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Commercialisation of university research

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COMMERCIALISATION OF UNIVERSITY RESEARCH

KEY FINDINGS

Research commercialisation income in the eight New Zealand universities rose between 2003 and 2008.

Research commercialisation income increased as a proportion of total university income.

The universities have improved measures of research commercialisation productivity – research commercialisation expenditure per staff member has risen, as has the ratio of commercialisation expenditure to total university equity, while the ratio of commercialisation revenue to equity has been stable.

The number of invention disclosures increased, though patents per staff member were lower in 2008 than in 2005.

The market capitalisation of and the number of staff employed by start-up companies set up to commercialise university research have both risen.

These improvements have occurred over the period when the two main university research funding mechanisms – the Performance-Based Research Fund and the Centres of Research Excellence – were phased in.

Introduction

The contribution of university research to business and to economic development is of increasing interest to governments around the world as they seek to generate wealth through innovation and as they seek to get a better return on their investment in research. This paper uses new data from the University Commercialisation Offices of New Zealand to look at trends in the commercialisation of university research in New Zealand. We also look at data from the Times Higher Education World University Rankings to examine the extent to which New Zealand universities attract research income from industry.

The paper:

- opens with a discussion of the importance of research to innovation and hence to economic growth
- looks at business investment in research in New Zealand
- discusses aspects of the current university research funding system
- looks at the recent data on university research commercialisation in New Zealand.

Context

Models of economic growth suggest that research and development plays an important role in increasing productivity and growth (Mandl, Dierx, Ilzkovitz, 2008). Therefore, developed countries see investments in research and development that lead to innovation as key to finding sustainable sources of growth, to maintaining and increasing employment and to improving productivity. And the tertiary education sector – the university system in particular – is an important component in a country's innovation system. Universities build innovative capability

in a country's population through their teaching programmes, make links between players in the innovation system and create and house innovation clusters (OECD, 2011, 2010a, 2010b). Close and supportive relationships between universities and clusters of high-technology firms can lead to sustainable wealth creation (Finegold, 1999). European Commission analysis shows that the intensity of research and development investment has a strong association with innovation performance (Mandl, Dierx, Ilzkovitz, 2008)[1].

One part of the role of universities in an innovation system is to conduct research that can be commercialised. This could either be through a university conducting research at the request of a firm or else through commercialising the products of research initiated by the university (Collier and Gray, 2010).

The New Zealand Government sees science and innovation as underpinning economic growth[2], benefiting New Zealand by adding value to the country's resources, by creating wealth and employment and by enhancing human capital. Capturing more of the financial benefits of the efforts of research providers means the country will be getting a better return on its research assets. Commercialisation is one of the main outcomes of a research organisation.

The Government has reformed the country's innovation system to improve the contribution of the research, science and innovation system to economic performance and hence to get a better return on the public's investment in research. These reforms have involved refocusing the Crown research institutes (CRIs), merging the Ministry of Research, Science and Technology with the Foundation for Research, Science and Technology to create a new Ministry of Science and Innovation, and allocating extra funding[3] for business research and development and commercialisation. The Ministry of Science and Innovation sees the purpose of its leadership of the science and innovation system as to 'deliver a step change to New Zealanders' prosperity and wellbeing' and it has set itself the challenge of 'doubl[ing] the value from science and innovation for New Zealand'[4]. Five of the eight Crown research institutes include enhancing economic growth or productivity in their statements of core purpose[5].

The universities are responsible for a large share of the country's research effort; universities control around a third of all research expenditure in New Zealand – compared with about a quarter for the CRIs (Statistics New Zealand, 2011)[6]. Given the critical role of the universities in the innovation system and the Government's wish to focus the innovation system on economic growth, the tertiary education strategy 2010-2015 emphasises the need for better linkages between universities and firms[7].

Business investment in research and development

In New Zealand, there is a relatively low level of business investment in research and development. Total domestic expenditure on research and development was around 1.3 percent of GDP in 2010 (Statistics New Zealand, 2011). But the level of research and development investment in New Zealand is below the OECD average of 2.3 percent and is 31st of 39 countries whose research and development was reported by the OECD (2010b). Businesses financed 43 percent of New Zealand's research expenditure in 2007, against an OECD average

[1] The analysis cited here cannot be taken as evidence of a causal relationship between investment in research and development and innovation performance. Rather, the data shows that '…wealthier economies with high levels of R&D investment receive higher innovation scores than countries with low levels of R&D…'.
[2] Refer, for instance, to http://www.beehive.govt.nz/release/more-support-budget-2011-business-rampd.
[3] ibid.
[4] Refer to http://www.msi.govt.nz/about-us/purpose-and-goals/.
[5] Refer to: http://www.msi.govt.nz/get-connected/crown-research-institutes/cri-toolkit/section-2-planning-and-reporting-requirements/statement-of-core-purpose/.
[6] Also, bibliometric data from Thomson Reuters shows that between 2005 and 2009 the universities accounted for around 69 percent of New Zealand's indexed publications.
[7] http://www.minedu.govt.nz/NZEducation/EducationPolicies/TertiaryEducation/PolicyAndStrategy/TertiaryEducationStrategy.aspx.

of 70 percent. So business-funded research and development represented 0.5 percent of GDP in New Zealand, compared with 1.6 percent in the OECD as a whole (OECD, 2010b).

Statistics New Zealand reports that, over 2008 and 2009, nearly half of firms that participated in its business operations survey engaged in some innovation activity and that there was innovation activity in nearly two-thirds of firms with 100 or more employees. But the proportion of firms whose innovation activity included research and development was only 8 percent (Statistics New Zealand, 2010).

