

The impact of the establishment of a university in a peripheral region on the local labour market for graduates

WORKING PAPER No. 11/2018

Gerwin Evers

Aalborg University, Department of Business and Management
Innovation, Knowledge and Economic dynamics (IKE) group
Aalborg, Denmark
evers@business.aau.dk



The impact of the establishment of a university in a peripheral region on the local labour market for graduates

Table of Contents

| | |
|---|----|
| Abstract | 3 |
| 1. Introduction | 4 |
| 2. Literature Review..... | 5 |
| 3. Methodology & case study overview..... | 8 |
| 3.1. Empirical context..... | 8 |
| 3.2. Data, variables and analyses..... | 9 |
| 4. Empirical results..... | 10 |
| 5. Discussion | 13 |
| 6. Conclusion..... | 16 |
| Acknowledgements | 16 |
| 7. References | 17 |

Figures

| | |
|---|----|
| Figure 1. Number of graduates per cohort..... | 10 |
| Figure 2. Wage development per cohort university graduates ten years after graduation.. | 11 |
| Figure 3. Retention of AAU graduates to origin | 12 |
| Figure 4. Share of graduates in the workforce per labour market region | 13 |

The impact of the establishment of a university in a peripheral region on the local labour market for graduates

Abstract

University establishments have become a common policy instrument to revitalize peripheral regions. By introducing a supplier of highly skilled graduates, firms in these regions get the access to human capital that is crucial for their development. However, it can turn out to be a cathedral in the desert. Furthermore, graduates can feel forced in the absence of labour market demand to take a job below their skill level. To date there are just a few studies covering the mobility of younger universities, and these studies are limited to studying only mobility at one point in time. The importance that university establishments have as instrument to revitalize peripheral regions asks for detailed exploration of these dynamics.

The empirical analysis takes the form of a quantitative case study at the establishment of Aalborg University in 1974 in the North Denmark region. Although the wage analysis indicated some slight differences in the intra-regional graduate wages, they are negligible when taking the costs of living into consideration. Furthermore, the retention rates of both local and incoming graduates have been stable over the last few decades, which implies in a context of fast rising graduate numbers an increasing absorbance of graduates. Over time, this development resulted in an increased share of graduates in the workforce of the Aalborg labour market, whose relative growth outpaces that of the other urbanized labour markets in Denmark. Therefore, we can conclude that the economy of a peripheral economy can adapt to and benefit from the establishment of a university.

Keywords: University; peripheral region; labour market; graduates.

JEL: I23; J23; J40; R23

The impact of the establishment of a university in a peripheral region on the local labour market for graduates

1. Introduction

Universities are increasingly expected to play an important role in regional development and innovation (Charles, 2006; Chatterton & Goddard, 2000). One of the reasons for the development of this role is the growing importance of knowledge in today's economy (Grant, 1996; Malmberg & Maskell, 2002). There is a dual role in this for universities; although universities can help firms directly by collaborating and supplying knowledge, the main university mission is the training of a high skilled labour force, which enables organizations to process and utilize knowledge, and thereby compete in the knowledge-based economy (Charles, 2006; Etzkowitz & Leydesdorff, 1995).

In the 20th century the world has seen a rapid growth in the number of universities, and by the mid of the century the majority of the larger cities, often located in the more central regions, were hosting a university (Perkin, 2007). This development led to an increasing gap in university attendance between the peripheral and central regions due to commuting distances (Frenette, 2004; Looker & Andres, 2001). Furthermore, many of the youngster that moved to other regions for their study, did not return afterwards (Faggian & Mccann, 2009; Groen, 2004).

Both these developments led to a thin labour market for graduates in peripheral regions; and limited thereby the local companies' access to high skilled labour (Tödtling & Trippl, 2005). Given the importance of this labour to compete in the knowledge-based economy, peripheral regions faced difficulties in maintaining and developing industries in their region. To address this particular issue, policymakers, often encouraged by local lobby initiatives, used the establishment of a university as instrument to take away this barrier to economic development. In the years afterwards, these regions experienced an increased university attendance (Charles, 2016; Frenette, 2009), and over the first decades most new universities experience rapid growth rates. However, just having a university as fast-growing supplier of graduates in the region is not sufficient, since it can also turn out to be a cathedral in the desert, from where people obtain their degree and move away due to lack of industry demand for their skills. Furthermore, graduates can feel forced in this situation to take a job below their skill level, leading both to lower wages compared

The impact of the establishment of a university in a peripheral region on the local labour market for graduates

to their peers in other regions and reduced public returns on the investments in university education (Seamus McGuinness, 2006). Previous studies at graduate labour markets have given us some insights in possible dynamics, but have left this particular issue merely untouched. To date there are just a few studies around this issue, but data constraints allow these studies only to assess mobility at one point in time (Faggian & Mccann, 2009; Saarivirta & Consoli, 2014). Given the importance that university establishments have as instrument to revitalize peripheral regions, we see the need to explore these dynamics in more detail, by providing an answer to the following question:

What impact does the establishment of a university in a peripheral region has on the local labour market for graduates?

