

Andersson, Fredrik; Jordahl, Henrik; Kärnä, Anders

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IFN Working Paper No. 1399, 2021

Ballooning Bureaucracy: Tracking the Growth of High-Skilled Administration within Swedish Higher Education

Fredrik W. Andersson, Henrik Jordahl and
Anders Kärnä

Ballooning bureaucracy: tracking the growth of high-skilled administration within Swedish higher education

Fredrik W. Andersson^{† ‡}, Henrik Jordahl^{‡ ♠}, and Anders Kärnä^{* ‡ ♠}

[†]Statistics Sweden (SCB)

[‡]Örebro University

[♠]Research Institute of Industrial Economics (IFN)

Abstract

Organizations, both non-profit and for-profit, need to allocate labor for both production as well as internal administration. If this allocation is skewed towards internal administration, organizations, and especially non-profit organizations, might develop sclerosis over time with too much labor allocated to internal administration compared to production. Using detailed registry data on all individuals working at Swedish universities and colleges, we document a rapid increase in the number of qualified administrators, both in the number of employees and in total wages paid for these. This increase is not present in less qualified administration, and is mainly driven by an increase by a few professions such as communication and human resources. The increase does not lead to a significant reduction, or increase, in the time that researchers and teachers spend on administration. This in turn suggests that Swedish higher education over-allocates resources to high-skilled administration.

Keywords: Organization theory, Sclerosis, Productivity Growth, Bureaucracy, Higher education

JEL: P16, L25

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1 Introduction

Hacker: How many people do we have in this department?

Sir Humphrey: Ummm... well, we're very small...

Hacker: Two, maybe three thousand?

Sir Humphrey: About twenty-three thousand to be precise.

Hacker: TWENTY-THREE THOUSAND! In the department of administrative affairs, twenty-three thousand administrators just to administer the other administrators! We need to do a time-and-motion study, see who we can get rid of.

Sir Humphrey: Ah, well, we did one of those last year.

Hacker: And what were the results?

Sir Humphrey: It turned out that we needed another five hundred people.

_____ *Yes Minister, Season 1, Episode 3: "The Economy Drive" (1980)*

In all major organizations, professionals need to spend time at internal administration such as documenting their work, filling out forms and making sure they uphold relevant internal standards. This in turns means that managers needs to allocate workers between production and internal administration in order to achieve an optimal division of labor. If there is a bias in the allocation of workers towards internal administration, this could have negative effects on the productivity of the organization. This might be especially true in the public sector, where the lack of competition makes efficiency less pressing than in the private sector. Whereas a firm that becomes too inefficient and sclerotic faces the risk of bankruptcy, inefficient public agencies seldom faces such a harsh punishment. Furthermore, public agencies often have many, possibly conflicting, goals that needs to be balanced compared to the private firms straightforward goal of profit maximization. A reduction of the general productivity of public funded organization could have long term negative consequences, especially in countries where these make up a large part of the economy.

This paper contribute to the literature by studying bureaucratic sclerosis, using fine

grained registry data from Swedish universities and colleges. Higher education provides an excellent test bed to see if there is an bias towards allocation labor towards internal administration, since higher education is a complex, multi-faceted organization with goals that are difficult to evaluate. With the help of registry data on all individuals working at universities and colleges in Sweden during 2001-2018, we can track how the number of teachers and researchers, as well as all non-teaching staff, evolve over time. Furthermore, we can distinguish the exact profession for all staff as well as their gender and salary. This allows us to study if Swedish higher education have suffered from sclerosis, with an increase in bureaucracy in administration during this period. Furthermore, it is possible to see if the composition of the administration has changed, i.e. if low skilled employees are replaced by high skilled employees. The results suggests that while less qualified administration do not increase substantially during this period, there is an substantial increase in the number employees in qualified, highly educated, administration. Between the period 2001-2013, the number of highly educated administrators and managers grew by almost a factor 10 compared to the number of teachers and researchers. The increase is similar with wage costs, with a clear increase of the share of wages that goes to qualified administration. Between 2014-2018, the number of administrators and managers increased by about 15 percent, while the number of teachers and researchers actually decreased slightly. Total wages paid to qualified administration and management increased with almost 20 percent, ten times as much as for researchers and teachers. This suggests both that administration is increasing in Swedish universities and colleges and that it is also becoming increasingly high skilled. This increase in qualified administration could partly financed by a substantial reduction in professions that can be replaced by digital technology. The time that teachers and researchers spend on doing administration themselves have not decreased during this period, suggesting that the additional administration does not remove task from researchers and teachers. An increasing amount of funding being directed to administration could have negative effects of the funding available for other areas, perhaps leading to a decrease in research output and

teaching quality, with negative long term effects on technological development and economic growth.

2 Management, production and administration

The management of firms and organizations have attracted a considerable amount of research, and there exists a surprising large degree of effectiveness in organizations deepening on how they are organized (Bloom and Van Reenen, 2007, 2010; Bloom et al., 2019). In all large organizations there exists a bureaucracy responsible for internal affairs, creating information for management and handling practical task such as making sure wages are paid. In the same way that the productivity of those in the primary production is of great importance to the output of the organization, an efficient bureaucracy is vital for the productivity of the organization, a fact that has been recognized for a long time (Weber, 1921). An efficient internal organization, with e.g. quality control and efficient management, can significantly improve the productivity of an organization. This includes the organization of non-profit firms, who benefit from efficient management (Bloom, Lemos, Sadun and Van Reenen, 2015; Bloom, Propper, Seiler and Van Reenen, 2015). External intervention, such as ownership by venture capitalists or private equity, is often effective in increase the efficiency of firms (Kaplan and Stromberg, 2001; Bloom, Sadun and Van Reenen, 2015), or the usage of management consultants (Bloom et al., 2013).

