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Gerwin Evers 

ABSTRACT

The establishment of a university can be used as policy instrument to revitalize peripheral regions. Such newly established universities tend to experience rapid growth, but little is known about how this affects the labour market for graduates in these regions over time. A quantitative case study, employing individual-level microdata, analyzed changes in the wage levels and mobility of graduates of Aalborg University, which was established in 1974 in the North Denmark region. The analysis shows that the establishment of Aalborg University contributed to the upgrading of the human capital in the region, fulfilling a demand in the labour market, as indicated by wage growth similar to that of the labour market in other regions and a growing percentage of local young people to stay in the region after graduation. Furthermore, the university increased its intake of students from outside the region, who then as graduates dispersed to other parts of the country, thereby serving to supply human capital at the national level. These insights add to our understanding of how a new university can play a role in the economic development of a peripheral region, while at the same time also having impact at the national level. Nevertheless, this instrument is not applicable to all regions in the same way, since local critical mass and regional embeddedness are required to enable a region to absorb a substantial number of graduates and benefit from the presence of the university.

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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 this role is the growing requirement for knowledge in today's economy (Grant, 1996; Malmberg & Maskell, 2002). There is a dual role in this for universities; although universities can help businesses directly by collaborating, their main mission is the training of a highly skilled labour force, which enables organizations to process and use knowledge and thereby compete in the knowledge-based economy (Charles, 2006; Etzkowitz & Leydesdorff, 1995).

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In the 20th century, the world experienced a rapid growth in the number of universities, and by mid-century most larger cities, often located in more central regions, hosted a university (Perkin, 2007). This development led to an increasing discrepancy in university attendance between peripheral and central regions owing to commuting distances (Frenette, 2004; Looker & Andres, 2001). Furthermore, many of the young people who moved to other regions to pursue their studies did not return afterwards to their original home areas (Faggian & McCann, 2009; Groen, 2004).

Both these developments led to a thin labour market for graduates in peripheral regions and thus limited local companies' access to highly skilled labour (Tödtling & Trippel, 2005). Given the importance of this labour to compete in the knowledge-based economy, peripheral regions encountered difficulties in maintaining and developing industries. As a result, policy-makers, often encouraged by local lobbying, established a university to remove this barrier to economic development. Increased university attendance naturally followed (Charles, 2016; Frenette, 2009), and over their first few decades most new universities grew rapidly. Ideally, these institutions' supply of human capital spur industrial upgrading and the growth of knowledge-intensive industries. However, having a university as a fast-growing supplier of graduates in the region is not sufficient, since it can also turn out to be a 'cathedral in the desert', where students obtain their degree before leaving because of a lack of industry demand for their skills. Furthermore, graduates who prefer to stay in the region can feel under pressure to take a job below their skill level, leading both to lower wages compared with their peers in other regions and reduced public returns on the investments in university education (McGuinness, 2006). Lower wages may in this case be a sign of a mismatch, in which employers in the region value the skills of the graduates less highly than employers in other regions. Previous studies of graduate labour markets have offered some insights into the possible dynamics, but have failed to consider these dynamics in the context of the establishment of a university. To date, just a few studies have touched on this issue (Faggian & McCann, 2009; Saarivirta & Consoli, 2014), but data constraints have limited these studies to assessing mobility at just one point in time. Given the particular importance that university establishments have in revitalizing peripheral regions, there is a need to explore these dynamics in more detail, by attempting to answer the following question:

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

This investigation takes the form of a quantitative case study on the establishment of Aalborg University in 1974 in the North Denmark region. The availability of micro-level data from all graduates in Denmark provides an opportunity to conduct a detailed and comprehensive analysis of graduate labour market dynamics following the establishment of the university. The analysis of these data shows that Aalborg University played a transformative role in the region by upgrading the human capital, fulfilling a labour market demand, as indicated by wage growth similar to that of the labour market in other regions and a growing percentage of local young people to stay in the region after graduation. Furthermore, the university increased its intake of students from outside the region, who then as graduates dispersed to other parts of the country, thereby serving to supply human capital at the national level. These insights add to our understanding of how a new university can contribute to the economic development of a peripheral region, while at the same time also having impact at the national level.