This investigation takes the form of a quantitative case study at the establishment of Aalborg University (from now on AAU) in 1974 in the North Denmark region. The availability of the micro-level data from all graduates in Denmark provides the opportunity to conduct a detailed and complete analysis of the graduate labour market dynamics around the establishment of Aalborg University. This study adds to the ongoing academic discussion about the role that universities can play in regional development and innovation, while offering at the same time insights about the impact of a new university that offers new avenues for policy development. The following sections address subsequently the theory, methodology and the empirical results. The paper ends with a discussion and conclusion.

2. Literature Review

Universities have always fulfilled a role as educational institution. Although there is a variety of institutions that train people for the labour market, universities distinguish themselves by equipping their graduates with a unique set of capabilities focused on the incorporation and application of (relatively new) knowledge of a particular domain¹. There has been a growing consensus that human capital plays an important

¹ We could also argue that students who are more theoretically oriented opt for university education and universities are just claiming credit for this selection bias. Anyway, for companies a university degree signals the presence of these skills

The impact of the establishment of a university in a peripheral region on the local labour market for graduates

role in economic development (Teixeira & Queirós, 2016), and that especially the university taught capabilities of absorbing and processing knowledge are crucial to firm performance in the knowledge-based economy (Cohen & Levinthal, 1990).

This makes it crucial for firms to have access to a labour market on which they can acquire employees with these skills. However, there are interregional differences in the composition of the supply-side of the labour market, and university graduates in particular tend to cluster in the more urbanized regions. This is mainly due to that youngster move to other regions for studying and do not return afterwards (Faggian, McCann, & Sheppard, 2007), partly because of accumulated social capital in their new home region increases the opportunity costs for moving back to their home region. Furthermore, career possibilities tend to play a significant role in migration decisions, and the thin labour market characterizing peripheral regions makes these regions less attractive for graduates, since it is not just about finding the first job, but also determines future career paths (King *et al.*, 2016; Tödting & Trippl, 2005).

Hereby, peripheral regions without a university experienced a limited supply of graduates to the local labour market, limiting the ability of their knowledge-intensive companies to hire graduates. This process had all the characteristics of a vicious cycle, since few graduates meant little development of the local company base and a growing gap with the central regions, making the region even less attractive for the next cohorts of graduates. Regional stakeholders fearing that this would determinate the long-term fate of their region, started lobbying for the establishment of university (campus) in their region to stop this process. In the cases in which the stakeholders succeeded, the establishment of a university led to an increased university attendance among local youth (Frenette, 2009), and it also reduced the barrier for people at a later age to obtain a university degree (Charles, 2016).

In the decades that follow, young universities tend to display a rapid growth in student numbers, leading to an increased number of graduates available for the regional labour market. Although the wide availability of talent for the local companies was one of the motives for establishing a university, it is uncertain

The impact of the establishment of a university in a peripheral region on the local labour market for graduates

whether there is enough demand from the local labour market to provide employment for the increasing supply of graduates.

On the one hand, in most peripheral regions firms were experiencing a labour market shortage for highly skilled human capital prior to the establishment of the university (Tödtling & Trippel, 2005), which would suggest a good labour market position for the graduates coming from the new university. On the other hand, the new educational institution lacks track record and firms have little indication of the quality of the education. Therefore, although the presence of a university provides many home-grown graduates, firms might still prefer to hire graduates from the universities with a better reputation. However, in most cases new established universities build on preceding educational institutions in the regions, which might give them some regional legitimacy from the start. Nevertheless, regions need to increase the local demand for graduates in order to reap the benefits of the fast-growing university. However, knowledge intensification and economic development of regions are gradual long-term processes (Maskell & Malmberg, 1999).

The processes described above all influence either the demand or supply on the graduate labour market. To resolve occurring mismatches, labour economists present wage and labour mobility as instruments to bridge the gap between demand and supply. Intra-regional inter-sectoral wage differences in Denmark will be rather limited due to high prevalence of national collective bargaining agreements in Denmark (Due, Madsen, Jensen, & Petersen, 1994). However, by lack of industry demand for graduate skills, graduates could decide to find employment in jobs that do not require university skills. By opting for a job for which they are overeducated, they are most likely to receive a wage that is lower than that of their peers that are able to find an employment that matches their skill level (McGuinness, 2006). Hereby, intra-regional wage differences could even occur in labour markets controlled by collective bargaining agreements.