For management, there is always a genuine problem with the allocation the correct amount of resources to internal administration versus production. This allocation problem exists regardless of if the organizations is in the public or private sector. Public sector organizations, be it in education, health care or government administration, almost always have a production element to them. Schools and universities educate children and students, hospitals cure patients, tax authorities collect taxes etcetera. For private sector organizations, this problem is identical, but managers in the private sector are helped by the fact that competition makes

it more difficult to make a wrong decision for a long time.

While many organizations are efficient, there are also a suppressing amount of inefficiency in both the public and the private sector. Organization can get trapped within a dysfunctional equilibrium of functional stupidity, which could be difficult to move away from (Alvesson and Spicer, 2012, 2016). If such organizations do not face sufficient competition, or are in a non-competitive sector, inefficiencies could be permanent with long term negative consequences.

The members of the internal administration might of course want to use their position to get higher wages, better offices, and could very well be in a position to acquire this due to their greater access to information and a closer to connection to the management compared to employees in the more direct production (Niskanen, 1968, 1975). The administration within an organization should be more skilled in solving collective action related to e.g. petitioning management for more resources. Since their main profession is administration and internal organization, compared to the employees in the main production of the organization, they should have both a comparative advantage in this type of works and perhaps more time available for this task. Accumulation of interest groups within an organization could have similar effects as the accumulation of interest groups within a nation, creating a sclerotic and inefficient organization (Olson, 1982).

Looking more directly at the public sector, additional explanations are warranted compared to the private sector (Parkinson and Osborn, 1957). Most importantly, inefficiencies in the public sector could both be worse and more persistent, since there is a lower risk of being out-competed by other firms. To solve this problem, and increase the efficiency in the public sector, a myriad of reforms have been suggested. However, recent reforms of the public sector to increase efficiency, often called new public management (NPM), have been accused of actually increasing the need for administration, in order to e.g. measure performance that is inherently difficult to measure (Diefenbach, 2009). Such reforms have been accused to push a neo-liberal view of public administration, being more motivated by ideology than

real world positive effects ([Lorenz, 2012](#); [Nash, 2019](#)). The effect of productivity is debated and unclear.

Universities and colleges provide an excellent testing ground for theories if organizations over time become susceptible to sclerosis ([Stage and Aagaard, 2019, 2020](#)). Not only are universities and colleges large organizations, with many employees and hence a large need of internal organization. They are also non-profit, with a somewhat fuzzy objective and therefore hard to evaluate. Unlike a commercial firm, which sooner or later will face large difficulties if their core objective is not achieved, it is not as obvious how the goal of teaching and research should be evaluated. It is also not easy to measure the quantity, and especially not the quality, of education and research, making it difficult to see if an increase of administration is having a negative effect of the core mission of colleges and universities. If administration is allowed to expand at the expense of teaching and research, the decline of the output might not be obvious to politicians and higher management, and therefore remain unchallenged ([Paldam, 2015](#)). Furthermore, universities have been giving additional task, such as working for diversity among the student body which e.g. requires the hiring of diversity officers, making evaluation even more difficult ([Bradley et al., 2018](#)).

Reforms to make universities more similar to private firms might also back-fire, especially due to the difficulty of measuring quality. This forces teachers and researchers to spend considerable time recording their teaching and research, in order for them to be evaluated. This type of administration is not popular among employees, according to evidence from Finland ([Kallio et al., 2016](#)). While academics dislike such reforms, they might also be unable to resist an increase in bureaucracy, preferring to adapt and working longer hours to compensate for the increase in administration rather than lowering their output ([Flory et al., 2016](#)).

Due to the large number of reasons why a the total amount of administration can increase, especially in higher education, it becomes important to empirically test if administration does increase over time, as well as trying to identify which categories of professions is driving this

increase.

3 The Swedish system of higher education

Swedish higher education is in general divided into two different parts, universities ("Universitet") and colleges ("Högskola")¹. This definition includes specialized institutions, such as the Royal Institute of Technology (KTH), which is regarded as a university². The main difference between an university and a college is that universities have the right to grant PhDs in a broad number of fields. However, colleges often have the right to grant PhDs within a few fields for which the college is specialized in. By law, the main goal of higher education is to educate students, do research and spread knowledge to the public.

Higher education have expanded rapidly, and for a period there was a direct political intention that 50 % of a cohort should attend higher education. This goal has been relaxed since 2006, but the number of students have increased rapidly since 1990, as can be seen in figure 9 in the appendix. This has in turn increased funding, since higher education in Sweden is mainly by public funding because there are no tuition fees³. Research is financed both by public grants via public agencies as well as from private foundations from which researches can apply for grants. Such grants are often used to reduce the teaching load for the researcher, allowing more time for research instead of teaching.

To achieve this expansion of the number of students, higher education have expanded on all fronts. Older universities have expanded, some colleges have both expanded and been promoted to universities and new colleges have been started from scratch. In latter years, the number of students have declined, possibly due to the good economic conditions and low unemployment rate, and the expansion have hence stopped. This variation allows us to

¹All Swedish universities and colleges except three are public agencies: Chalmers University of Technology, Stockholm School of Economics and Jönköping University are instead non-profit foundations. In practice, the difference is negligible.

²Due to the low number of employees and students at art colleges, we exclude them from the analysis.

³Tuition fees for non-EU students were introduced in 2011, but are not large source of funding since they mainly aim to recover the cost of the student rather than to generate a surplus.

study the changes in administration both during periods when the number of students are increasing, as well during periods when the number of students are decreasing.

4 Data and empirical results

To study if there is a growth in administration in Swedish colleges and universities, we use total population data on Swedish employees from Statistics Sweden (SCB) for the years 2001-. From this data-source, we extract the 20 most commons professions, as defined by employment codes called SSYK-codes, for colleges and universities for each year⁴. Colleges that becomes promoted to universities during the panel, such as Örebro and Karlstad, are coded as universities the entire period. Malmö University, which became a university in 2019, is coded as a college during our panel which ends in 2018. Along with the number of employees for each profession, we also know the total wage sum for that profession.

