Australian Universities Increased Dependency on Overseas Research Students Highlights A National Policy Failing

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Summary: Australian Universities are becoming increasingly dependent on discretionary income and overseas doctoral research students to sustain their research activities as government support continues to be eroded. Australia's intellectual property generation and its international competitiveness in innovation and new product development is at risk because of a national policy failing.

Research students are central to the research productivity of universities. An analysis of the trends in doctorate by research enrolments from 2008 to 2017 reveals the growing dependency of universities on overseas students to sustain their research contribution to the national innovation agenda. For 2017, on a student load basis, 40 of every 100 doctoral research contributions were from overseas students, compared with only 26 in 100 in 2008. Domestic student candidatures in 2017 were dominated by part-time students. There were 208 part-timers for every 100 full-time candidates. By contrast, for overseas students there were only 68 part-timers for every 100 full-time candidates. Furthermore, in 2017 the number of full-time domestic and overseas candidates were almost equal with more overseas doctoral students researching in information technology and in engineering and related technologies than domestic students.

Full-time students are very important to sustain the momentum of research discoveries in fast-moving internationally competitive fields through timely discoveries. Recent reductions by the Commonwealth government in the funding for PhD scholarship will further impact on the balance between domestic to overseas students.

In 2017 non-Go8 universities enrolled more domestic and more overseas doctoral students than the Go8 universities. This development highlights a significant shift in the balance of the collective research contributions by university groupings. Over the decade to 2017 Go8 universities have had a much greater emphasis on the recruitment of overseas doctoral students (102% load growth) than on domestic recruitment (3% load growth). The consequence for national higher-level skills development and the retention of new knowledge in Australia requires more policy consideration.

1. Introduction

Australian universities are expected to make major contributions to the national research effort; however, their capacity to continue at an acceptable level is being seriously eroded. The Australian Bureau of Statistics (ABS) when reporting the latest R&D data for 2016(1) noted that Higher Education Institutions Expenditure on R&D (HERD) contributed 0.62% to GDP, namely $10.878 billion. Business expenditure on R&D for 2015-16 was 1.01% of GDP, namely $16,659 billion (2). Hence, Australian Universities R&D effort corresponded to 65% of the contribution by business. However, both sectors contributions declined as a proportion of GDP from 2014 to 2016 threatening Australia's international competitiveness in innovation and new product development. Given recent government research expenditure reductions to universities (3) this adverse trend will have continued when the 2018 data are available in 2020.

The majority source of funding for university R&D activities is now general university funds, as discussed in a previous article (4). Commonwealth funding by way of competitive grants and other sources declined from 2014 to 2016. The drive for some universities to be internationally research competitive and achieve higher rankings has resulted in them seeking discretionary funding to compensate for reduced government research funding. The principal sources are student fee income, investments and philanthropy. The 2016 ABS data (1) reveals that general university funds provided 56% of the HERD and Australian competitive grants only 15%.

A critical ingredient to the national research success is the availability of high quality intellectual talent, both students and staff, with a capacity for discovery and innovation across a broad range of fields of research. Research students make a major contribution to the overall research output of universities. Based on the authorship of journal articles, research students typically contribute to 60 to 70% of the research undertaken. Research staff have an essential role in identifying research topics and in providing research guidance to students. Since 2013 there has been a decline in the number of teaching and research (T&R) staff and research-only (RO) staff employed by universities (5) limiting the contribution universities can make to national R&D programs.

In the context of declining staff with research responsibilities and of funding constraints higher degree research students have an even more important contribution to make than in previous times. Trends in both domestic and overseas doctoral student enrolments over the past decade, 2008 to 2017, are examined in this paper. The growing dependence of the R&D contribution by universities on overseas student productivity is highlighted as a potential national policy failing.

2. Doctoral Research Student Trends by Numbers and Load 2008 to 2017

The sources of data for this work are available from the Commonwealth Department of Education Student databases (6, 7, 8). The primary data for Doctorates by Research for Domestic and Overseas students are examined – both numbers (all students) and Effective Full Time Student Load (EFTSL) information are available. The decade 2008 to 2017 is a period over which higher education institutions have experienced major change. The student number data for 39 Australian universities are shown in Appendix A and the Load data in Appendix B. The present analysis primarily focusses on the load data because it provides information on the distribution between full-time and part-time candidates and hence a clearer insight into the level of contribution research students are making to a university research agenda.