In part, the relatively low level of business expenditure on research is due to the fact that New Zealand has very few large firms, with commerce largely dominated by small and medium-sized enterprises (SMEs). By and large, SMEs have less scope than large firms for investment in research and development. The business operations survey showed that around 20 percent of firms with 100 or more employees accessed research and development[8] as part of their innovation activities, while among firms of fewer than 50 employees the proportion was less than 10 percent (Statistics New Zealand, 2010). OECD data shows that 73 percent of business expenditure on research and development in New Zealand is made by SMEs, the highest in the OECD[9] (OECD, 2011).

Because the proportion of innovation activity that derives from research and development is relatively low, universities, polytechnics and Crown research institutes don't feature highly as sources of innovation ideas or information for firms. The business operations survey shows that, in 2008 and 2009, universities and polytechnics were cited as a source of innovation information by 8 percent of firms with innovation activity, with CRIs and other research providers being cited by 6 percent. However, these figures varied by firm size, with the proportion of innovative firms with 100 or more employees using ideas from universities and polytechnics at 12 percent and from CRIs at 11 percent. Take-up of university, polytechnic and CRI information was also higher in some industries. In agriculture, forestry and fishing, for instance, 17 percent of innovative firms reported that they used information from universities/polytechnics and 23 percent from CRIs/research organisations.

In an effort to boost business investment in and use of university research, Universities New Zealand was allocated funding by the Tertiary Education Commission in 2008 to run a series of promotional events designed to build university-business links and promote greater collaboration between universities and firms. The series of 14 events finished in late 2011. Due to the success of the programme, the universities have agreed to continue the programme, on a reduced basis, with eight events due to be held in the period 2012 to 2013.

External research income in universities

Measurement of the effects of investment in research is difficult partly because they are intangible (Mandl, Dierx and Ilzkovitz, 2008) and because the effects may not be realised for many years after the work was carried out (Collier and Gray, 2010). So analysts usually revert to proxy measures.

One proxy measure of the success of universities in commercialising their research is the level of their external research purchase income – money provided by businesses or public sector organisations to purchase specified research information and findings. In his analysis of trends in university external research income (ERI), Smart (2011) reported that the ERI earned by universities that was sourced from business increased by 47 percent in inflation-adjusted terms

[8] This includes purchasing technical information from abroad.
[9] The corresponding figure for Japan is 6 percent.

between 2000 and 2009. On a per FTE basis, the inflation-adjusted increase was 33 percent. But this sum represented only 4 percent of the research expenditure of businesses.

And, as a percentage of all university ERI, the percentage sourced from business was lower in 2009 than in 2000, reflecting more rapid growth in government funding of university research.

Funding research in New Zealand universities

The Government spends around $280 million a year in funding tertiary education organisations to conduct research – around 97 percent of which is won by the universities[10].

Since 2007, most of the Government's funding for research in the tertiary education sector has been directed through the Performance-Based Research Fund (PBRF), which uses three measures to allocate funding. One of the three measures is the performance of the institution in attracting ERI. A Ministry of Education analysis of research funding trends (Smyth, 2008) showed that the performance of the universities on the ERI measure was the most significant driver of research funding shifts; the PBRF research quality measure has had little effect on the distribution of funding – in part because there is relatively little difference in the research quality scores of the universities but there are very significant differences in the amount of external research income they earn.

However, the PBRF ERI measure treats research revenue that comes from government but from outside the PBRF – such as grants from the Ministry of Science and Innovation or the Marsden Fund – on the same basis as research funding from business. So the ERI component of the PBRF isn't a good measure of university/business linkages.

Some commentators are concerned that, because individual researchers are assigned research scores as part of the research quality measure of the PBRF, there are very strong incentives for staff in universities to give priority to fundamental or basic research published in high-reputation, peer-reviewed international journals – because PBRF scores are important to the researcher's reputation. This incentive is said to lead university researchers to favour publications in peer-reviewed journals and this is often thought to discourage a focus on applied research or on research that lends itself to commercialisation – especially among younger researchers who are building their careers. This view argues that the incentives for individuals to enhance their reputations (via the research quality measure) outweigh the incentives for universities to increase their funding (via the ERI measure). In response to these concerns, the PBRF has been modified to provide for a commercialisation assessment Expert Advisory Group for the 2012 PBRF quality evaluation, enabling a researcher to opt to have his or her research performance assessed, in part, for its commercial impact.

In this context, it is sometimes stated that commercialisation of university research has been stunted by the presence of the PBRF. However, most of these claims are anecdotal; there has been no previously published systematic analysis of this question. This paper uses new data to look at trends in commercialisation following the introduction of the PBRF.

The other main source of the Government's education research funding is through the Centres of Research Excellence (CoREs), which are '…inter-institutional research networks…focus[ed] on the development of human capital…CoREs make a contribution to national development and focus on the impact of their research'[11]. The CoREs were set up to undertake research that would be:

- strategically focused and linked to New Zealand's future economic and societal needs

[10] This figure relates only to funds that come through Vote Tertiary Education. In addition, universities bid for contestable government research funding through funds managed by the Ministry of Science and Innovation, the Health Research Council and the Royal Society of New Zealand.
[11] www.tec.govt.nz/Funding/Fund-finder/CoREs/.

- of excellent quality
- transferable[12].

The eight CoREs have different areas of focus. Some work in areas that don't lend themselves to commercialisation but others (for instance the MacDiarmid Institute for Advanced Materials and Nanotechnology and the Maurice Wilkins Centre) have had notable success in commercialising discoveries – refer to Hendy, Smart and Smyth (forthcoming).

Commercialisation of university research

How commercialisation can occur

Broadly speaking, there are two ways commercialisation of university research may be initiated:

- A firm may contract the university to conduct research to produce intellectual property which is then used by the firm in its business, or
- University researchers may conduct an investigation that leads to a discovery that has the potential to yield commercial value.

Where the research is initiated by a firm, the revenue is paid to the university and is recognised for accounting purposes as the research is conducted and the intellectual property is delivered to the company. Where the research is initiated by the university researchers, the revenue is usually generated through:

- selling the intellectual property to a firm, or
- providing a licence for a firm to use the intellectual property, or
- creating a 'spin-off' company that may have university share-holding, to undertake the commercialisation.