The paper is structured as follows. The next section begins with a literature review, followed by a discussion of theory and methodology and presentation of the empirical results. The paper ends with a discussion and conclusion.

UNIVERSITIES AND THE GRADUATE LABOUR MARKET

Although there are a variety of institutions that train people for the labour market, universities have the distinction of equipping their graduates with a unique set of capabilities focused on the incorporation and application of (relatively new) knowledge of a particular domain. Although the presence of these capabilities could also partly be explained by the selection effect of theoretically oriented young people being more likely to opt for a university education, nevertheless a university degree signals the presence of these capabilities. There has been a growing consensus that human capital plays an important role in economic development (Teixeira & Queirós, 2016), and that especially the university-taught capabilities of absorbing and processing knowledge are crucial to businesses' performance in the knowledge-based economy (Cohen & Levinthal, 1990).

This makes it crucial for firms to have access to a labour market in which they can acquire employees with these skills. However, there are substantial interregional differences in the supply side of the labour market for graduates, regions in the economic periphery tending to experience an undersupply. While these regions are often also situated in the geographical periphery, they are distinguished based on their lower wages (and wage growth), thinner labour markets and stronger reliance on traditional industries compared with the national average. The underdeveloped regional innovation systems in these regions often lack knowledge institutions such as a university for the training of graduates and provide a poorly developed labour market for graduates (Tödtling & Trippl, 2005). Furthermore, young people from these regions moving to core regions for their university education often do not return after graduation (Faggian, McCann, & Sheppard, 2007). This is partly because accumulated social capital in their new home region increases the opportunity costs for moving back to their former home region, but also partly because the underdeveloped labour market in the former home region is likely to reduce their current and future employment opportunities (King, Lulle, Conti, & Mueller, 2016).

The paucity of graduates in the labour market that peripheral regions without a university experience and the consequent limits to the ability of knowledge-intensive companies to hire the graduates they need is a process that has all the characteristics of a vicious circle, limiting the development of the local company base and making the region even less attractive for the next cohorts of graduates. Regional stakeholders, fearing that this will determine the long-term fate of their region, often start lobbying for the establishment of a university (campus) in their region. When a university is established, university attendance among local young people increases (Frenette, 2009) and the barrier for people at a later age to obtain a university degree is also lowered (Charles, 2016).

In the decades following the foundation of a university, student numbers tend to grow rapidly, leading to an increased number of graduates available on the regional labour market. However, although the wide availability of talent for local companies was one of the motives for establishing a university, the demand from the local labour market may not keep pace with the increasing supply of graduates. On the one hand, in most peripheral regions, firms were experiencing a shortage of highly skilled human capital before the establishment of the university (Tödtling & Trippl, 2005), which would suggest a good labour market position for the new graduates. On the other hand, the new educational institution lacks a track record and firms have little indication of the quality of the education it offers. Therefore, although the university provides many home-grown graduates, firms may still prefer to hire graduates from universities with a better reputation. However, in most cases, newly established universities build on preceding educational institutions in the region, which could give them some 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 peripheral regions are gradual, long-term processes (Maskell & Malmberg, 1999).

The circumstances described above all influence either demand or supply in the graduate labour market. To bridge gaps between demand and supply, labour economists often turn to wage and labour mobility as instruments. However, intra-regional, inter-sectoral wage differences can be limited in countries with a strong presence of national bargaining agreements, such as Denmark (Due, Madsen, Jensen, & Petersen, 1994). On the other hand, where they encounter a lack of industry demand for graduate skills, graduates could decide to find employment in jobs that do not require such skills. By opting for a job for which they are overeducated, they are most likely to be paid less than their peers who are able to find employment that matches their skill level (McGuinness, 2006). Thus, intra-regional wage differences could even occur in labour markets controlled by collective bargaining agreements.