The system-wide load data are summarised in table 1 and the numbers data in table 2.

Table 1. Domestic and Overseas Doctorate by Research Student Load for 39 Australian Universities in 2008 and 2017

Student EFTSL	All	Domestic	Overseas	% Overseas
2008	30,090	22,421	7,669	25.5%
2017	41,028	24,860	16,168	39.4%
Increase 2008-17	10,938	2,439	8,499	
% Increase 2008-17	36.3%	10.9%	110.8%	

Table 2. Domestic and Overseas Doctorate by Research Student Numbers for 39 Australian Universities in 2008 and 2017

Student Numbers	All	Domestic	Overseas	% Overseas
2008	42,265	32,589	9,679	22.9%
2017	57,796	37,535	20,261	35.0%
Increase 2008-17	15,531	4,946	10,585	
% Increase 2008-17	37%	15%	109%	

The student numbers will always be higher than the student loads. For example, the total doctoral numbers for 2017 were 57,796 (an increase of 37.0% on 2008) compared with the load value of 41,028 (an increase of 36.3% in 2008). Interestingly, as discussed in a previous article, T&R and RO staff numbers increased by only 12.4% during this 10-year period (5). Hence, there has been a significant change in the capacity of at least some universities to supervise research students in 2017 relative to 2008. Some research students are supervised by non-university staff; for example, in medical research institute and CSIRO; nevertheless, the overall change in the availability of research supervisors, especially T&R staff growth relative to research student growth, has implications for the quality of the student experience.

The proportion of candidates from overseas increased very significantly from a load of 25.5% in 2008 to 39.4% in 2017. The load percentages are higher than the number percentages because more of the overseas students are full-time, as discussed below. This difference is also reflected in the increases over the decade. On a load basis domestic enrolment increased by 11% from 2008 to 2017 while overseas student load increased by 111%; i.e. 78% of the load increase was due to overseas students. Alternatively expressed, in 2008 26 in every 100 units of student load were from overseas increasing to 40 in every 100 by 2017.

If one assumes that on average part-time doctoral research students are weighted 0.5 EFTSL (a very reasonable assumption,) then by comparing the number and load data one concludes that for every 100 full-time domestic doctoral students enrolled in 2017 there were 208 part-time candidates. The corresponding position for overseas students in 2017 is that for every 100 full-time candidates there were only 68 part-time candidates. This imbalance has been the case for many years. The predominance of full-time overseas students in part reflects the time-limiting visa condition associated with study in Australia. The corresponding situation for 2008 was that there were 166 part-time domestic candidates for every 100 full-time candidates. Hence, after a decade the domestic change is towards more part-time research. For overseas students there were 71 part-time candidates for every 100 full-time candidates in 2008, so there has been slight proportional decrease in part-time activity since 2008. The data in appendices A and B provides the evidence that most universities are becoming increasingly dependent on overseas students to fulfil their research aspirations.

The data in appendix A reveals that four of 39 universities - Southern Cross, Murdoch, University of Western Australia and University of South Australia – reduced their total number of doctoral students over the decade (column 10). Five universities – Charles Sturt, Southern Cross, Bond, Griffith and USA – reduced the number of overseas students enrolled (column 12) and six universities reduced the number of enrolled domestic research students (column

11). Three of these universities were Go8 universities – Melbourne (-114 domestic students), Queensland (-101 domestic students) and UWA (-100 domestic students). These universities all increased the number of enrolled overseas students. There are wide variations between universities in the percentage of overseas research students enrolled in 2017 from a low of 5% at Notre Dame and 12% at ACU to 43.5% at both Monash and Wollongong (Appendix A, column 9).