In the case of commercialisation of university-initiated research, the revenue may come over a longer time period, usually some time after the expenses have been incurred. This is because to make a new discovery ready for a market usually requires intellectual property protection, further investment of time and money in development, significant investment in making the new technology market-ready, a corporate structure, and investors (Collier and Gray, 2010).

The University Commercialisation Offices of New Zealand data

This section examines data on the commercialisation of university research for the period 2003 to 2008. This data has been sourced from the University Commercialisation Offices of New Zealand (UCONZ) and was compiled by Ernst and Young from the responses to an annual survey of the universities' research commercialisation activities.

The total amount of income for UCONZ members has increased over time. In 2008, total income was $268 million. This represents an increase of 45 percent in inflation-adjusted terms between 2003 and 2008. Total expenditure on conducting and managing commercial research by UCONZ members was $395 million in 2008, an increase of 67 percent from 2003 in inflation-adjusted terms[13].

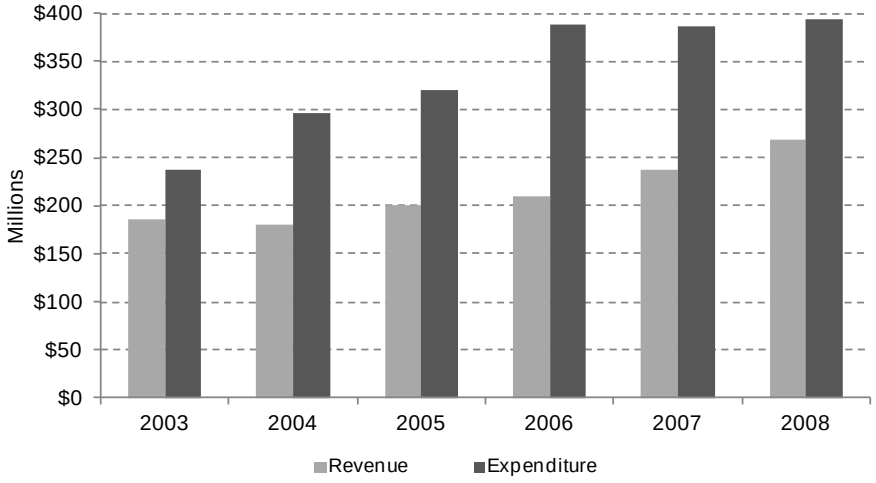
In the data used in this report, research contract income can be sourced from central and local government, industry, voluntary health organisations, and non-profit organisations. The income

12 This is drawn from the Cabinet paper that argued for the funding of the CoREs.
13 The Consumers Price Index is used in this section to adjust income and expenditure for inflation.

may be from New Zealand-based entities or from overseas. However, research income via Vote Science and Innovation public good contract funding from the Foundation for Research, Science and Technology, the Health Research Council and the Marsden fund is excluded.

Expenditure by UCONZ members has been greater than revenue, principally reflecting the costs of university-initiated commercial research, some of the costs of which have been met through the universities' other revenue sources, such as PBRF or CoREs funding.

Figure 1: Revenue and expenditure of UCONZ members (in 2008 dollars)

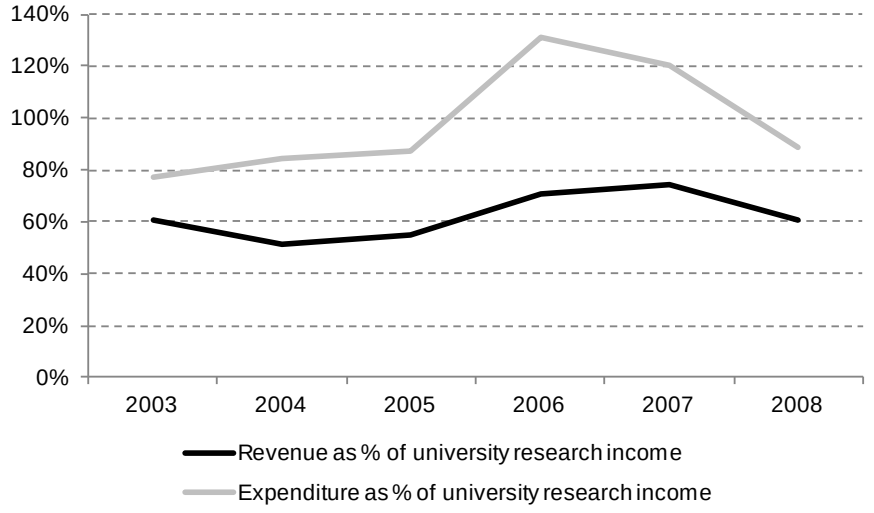


Note: Ernst and Young compiled the data used in this report for UCONZ.

Source: UCONZ

In Figure 2 we present the revenue and expenditure of UCONZ members as a percentage of research income for the universities, excluding the PBRF. In 2008, the revenue earned by UCONZ members was around 60 percent of total university reported research income. This was down on the figure of 74 percent in 2007.