Starting from 2014, there is a switch from coding professions according to a standard called SSYK96, to the new standard SSYK2012. It is unfortunately quite difficult to convert SSYK96 to SSYK12 and hence create a cohesive panel. Not only do several professions have different codes, but entire professions are removed and new ones created. This changes the top 20 most common professions, which we use as the cut-off for the analysis. For example, with SSYK 2012 a professor is a separate profession, whereas with SSYK96 professors are a part of the profession "university and college teacher". To be prudent and reduce the risk of mistakes, we split the sample and do a separate analysis for the 2001-2013 period and the 2014-2018 period.

Another problem for the period 2001-2013 are employed PhD-students. During this time period, PhD students have to an increasing degree been employed directly by the univer-

⁴SSYK codes are created by the employer, who reports the profession for the jobs to SCB. This is could be a potential problem, if employers decide to change the code of a profession without changing the nature of the profession. Using SSYK as such a detailed level as 4-digit could also be problematic, since employers might not able spend enough time to record such detailed information. However, in this case, all individuals are employed by large public or publicly funded organizations who should be able to keep records at a detailed level. Still, some variation could be the result of measurement errors and new classification of jobs.

sities, rather than financed by scholarships or loans. With SSYK2012, PhD-student is a separate category, but there is no such category for SSSYK96, which will make the category researchers and teachers too large since the employed PhD-students gets absorbed into this category. In order to solve this, we identify Ph.D students from other teachers by ensuring that the individual had received educational credits during the year. In this way, we are able to create a separate definition of PhD students. For PhD-students after 2012, there is a proper registry of Ph.D. students that allows for perfect identification and allows us to double-check the SSYK-code.

4.1 Changes in staffing in Swedish universities and colleges

There is quiet some variation in the top 20 most common professions, with a total of 35 different professions for universities and colleges for the 2001-2013 period and 28 for the 2014-2018 period. This variation is created due to the number of employees increasing/decreasing in one profession and hence pushing it into, or dropping out from, the top 20 list.

Based on the profession-codes, we create 4 different groups of professions. Groups are created by similarity in profession and the educational requirements. The first number in the SSYK codes identifies the requirement for the profession, with professions starting with a 1 being managerial positions, professions with a 2 require higher academic requirement and so on. The higher the number, the lower the requirements. The first group, *Assistant admin. and supporting staff*, consists of professions with the lowest levels of educations, such as cleaners and janitors, as well as administration with low to medium education, such as library assistants and accounting assistants. The second group, *Professional admin. and management*, consists of administration with higher requirement of education, such as communication, librarians and employees in human administration, as well as all individuals with a management position, that is everyone with an SSYK code that starts with a 1. The third group, *Teachers and researchers*, consists of all individuals with a clear research and teaching position, including PhD. students. The fourth and final group, *Others*, consist of

everyone else, mainly individuals who work in research and teaching, but are not explicitly coded as researchers or teachers. This group includes engineers, biologists and similar mainly highly educated individuals, who can be assumed to be doing research or teaching, but were we cannot confirm that this is the case. The professions that are included in each group is described in Tables 1-2 in the appendix.

The number of employees is plotted in Figures 1-2. It is clear that there has been a large increase in the number of researchers and teachers in higher education during this period, corresponding to the large increase of the number of students. Between 2001-2013, the number of researchers and teachers increased with 23.9 %, which is reasonable since more students creates a need for more teachers and also provides the funding for these positions. The assistant admin. and supporting staffs were reduced with 5.9%. However, administrators with higher education and management, increased with almost 200 percent. Hence, the number of qualified administration increased almost 10 times as rapid as the number of researchers and teachers. Turning instead to the wage sum, wages for administration have increased with 275 percent, roughly five times as much as for teachers and researchers whose wages increased with 52 percent. Wages are inflation adjusted by consumer price index and are expressed in millions of SEK.

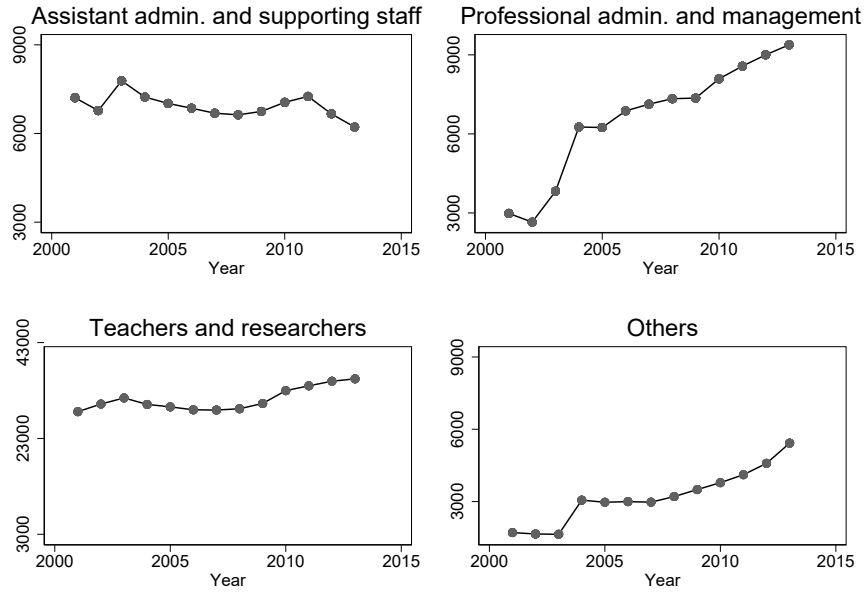
During the period 2014-2018, changes were quite drastic given the lower time span. Assistant admin. and supporting staffs were reduced with 7.2%. Qualified administrators and management increased with 15.1 percent, which is interesting since the number of researchers and teachers decreased with 2.5 percent. The decrease in researchers and teachers is not surprising, since the number of students decreased during most of this time (see Figure 9), making the increase in administration even more profound. The total wage sum paid for teachers and researchers increased with about 2.2 percent, whereas the wage sum for administration increased with about 20.4 percent, about ten times the increase of teachers and researchers.