The second mechanism, mobility is expected to be even more indicative for labour market mismatches. Graduates are in general more mobile, in particular students who have shown mobility in the past, are more likely to move again (Faggian & Mccann, 2009). Therefore, when graduates enter a labour market on which there is

The impact of the establishment of a university in a peripheral region on the local labour market for graduates

insufficient demand for their skills, they might rather prefer to find employment in other regions than to enter a position for which they are overeducated. Hereby the mobility of graduates gives insight in whether there is enough industry demand in the region for graduates, since low mobility among graduates signals an unmet demand, but graduates leaving the region is indicative for an oversupply of graduates. Although that students moving out does not necessarily needs to be described as a brain-drain (Venhorst, Van Dijk, & Van Wissen, 2010), it is important for the local economy to acquire a significant part of them for the local labour market to support the development of the local industry.

In a study at young rural universities in Finland that are founded as part of new Finish science and technology policies of the 1960s, Saarivirta & Consoli (2014) find based on a questionnaire that many of these universities acted as cathedrals in the desert, where most of their graduates move after graduation to the more central regions close to Helsinki. Contrastingly, Faggian & Mccann (2009) find low mobility for the graduates of the post-1992 university in the UK. However, both these studies do not incorporate wage, and study the mobility at just one point in time.

3. Methodology & case study overview

3.1. Empirical context

The AAU was established in 1974 in the North Denmark region located at the northern tip of continental Denmark. Population numbers show that North Denmark is the smallest Danish region with around 550,000 inhabitants, from which more than a third are living in the main city Aalborg (Statistics Denmark, n.d.-a). Prior to the establishment of the university, the region shared many of the characteristics that are typical for a peripheral region; a focus on small non-knowledge intensive companies, a negative migration balance, relatively high unemployment numbers and a lower educated workforce. Nevertheless, the region hosted at that time several technical higher education institutions that formed together the foundation for the new university. This meant that the university did not need to start from scratch and could benefit from the existing legitimacy in the region (Aalborg University, n.d.-a; Nilsson, 2006; Plenge, 2014).

The impact of the establishment of a university in a peripheral region on the local labour market for graduates

The change to a university status led to a sharp increase in student numbers from 1,635 in 1974 to a quadrupled number in 1990 (Aalborg University, n.d.-b). Nowadays, the AAU is the fourth university of Denmark based on the number of full-time students (20,506 in 2016), and spreads among three cities, although with a strong concentration on the Aalborg campus which hosts around eighty percent of the students. The university has five faculties (Humanities, Social Sciences, the Technical Faculty of IT and Design, Engineering and Science, Medicine) from which the Faculty of Social Sciences with 6,212 students is the largest. However, the heritage of the preceding higher education institutions is still visible in the strong technical character of the university (between 39% or 48% of the students are enrolled at one of the technical faculties, depending on whether the Faculty of Medicine is included (Aalborg University, n.d.-c)).

3.2. Data, variables and analyses

In order to study the wage and mobility dynamics on the graduate labour market after the establishment of the university, register data from the Danish Integrated Database for Labour Market Research (IDA) is used. This database contains micro-level data for all individuals in Denmark, on a wide set of variables, including wage, place of residence and educational history. Data for most of our variables is available from 1982 until 2006.

For the wage analyses, we conduct an intra-regional comparison of the average hourly wage of all university graduates ten years after graduation. The regions of interest are for this purpose the four most urbanized labour market areas, which are proposed by Andersen (2000) based on commuting patterns. The Copenhagen labour market region is with a workforce of 1,1 million in 2006 significantly larger than the labour market regions of Aarhus (286,134), Odense (201,253) and Aalborg (159,757). Together these regions represent nearly two-thirds of the total Danish workforce.

The time span of ten years is chosen, since most employees experience the majority of their wage growth within the first years of their employment (McCue, 1996), allowing after ten years a comparison that is more indicative for the whole career.

The impact of the establishment of a university in a peripheral region on the local labour market for graduates

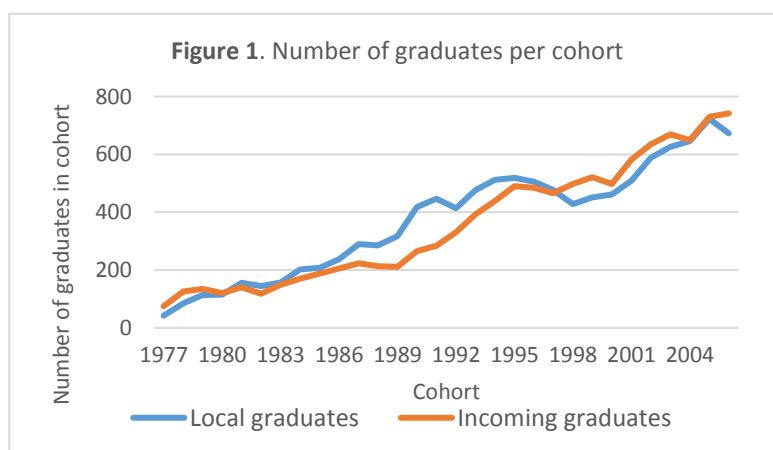
Furthermore, it allows using wage data from 1982 for assessing the labour market position of university graduates that received their degree in 1972². The part of the population that lacks a valid estimate of the hourly wage is excluded from the wage analysis (Statistics Denmark, n.d.-b).