Figure 2: Revenue and expenditure of UCONZ members as a percentage of university reported research income

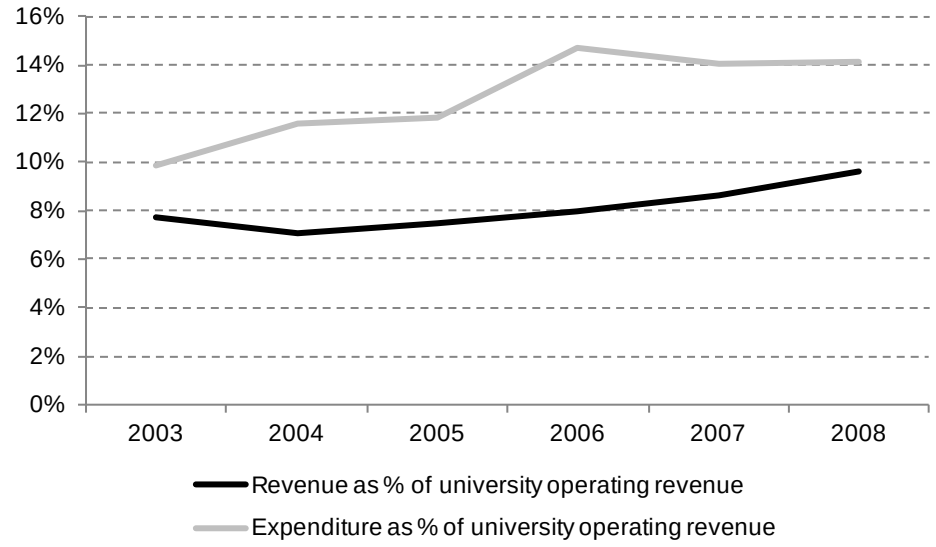


Note: Research income excludes the Performance-Based Research Fund.

Source: UCONZ, Tertiary Education Commission

Figure 3 presents UCONZ revenue and expenditure as a percentage of total university operating revenue. Since 2004, the percentage of university operating revenue earned by UCONZ members has been increasing. In 2008, just under 10 percent of university operating revenue was earned by UCONZ members, which represents a significant source of income for the universities.

Figure 3: Revenue and expenditure of UCONZ members as a percentage of university total operating revenue

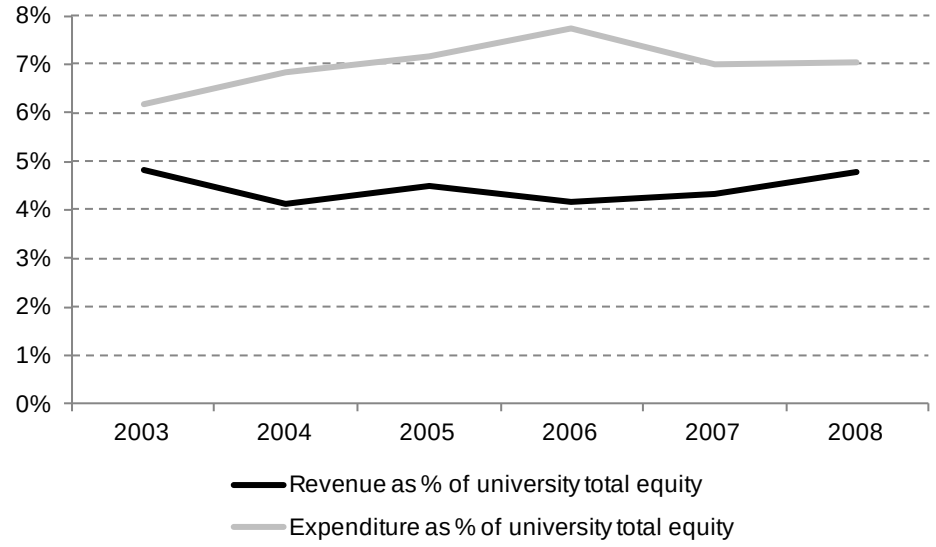


Source: UCONZ, Tertiary Education Commission

The difference between Figures 2 and 3 is a result of Government research funding growing faster than other forms of research income over the period.

Figure 4 presents UCONZ revenue and expenditure as a percentage of total university net assets/equity.

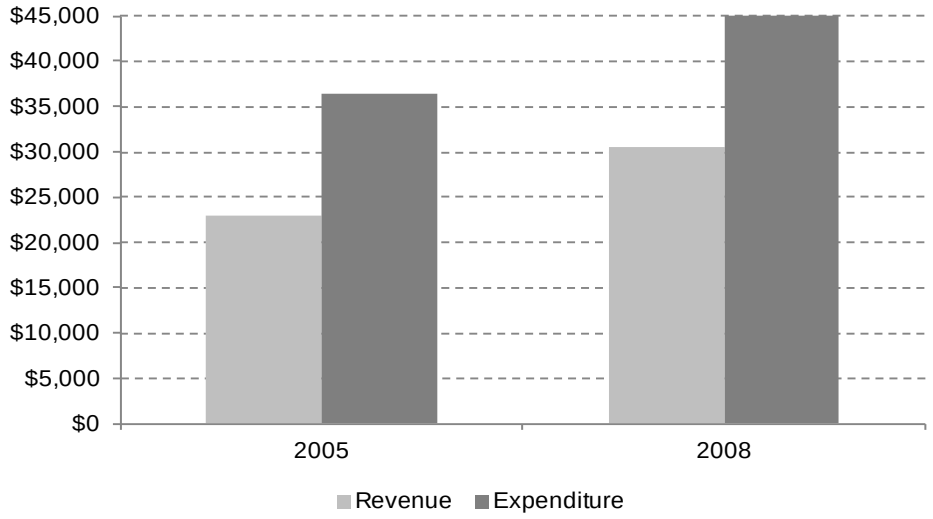
Figure 4: Revenue and expenditure of UCONZ members as a percentage of university total equity



Source: UCONZ, Tertiary Education Commission

Figure 5 presents the revenue and expenditure of UCONZ members on a per full-time equivalent staff basis and adjusted for inflation. We don't have data on the number of researchers employed by the UCONZ members, so here we use academic and research-only staff of universities as a proxy for the size of the research workforce. Between 2005 and 2008, both revenue and expenditure increased significantly on a full-time equivalent staff basis by 33 percent and 24 percent, respectively.

