Journal of Historical Geography 62 (2018) 51–70

Contents lists available at ScienceDirect

Journal of Historical Geography

journal homepage: www.elsevier.com/locate/jhg

Transportation and regional inequality: the impact of railways in the Nordic countries, 1860–1960

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ARTICLE INFO

Article history:
Received 13 September 2017
Received in revised form
17 April 2018
Accepted 1 May 2018

Keywords:
Regional inequality
Railways
Historical GIS
Population growth
Economic growth
Nordic countries

ABSTRACT

Before industrialisation the Nordic countries (Denmark, Finland, Norway and Sweden) were part of Europe's poor periphery, but over the last century these countries have become some of the richest in the world. This article analyses the origins of Nordic growth from the late nineteenth century, focusing on a previously neglected topic: the role of transportation. We argue that transportation, and most notably large investments in railways, played a key role in Nordic industrialisation. Railways made the exploitation and exportation of natural resources possible in what had previously been isolated areas and helped fuel a process of rural-based industrialisation. By creating conditions that favoured migration towards previously scarcely populated, but economically booming areas, Nordic industrialisation was paralleled by a reduction in regional inequality as measured in per capita GDP. We assert that railways were built before local population growth and helped shape the economic landscape of the entire region. We illustrate these points using maps based on Historical Geographic Information Systems (HGIS) highlighting railways, regional GDP and population densities from the mid nineteenth century until 1960.

The Nordic countries (Denmark, Finland, Norway and Sweden) form Europe's northernmost geographical region and include some areas that even reach beyond the Arctic Circle.[1] Although geographically peripheral and small in population terms, these countries have become some of the richest in the world over the last century. This article will analyse the origins of Nordic economic growth since the mid nineteenth century, focusing on a previously neglected topic: the role of transportation. We have looked at the Nordic countries together since they have a long-standing and largely common historical base, starting with the formation of the Kalmar union in 1397. Sweden–Finland left the Kalmar union in 1523, while Norway remained under Danish rule until the end of the Napoleonic wars when it became part of a union with Sweden until its independence in 1905. Finland was incorporated into the Russian Empire, as a grand duchy in 1809, but declared its independence after the Bolshevik revolution of 1917. The Nordic region also shared a common path to industrialisation. All four countries started industrialising by exploiting natural resources, but subsequently evolved to supply products higher up the value added chain. By the mid twentieth century industrialisation and economic growth had turned the region into an industrial leader. According to Joel Mokyr, the region has followed the pattern of 'Small Successful European Economies'.[2] Such economies combine openness to trade with specialization in human capital intensive niches in which they have established technological leadership. Although these four countries differ somewhat in terms of natural resources and historical governance, we argue that they share important commonalities, providing scope for a joint analysis.

In this paper we argue that improvements in transportation were crucial to overcoming the constraints of supplying food and energy to a growing population. Although the importance of

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[1] Iceland, Greenland and the Faroe Islands are also often referred to as Nordic countries, but they have been omitted from this analysis due to a lack of data and the fact that their economic development and growth have mainly been due to factors other than railways.

[2] J. Mokyr, Preface: successful small open economies and the importance of good institutions, in: J. Ojala, J. Eloranta and J. Jalava (Eds), *The Road to Prosperity: An Economic History of Finland*, Jyväskylä, 2006.

https://doi.org/10.1016/j.jhg.2018.05.001
0305-7488/

transportation in this process has previously been stressed in the historical literature, its role has yet to be fully investigated for the whole of the Nordic region.[3] We stress three main areas in which large scale investment in railways played a key role in Nordic industrialisation. Firstly, the timing of the Nordic take off to industrialisation and growth coincided with the construction of the area's railway networks. Improvements in transportation were an integral part of the development of these economies.[4] Secondly, by reducing transportation costs railways made possible the exploitation and exportation of the natural resources of what had previously been isolated areas. Railways also supplied settlements with the food and energy needed to sustain growth. Before the industrial revolution, climatic constraints meant that large cities were generally absent from the Nordic region. Furthermore, agriculture in the urban hinterlands was generally restricted in its capacity to feed a growing urban population. It was only through the expansion of the railway network that the limitations imposed by the climate and geographical isolation could be overcome. Railways stimulated urbanization and they also reinforced the rural character of the Nordic economies by supporting a process of early industrialisation that was largely resource-based. In rural areas, railways were often built to connect natural resources to ports to facilitate exportation rather than between existing population centres. Thirdly, as a result of the rurally based and export-intensive industrialisation process, railways helped to access largely deserted areas and to create many new settlements. They were therefore often constructed before local demand and helped shape the long term economic landscape of the entire region.[5]

Following a line of research on railways that exploits new GIS techniques, we illustrate these arguments using a newly created HGIS database of population, GDP and railway construction.[6] The Nordic countries have long-run population statistics for consistent municipal borders, which allows us to analyse the railway outcomes in terms of population dynamics at a geographically detailed level. For Norway, we collected data from Statistikkbanken from 1860 onwards. For Sweden, we used the Umeå Demographic Data Base FOLKNET, with data from 1860 onwards. For Finland, the database on population at the municipal level was provided by Statistics Finland which, as in the other countries, was homogenised to fit the current municipal map. However, the Finnish data series was only available from 1880 onwards. Population data for Denmark were harder to obtain for constant municipal borders and we therefore decided to exclude this country from the analyses that specifically pertain to municipal population. We have provided additional population data for the largest urban agglomerations in all four countries from 1880 onwards, at ten-year intervals.[7] We have also included a newly created dataset of regional GDP measured at the NUTS 3 level. For most variables, we are able to follow their evolution through the entire process of industrialisation. To our knowledge, this is the first time that such a large, detailed and long-run regional dataset has been presented for the Nordic region.