Mobility tends to be an even stronger indicator of labour market mismatches. Graduates are in general more mobile, and especially those who have been more mobile in the past are more likely to move again (Faggian & McCann, 2009). Therefore, when graduates enter a labour market in which there is insufficient demand for their skills, they may prefer to look for employment in other regions rather than to accept a position for which they are overqualified. Hereby, low mobility among graduates signals an unmet demand, whereas graduates leaving the region indicates an oversupply of graduates. Although the departures of students for other regions does not necessarily qualify as a brain drain (Venhorst, Van Dijk, & Van Wissen, 2010), it is important that a significant proportion of them be retained for the local labour market to support the development of local industry and hence the local economy.

In a study among rural universities in Finland that were founded as part of new Finnish science and technology policies of the 1960s, Saarivirta and Consoli (2014) found that many of these universities lost considerable numbers of their graduates to more central regions close to the capital. By contrast, Faggian and McCann (2009) found low mobility among graduates of the post-1992 universities in the UK. However, neither of these studies took wages into account and both considered mobility at just one point in time.

METHODOLOGY AND CASE STUDY OVERVIEW

Empirical context

Aalborg University was established in 1974 in the North Denmark region, at the northern tip of continental Denmark. North Denmark is the smallest Danish region in terms of population, with around 590,000 inhabitants nowadays, of whom more than one-third live in Aalborg (Statistics Denmark, *n.d.-a*). Before the establishment of the university, the region shared many of the typical characteristics of a peripheral region: a predominance of small, non-knowledge-intensive companies, a negative migration balance, relatively high unemployment numbers and a lower educated workforce. Nevertheless, the region at that time was home to several technical higher education institutions that together formed the basis for the new university. This meant that the university did not need to start from scratch and could benefit from existing legitimacy in the region (Aalborg University, *n.d.*; Nilsson, 2006; Plenge, 2014).

The change to university status led to a sharp increase in student numbers, from 1635 in 1974 to 6410 in 1990. Nowadays, Aalborg University, having just over 20,000 students, is the fifth largest university in the country based on student numbers. The main campus in Aalborg has around 80% of the students, and there are smaller branch campuses in Copenhagen and Esbjerg. The university has five faculties (humanities, social sciences, the technical faculty of IT and design, engineering and science, and medicine), of which the Faculty of Social Sciences, with 6212 students, is the largest. However, the legacy of the preceding higher education institutions

is still visible in the strong technical character of the university, and around 40% of the students are enrolled in one of the technical faculties (Aalborg University, 2018).

Data, variables and analyses

In order to study wage and mobility dynamics in the graduate labour market after the establishment of the university, register data from the Danish Integrated Database for Labour Market Research (IDA) are used. This database contains micro-level data for all individuals in Denmark, on an extensive set of variables, including wages, place of residence and educational history. Data for these variables are available from 1982 to 2006. University graduates are defined as individuals who completed a degree at one of the eight Danish universities, namely Aalborg University, Aarhus University, Copenhagen Business School, IT University of Copenhagen, Roskilde University, Technical University of Denmark, University of Copenhagen and the University of Southern Denmark. Insofar as the predecessors of these institutions can be classified as universities, their graduates are regarded as university graduates, while graduates from other Danish and foreign higher education institutions are not. Aalborg University graduates only recognize as such individuals who completed their degree at the Aalborg campus, since the Esbjerg and Copenhagen campuses are not geographically near to the Aalborg labour market region.

