Service-sector firms with plants in more than one travel-to-work area, or that were part of a multi-industry firm or conglomerate had an increased likelihood of higher absorptive capacity.

Being a single-plant enterprise increased the probability of belonging to the lowest absorptive capacity sub-group by 4%, in the primary sector.

In the primary sector and services, and relative to other regions, firms in Wellington were more likely to experience high absorptive capacity. In the primary sector, this also extended, to a lesser extent, to other areas except the Waikato and Auckland.

## IMPACT ON DRIVERS OF PRODUCTIVITY

The paper looks at the impact of absorptive capacity on exporting, innovation and R&D activity, as these are useful proxies for drivers of productivity. To do this researchers used the BOS data merged with data from the Longitudinal Business Database and random effects probit models to discover the influence of absorptive capacity on these drivers. To test for robustness, results were also reproduced using two alternative approaches.

Fixed and sunk costs are important in determining productivity-enhancement activities. Manufacturing and service firms that had exported in the previous year were 45-65% more likely to continue to export. Past innovation and/or R&D both tend to impact on current decisions to innovate/undertake R&D, but the impacts are much smaller. In manufacturing and services, especially, all three activities in previous years' impact to some extent on undertaking activities in the year studied, showing that all three drivers are indeed interrelated and part of enhancing the overall productivity and competitiveness of the firm.

The strongest impacts on exporting in the primary sector are 'links with national researchers' and 'international cooperation with business', increasing the probability of exporting by some 10-13 percentage points. Given the average propensity to export was 28.5%, this is a substantial increase. Absorptive capacity has a smaller impact on exporting in the other sectors covered, although a 5.3 percentage point increase associated with 'external knowledge' in services (given only 12.6% exported) is relatively large.

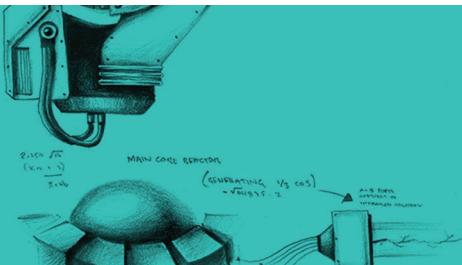
Innovation is strongly influenced by an increase in 'external knowledge' – around 21/50/41 percentage points higher in the primary/manufacturing/service sector – while 'international cooperation with business' has a strong impact in manufacturing and especially services (given just over 17% of the latter innovated in this period).

The likelihood of undertaking R&D in the primary sector increases by just over 18 percentage points when 'national cooperation with business' increases from the median to the 99 percentile (against a benchmark propensity to do R&D of only 6.9%).

'External knowledge' and 'national cooperation with researchers' produce sizable impacts in manufacturing and services, while 'international cooperation with business' is also relatively important in services.

Unexpectedly, firms involved in 'international cooperation with researchers' experience a relatively small but significant negative impact on innovation in manufacturing in particular. The negative impact of such cooperation is likely because public research knowledge is hard to transfer into "ready-to-produce" innovations. The gap between specialised knowledge and practical innovations may mean that the more firms try to reduce the gap, the greater the negative impact.





## POLICY IMPLICATIONS

Given the results in this paper, it is our contention backed by empirical evidence that a focus on improving firms' absorptive capacity will have a positive and likely substantial impact on increasing productivity New Zealand firms.

The activities of NZTE and Callaghan Innovation, while important, are, however limited in their impact on absorptive capacity as they have focused on boosting exports in around 700 firms (NZTE) and on smaller firms limited in their ability to export (Callaghan Innovation). Instead this paper suggests a focus on dynamic capabilities (as per Teece 2017) may have better productivity results.

Fundamentally, Teece and other proponents of the resource-based view of the firm argue that competencies and capabilities by their very nature cannot be bought; they can only be built by the firm. Because the market for information/knowledge about new opportunities is not well developed, the firm must build capabilities inside the business to assist knowledge creation and knowledge capture.

He advocates policy that creates and helps support "entrepreneurial managerial capitalism", where, "... the distinctive role of the (entrepreneurial) manager is ... 'orchestration' of co-specialised assets and of business activity to achieve value-creating and value-capturing alignment" (Teece, 2017, p. 20).

A second reason for policy to place the firm at the centre of the policy debate is that firms will not fully benefit from external knowledge unless they have sufficient absorptive capacity. External cooperation can possibly stimulate in-house R&D but it is not able to replace the firms' self-innovation activity. That in-house R&D and technology transfer complement rather than substitute each other implies that firms with high levels of absorptive capacity may have better external networks in terms of breadth and depth. However better networks do not necessarily guarantee firms benefiting from technology transfer if the absorptive capacity is lacking.

## SUMMARY

Absorptive capacity as measured here has a substantial influence on exporting, innovation and undertaking R&D, and consequently on firm-level productivity.

Building absorptive capacity and dynamic capabilities is generally not reflected in today's mainstream approaches to industrial policy, where developing networks and systems are favoured over directly helping firms. However, firms are unlikely to fully gain and benefit from external knowledge generated by networks and assistance unless they have sufficient absorptive capacity.

We would recommend work to assess more fully how dynamic capabilities and absorptive capacity can be built in order to enhance activities that improve productivity. Obtaining more information through, for example, undertaking more work on how to foster and create entrepreneurial managerial capitalism, and bringing the relevant parties (key firms, business organisations and government) together to plan for a new industrial policy focused on increasing absorptive capacity, will help provide policymakers with an improved conceptual lens to understand the learning and value capture processes inside firms.

**READ THE FULL VERSION OF THE WORKING PAPER AT**

**[WWW.MOTU.ORG.NZ](http://WWW.MOTU.ORG.NZ) OR CALL US ON 04 939 4250**

Motu Economic and Public Policy Research is an independent research institute operating as a charitable trust. It is the top-ranked economics organisation in New Zealand and in the top ten global economic think tanks, according to the Research Papers in Economics (RePEc) website, which ranks all economists and economic research organisations in the world based on the quantity and quality of their research publications.