Our mobility analysis, taking in mind the findings of Faggian & Mccann (2009) that graduates that moved before are more likely to move again, distinguishes local graduates from incoming graduates. Graduates are classified local when they went to high school within an hour travel time from Aalborg University, while all other graduates are classified as incoming. Next is checked where these graduates resided five years after their graduation, to assess the retention rates of graduates for the region based on whether graduates are located within an hour travel time from Aalborg University.

4. Empirical results

In 1982, just after the first cohorts of AAU graduates entered the labour market, only 1.5% of the people in the workforce of the Aalborg labour market region had obtained a university degree. Although a similar percentage was the case for the Odense labour market region, the labour market regions of Aarhus with 2.3% and Copenhagen with 2.8% were better served.

After the establishment of the university, the supply of graduates by Aalborg University really gained steam in the second half of the 1970s. Our data in *Figure 1* displays the development of the graduate numbers for both the local and



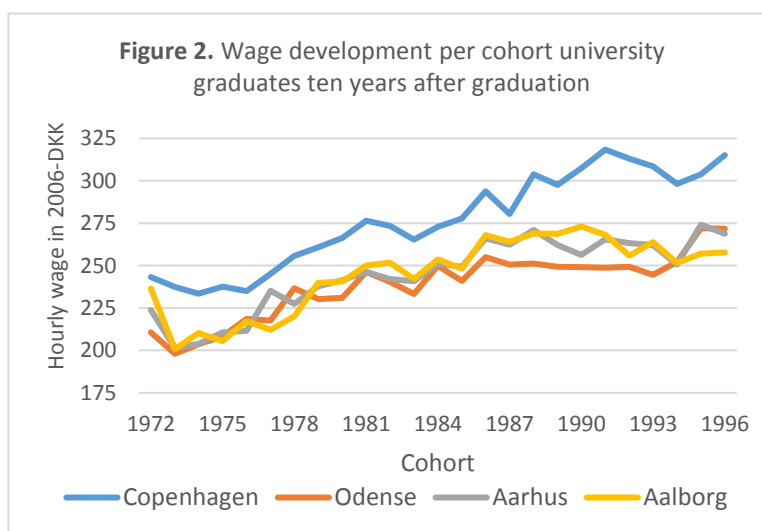
Source: Own compilation based on register data from Statistics Denmark

² Here we refer to university graduates, irrespectively of the university from which they obtained their degree

The impact of the establishment of a university in a peripheral region on the local labour market for graduates

incoming students. Over the years, both groups have been about the same size and experienced a similar growth. While the local graduates group developed from 42 graduates in 1977 to 673 in 2006, the incoming group developed in the same period from 75 to 742. These numbers display both a rapid relative as absolute growth, and clearly indicate that the establishment of Aalborg University has introduced a fast-growing supplier of university graduates to the Aalborg labour market.

Given the small and thin graduate labour market around Aalborg prior to the establishment of the university, graduates might weaken their bargaining position when searching for employment in the Aalborg graduate labour market or might be forced to opt for jobs that do not match their skill



Source: Own compilation based on register data from Statistics Denmark

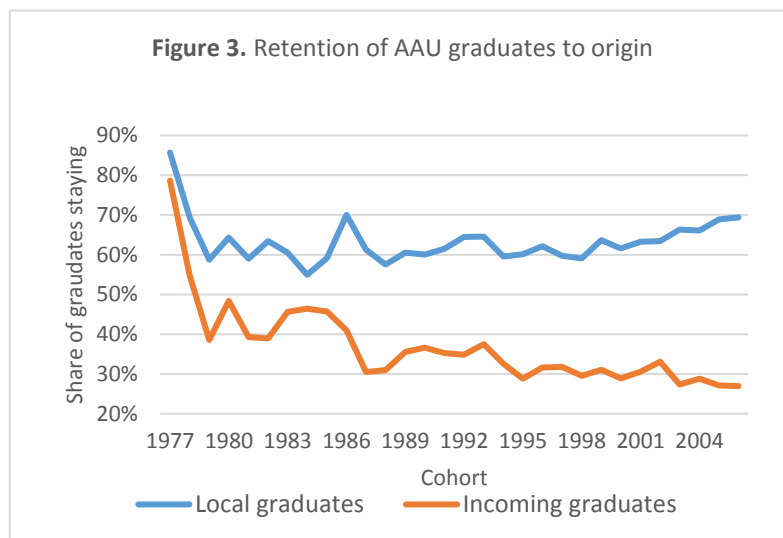
level. However, the wage development in *Figure 2* indicates that their hourly wage in 2006-adjusted Danish Kroner has developed in a similar upward fashion as that of graduates that find employment on the labour markets in the other main urbanized labour market regions. Nevertheless, the graduates finding employment in the Copenhagen labour market seem to have acquired a substantial wage premium compared to the other regions. Possibly this can be attributed to the above average presence of multinational companies in the capital, but is negligible if the increasing costs of living in the capital region are taken into consideration.

