



Vetenskapsrådet

**POSTGRADUATE TRAINING IN SWEDEN
VARIATIONS IN VOLUME, EFFICIENCY AND COSTS
SINCE THE EARLY 1990S**



Postgraduate training in Sweden **Variations in volume, efficiency and costs since the early 1990s**

Summary of the report

Forskarutbildningen i Sverige

Variation i volym, effektivitet och kostnader sedan tidigt 1990-tal¹

The Swedish postgraduate examination is the largest among the OECD countries; 2.8 % of a typical age cohort takes a postgraduate degree corresponding to almost 400 postgraduate exams per million inhabitants in 2002². In the Swedish science policy debate it has at times been argued that the number of postgraduate students is too high. It has been claimed that a large volume of postgraduate training may drain the resources available for research and that this could affect the quality of Swedish research negatively. The purpose of the report is to give a contribution to this discussion by presenting statistics concerning the number of exams achieved as well as the efficiency and costs of postgraduate training during the last fifteen years.

In this paper figures and tables from the original report are presented in English. A few figures (figures 3, 8-10, 12) in the original report have been omitted since they are of limited interest for foreign readers.

By universities we refer to all universities and university colleges that have the right to issue doctoral degrees.

It should be noted that in an international perspective the Swedish system of financing postgraduate students is somewhat unusual. At the latest when students have two years left of their doctoral studies they have a right to a postgraduate studentship (“doktorandanställning”) which means that they become employed by the university. This means that the university has to pay not only salaries but also social fees and overheads. This rule as well as rules stipulating that only students who have adequate financing – a postgraduate studentship or a postgraduate student’s grant - may be accepted for doctoral studies came into force in 1998. Before 1998 postgraduate students could be enrolled without having any financial support from the university.

The most important conclusions of the report are the following:

¹ Can be found on www.vr.se.

² Swedish National Agency for Higher Education 2006. Swedish Universities & University Colleges. Short version of annual report 2006. Report 2006:38 R.
The EU commission 2005. The EU-15’s New Economy – A statistical portrait (p. 92)

(1) The efficiency of postgraduate training (measured as length of study and the fraction of accepted students that complete their studies) has improved successively during the last 15 years. Considerable differences remain, however, between areas of research.

(2) The *costs of student financing* (postgraduate studentships and postgraduate student's grants) have increased in relation to university incomes for research and postgraduate training when you look at the entire period studied (1993/94 to 2005). However, the increase in costs occurred mainly during the first part of the period, when the number of PhD students increased strongly. Since 1998 the number of students has not increased and costs have been relatively stable (corresponding to 20 % of the incomes of universities for research and postgraduate training).

The *total costs* for postgraduate training are difficult to estimate. We have, however, made an attempt based on some previously published data regarding the costs of carrying out the research part of the training. For 2005 we estimate the costs to be 11.5 billion SEK (1.26 billion €³). This corresponds to 48 % of the total costs for research and postgraduate training of universities. It should be emphasized again, however, that this estimate is associated with large uncertainties and that there are no reference points for how this cost has changed over time.

Figures and tables

Table 1. Goals set by the Government for the number of exams 2001-2008 and the outcome 2001-2004⁴

Area of research	2001-2004			2005-2008
	Number of exams		Outcome	Goal
	Goal	Outcome	(%)	
Humanities and Social sciences	2 032	2 601	128	2 555
Medicine	2 743	3 213	117	2 810
Natural sciences ^A	1 558	1 708	110	1 685
Technical sciences	2 444	2 658	109	2 610
Agronomy ^B	400	488	122	415
Total	9 177	10 668	116	10 075