Figure 5: Revenue and expenditure of UCONZ members on a per full-time equivalent staff basis (in 2008 dollars)

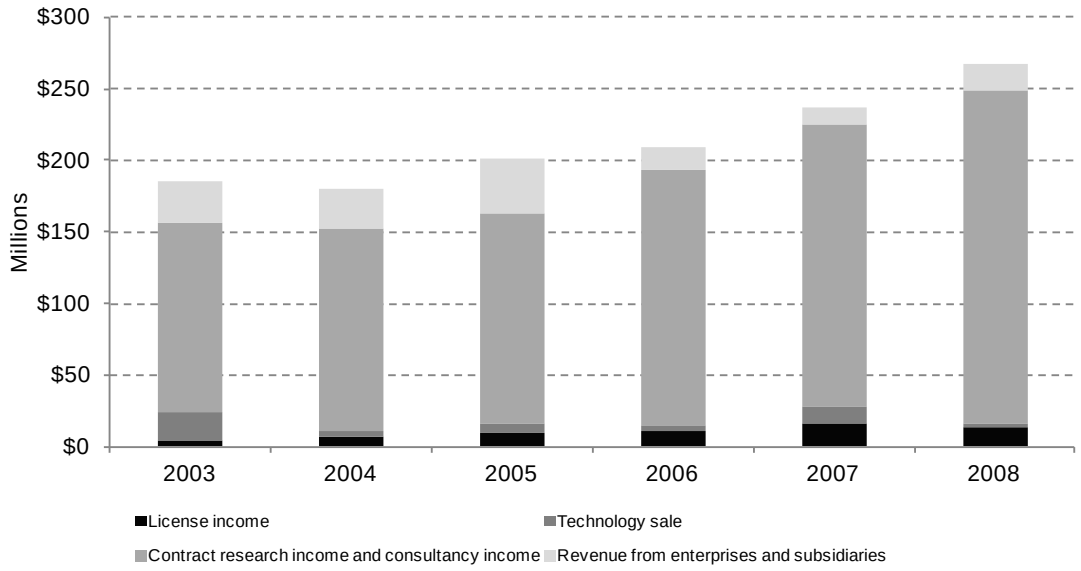


Note: Full-time equivalent staff includes academic and research-only staff at the universities.

Source: UCONZ, Ministry of Education

Figure 6 shows the sources of UCONZ members' income, with the revenue categories reflecting the range of approaches to commercialisation described in the preceding section. The largest source of income for UCONZ members was contract research income and consultancy income. In 2008, 87 percent of revenue was from this source, compared with 71 percent in 2003.

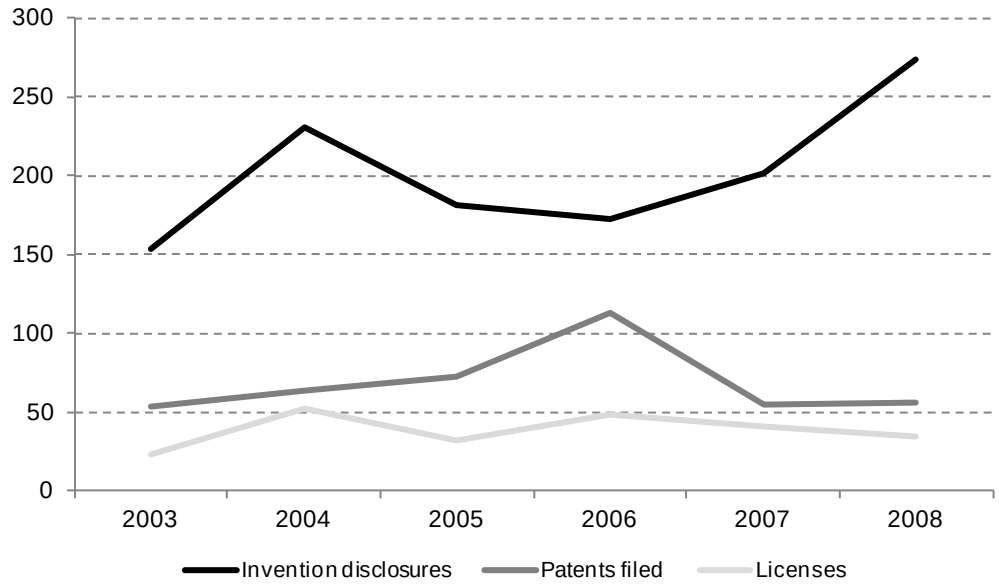
Figure 6: UCONZ member income by source (in 2008 dollars)



Source: UCONZ

Figure 7 presents the annual innovation activities of UCONZ members. In 2008, there were 273 invention disclosures[14], an increase of 78 percent on 2003. Although the number of patents filed in 2008 (56) was 50 percent below the peak of 2006, the lag in the filing of patents following invention disclosures would suggest that the number of patents filed would increase again in the years following 2008[15]. The number of licenses also fell from 41 in 2007 to 34 in 2008, but remains above the 23 licenses in 2003.

Figure 7: Innovation activity by UCONZ members



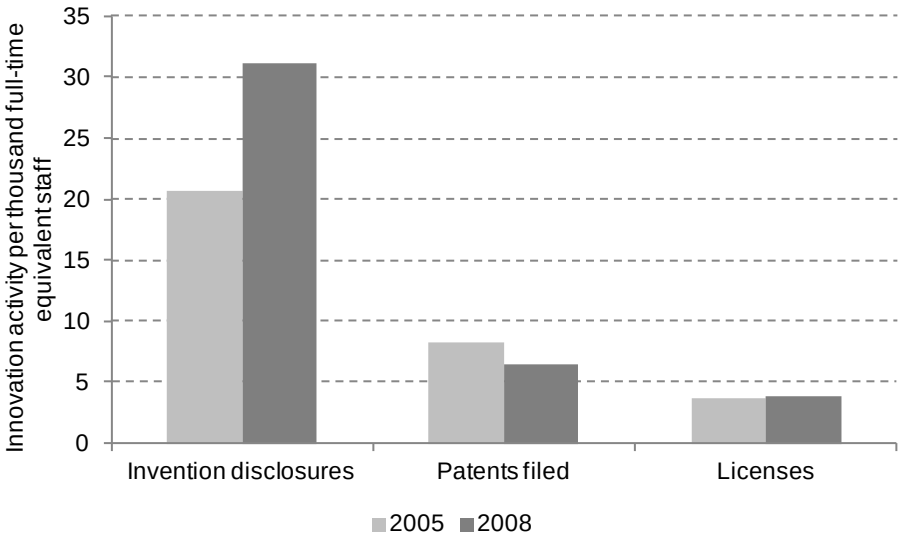
Note: The upswing in patents in 2006 was a result of new technologies being developed that led to groups of patents being filed for simple technological advancements.
Invention disclosures are written declarations of inventions which initiate the novelty searches required as the first stage for eventually establishing patent protection.