The intra-regional similarities in wage development are most likely mainly due to the collective bargaining agreements in place that are negotiated on the national level, and therefore not indicative for intra-regional differences in graduate labour market mismatches. However, the limited wage difference still indicates that graduates from Aalborg University are not forced to apply for jobs for which they are overeducated.

The impact of the establishment of a university in a peripheral region on the local labour market for graduates

Although the wage analysis indicates us that wage differences are not playing a major role, it gives us only a partial insight in the labour market dynamics. By moving away from the wage analysis, and providing insight in the mobility dynamics of the graduates of Aalborg University, we give a more detailed insight in the dynamics on the Aalborg labour market for graduates.

The mobility analysis focuses on the extent to which the Aalborg labour market can offer employment to AAU graduates, by assessing the share of graduates that stayed in close vicinity of the AAU after graduation. For this purpose, *Figure 3*

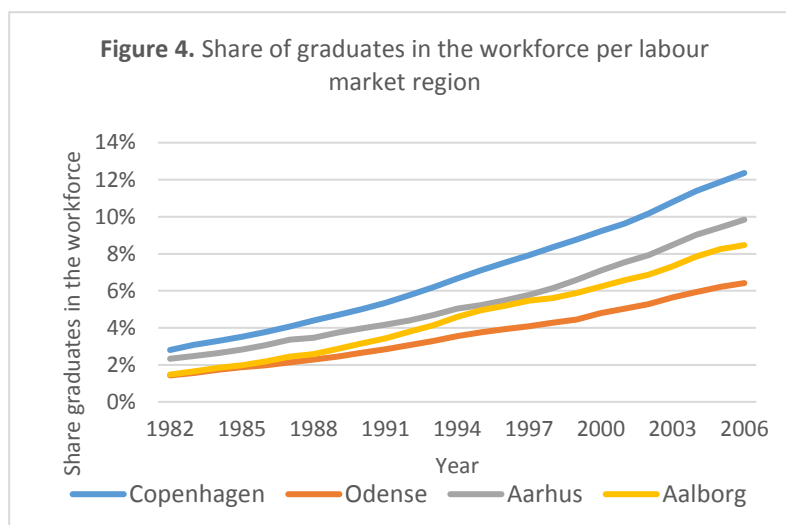


displays the retention rates of AAU graduates, distinguishing again local from incoming graduates. Both groups experience high retention rates for the early cohorts, which could be due to either a strong unmet industry demand prior to the establishment of the university, or by the university hiring their own graduates as staff to accommodate the very rapid growth of the early years. However, over time a more stable pattern emerges, with a slightly increasing retention for the local graduates and a slight decline for the incoming graduates. Overall, in the context of rapid growing graduate numbers, these stabilizing retention rates are indicating an increasing absorbance of graduates.

Although *Figure 3* showed that the region around Aalborg increased its absorbance of graduates, it could be that the other regions are also increasing their uptake of graduates, and thereby still increase the gap with the Aalborg labour market region.

The impact of the establishment of a university in a peripheral region on the local labour market for graduates

To study this, *Figure 4* displays the development of the share of university graduates in the workforce of the four labour market regions. While Copenhagen experienced a 9,6% absolute growth in the share of graduates from 2,8% in 1982 to 12,4% in 2006, and Aarhus grew



Source: Own compilation based on register data from Statistics Denmark

7,5% starting from 2,3% in 1982, the Aalborg labour market region showed a slightly lower absolute percentage growth of 7% from 1,5% in 1982 to 8,5% in 2006. Nevertheless, if we look at a relative percentage growth rates, Aalborg more than quadrupled their share of graduates and is displaying a significantly higher relative growth than the other regions.

5. Discussion

Although knowledge intensification and economic development of regions are gradual long-term processes (Maskell & Malmberg, 1999), the case of Aalborg University has shown that the development of the local demand for graduates can keep pace with the rapid development of a new established university in the region. Over the studied period, a substantial increase in the share of graduates in the Aalborg labour market region becomes visible, which is nevertheless slightly lagging behind the absolute growth percentages of the Copenhagen and Aarhus labour market regions. This is in line with Berry & Glaeser (2005) who found that regions with higher human capital levels show a larger subsequent absolute growth in people with university degrees. However, the intra-regional absolute growth differences are small in our case, and the Aalborg outperforms the other regions when the relative growth of the share of university graduates in the workforce is assessed.

From the limited number of studies at graduate mobility of young universities we obtain a mixed view. Faggian & Mccann (2009) find limited mobility among the

The impact of the establishment of a university in a peripheral region on the local labour market for graduates

graduates of the post-1992 universities, and explains that by pointing at the stronger orientation of these universities to cater to the local economies, since most of their funding was originally coming from the region. Saarivirta & Consoli (2014) on the contrary, who conducted a study at five of the universities that were established as result of the new national Finish science and technology policies in the 1960s, found that region could only maintain a minority of their graduates in the region. The discrepancies could be stemming from differences in the orientation of the universities.