Taking a more detailed look at the number of employees in the category administration

in universities, in Figures 3-4, it is apparent that the increase is unequally distributed. Professions that are especially quickly increasing are those related to communications, human resources and information technology⁵. Interestingly, librarians and archivists did not increase during the period 2001-2013 or 2014-2018, which is somewhat surprising. An increase in the number of students should, *ceteris paribus*, require more librarians to help these additional students. Archivists are needed to fulfill the requirements set up by Sweden's strong right to information laws, which are regulated in the constitution, and their workload should increase with an increase administration and the information flows these generate. One possible explanation could be that these professions do not work closely to the management and are therefore less able to persuade management into spending more resources on them, something that employees in communications and human resources might be able to do.

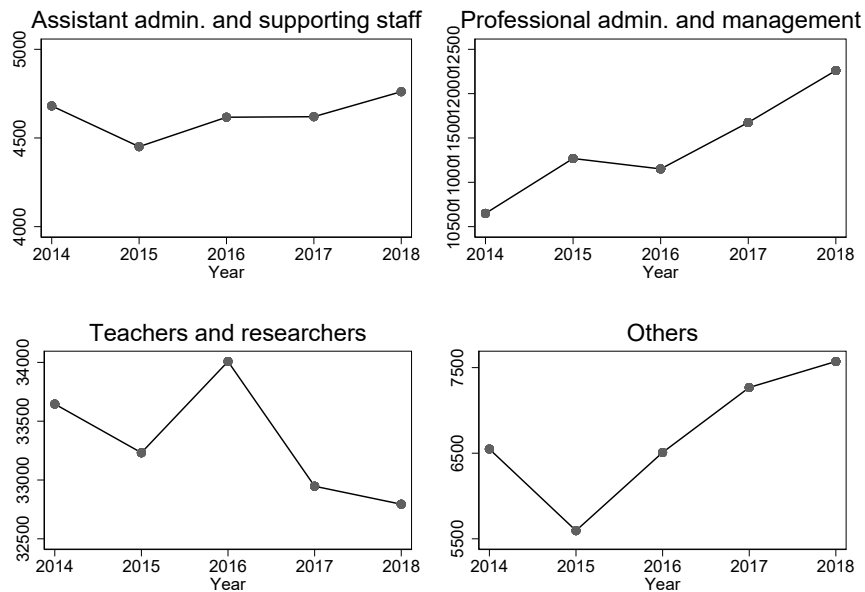
⁵There is a large drop in the number of managers in universities between 2008-2009, from 701 to 446 (in the category "Production and operations managers in public administration", SSYK96 = 1226). Possible explanations is that the managers are either moved to an organization separate from the main university or that they have been given a new SSYK-code. If the number of individuals of in this SSYK-code is not sufficient high to make it into the top 20 profession list, they are excluded from the analysis. Unfortunately, we cannot track where these individuals have been transferred.

Figure 1: Number of employees 2001-2013



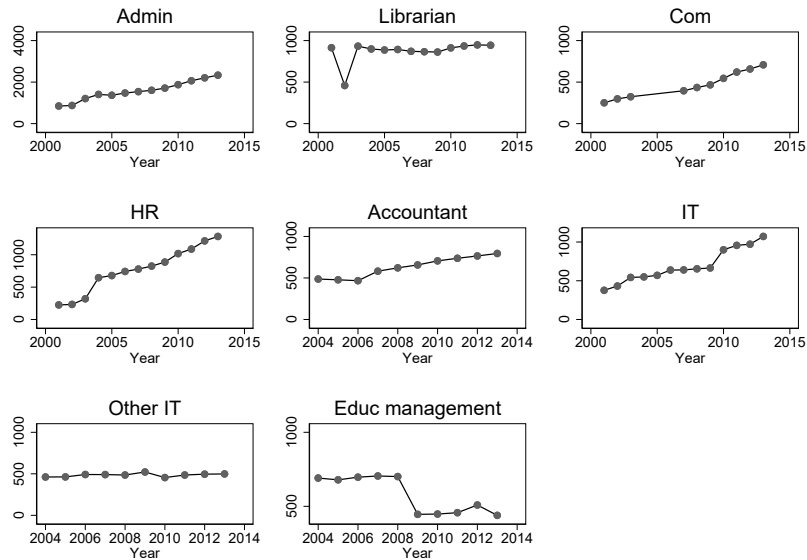
For a definition of of each group, see Table 1.

Figure 2: Number of employees 2014-2018



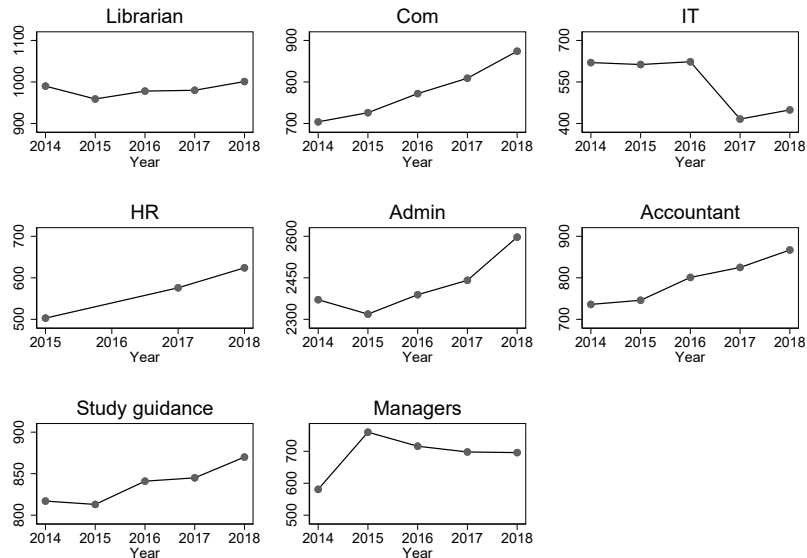
For a definition of of each group, see Table 2.