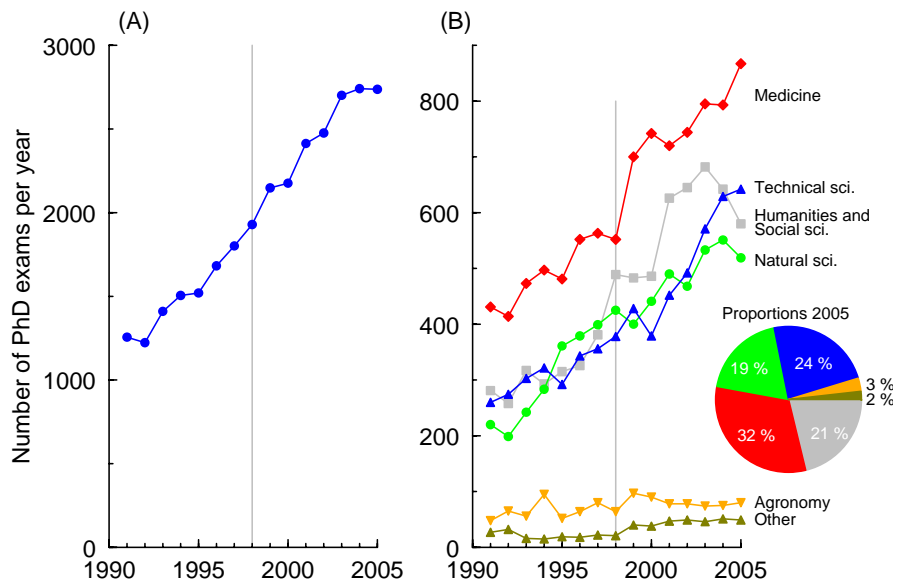
^A Including biology

^B Including agricultural, forestry, veterinary sciences and landscape planning (all at the Swedish University of Agricultural Sciences).

³ Based on a conversion rate of 9.1 SEK/€(conversion rate for January 2007).

⁴ According to the Government's budget proposal for 2006 (prop. 2005/06:1, volume 8, page 142). Licentiate exams are counted as ½ exam. PhD exams that have been preceded by a licentiate exam are also counted as ½ exam. The numbers include only universities/university colleges for which the government has set a goal, if all universities and university colleges are included the number of exams increases with 280 (outcome for 2001-2004).

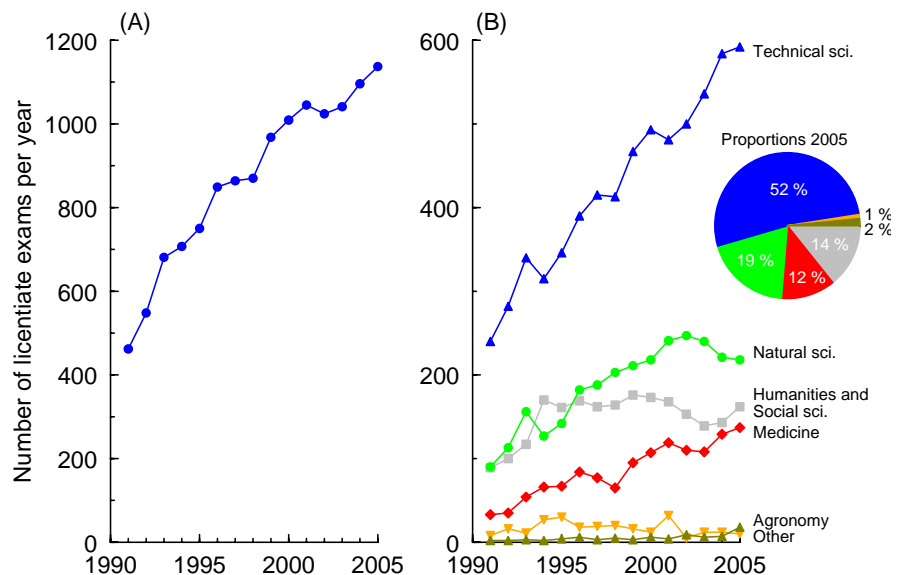
Figure 1. Number of PhD degrees per year



(A) Panel A shows the total number of PhD degrees per year and panel B the number of PhD degrees by area of research. Natural sciences include biology. Agronomy includes agronomy, forestry and veterinary sciences and landscape planning. The pie chart shows the relative contribution of the different areas of research to the number of degrees in 2005. The vertical grey lines indicate 1998. In that year new rules for postgraduate financing came into force.