The wage analysis is based on an intra-regional comparison of the average hourly wage of all university graduates in a particular yearly cohort 10 years after these graduates entered the labour market. The regions of interest are the four most urbanized labour market areas, proposed by Andersen (2002) and based on commuting patterns, which makes them more indicative for labour market behaviour than the administrative regions (Figure 1). The Copenhagen labour market region had 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 period of 10 years is chosen because employees tend to experience most of their wage growth within the first years of their employment (McCue, 1996), allowing a comparison at

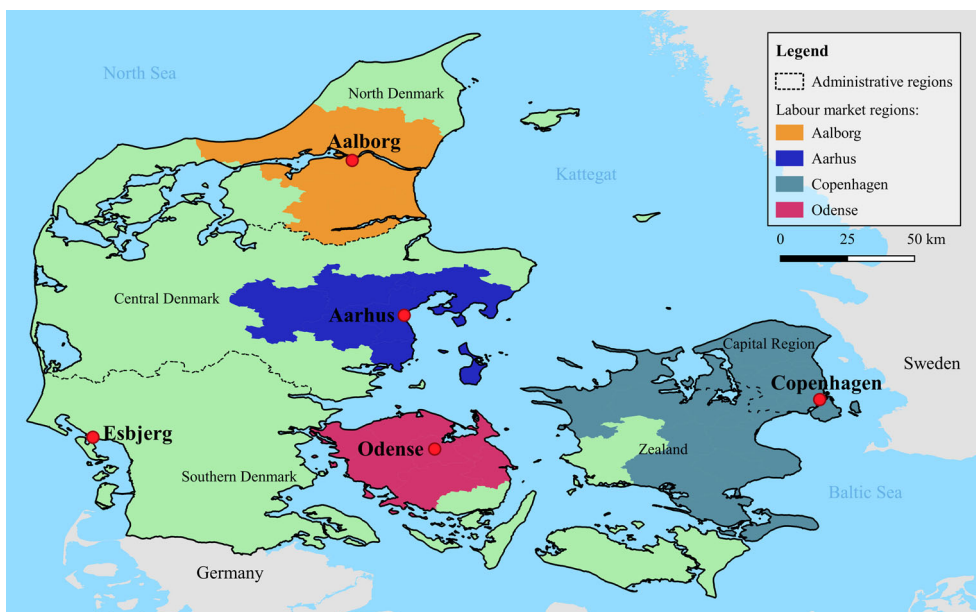


Figure 1. Denmark's urbanized labour market regions.

the end of the 10 years that more clearly indicates wage development over their whole career. Furthermore, it allows wage data from 1982 to be used to assess the labour market position of university graduates from any Danish university who completed their degree in 1972. Any section of the population for which there is no valid estimate of the hourly wage is excluded from the wage analysis (Statistics Denmark, *n.d.-b*).

The mobility analysis distinguishes local graduates from incoming graduates, on the grounds that graduates who have moved before are more likely to move again (Faggian & McCann, 2009). Graduates are classed as local if they went to high school within an hour's travelling time of Aalborg University; all others are classed as incoming. Retention is assessed based on whether graduates continued to reside for five years after graduation within an hour's travelling time of Aalborg University.

RESULTS

In 1982, just after the first cohorts of Aalborg University graduates entered the labour market, only 1.5% of the people in the workforce in the Aalborg labour market region had obtained a degree from any Danish university. The share was similar for the Odense labour market region, but the labour market regions of Aarhus and Copenhagen had a higher share of university graduates, at 2.3% and 2.8%, respectively.

The supply of graduates, both local and incoming, from Aalborg University increased rapidly after its establishment (Figure 2). Over the years, both groups have been about the same size and experienced similar growth. While the local graduates group developed from 42 graduates in 1977 to 673 in 2006, the incoming group developed from 75 to 742. These numbers demonstrate both rapid relative and absolute growth, and indicate that the establishment of the university has amounted to introducing a fast-growing supplier of graduates to the Aalborg labour market region.