Aalborg University and the post-1992 universities identify themselves as local actors, which is due to that their establishment is linked to the support of local stakeholders who not only were convinced that their region needed a university, but also indicative for a substantial critical mass of industry demand in the region. However, the universities in the study of Saarivirta & Consoli (2014) are established as part of a new national science and technology policy, in considerable smaller towns, lacking the critical mass of industry for making it an attractive place for a new graduate to start their career. That these initial differences can have long term consequences in the development of universities has been shown in for the cases of i.a. Tampere, Turku and Aalborg (Bruun, 2004; Guerrero & Evers, 2018; Kautonen, Koski, & Schienstock, 2004). In their case study at the role of Aalborg University in the regional development of the surrounding region, Guerrero & Evers (2018) showed that the AAU fulfilled a co-evolving role with the emerging ICT cluster in the region, by conducting both research in the area and increasing their degree offerings related to the sector. Admitting that the university cannot take all credit for the emergence of the cluster, it is without doubt that the AAU by supplying thousands of graduates with skills relevant to the ICT industry has played an important role in this process.

Although this paper focuses on the impact in the region around Aalborg, the contribution of the university goes further than that. Our study has shown that the AAU increased continually their intake of students from outside the region, from whom a growing majority moved after their graduation to other regions in Denmark. Hereby the AAU, who was originally mainly deployed as instrument for regional development, has developed a role as important supplier of graduates to other regions. In this, the growing outward migration of graduates that originated from

The impact of the establishment of a university in a peripheral region on the local labour market for graduates

outside the region does not need to be regarded as a brain-drain, but as part of the national task that a regional university can fulfil. Furthermore, Aalborg can in the short-run benefit from these students since they are creating employment both in the university and city (Venhorst *et al.*, 2010), and when the industry demand spikes the region can benefit from this untapped potential.

Notwithstanding the insight provided in the Aalborg labour market region dynamics, we acknowledge that this study is primarily focused on the impact in the urbanized areas. For further studies, it would be interesting to see how these dynamics play out in the more rural areas. Nevertheless, this study by including two-thirds of the Danish workforce gives a quite holistic picture of the dynamics that are taking place.

While this study focuses on the core labour dynamics around the establishment of Aalborg University, we acknowledge that this establishment might also affect the labour market dynamics of the other universities in Denmark. Prior to the establishment of Aalborg University, the people from Aalborg that wanted to obtain a university degree were forced to move to other regions, and a share of them returned afterwards. It is quite likely that a significant part of this latter returning group now opts for a study in Aalborg, while this might be less the case for students that were less committed to the region. This might result that the share of youngster that move to other cities to study and subsequently return is dropping, due to the selection effect that 'potentially returnees' already were more likely to opt for studying in Aalborg. Further studies into these dynamics could provide some more context to the findings of our study. However, since the development of the overall share of university graduates on the Aalborg labour market has been promising compared to the other regions, we know that these effects will not cancel the findings of this study out.

Finally, this study looks at an aggregate level into both wage and the mobility dynamics. Although we consider this the appropriate level for the focus of our study, we recognize that there are differences between study programmes. Therefore, for further studies on this topic it would be worthwhile to explore how the growth of particular study programmes co-occurs with the development of the sectors in which the majority of their graduates find employment.

6. Conclusion

The purpose of this paper was to look into the impact of the establishment of a university in a peripheral region on the local labour market for graduates. Our analysis has shown that the establishment of the AAU has introduced a fast-growing supplier of highly educated graduates in the Aalborg labour market region. Although the wage analysis indicated some slight differences in the intra-regional graduate wages, they are negligible when taking the costs of living into consideration. Furthermore, the retention rates of both local and incoming graduates have been stable over the last few decades, which implies in a context of fast rising graduate numbers an increasing absorbance of graduates by the local labour market. Over time, this development resulted in an increased share of graduates in the workforce of the Aalborg labour market, whose relative growth outpaces that of the other main urbanized labour markets in Denmark. Therefore, we can conclude that the labour market effects are limited, and that the economy of a peripheral economy can adapt and benefit from the establishment of a university. Nevertheless, we stress that this is not instrument applicable to all regions, since local critical mass and regional embeddedness are required to make the region absorb substantial number of graduates and benefit from the university.

With this paper, we did an effort to add to the limited available literature on the impact of university establishments on the labour market for graduates. Our study has shown that universities can be useful instruments for regional transformation, but acknowledge that local circumstances play an important role in determining the outcome. For practical application it is worth to realize that these university establishments are not something from the past, but nowadays are still applied by regional policymakers in the Western world, who could draw some lessons from this study.