Source: Statistics Sweden (UF 21 SM).

Figure 2. Number of licentiate degrees per year



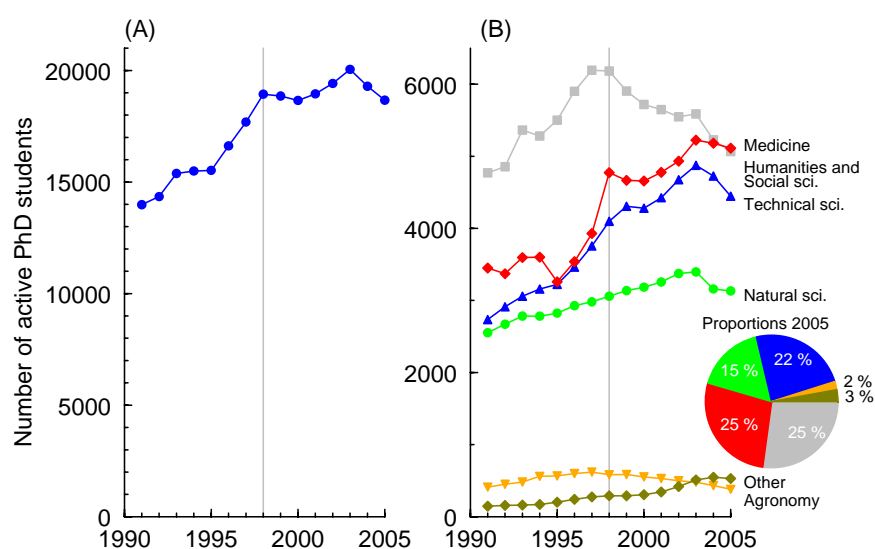
Panel A shows the total number of licentiate degrees per year and panel B the number of licentiate degrees by area of research. Natural sciences include biology. Agronomy includes agricultural, forestry and veterinary sciences and landscape planning. The pie chart shows the relative contribution of the different areas of research to the number of exams in 2005.

Source: Statistics Sweden (UF 21 SM).

Table 2. Proportion of licentiate degrees of the total number of postgraduate degrees (PhD + licentiate) within different disciplines and the proportion of PhD graduates who had previously obtained a licentiate degree. Means for the years 2004-2005

	Area of research						
	Hum.	Med.	Natural sci.	Social sci.	Agro-nomy	Techn. sci.	All
Proportion of licentiate degrees (%)	14	14	29	24	12	48	29
Proportion of PhD graduates with a previous licentiate degree (%)	13	12	37	24	11	65	30

Figure 4. Number of PhD students

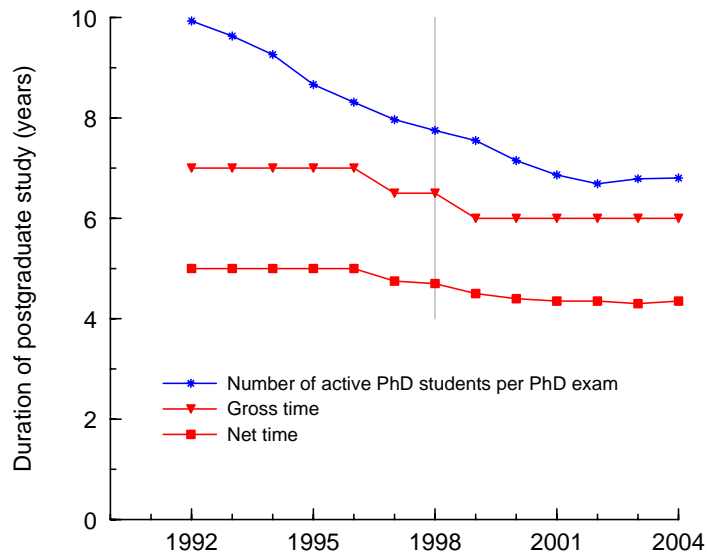


Panel A shows the total number of active PhD students⁵ between 1991 and 2005. Panel B shows the number by areas of research. Natural sciences include biology. Agronomy includes agricultural, forestry and veterinary sciences and landscape planning. The pie chart shows the relative contribution of the different areas of research to the number of students in 2005.