The thin graduate labour market around Aalborg before the establishment of the university potentially weakened the bargaining position of graduates seeking employment or drove them to opt for jobs below their skill level. However, the wage development in Figure 3 indicates that their hourly wage in 2006-adjusted Danish Kroner has risen in much the same way as that of graduates who have found employment in the other urbanized labour market

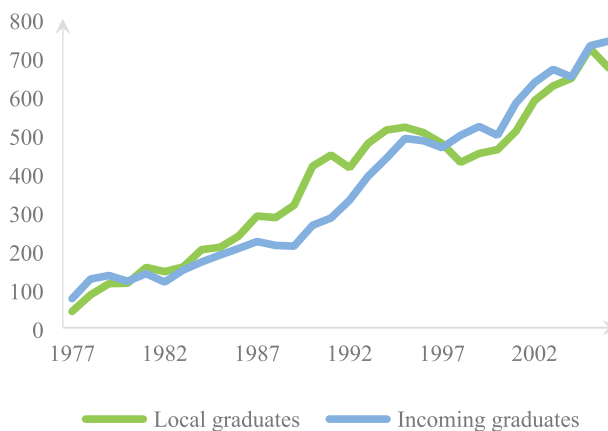


Figure 2. Number of local and incoming Aalborg University graduates per cohort (compilation based on register data from Statistics Denmark).

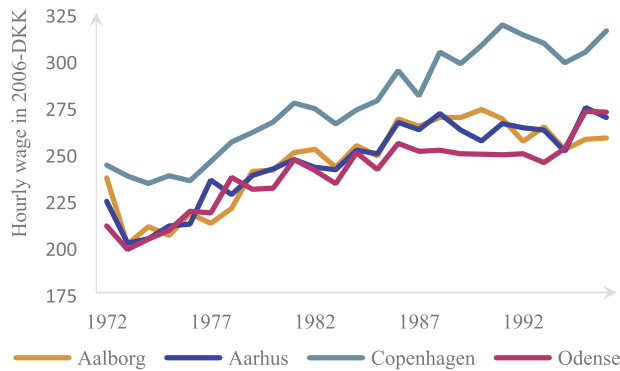


Figure 3. Wage development ten years after graduation per cohort of university graduates (compilation based on register data from Statistics Denmark).

regions. Only the graduates finding employment in the Copenhagen labour market region seem to have enjoyed a substantial wage premium compared to the other regions. These differences are partly due to the presence of multinationals in the capital, but partly also to the generally higher wage levels in metropolitan areas that are required to cover the increasing cost of living in such regions. The interregional similarities in wage growth, both for graduates and for the general workforce, are likely mainly due to the existence of national collective bargaining agreements, which offer some room for interregional differences but overall play a similar role in all regions in influencing wage growth. Thus, the limited wage difference indicates that graduates of Aalborg University are not compelled to apply for jobs for which they are overeducated.

However, the similar rate of wage development could potentially also be the result of the tendency of graduates who are struggling to find employment to move to other regions. Insight into the mobility dynamics of the graduates of Aalborg University therefore provides complementary insight into the dynamics of the Aalborg labour market for graduates in general.

The mobility analysis focuses on the extent to which the Aalborg labour market can offer employment to Aalborg University graduates, by assessing the share of graduates that stayed

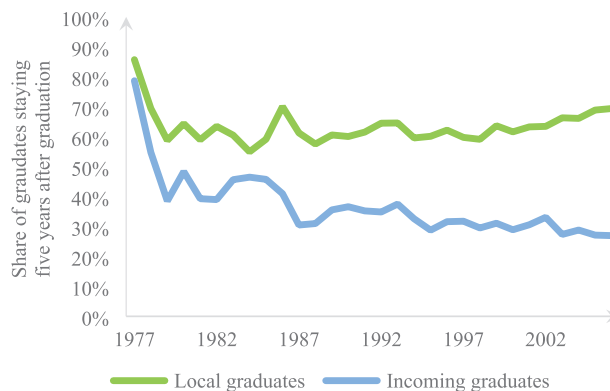


Figure 4. Retention of local and incoming Aalborg University graduates per cohort to origin (compilation based on register data from Statistics Denmark).