Acknowledgements

The author wishes to thank Marte Solheim, Christian Østergaard and Ina Drejer, for both feedback and practical support provided. Earlier versions of this paper have been presented at the Lincoln International Business School, DRUID academy conference 2018 and the GEO-INNO conference 2018. The author's PhD has received funding from the European Union's Horizon 2020 research and innovation

The impact of the establishment of a university in a peripheral region on the local labour market for graduates

programme under Marie Sklodowska-Curie grant agreement No. 722295, as part of the involvement in the RUNIN training network. The usual disclaimer applies.

7. References

- Aalborg University. (n.d.-a). Aalborg Universitets Historie. Retrieved June 6, 2017, from <http://www.aau.dk/om-aau/historie-priser/historie/>
- Aalborg University. (n.d.-b). Aalborg University in figures and facts. Retrieved September 4, 2017, from <http://www.en.aau.dk/about-aau/figures-facts>
- Aalborg University. (n.d.-c). Studerende på Aalborg Universitet. Retrieved June 7, 2017, from <http://www.aau.dk/om-aau/aau-i-tal/studerende/>
- Andersen, A. K. (2000). Commuting Areas in Denmark.
- Berry, C. R., & Glaeser, E. L. (2005). The divergence of human capital levels across cities. *Papers in Regional Science*, 84(3), 407–444. <https://doi.org/10.1111/j.1435-5957.2005.00047.x>
- Bruun, H. (2004). The emergence of a regional innovation network: BioTurku in Turku, Finland. In G. Schienstock (Ed.), *Embracing the Knowledge economy: the dynamic transformation of the Finnish innovation system*. Edward Elgar Publishing.
- Charles, D. (2006). Universities as key knowledge infrastructures in regional innovation systems. *Innovation: The European Journal of Social Science Research*, 19(1), 117–130. <https://doi.org/10.1080/13511610600608013>
- Charles, D. (2016). The rural university campus and support for rural innovation. *Science and Public Policy*, 43(6), 763–773. <https://doi.org/10.1093/scipol/scw017>
- Chatterton, P., & Goddard, J. (2000). The response of higher education institutions to regional needs. *European Journal of Education*, 35(4), 475–496.
- Cohen, W. M., & Levinthal, D. A. (1990). Absorptive Capacity: A New Perspective on Learning and Innovation. *Administrative Science Quarterly*, 35(1), 128–152.
- Di Pietro, G., & Urwin, P. (2006). Education and skills mismatch in the Italian graduate labour market. *Applied Economics*, 38(1), 79–93. <https://doi.org/10.1080/00036840500215303>
- Dolton, P., & Vignoles, A. (2000). The incidence and effects of overeducation in the U.K. graduate labour market. *Economics of Education Review*, 19(2), 179–198. [https://doi.org/10.1016/S0272-7757\(97\)00036-8](https://doi.org/10.1016/S0272-7757(97)00036-8)
- Due, J., Madsen, J. S., Jensen, C. S., & Petersen, L. K. (1994). *The survival of the Danish Model: A historical sociological analysis of the Danish system of collective bargaining*. (S. Martin, Ed.). Copenhagen: DJØF Publishing.
- Etzkowitz, H., & Leydesdorff, L. (1995). The Triple Helix -- University-Industry-Government Relations: A Laboratory for Knowledge Based Economic Development. *EASST Review*, 14(1), 14–19.

The impact of the establishment of a university in a peripheral region on the local labour market for graduates

- Faggian, A., & McCann, P. (2009). Universities, agglomerations and graduate human capital mobility. *Tijdschrift Voor Economische En Sociale Geografie*, 100(2), 210–223. <https://doi.org/10.1111/j.1467-9663.2009.00530.x>
- Faggian, A., McCann, P., & Sheppard, S. (2007). Some evidence that women are more mobile than men: Gender differences in U.K. graduate migration behavior. *Journal of Regional Science*, 47(3), 517–539. <https://doi.org/10.1111/j.1467-9787.2007.00518.x>
- Frenette, M. (2004). Access to College and University: Does Distance to School Matter? *Canadian Public Policy / Analyse de Politiques*, 30(4), 427. <https://doi.org/10.2307/3552523>
- Frenette, M. (2009). Do universities benefit local youth? Evidence from the creation of new universities. *Economics of Education Review*, 28(3), 318–328. <https://doi.org/10.1016/j.econedurev.2008.04.004>
- Grant, R. M. (1996). Toward a knowledge-based theory of the firm. *Strategic Management Journal*, 17(S2), 109–122. <https://doi.org/10.1002/smj.4250171110>
- Greenbank, P. (2007). Higher Education and the Graduate Labour Market: The 'Class Factor.' *Tertiary Education and Management*, 13(4), 365–376. <https://doi.org/10.1080/13583880701546262>
- Groen, J. A. (2004). The effect of college location on migration of college-educated labor. *Journal of Econometrics*, 121(1), 125–142. <https://doi.org/10.1016/j.jeconom.2003.10.002>
- Guerrero, D. F., & Evers, G. (2018). Co-creation of Localised Capabilities between Universities and Nascent Industries: The Case of Aalborg University and the North Denmark Region (RUNIN working paper series).
- Kautonen, M., Koski, P., & Schienstock, G. (2004). From the national industrial heartland towards a node in the global knowledge economy: the case of Tampere Region. In G. Schienstock (Ed.), *Embracing the Knowledge economy: the dynamic transformation of the Finnish innovation system*. Edward Elgar Publishing.
- King, R., Lulle, A., Conti, F., & Mueller, D. (2016). Eurocity London: a qualitative comparison of graduate migration from Germany, Italy and Latvia. *Comparative Migration Studies*, 4(1), 3. <https://doi.org/10.1186/s40878-016-0023-1>
- Looker, E. D., & Andres, L. (2001). Rurality and capital: educational expectations and attainments of rural, urban/rural and metropolitan youth. *The Canadian Journal of Higher Education*, 31(2), 1–45.
- Malmberg, A., & Maskell, P. (2002). The Elusive Concept of Localization Economies: Towards a Knowledge-Based Theory of Spatial Clustering. *Environment and Planning A*, 34(3), 429–449. <https://doi.org/10.1068/a3457>
- Maskell, P., & Malmberg, A. (1999). Localised learning and industrial competitiveness. *Cambridge Journal of Economics*, 23(2), 167–185. <https://doi.org/10.1093/cje/23.2.167>
- Mason, G., Williams, G., & Cranmer, S. (2009). Employability skills initiatives in higher education: what effects do they have on graduate labour market outcomes? *Education Economics*, 17(1), 1–30. <https://doi.org/10.1080/09645290802028315>