Source: Statistics Sweden (UF 21 SM)

⁵ In the statistics from Statistics Sweden "active PhD students" are defined as those working 1 % of full time or more on their PhD.

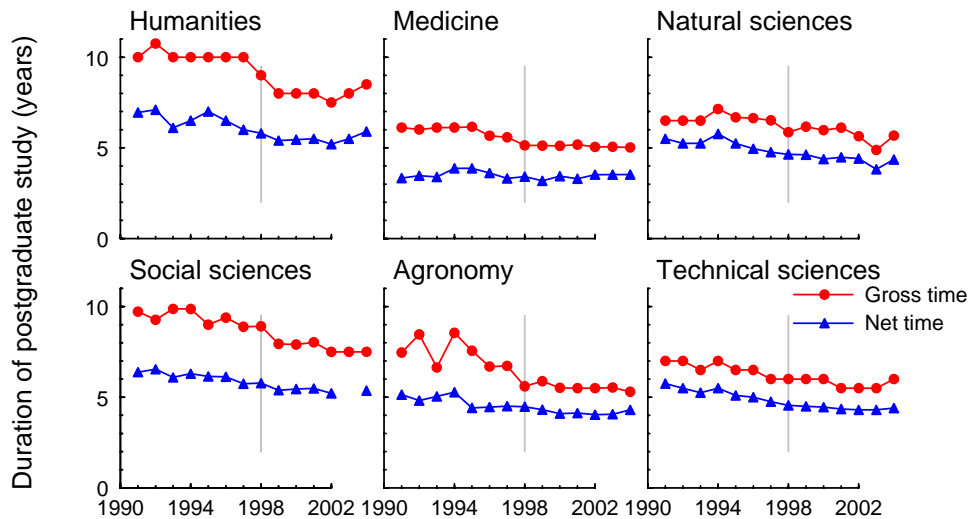
Figure 5. Duration of study for PhD degrees



Gross time is the time from entry to PhD studies to obtaining the degree. Net time is the time actually spent working on the thesis or following courses. Both values are based on PhD students completing their theses. The blue line shows the ratio between the number of PhD degrees and the number of active students 6 years earlier (moving 3-year means).

Source: Net and gross time Statistics Sweden (UF 21 SM).

Figure 6. Duration of postgraduate study in different areas of research



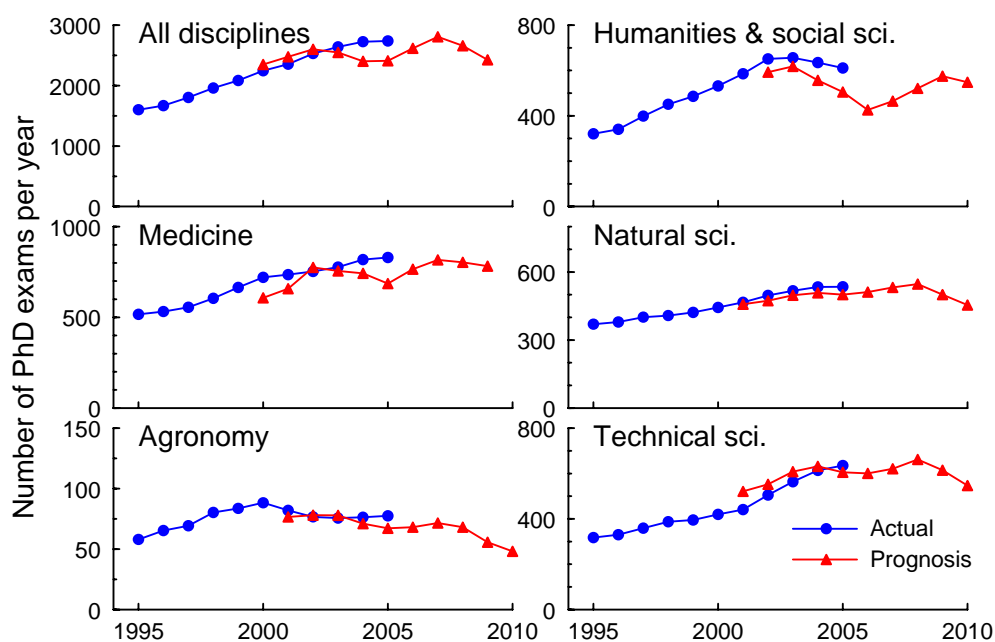
Gross time is the time between entry into postgraduate training and completion of thesis, and net time is the actual time spent working on the thesis or following courses.