Source: UCONZ

Figure 8 presents the innovation activity data on a per full-time equivalent staff basis. Once again, we use the number of academic and research-only staff at the universities as a proxy for the size of the research workforce. Between 2005 and 2008, the number of invention disclosures increased by 51 percent, the number of patents filed decreased by 22 percent and the number of licenses increased by 6 percent.

[14] These are written declarations of inventions which initiate the novelty searches required as the first stage for eventually establishing patent protection. The invention disclosures are counted by UCONZ members no matter how comprehensive or incomplete.
[15] The trend may also reflect changing capability, fields of interest, or management practice. For instance, the universities may be taking better decisions about which invention disclosures to develop into patent applications.

Figure 8: Innovation activity by UCONZ members per thousand full-time equivalent staff



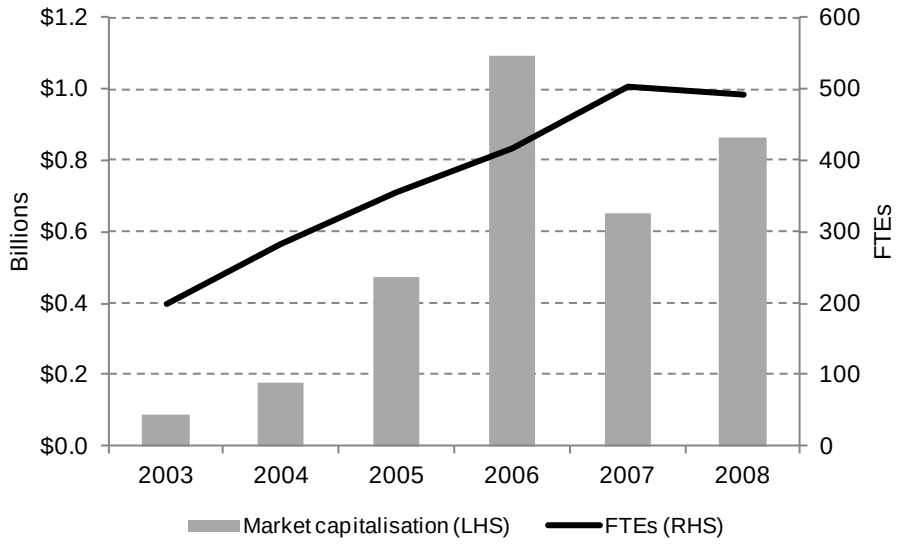
Note: Full-time equivalent staff includes academic and research-only staff at the universities.

Source: UCONZ, Ministry of Education

Figures 3, 4, 5 and 8 together suggest that the universities have become somewhat more productive in their research commercialisation over the period under study – they have used their financial and human resources and their asset base more effectively for commercialisation.

A key part of the innovation process for universities is establishing start-up companies – where technology produced by universities is used to establish a company to exploit the new innovation. During the period between 2003 and 2008, a total of 51 start-up companies were established by UCONZ members. In total, around $200 million (in 2008 dollars) was invested by outside parties in the start-up companies over this period. The cumulative market capitalisation and full-time equivalent (FTE) employees of the start-ups established between 2003 and 2008 are presented in Figure 9. This shows that the combined market value of the start-ups was $865 million in 2008 and they supported a total of 492 full-time equivalent staffing positions. The large decrease in market capitalisation in 2007 was due to the downwards revaluation of assets at one of the start-up companies.

Figure 9: Cumulative market capitalisation of start-up companies of UCONZ members established between 2003 and 2008 (in 2008 dollars) and their cumulative number of full-time equivalent employees



Note: Market capitalisation uses publicly traded values, when available, or otherwise uses the value of shares traded privately during the most recent investment round.

Source: UCONZ

Figure 9 gives a sense of the scale of the business that the universities have seeded. Ignoring the year 2006, where the trend is distorted by the one-off write-down of assets, the market capitalisation of the companies has increased at a steady rate.

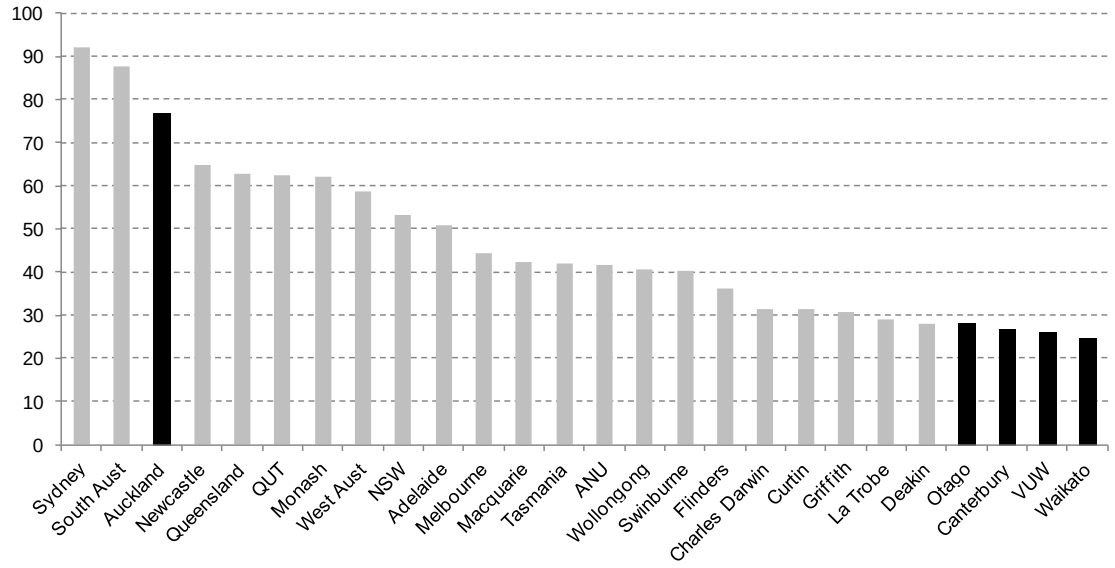
UCONZ members have also attracted investment in the start-up companies (including angel investors, venture capital or the general public). In 2008 dollars, investments raised in start-up companies peaked at $61 million in 2005. In 2008, investments were $19 million.