2.3 Go8 Universities

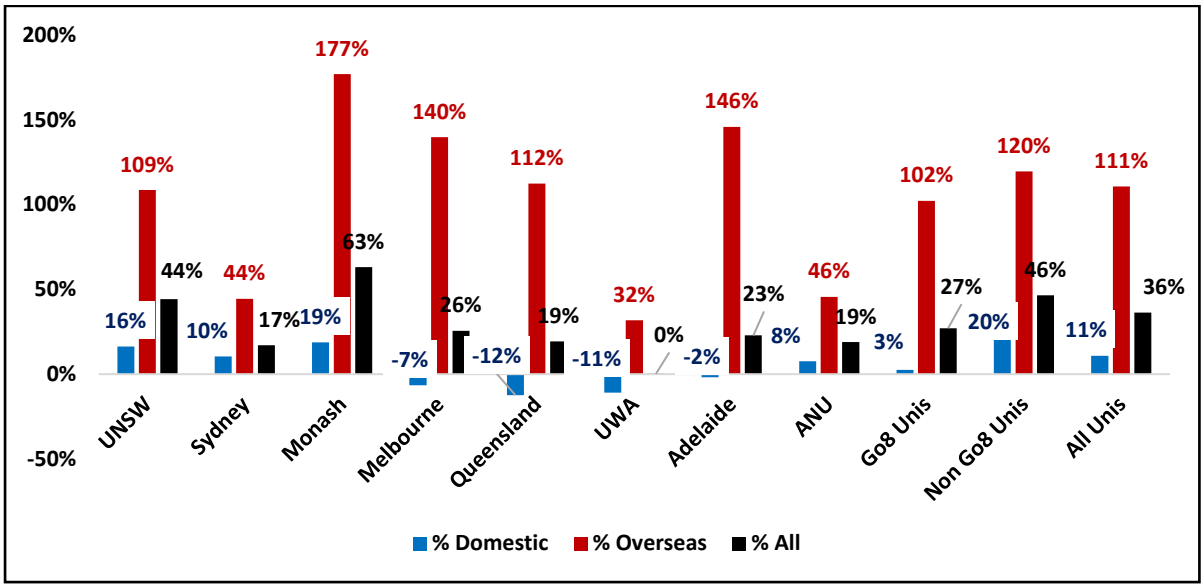
The Go8 universities have traditionally accounted to around 50% of all the enrolled doctoral students; however, in the past decade their proportional contribution on both a load basis and a numbers basis has declined. Proportionally, Go8 student load declined from 52.3% in 2008 to 48.8% in 2017. Based on the data presented in Appendix B the percentage change in the research student load enrolments from 2008 to 2017 for the individual Go8 universities are shown in Table 3 along with the collective changes for all Go8 universities, all non-Go8 universities and for all universities. The overall growth for non Go8 universities (46%) exceeds the growth for Go8 universities (27%) for both domestic (20% v 3%) and overseas students (120% v 102%). The very small increase of 3% in domestic students at Go8 universities has significant implications for higher level skills training of Australian residents because in aggregate these universities have more high-quality research infrastructure and research staff than most non-Go8 universities. The non Go8 universities enrolled more domestic doctoral students in 2017 than the Go8 universities, EFTSL 12,695 compared with EFTSL 12,165. They also enrolled more overseas students, 8,306 EFTSL compared with 7,862 EFTSL. This development represents a significant shift in the balance of contributions by universities to the national research effort.

Table 3. Percentage Change in Research Doctoral Student Load from 2008 to 2017 for Go8 and non-Go8 Universities

% Change 2017-2008	Domestic EFTSL	Overseas EFTSL	All EFTSL
UNSW	16%	109%	44%
Sydney	10%	44%	17%
Monash	19%	177%	63%
Melbourne	-7%	140%	26%
Queensland	-12%	112%	19%
UWA	-11%	112%	0%
Adelaide	-2%	146%	23%
ANU	8%	46%	19%
All G08 Unis	3%	102%	27%
All Non Go8 Unis	20%	120%	46%
All Unis	11%	111%	36%

The data presented in table 3 are also shown graphically in figure 1.

Figure 1. Percentage Change in Research Doctoral Load (EFTSL) from 2008 to 2017 for Go8 and non-Go8 Universities



There are considerable variations in the recruitment practices among the Go8 universities with contrasting responses to the recruitment of domestic and overseas students. Four Go8 universities, Melbourne, Queensland, UWA and Adelaide had fewer domestic doctoral students enrolled in 2017 on a load basis compared with 2008 (appendix B, column 11). Only three Go8 universities, Sydney, UWA and ANU did not more than double their overseas intake (appendix B, columns 4 and 8). Monash was the standout institution for growth with a 177% increase in overseas doctoral students. The contrasting responses are clearly evident from figure 1. Scholarship and stipend support for many overseas students would have been provided from the discretionary funds available to a university. The recruitment practices by Australian universities to sustain research activities do warrant further scrutiny as to how well the national interest is being served.