The importance of transportation for catching up in economic growth

Before industrialisation, the Nordic countries were relatively poor and isolated. They stood on the periphery of Europe. The region's population was predominantly rural and towns were small, since the constraints of land and transportation limited the carrying capacity of their hinterlands. By the late nineteenth century, rapid population growth in the region had resulted in a large landless rural underclass and some areas were probably at their Malthusian limits in terms of population density. As such, people were extremely vulnerable to any problem affecting domestic agricultural production. Indeed, poor harvests from 1866 to 1868 resulted in famine in northern Finland and also caused an economic crisis in northern Sweden, each exacerbated by lack of transportation.[8] In addition, the cold winters of these northern countries ensured that energy requirements for heating were always high. It has been estimated that the annual household per capita consumption of firewood in Sweden was about five times greater than in Germany.[9] As none of the Nordic countries had any domestic coal reserves, saving land by substituting coal for firewood was not an option. In short, these countries were, in the words of Tony Wrigley, 'trapped within the limits of the organic economy'.[10] In the absence of efficient long-distance transportation, their prosperity was completely dependent on the food and fuel provided by their domestic territories.

The preindustrial transportation network was one of the main factors that constrained long-term growth. The roads in the region were poor and overland transport was limited to pack animals and horse-drawn carts. It has been argued that the overland transportation of high weight to value goods, such as iron ore, was neither practical nor economically viable over distances of more than thirty kilometres.[11] Most transport activity had, therefore, to be confined to the winter months, when snow and ice provided the best surface for sleigh haulage. Although the region is well endowed in terms of its potential for water transportation, climatic conditions served as a limiting factor to sea transport. Large parts of the Bothnian Gulf were covered with ice during the winter months and this severely limited market access to and from many Swedish and Finnish settlements for large parts of the year.[12]

[3] E. Heckscher, *An Economic History of Sweden*, Cambridge, 1954.

[4] This argument was indeed pioneered for Sweden in W.W Rostow, *The Stages of Economic Growth*, Cambridge, 1960.

[5] This argument runs counter to the famous early works of Robert Fogel who downplayed the effect of railways on aggregate economic growth. Similarly, Albert Fishlow investigated whether railways were built ahead of demand and failed to find evidence. However, applying a set of criteria allowing for 'anticipatory settlement' to post-Civil War railway construction in US states further west suggests that this constituted a true episode of 'building before demand'. See A. Fishlow, *American Railroads and the Transformation of the Ante-bellum Economy*, Cambridge, 1965, 204; R. Fogel, *Railroads and American Economic Growth*, Baltimore, 1964.

[6] For previous work on railways using HGIS see J. Atack, F. Bateman, M. Haines and R.A. Margo, Did railroads induce or follow economic growth? *Social Science History* 34 (2010) 171–197 and J. Martí-Henneberg, European integration and national models for railway networks (1840–2010), *Journal of Transport Geography* 26 (2013) 126–138. The database referred to in this article can be found at *HGISe* project, University of Lleida, http://europa.udl.cat/.

[7] These are census data collected by the *eGeopolis* project led by Professor François Moriconi-Ebrard.

[8] M. Voutilainen, Poverty, inequality and the Finnish 1860s famine, unpublished PhD thesis, University of Jyväskylä, 2016.

[9] A. Kander, P. Malanima and P. Warde, *Power to the People: Energy in Europe over the Last Five Centuries*, Princeton, 2014, 153.

[10] E.A. Wrigley, The transition to an advanced organic economy, *Economic History Review* 59 (2006) 435–480; E.A. Wrigley, Reconsidering the 'Industrial Revolution', *Journal of Interdisciplinary History* (in press).

[11] E. Heckscher, *Till Belysning af Järnvägarnas Betydelse för Sveriges Ekonomiska Utveckling*, Stockholm, 1907.

[12] The problem of ice-bound ports only applies to the Bothnian Gulf, and is not shared by Denmark and Norway since the Gulf Stream ensures that the North Sea is almost always clear of ice. Better market access could perhaps explain the relative strength and success of the Norwegian shipping industry and the Danish economy in general at the beginning of the nineteenth century. See L. Leijonhufvud, R. Wilson, A. Moberg, J. Söderberg, D. Retsö and U. Söderlind, Five centuries of Stockholm winter/spring temperatures reconstructed from documentary evidence and instrumental observations, *Climatic Change* 101 (2010) 109–141; J. Ljungberg and L. Schön, Domestic markets and international integration: paths to industrialisation in the Nordic countries, *Scandinavian Economic History Review* 61 (2013) 101–121.