Source: Statistics Sweden (UF 21 SM).

Table 3. Proportion of postgraduate students obtaining PhD degrees

	Area of research					
	Hum- anities	Medicine	Natural sciences	Social sciences	Agron- omy	Techn. sci.
Entry 1972-78 ⁶	18	64	50	19		36
Entry 1993/94 ⁷	32	68	74	40		48
Obtaining a degree 2001- 2005 ⁸	67	78	83	73	78	64
	Proportion obtaining a PhD or licentiate degree (%)					
Obtaining a degree 2001-2005	68	80	88	74	81	75

Figure 7. Prognosis for the number of PhD degrees until 2010



The prognosis is based on the assumption that new postgraduate students obtain their PhD degrees after the mean length of study (gross time in figure 6) except for a fraction that fails to complete their studies (according to line 3 in table 3). The prognosis is compared with the actual outcome for some years (moving 3-year means. The actual rate is based on figure 1.

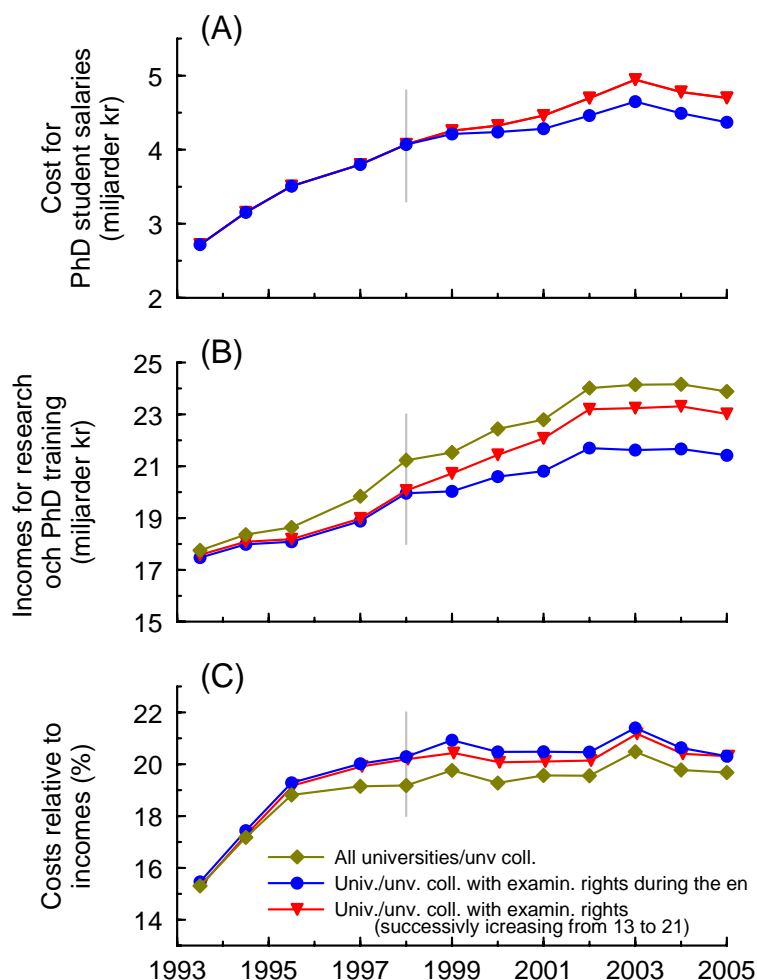
Source: New postgraduate students according to Statistics Sweden (UF 21 SM).