2.4 All Doctoral Students by Broad Field of Education

The enrolment of domestic and overseas doctoral candidates across eleven broad field of education for 2008 and 2017, along with the changes over the decade, are shown in table 4. Such data are available only on a student number basis. There has been major growth in the natural sciences, engineering and health (table 4, third last row). It is significant that for 2008 there were more domestic than overseas doctoral students in all fields of education. By 2017 the situation had changed with more overseas doctoral candidates in information technology and in engineering and related technologies than domestic candidates. The overseas student growth in all the science-related doctoral courses has far exceeded the domestic student growth (table 4 last two rows). Management and Commerce doctoral courses have also enjoyed strong overseas student growth, while domestic enrolments have declined over the decade. Agriculture, Environmental and Related Studies is the other field where domestic enrolments have declined. The Humanities and Social Sciences fields are significantly more popular with domestic than overseas students. The field Natural and Physical Sciences has the most doctoral candidates in 2017 with the second most popular field being Society and Culture.

Table 4 Field of Education Domestic and Overseas Doctoral Numbers by Research Students for 2017, 2008 and Changes to Enrolments

Doctorate by Research 2017	Natural and Physical Sciences	Information Technology	Engineering and Related Technologies	Architecture and Building	Agriculture, Environmental and Related Studies	Health	Education	Management and Commerce	Society and Culture	Creative Arts	Total
All 2017	12,990	2,364	8,718	908	2,335	8,968	3,699	3,688	12,100	2,332	58,102
Domestic	7,536	1,038	3,877	601	1,225	6,885	2,913	2,141	9,546	2,035	37,797
Overseas	5,454	1,326	4,841	307	1,110	2,083	786	1,547	2,554	297	20,305
All 2008	8,730	1,528	4,547	550	2,063	5,618	3,445	3,494	10,612	1,779	42,366
Domestic	6,707	1,024	2,847	415	1,499	4,697	2,749	2,375	8,807	1,560	32,680
Overseas	2,023	504	1,700	135	564	921	696	1,119	1,805	219	9,686
All 2017-08	4,260	836	4,171	358	272	3,350	254	194	1,488	553	15,736
Domestic	829	14	1,030	186	-274	2,188	164	-234	739	475	5,117
Overseas	3,431	822	3,141	172	546	1,162	90	428	749	78	10,619

3. Policy Considerations

Universities are very dependent for their research productivity on PhD students. They underpin the contribution universities make nationally to skills development, new discoveries and innovation. More domestic than overseas doctoral candidates were enrolled in 2017. However, the balance is changing, because 78% of the doctoral student growth since 2008 came from overseas student enrolments. Over the decade domestic doctoral load increased by 2,439 while overseas load increased by 8,499. This approach to doctoral recruitments means that domestic load increased by only 11% while overseas load increased by 111%. Another concern is that the majority of domestic students are part-time, while only a minority of overseas students had that status. Consequently, it is estimated that for 2017 full-time doctoral candidatures are in balance with 12,185 domestic and 12,075 overseas students enrolled. On an EFTSL basis the contribution to university research by overseas students is currently at 40% and increasing. The research system is vulnerable nationally because of this trend.

The benefits from the investment Australia is making in research through its universities does require more policy consideration. Overseas students make a valuable contribution to the creation of new knowledge; however, many of them will leave Australia so the economic benefit of much of the new knowledge created and the higher-level skills training achieved may be lost to the nation. The declining proportion of domestic doctoral students, with a trend to part-time research, has the potential to erode Australia's own higher-level skills base. Factors influencing the stronger recruitment of overseas students are student demand, the propensity for full-time study, diligence and the intellectual ability of applicants. These imbalances need to be addressed. Fifteen of Australia's 39 universities had more than 40% of their doctoral student load from overseas in 2017 compared with only one university in 2008 (appendix B, columns 5 and 9).

Universities evidently consider there are more institutional benefits, including international rankings, to accrue from using discretionary income to recruit overseas students than for other purposes. The ABS data (1, 4) reveals that discretionary funds devoted to research have increased from 41% in 2008 to 56% in 2017. Universities Australia has recently noted (3) that the latest Commonwealth research funding freeze will result in up to 500 fewer PhD scholarships for domestic students. This development, coupled with reductions in research-only and teaching-and-research staff, will further accelerate a disturbing trend undermining Australia's capacity for domestic skills development, innovation and international competitiveness.