Figure 3: Detailed description of administration at universities, 2001-2013



Number of employees depending on profession in the group administration at universities. Admin=administrations. Com= Communications. HR = Human Resources. For a detailed deception of each profession, see Table 1.

Figure 4: Detailed description of administration at universities, 2014-2018



Number of employees depending on profession in the group administration at universities. Com= Commu- nications. HR = Human Resources. For a detailed deception of each profession, see Table 2.

4.2 Financing the increase in administration

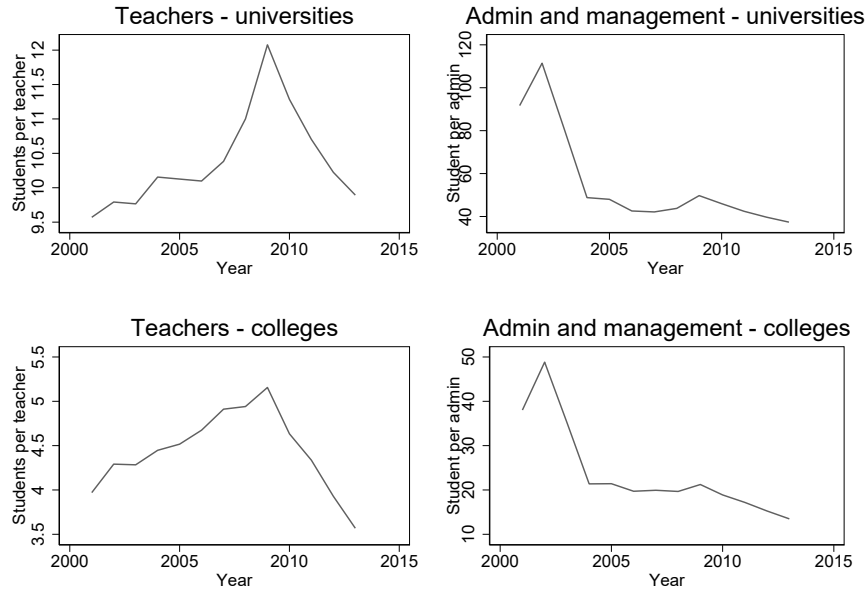
A major source of funding for Swedish universities and colleges is the payment for students, which is divided into one part for the student attending a college or university, and one part if the student is able to receive all their credits for that semester. Therefore it is interesting to see if the ratio of students to teachers and administrators have changed, and we plot this ratio in Figures 5-6. For almost all years the ratio of students to administrators have been decreasing, suggesting that an increasing amount of money is being directed to administration. The ratio of students to teachers varies over time, reflecting the fairly large variation in the number of students per year whereas the number of researchers and teachers have less variation over time. This also suggests that teachers and researchers are able to cope with a sudden increase in students, whereas the administration is continuously expanding.

The relative wage share for each group of profession is plotted in Figures 10-11 in the appendix. Between 2001-2013, the wage share that the group administration received increased from 6 to 16 percent. Wages for assistant admin. and supporting staffs did decline during this time, suggesting that there is a transfer of resources from less skilled supporting staff into more educated administration.

Many professions have, over time, been exposed to technical change and have been replaced by digital technology (Acemoglu and Autor, 2011; Acemoglu and Restrepo, 2019). For example, a professor today works on his own computer instead of having a secretary helping him or her on a type-writer. This technological change creates a possibility for universities and colleges to reduce the number of employees, freeing up resources that can be used to other employees who cannot be automated. For publicly funded organizations, with a limited possibility to increase their resources, the ability to release resources through automatization could provide an increase of resources that otherwise would be hard to acquire.

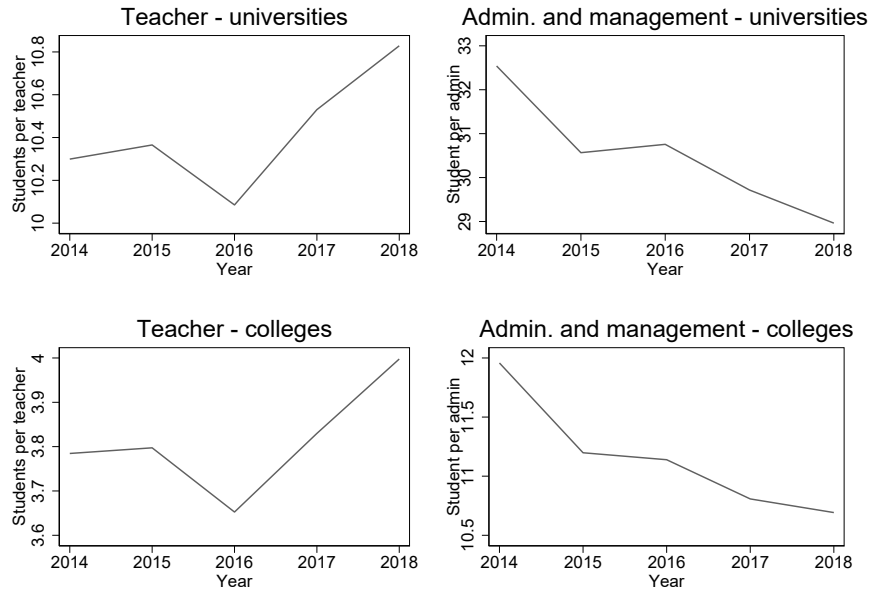
To see if the change in professions is related to technical change, we use the probability that a profession will be automated as calculated by Gardberg et al. (2020). Their calculations can be used for the SSYK-codes that we have access to, making it possible to see

Figure 5: Ratio of students to administrators and teachers, 2001-2013



Number of students per group "Professional admin. and management" and "Teachers and researchers".