The impact of the establishment of a university in a peripheral region on the local labour market for graduates

- McCue, K. (1996). Promotions and Wage Growth. *Journal of Labor Economics*, 14(2), 175–209. <https://doi.org/10.1086/209808>
- McGuinness, S. (2006). Overeducation in the Labour Market. *Journal of Economic Surveys*, 20(3), 387–418. <https://doi.org/10.1111/j.0950-0804.2006.00284.x>
- McGuinness, S., & Bennett, J. (2007). Overeducation in the graduate labour market: A quantile regression approach. *Economics of Education Review*, 26(5), 521–531. <https://doi.org/10.1016/J.ECONEDUREV.2005.12.003>
- Nilsson, J. (2006). Regions with comprehensive technical universities. In J. Nilsson (Ed.), *The Role of Universities in Regional Innovation Systems: A Nordic Perspective* (pp. 115–142). Frederiksberg : Copenhagen Business School Press.
- Perkin, H. (2007). History of Universities. In *International Handbook of Higher Education* (pp. 159–205). Dordrecht: Springer Netherlands. https://doi.org/10.1007/978-1-4020-4012-2_10
- Plenge, P. (2014). *Ledelse af AAU: syv fortællinger fra AAU's ledelseshistorie* (Aalborg Un). Aalborg Universitet, AAU Kommunikation.
- Saarivirta, T., & Consoli, D. (2014). Where did they go? A study on newly established universities and graduate mobility in Finland. In Pier Paolo Patrucco (Ed.), *The Economics of Knowledge Generation and Distribution The Role of Interactions in the System Dynamics of Innovation and Growth* (pp. 92–116). Routledge. <https://doi.org/10.4324/9780203436271-14>
- Statistics Denmark. (n.d.-a). Population and elections. Retrieved June 7, 2017, from <http://statistikbanken.dk/statbank5a/default.asp?w=1920>
- Statistics Denmark. (n.d.-b). Tlonkval. Retrieved December 20, 2017, from <https://www.dst.dk/da/Statistik/dokumentation/Times/ida-databasen/ida-ansættelser/tlonkval>
- Teixeira, A. A. C., & Queirós, A. S. S. (2016). Economic growth, human capital and structural change: A dynamic panel data analysis. *Research Policy*, 45(8), 1636–1648. <https://doi.org/10.1016/j.respol.2016.04.006>
- Tödting, F., & Trippl, M. (2005). One size fits all?: Towards a differentiated regional innovation policy approach. *Research Policy*, 34(8), 1203–1219. <https://doi.org/10.1016/j.respol.2005.01.018>
- Venhorst, V. A. (2013). Graduate Migration and Regional Familiarity. *Tijdschrift Voor Economische En Sociale Geografie*, 104(1), 109–119. <https://doi.org/10.1111/tesg.12000>
- Venhorst, V., Van Dijk, J., & Van Wissen, L. (2010). Do the best graduates leave the peripheral areas of the Netherlands? *Tijdschrift Voor Economische En Sociale Geografie*, 101(5), 521–537. <https://doi.org/10.1111/j.1467-9663.2010.00629.x>
- Whitley, R. (1992). Societies, Firms and Markets: The Social Structures of Business Systems. In R. Whitley (Ed.), *European Business Systems: Firms and Markets in their National Contexts* (pp. 5–45). London: Sage.