This is not the future a modern Australia, embedded in a globalised digital world, should be aspiring to create.

4. References

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Appendix A. Number of Students enrolled for Doctorates by Research in 39 Australian Universities in 2008 and 2017.

Student Numbers	All 2008	Dom 2008	O/S 2008	% O/S	All 2017	Dom 2017	O/S 2017	% O/S	All 2017-08	Dom 2017-08	O/S 2017-08
C. Sturt	459	364	95	20.7%	496	406	90	18.1%	37	42	-5
Macquarie	1,587	1,055	532	33.5%	1,629	948	681	41.8%	42	-107	149
Southern Cross	493	364	129	26.2%	284	215	69	24.3%	-209	-149	-60
New England	515	407	108	21.0%	601	392	209	34.8%	86	-15	101
UNSW	2,620	1,894	726	27.7%	3,724	2,226	1,498	40.2%	1,104	332	772
Newcastle	863	694	169	19.6%	1,723	987	736	42.7%	860	293	567
Sydney	3,331	2,752	579	17.4%	4,212	3,302	910	21.6%	881	550	331
UTS	916	755	161	17.6%	1,755	1,016	739	42.1%	839	261	578
Western Sydney	562	489	73	13.0%	1,018	714	304	29.9%	456	225	231
Wollongong	1,012	723	289	28.6%	1,507	852	655	43.5%	495	129	366
Deakin	811	692	119	14.7%	1,680	1,109	571	34.0%	869	417	452
La Trobe	1,176	911	265	22.5%	1,410	1,050	360	25.5%	234	139	95
Monash	2,805	2,103	702	25.0%	4,513	2,551	1,962	43.5%	1,708	448	1,260
RMIT	1,201	916	285	23.7%	2,021	1,203	818	40.5%	820	287	533
Swinburne	628	422	206	32.8%	1,080	620	460	42.6%	452	198	254
Melbourne	3,816	3,084	732	19.2%	4,691	2,970	1,721	36.7%	875	-114	989
Federation	159	135	24	15.1%	288	251	37	12.8%	129	116	13
Victoria	599	440	159	26.5%	662	473	189	28.5%	63	33	30
Bond	115	56	59	51.3%	183	132	51	27.9%	68	76	-8
CQU	234	196	38	16.2%	292	257	35	12.0%	58	61	-3
Griffith	1,197	984	213	17.8%	1,753	1,137	616	35.1%	556	153	403
James Cook	652	456	196	30.1%	781	474	307	39.3%	129	18	111
QUT	1,218	890	328	26.9%	2,070	1,185	885	42.8%	852	295	557
Queensland	3,148	2,427	721	22.9%	3,957	2,326	1,631	41.2%	809	-101	910
Southern Qld	283	201	82	29.0%	679	513	166	24.4%	396	312	84
Sunshine Coast	104	88	16	15.4%	324	253	71	21.9%	220	165	55
Curtin	1,489	1,034	455	30.6%	2,032	1,231	801	39.4%	543	197	346
E. Cowan	399	306	93	23.3%	557	388	169	30.3%	158	82	76
Murdoch	764	612	152	19.9%	650	424	226	34.8%	-114	-188	74
Notre Dame	40	37	3	7.5%	237	225	12	5.1%	197	188	9
UWA	1,741	1,293	448	25.7%	1,728	1,193	535	31.0%	-13	-100	87
Flinders	782	669	113	14.5%	1,015	785	230	22.7%	233	116	117
Adelaide	1,620	1,351	269	16.6%	1,992	1,374	618	31.0%	372	23	349
USA	1,017	706	311	30.6%	950	748	202	21.3%	-67	42	-109
Tasmania	1,042	892	150	14.4%	1,522	921	601	39.5%	480	29	451
Charles Darwin	183	157	26	14.2%	263	213	50	19.0%	80	56	24
ANU	2,170	1,585	585	27.0%	2,639	1,768	871	33.0%	469	183	286
Canberra	232	180	52	22.4%	493	363	130	26.4%	261	183	78
ACU	282	269	13	4.6%	385	340	45	11.7%	103	71	32
TOTAL	42,265	32,589	9676	22.9%	57,796	37,535	20,261	35.1%	15,531	4,946	10,585

Appendix B. Student Load (EFTSL) Enrolled for Doctorates by Research in 39 Australian Universities in 2008 and 2017.