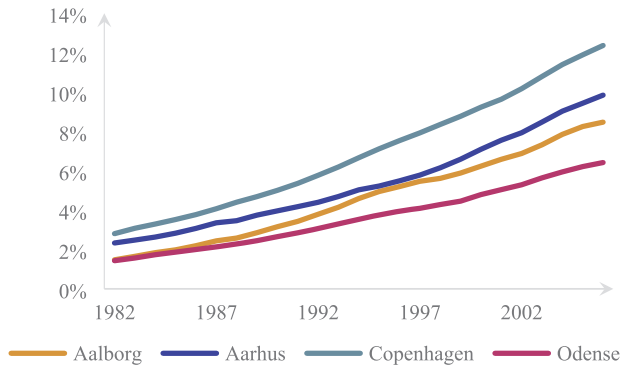


Figure 5. Share of university graduates in the workforce per labour market region over time (compilation based on register data from Statistics Denmark).

in the near vicinity of Aalborg University after graduation. Figure 4 displays the retention rates of Aalborg University graduates, again distinguishing local from incoming graduates. Both groups demonstrated high retention rates for the early cohorts, which could be due either to a strong unmet industry demand before the establishment of the university or to the university hiring its own graduates as staff to accommodate the very rapid growth of the early years. However, over time a more stable pattern emerged, with slowly increasing retention for the local graduates and a minor decline for the incoming graduates. Overall, in the context of rapidly growing graduate numbers, these stabilizing retention rates indicate that graduates are increasingly being absorbed into the local labour market.

Although Figure 4 shows that the region around Aalborg absorbed more graduates over the years, it could be that other regions are also increasing their uptake of graduates, thereby perpetuating or widening the gap with the Aalborg labour market region. Figure 5 accordingly displays the growth in the share of university graduates in the workforce of the urbanized labour market regions. While the Copenhagen labour market region experienced a 9.6 percentage point growth from 2.8% in 1982 to 12.4% in 2006 and the Aarhus labour market region grew 7.5 percentage points, starting from 2.3% in 1982 and reaching 9.8% in 2006, the Aalborg labour market region exhibited slightly smaller growth, of 7.0 percentage points, from 1.5% in 1982 to 8.5% in 2006. Nevertheless, considering relative growth rates, the share of graduates in the Aalborg labour market region more than quintupled, exhibiting significantly higher relative growth than the other labour market regions.

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 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 occurred, although slightly lagging behind the absolute growth in the Copenhagen and Aarhus labour market regions. This is in line with Berry and Glaeser (2005), who found that regions with higher human capital levels showed a larger subsequent absolute growth in the numbers of people with university degrees. However, the intra-regional absolute growth differences are small in the present case, and the Aalborg labour

market region outperforms the other urbanized labour market regions in the relative growth in the share of university graduates in the workforce.

The limited number of studies of graduate mobility at new universities show a mixed picture. Faggian and McCann (2009) found limited mobility among the graduates of the post-1992 universities, which they explained by highlighting the stronger desire of these universities to cater to the local economies, since most of their funding originally came from the region. By contrast, Saarivirta and Consoli (2014), who conducted a study at five of the universities that were established as a result of the new national Finnish science and technology policies in the 1960s, found that regions could retain only a minority of their graduates in the region. These discrepancies could stem from differences in the orientation of the universities and the composition of the regional industry. Aalborg University and the post-1992 universities identify themselves as local actors, because their establishment was instigated by local stakeholders who were convinced that their region needed a university, and additionally because there was clearly substantial industry demand in the region. However, the universities studied by Saarivirta and Consoli (2014) were established in considerably smaller towns that lacked the critical mass of industry needed to make them an attractive place for new graduates to start their career. As Tödting and Trippel (2005) argued, such differences call for tailor-made policies. In the specific case of universities, these kinds of initial differences can have long-term consequences, as shown in the universities of, among others, Tampere, Turku and Aalborg (Bruun, 2004; Guerrero & Evers, 2018; Kautonen, Koski, & Schienstock, 2004). In a case study on the role of Aalborg University in regional development, Guerrero and Evers (2018) showed that the university co-evolved with the emerging information and communication technology (ICT) cluster in the region, both by conducting research in the area and by enhancing its degree offerings related to the sector. Admittedly, the university cannot take all credit for the emergence of the cluster, but it has undoubtedly played an important role in this process by supplying considerable numbers of graduates with skills relevant to the ICT industry.