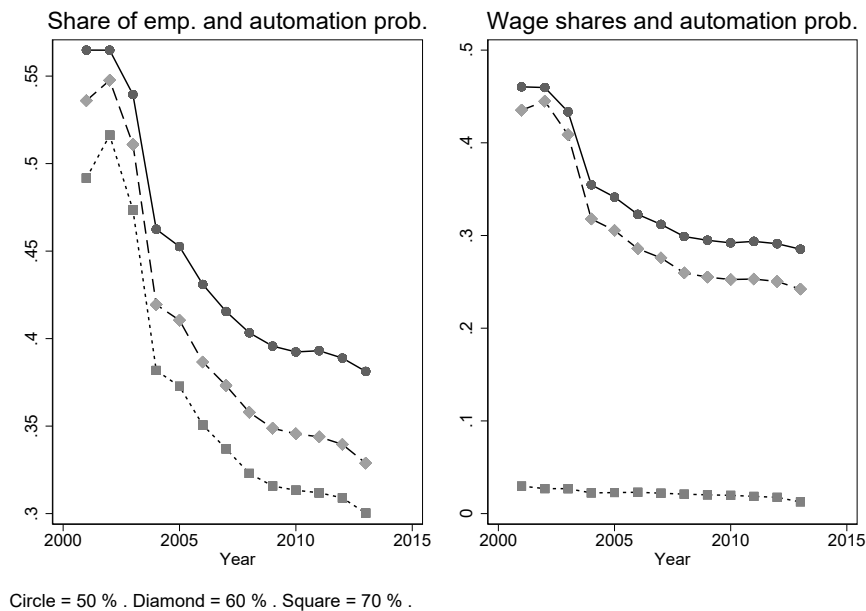
Figure 6: Ratio of students to administrators and teachers, 2014-2018



Number of students per group "Professional admin. and management" and "Teachers and researchers".

if professions that have a theoretical high chance of automation also decrease over time in practice. However, since their probabilities are calculated for SSYK96 professions, we only use them for the 2001-2013 period to ensure that there is no mistake when converting the codes. In Figure 7, we plot the changes of professions with an automation index over 50, 60 and 70 percent, respectively.

Figure 7: Relative no. of employees and wages for automation exposed professions



Professions with more than 50, 60 or 70 percent of automation included, 2001-2013. The share of employees and wages is relative to the total of all employees included in the analysis.

It is clear that both the number of employees and the wage shares for these groups have decreased substantially. The drop in wages for the groups with 50-60 percent chance of automation is quite rapid, dropping from roughly 45 percent in 2001 to 25 percent in 2013. For the the group with the highest chance of automation, the wage share is and remains low for the entire period.

This decrease in employees that can be replaced with digital technology could partly explain how resources have been available for the increase in qualified and highly educated administration. The economic surplus created when employees can be replaced with digital

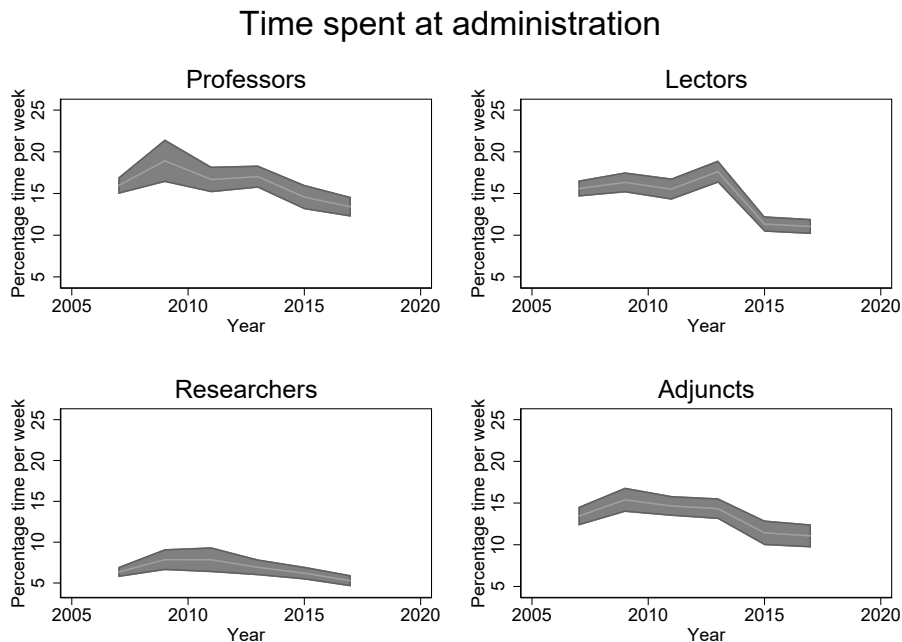
technology seems to have been directed into the administration, allowing the administration to expand both in terms of employees and as a share of wages.

A possible caveat is that some low-skilled professions, such as cleaners, could have been outsourced to private firms during this time and would therefore not show up in the data. Unfortunately, we are not able to address this problem.

4.3 Time usage of researchers and teachers

A natural follow up question is how the changes in bureaucracy affects the time usage for researchers and teachers. If an increase in the quantity, or quality, of administrative staff leads to a decrease in the time spent doing administrative task, it could be a price worth paying. We test this theory using a biannual survey of time usage for Swedish academics between 2007-2017, which is produced by SCB and Swedish Higher Education Authority (Universitetskanslersämbetet). One of the question asked is how much time, as a percentage of their total working hours, that employees spend at "Administration not related to R&D". We use this variable to see if the increase in qualified administration leads to a significant decrease in the time that various categories of teachers and researchers that are separated in the survey. We plot the answer to to the questions, along with the 95% confidence intervals, in Figure 8.

Figure 8: Time spent administration not related to R&D



Time is defined as the share of total workload. The Y-axis is identical for all groups.

While all groups have a decrease in the time spent at administration, the decline is quite

limited for all groups and time spent at administration is roughly 15% for most groups.

This suggest that the large increase in administration does not lead to a significant drop in the time that researchers and teachers spend on administration. It does not, however, seem to increase.

5 Conclusions

This paper studies the evolution of employees in the 20:th most common professions in Swedish universities and colleges, using detailed registry data. Higher education is an excellent test-bed for theories of sclerosis and bureaucratization, since it is easy to measure the employees that are the main producers: teachers and researchers. In combination with being non-profit, there are several reasons to why such organizations might become more sclerotic over time. They are complicated, making it difficult for management to understand the production process. The output is diverse, including both teaching and research; quality is difficult, almost impossible, to measure.