Doctorate by Research 2008 EFTSL	All ETFSL 2008	Domestic EFTSL 2008	Overseas EFTSL 2008	% Overseas	All ETFSL 2017	Domestic EFTSL 2017	Overseas EFTSL 2017	% Overseas 2017	All ETFSL 2017-08	Domestic EFTSL 2017-08	Overseas EFTSL 2017-08
Charles Sturt	273	216	57	20.9%	310	246	64	20.6%	37	30	7
Macquarie	1070	691	379	35.4%	1,106	617	489	44.2%	36	-74	110
Southern Cross	299	219	80	26.8%	166	119	47	28.3%	-133	-100	-33
New England	294	223	71	24.1%	371	214	157	42.3%	77	-9	86
UNSW	2036	1,420	616	30.3%	2,936	1,651	1,285	43.8%	900	231	669
Newcastle	566	444	122	21.6%	1,250	672	578	46.2%	684	228	456
Sydney	2563	2,064	499	19.5%	3,000	2,279	721	24.0%	437	215	222
UTS	662	532	130	19.6%	1,276	682	594	46.6%	614	150	464
Western Sydney	407	343	64	15.7%	747	486	261	34.9%	340	143	197
Wollongong	760	510	250	32.9%	1,164	594	570	49.0%	404	84	320
Deakin	571	478	93	16.3%	1,090	662	428	39.3%	519	184	335
La Trobe	756	562	194	25.7%	928	643	285	30.7%	172	81	91
Divinity	41	35	6	14.6%	53	42	11	20.8%	12	7	5
Monash	1938	1,394	544	28.1%	3,162	1,655	1,507	47.7%	1,224	261	963
RMIT	824	603	221	26.8%	1,445	797	648	44.8%	621	194	427
Swinburne	474	297	177	37.3%	712	384	328	46.1%	238	87	151
Melbourne	2615	2,042	573	21.9%	3,282	1,908	1,374	41.9%	667	-134	801
Federation	115	94	21	18.3%	204	173	31	15.2%	89	79	10
Victoria	387	263	124	32.0%	468	303	165	35.3%	81	40	41
Bond	86	37	49	57.0%	120	80	40	33.3%	34	43	-9
CQU	147	119	28	19.0%	158	130	28	17.7%	11	11	0
Griffith	864	682	182	21.1%	1,382	837	545	39.4%	518	155	363
James Cook	454	304	150	33.0%	566	306	260	45.9%	112	2	110
QUT	902	617	285	31.6%	1,410	721	689	48.9%	508	104	404
Queensland	2482	1,852	630	25.4%	2,961	1,623	1,338	45.2%	479	-229	708
Southern Queensland	176	119	57	32.4%	444	305	139	31.3%	268	186	82
Sunshine Coast	70	59	11	15.7%	219	160	59	26.9%	149	101	48
Curtin	916	600	316	34.5%	1,349	749	600	44.5%	433	149	284
Edith Cowan	265	196	69	26.0%	388	244	144	37.1%	123	48	75
Murdoch	581	452	129	22.2%	470	285	185	39.4%	-111	-167	56
Notre Dame	24	21	3	12.5%	136	128	8	5.9%	112	107	5
UWA	1358	1,002	356	26.2%	1,361	892	469	34.5%	3	-110	113
Flinders	517	435	82	15.9%	676	499	177	26.2%	159	64	95
Adelaide	1151	959	192	16.7%	1,414	942	472	33.4%	263	-17	280
USA	711	474	237	33.3%	601	457	144	24.0%	-110	-17	-93
Tasmania	702	579	123	17.5%	1,033	581	452	43.8%	331	2	329
Charles Darwin	129	108	21	16.3%	197	153	44	22.3%	68	45	23
ANU	1607	1,129	478	29.7%	1,911	1,215	696	36.4%	304	86	218
Canberra	149	108	41	27.5%	333	233	100	30.0%	184	125	59
ACU	148	139	9	6.1%	229	193	36	15.7%	81	54	27
TOTAL EFTSL	30090	22,421	7669	25.5%	41,028	24,860	16,168	39.4%	10,938	2,439	8,499