Although this paper focuses on the impact in the region around Aalborg, the contribution of the university goes further than that. The present study shows that Aalborg University has continuously increased its intake of students from outside the region, of whom a growing majority have moved to other regions in Denmark after graduation. Thus, Aalborg University, originally intended as an instrument for regional development, has developed a role as an important supplier of graduates to other regions. The outward migration of graduates should not be regarded as a brain drain, but rather as part of a national task that a regional university can fulfil. Furthermore, the Aalborg labour market region can in the short run benefit from the multiplier effects generated by these students (Venhorst et al., 2010), and when industry demand spikes, the region can benefit from this partly untapped human capital potential.

Albeit this paper offers an insight into the Aalborg labour market region dynamics, it 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 encompassing two-thirds of the Danish workforce, gives a general picture of the dynamics and circumstances within Denmark.

Similarly, it is acknowledged that the establishment of Aalborg University may also affect the labour market dynamics of the other universities in Denmark. Before the establishment of Aalborg University, local young people had to move to other regions in order to obtain a degree, and a proportion of them returned afterwards. It is quite likely that significant numbers of such young people now opt for a degree at Aalborg University, whereas this might be less prevalent among students who were not planning to stay in the Aalborg region anyhow. This might mean that the share of returnees among young people who have moved to other cities to study has dropped after the establishment of Aalborg University, owing to the fact that 'potential returnees' are more likely to opt for studying in Aalborg. Further studies into these dynamics could provide more

context to the findings of our study. Nevertheless, since the share of university graduates on the Aalborg labour market has shown a promising upward trend compared to other urbanized labour market regions, these effects will not cancel out the findings of this study.

CONCLUSIONS

The purpose of this paper was to look into the impact on the local labour market for graduates of the establishment of a university in a peripheral region in Denmark. The analysis showed that the establishment of Aalborg University effectively created a fast-growing supplier of graduates in the Aalborg labour market region. Although the wage analysis indicated some minor intra-regional differences in graduate wages, they are negligible when considering the cost of living. 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, that graduates have increasingly been absorbed into the local labour market. Over time, this has resulted in larger numbers of graduates in the workforce of the Aalborg labour market, whose relative growth in terms of the proportion of graduates outpaces that of the other urbanized labour markets in Denmark. At the same time, Aalborg University has increased its intake of young people from outside the region and developed into a supplier of human capital at the national level. Thus, not only can the economy of a peripheral region adapt to and benefit from the establishment of a university, but also a positive impact can be felt at the national level.

Universities are therefore shown to be a useful instrument for providing the human capital needed for the development of local industry in the knowledge-based economy. Nevertheless, it must be stressed that this is not an instrument applicable to all regions, since local critical mass and regional embeddedness are required to make the region absorb a substantial number of graduates and benefit from the university. However, it is still unclear which threshold needs to be passed to make the establishment of a university a feasible policy instrument, while understanding that this is a highly relevant issue, since even smaller municipalities have now started lobbying for their own university.

Furthermore, this study looks at an aggregate level into both wage and mobility dynamics. Although this is considered to be the appropriate level for the present study, there are inevitable differences between study programmes. Therefore, further studies exploring how the growth of particular study programmes co-occurs with the development of the sectors in which most of their graduates find employment could contribute to the discussion about universities as a policy instrument.

This paper contributes to the limited literature on the impact on the labour market for graduates of the establishment of a university. The case study demonstrated that a newly established university had enabled regional transformation, and that, in line with Flyvbjerg (2006), acquiring context-dependent knowledge is crucial for improving our understanding of how university establishments can be used as a policy tool. Policy makers currently considering establishing a university to transform their region should make a point of understanding the characteristics of the region that are key in influencing the way it could benefit from the university.

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