The results shows that qualified administration is growing at a much more rapid rate than teachers and researchers. Our results are possible due to the fine grained employment data, which allows us to document changes within categories of administration, instead of grouping all non-teachers and researchers into one category. Not all areas of administration have grown, especially not administration with lower educational requirement or personnel that can be replaced with digital technology. Instead, the growth has been most rapid in more qualified administration, especially related to communications, human resources and general administration and management. The increase is quite dramatic, with a large expansion of both number of employees and total wages. During the short period of 2014-2018, total wage sums grew ten times as rapid for qualified administration and management as for teachers. This increase is likely to large crowding out effects on alternative uses for this funding.

This increase seems to have been partly financed by a reduction of other categories, to a

large degree professions that have been replaced by digital technology. While we are unable to provide a strict causal explanation for this expansion, the results suggests that qualified administration have benefited from the resources that becomes available due to technological progress, in a sense capturing the rent that digital technology has produced. This increase in administration does not lead to a significant reduction, nor increase, in the time that teachers and researchers spend on administration themselves. It is therefore quite unclear what the additional administration produces or how it benefits the core production in terms of teaching and research.

If an increasing share of the funding for universities and colleges is being spent on administration, this could have negative effects on the amount of research being produced. If the trend of increasing funding to qualified administration continues, this could have serious negative effects for the quantity and quality of teaching and research, as these professions are starved for resources. This is especially relevant considering the recent research that shows a decrease in productivity growth and spending on R&D in private firms ([Erixon and Weigel, 2016](#); [Färnstrand Damsgaard et al., 2017](#); [Arora et al., 2018](#); [Bloom et al., 2020](#)). This study only considers one country, Sweden, and it would therefore be interesting to see if the trends are similar in other countries, as well as in other organizations, both for-profit and non-profit.

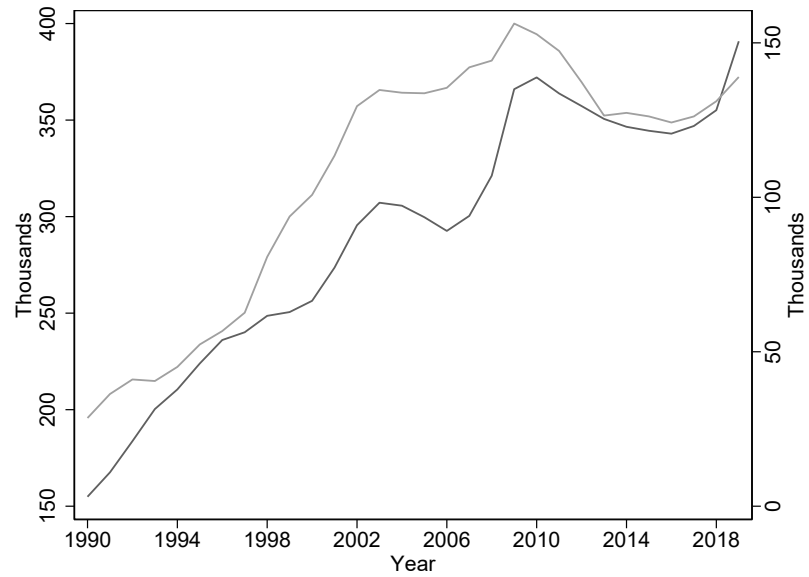
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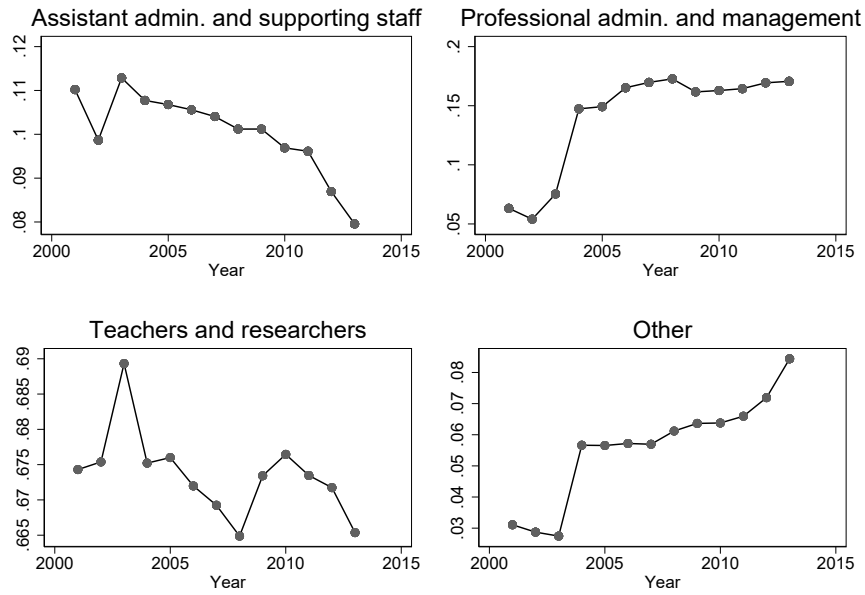
A Additional statistics