The Times Higher Education World University Rankings 2011/12 data

In this section we examine data on individual university performance from the Times Higher Education (THE) World University Rankings 2011/12. The THE World University Rankings include an indicator that measures the amount of research income sourced from industry per academic staff member. The performance of Australasian universities who were placed in the top 400 universities in the 2011/12 rankings is presented in Figure 10, with the New Zealand universities identified by black bars. The score represents a cumulative probability score with a higher score representing higher relative performance. For example, the score of 77 for The University of Auckland indicates that a random institution would fall below its level of performance in this measure 77 percent of the time.

The data shows that among Australasian universities The University of Auckland is ranked third behind the University of Sydney and University of South Australia. The other four New Zealand universities that had data for the industry income measure are ranked behind the other Australian universities that appeared in the THE rankings.

Figure 10: Cumulative probability score for research income from industry per academic staff member from the Times Higher Education World University Rankings 2011/12



Note: The measure represents a cumulative probability score for each institution. For example, the score of 77 for The University of Auckland indicates that a random institution would fall below its level of performance in this measure 77 percent of the time.

Source: Times Higher Education World University Rankings 2011/12

The results of other New Zealand universities were not reported by THE. However, had Lincoln University been included in the THE report, it is likely their results would have shown high levels of commercial research income per staff member. Lincoln has had the highest external research income per staff member of the New Zealand universities in each the last five years. While that statistic includes external research income from all sources – not just business – it is likely that Lincoln's business-sourced research earnings would also have been towards the higher end had we had the data to include that university in Figure 10 above.

Discussion

Given New Zealand's relatively high labour utilisation, gains in productivity are most likely to come through innovation; therefore, lifting innovation is important to the Government's economic growth goals. Universities contribute to innovation in two main ways. The first is through raising innovation capacity – through education that raises the skills of the workforce and hence makes our workforce more able to be innovative and receptive to innovation. The second is through their research. The universities make up the largest grouping in the research sector and their research infrastructure, assets and human resources represent a major national investment in research capability. These features make the commercialisation of university research an important area for analysis and monitoring.

There have been few systematic surveys of New Zealand university research commercialisation in the past (Collier and Gray, 2010). In large part, this is because there is no official collection of commercialisation data from the universities in New Zealand – unlike in comparable countries like Australia, where data is routinely collected, published and analysed. Also, the data is limited. Until recently, the universities themselves have been reluctant to make available the data they hold; and the universities have permitted data to be published only in an aggregated form[16]. This paper takes a first view of the data collected by Ernst and Young on behalf of the University Commercialisation Offices of New Zealand. It complements Smart's

[16] Possible and desirable disaggregations would be to separate out the data for each university and also to indicate the share of each revenue category that comes from overseas.

(2011) study of the sources of New Zealand university external research income and goes further by looking into the categories of commercialisation activities.

The data presented in this paper shows that research commercialisation activity has grown in real terms over the period studied. Research commercialisation revenue is the majority of university external research income.

And research commercialisation productivity has grown; research commercialisation expenditure per staff member has risen, while the ratio of commercialisation revenue to equity or net assets – essentially a measure of the productivity of the asset base of the universities – was higher in 2008 than it was in 2005.

One of the most important observations about these findings is that this growth has occurred over the period of the introduction of the two main current university research funding streams – the PBRF and the CoREs. Collier and Gray (2010) note that many people have argued that the PBRF has operated to stunt the growth of university research commercialisation. Their findings acknowledge that the PBRF may create disincentives for early career researchers to engage in commercialisation, but suggest that much commercialisation is undertaken by researchers who have high PBRF ratings. They also note that these claims are anecdotal and mostly made by those outside the universities.

The introduction of the PBRF has produced a much greater focus on research in the universities. This greater attention to research may have had benefits for research commercialisation in the universities; but we can't work out what would have happened to commercialisation in the absence of the PBRF or if the PBRF had been somehow different. It will be interesting to see if the changes made to the PBRF for the 2012 quality evaluation have any measurable effect on commercialisation – although it will be several years before a change of this sort will be evident.

The effect on the extent of commercialisation of the other main research funding stream – the CoREs – is somewhat different. As described in a Ministry of Education evaluative study (Hendy, Smart and Smyth, forthcoming), the CoREs created networks of and links between many of the best-performing researchers in a field throughout the university system.

Some of the CoREs have missions that don't lend themselves to commercialisation. An example is the National Research Centre for Growth and Development, set up to conduct research into how '…events in early life affect mammalian development, with both short and long-term consequences for health and disease…lead[ing] to new therapeutic and public health policy approaches to diseases with a developmental origin…'[17]. That centre has had success in transferring new knowledge into public health policy but those successes were not commercial.