⁶ Source: Zetterblom 1994, page 141.

⁷ Source: SOU 2004:27, appendix 5, table 1, page 336.

⁸ Estimate based on the number of exams 2001 to 2005 in relation to the number of new postgraduate students starting one length of study earlier (gross time according to figure 5).

Figure 11. The costs for universities and university colleges for postgraduate student salaries related to their incomes for research and postgraduate training



Panel A shows the costs for postgraduate student salaries (or equivalent). Panel B shows the incomes of universities and university colleges for research and postgraduate schools. Panel C shows the costs for postgraduate salaries in relation to incomes (% , i.e $100 \cdot (A)/(B)$). All costs are estimated in the prices level of 2005. The vertical grey lines indicate 1998 when the rules for postgraduate financing were changed. *Source* for income data: The Swedish National Agency for Higher Education (the NU-database) except for 1993/94 that is taken from "SOU 1996:29 Forskning och pengar, page 83) and 1995/96 where the source is the annual report from the Swedish National Agency for Higher Education.

Table 4. Estimated annual costs per postgraduate student (columns a and b) and cost per degree (columns d to f)⁹

Area of research	Total cost per post-graduate student (SEK/year) ¹⁰	Costs per post-grad. student excl. salaries and grants (SEK/year) ¹¹	Net length of study 2003/04 (year) ¹²	Total cost per exam (million SEK) ¹³		
				(d)	(e)	(f)
Humanities and social sciences	69 000	229 000	5.4	3.8	3.8	5.3
Medicine	1 004 000	638 000	3.5	3.5	3.9	4.4
Natural sciences*	801 000	514 000	4.1	3.3	4.1	3.7
Technical sciences	900 000	504 000	4.4	4.0	4.3	5.3

*Natural sciences includes biology

Table 5. Estimate of total costs for postgraduate training (PhD and licentiate degrees) in 2005

Area of research	Total cost (billion SEK) 2005	
	Excl. externally employed	Incl. externally employed
Humanities and Social sciences	2.2	2.9
Medicine	3.5	4.4
Natural sciences + Agronomy	2.6	2.9
Technical sciences	3.2	3.7
Total	11.5	13.9

*Natural sciences includes biology

The total cost has been estimated on the basis of the costs for postgraduate student salaries and other costs for the research carried out by PhD students according to table 4. Externally paid students are assumed to have a salary corresponding to a postgraduate studentship ("doktorandanställning").

Cited literature

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SOU 2004:29. Forskning och pengar.

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Zetterblom G. 1994. Forskarutbildningen under 70- och 80-talet. Reformen och resultat. Carlssons, Stockholm.

Statistics sources

Statistics Sweden (Statistiska centralbyrån, <http://www.scb.se/>)

⁹ In January 2007, 1 SEK corresponds to 0.11 €(or 9.1 SEK per €).

¹⁰ Source SOU 2004:27, page 131, recalculated to 2005 prices.

¹¹ Source SOU 2004:27, page 132, table 5.1, recalculated to 2005 prices.

¹² According to figure 6.

¹³ The estimates for column (d) are based on the actual salaries paid by the universities, ie, (a)*(c). Column (e) shows the costs assuming students had a PhD student employment "doktorandanställning" during the entire study period: ((b)+ 0.5 million SEK)* (c). All costs are estimated in the price level of 2005.

Column (f) is estimated as column (d) but including also a cost for those not completing their exams (lower line in table 3).

Swedish National Agency for Higher Education (the NU-database,
<http://nu.hsv.se/nu/index1.html>)