Figure 9: Number of students at colleges and universities



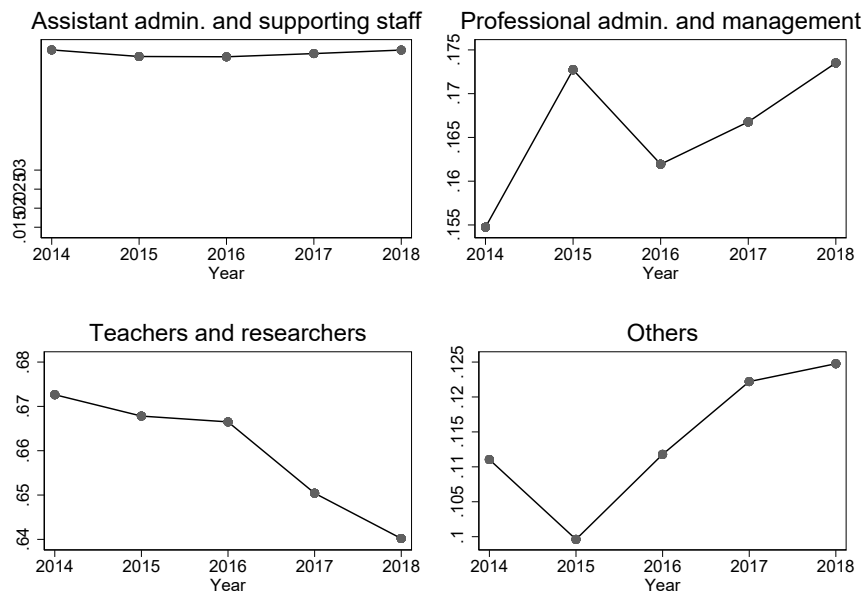
Students at universities (black, left axis) and colleges (gray, right axis), 1990-2018. Only students from colleges and universities that are used in the analysis included.

Figure 10: Relative wage shares for different professions, 2001-2013



Wages are relative to the entire wage sum for all 6 groups.

Figure 11: Relative wage shares for different professions, 2014-2018



Wages are relative to the entire wage sum for all 6 groups.

B Definition of groups

Tables 1-2 show each of the professions, with their own SSYK-code, as well as which group that profession have been placed.

Table 1: Definition of groups for SSYK96

| Profession name | SSYK96 | Group name |
|---|--------|--|
| Administrative secretaries and related associate professionals | 3431 | Assistant admin. and supporting staffs |
| Public service administrative professionals | 2470 | Professional admin. and management |
| Agronomists and horticulturists | 2213 | Other |
| Librarians and related information professionals | 2432 | Professional admin. and management |
| Library and filing clerks | 4140 | Assistant admin. and supporting staffs |
| Biologists and related professionals | 2211 | Other |
| Life science technicians | 3240 | Other |
| Numerical clerks | 4120 | Assistant admin. and supporting staffs |
| Data entry operators | 4111 | Assistant admin. and supporting staffs |
| Computer assistants | 3121 | Assistant admin. and supporting staffs |
| PhD Students | 0007 | Teachers and researchers |
| Finance and administration managers | 1231 | Professional admin. and management |
| Physicists and astronomers | 2111 | Other |
| Helpers and cleaners in offices | 9122 | Assistant admin. and supporting staffs |
| Authors, journalists and related professionals | 2451 | Professional admin. and management |
| Office secretaries | 4112 | Assistant admin. and supporting staffs |
| Chemical and physical science technicians | 3111 | Other |
| Medical doctors | 2221 | Other |
| Agricultural, fishery and related labourers | 9210 | Assistant admin. and supporting staffs |
| Military | 0110 | Other |
| Personnel and careers professionals | 2412 | Professional admin. and management |
| Receptionists | 4222 | Assistant admin. and supporting staffs |
| Bookkeepers | 3433 | Assistant admin. and supporting staffs |
| Accountants | 2411 | Professional admin. and management |
| Computer systems designers, analysts and programmers | 2131 | Professional admin. and management |
| College, university and higher education teaching professionals | 2310 | Teachers and researchers |
| Doorkeepers and related workers | 9142 | Assistant admin. and supporting staffs |
| Production and operations managers in public administration | 1226 | Professional admin. and management |
| Production and operations managers in education | 1227 | Professional admin. and management |
| Other office clerks | 4190 | Assistant admin. and supporting staffs |
| Personal care and related workers not elsewhere classified | 5139 | Assistant admin. and supporting staffs |
| Computing professionals not elsewhere classified | 2139 | Professional admin. and management |
| Business professionals not elsewhere classified | 2419 | Professional admin. and management |
| Teaching professionals not elsewhere classified | 2359 | Other |

Definition of the professions and groups that are used 2001-2013.

Table 2: Definition of groups for SSYK2012

| Profession name | SSYK2012 | Group name |
|--|----------|--|
| Librarians and archivists | 2622 | Professional admin. and management |
| Library and filing clerks | 4410 | Assistant admin. and supporting staffs |
| Medical and pathology laboratory technicians | 3212 | Other |
| Cell and molecular biologists and related professionals | 2131 | Other |
| PhD Students | 2314 | Teachers and researchers |
| Research assistants | 2313 | Other |
| Physicists and astronomers | 2111 | Other |
| Public relations professionals | 2432 | Professional admin. and management |
| Chemical and physical science technicians | 3215 | Other |
| Software- and system developers | 2512 | Professional admin. and management |
| Personnel and human resources specialist | 2423 | Professional admin. and management |
| Policy administration professionals | 2422 | Professional admin. and management |
| Professors | 2311 | Teachers and researchers |
| Accountants | 2411 | Professional admin. and management |
| School counselor | 2352 | Professional admin. and management |
| Cleaners and helpers in offices | 9111 | Assistant admin. and supporting staffs |
| ICT support technicians | 3512 | Assistant admin. and supporting staffs |
| System administrators | 2515 | Professional admin. and management |
| University and higher education lecturers | 2312 | Teachers and researchers |
| Janitors and related workers | 9622 | Assistant admin. and supporting staffs |
| ICT-specialist professionals not elsewhere classified | 2519 | Professional admin. and management |
| Managers in public services not elsewhere classified, level 1 | 1591 | Professional admin. and management |
| Engineering professionals not elsewhere classified | 2149 | Other |
| Administrative secretaries and related associate professionals | 3359 | Assistant admin. and supporting staffs |
| Office clerks not elsewhere classified | 4119 | Assistant admin. and supporting staffs |
| Other physicians | 2219 | Other |
| University and higher education teachers not elsewhere classified | 2319 | Teachers and researchers |
| Operations managers in public services not elsewhere classified, level 2 | 1592 | Professional admin. and management |

Definition of the professions and groups that are used 2014-2018.