However, in the five years from 2004 to 2010, researchers affiliated with the Maurice Wilkins Centre[18] were listed on 49 granted patents, all in the area of biomedical science. Each of these patents signifies a discovery that has the potential to result in a commercial benefit. And research at the Maurice Wilkins Centre has led to the creation of three start-up companies.

Since the creation of the MacDiarmid Institute in 2002, its researchers have filed 92 patents and spun out six new companies, one of which won the 2011 New Zealand Innovators Awards in the Health and Sciences category.

[17] http://www.nrcgd.org.nz/home.htm
[18] This centre is focused on molecular bioscience that targets cancer, diabetes, and infectious disease, as well as new tools to help basic research and clinical medicine.

A further interesting observation is that the universities have expanded commercialisation over a period when they were capturing a greater share of funds from the government's contestable research and science funding. Those funds are focused on areas strategically important for New Zealand. This strategic funding appears not to have crowded out university research commercialisation (although research funded by FRST was sometimes associated with commercialisation).

While research commercialisation has grown, there are substantial differences between the New Zealand universities in the extent of their commercialisation. The Times Higher Education World University Rankings 2011/12 showed that among Australasian universities, The University of Auckland has a relatively high amount of research income from industry per academic staff member. The four other New Zealand universities that were included in this measure were situated at the low end of performance among the Australasian universities.

Conclusion

Commercialisation is one of several ways in which university research can inform innovation and hence lift productivity in the New Zealand economy. The data available for this study is limited. But data on university research commercialisation in New Zealand has not been available on a comprehensive basis at all in the past, so there has been little analysis of this aspect of university system performance in the commercialisation of research.

This report uses new data to analyse commercialisation trends against a range of indicators and finds that:

- university research commercialisation rose between 2003 and 2008
- the universities have improved the research commercialisation productivity of their asset base over the period
- this growth has occurred over the period when the two tertiary education research funding mechanisms – the PBRF and CoREs – were being phased in; this means that the findings of this analysis will be a useful input into the scheduled reviews of the PBRF and CoRES.

Appendix: UCONZ commercialisation data

UCONZ Commercialisation Data 2003-2008

		2003	2004	2005	2006	2007	2008
Revenue ($million)	License Income	$4.0	$5.9	$8.7	$10.3	$16.0	$13.6
	Technology Sale	$16.8	$4.2	$6.6	$4.1	$10.9	$3.0
	Contract Research Income Consultancy Income	$114.1	$124.6	$133.4	$167.4	$189.5	$231.8
	Revenue from Enterprises and Subsidiaries	$24.9	$24.0	$34.5	$15.2	$12.1	$19.5
	Total Income	**$159.8**	**$158.8**	**$183.1**	**$196.8**	**$228.6**	**$267.9**
New Companies	Investment Raised ($million)	$36.5	$9.8	$55.6	$53.6	$9.6	$19.2
	Start-ups (Number)	10	7	6	7	12	9
	Cumulative Start-ups (starting in 2003)	10	17	23	30	42	51
	Market Capitalisation ($million)	$76	$159	$431	$1,028	$625	$865
	Employment (FTEs)	198	281	356	417	502	492
Research Productivity	Invention Disclosures	153	230	181	172	202	273
	New Patents Filed	54	64	72	113	55	56
	New Patents Granted	n/a	n/a	n/a	16	30	41
	Number of Licenses	23	52	32	49	41	34
	Cumulative Licenses (starting in 2003)	23	75	107	156	197	231
Total Research Expenditure ($million)		**$204.3**	**$261.7**	**$290.3**	**$364.3**	**$371.4**	**$394.7**
Revenue – Expenditure ($million)		**-$44.5**	**-$103.0**	**-$107.2**	**-$167.5**	**-$142.8**	**-$126.9**

Source: UCONZ

CPI (annual average)	917	938	967	999	1023	1064
CPI deflator	0.86	0.88	0.91	0.94	0.96	1.00

UCONZ Commercialisation Data 2003-2008 (real 2008 dollars)

		2003	2004	2005	2006	2007	2008
Revenue ($million)	License Income	$4.6	$6.7	$9.6	$10.9	$16.7	$13.6
	Technology Sale	$19.5	$4.8	$7.2	$4.3	$11.3	$3.0
	Contract Research Income & Consultancy Income	$132.3	$141.2	$146.8	$178.1	$197.0	$231.8
	Revenue from Enterprises and Subsidiaries	$28.9	$27.3	$37.9	$16.1	$12.6	$19.5
	Total Income	**$185.3**	**$179.9**	**$201.5**	**$209.5**	**$237.6**	**$267.9**
New Companies	Investment Raised ($million)	$42.3	$11.1	$61.1	$57.1	$10.0	$19.2
	Start Ups (Number)	10	7	6	7	12	9
	Cumulative start-ups (starting in 2003)	10	17	23	30	42	51
	Market Capitalisation ($million)	$88.3	$180.1	$473.9	$1,094.1	$650.1	$864.7
	Employment (FTEs)	198	281	356	417	502	492
Research Productivity	Invention Disclosures	153	230	181	172	202	273
	New Patents Filed	54	64	72	113	55	56
	New Patents Granted	n/a	n/a	n/a	16	30	41
	Number of Licenses	23	52	32	49	41	34
	Cumulative Licenses (starting in 2003)	23	75	107	156	197	231
Total Research Expenditure ($million)		**$236.8**	**$296.7**	**$319.3**	**$387.7**	**$386.1**	**$394.7**
Revenue – Expenditure ($million)		**-$51.6**	**-$116.7**	**-$117.9**	**-$178.2**	**-$148.5**	**-$126.9**

Source: UCONZ and Ministry of Education

University Revenue and Equity ($million)

	2003	2004	2005	2006	2007	2008
Reported Research Income	$265	$309	$331	$278	$309	$444
Operating Revenue	$2,070	$2,259	$2,458	$2,475	$2,647	$2,795
Total Equity	$3,312	$3,841	$4,066	$4,710	$5,297	$5,623

Source: University annual reports

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