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Spatial challenges to universal health care in Finland and Sweden

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Abstract

Sparsely populated and on the northern periphery of Europe, the decentralised healthcare systems of Sweden and Finland continue to produce the majority of their services from within the public sector, though this situation is steadily changing. Designed to be largely a-spatial, both systems have struggled with policy problems associated with access and implicit rationing, forcing changes in service structure and delivery. Both are impacted by population ageing and depopulation, particularly in peripheral areas. Demographic pressure and continually rising healthcare costs saw Sweden initiate a healthcare reform in the early 1990s to address costs, management and public perception issues. Finland began a similar process in the mid-2000s. Both processes have stressed a choice and marketisation agenda.

This paper addresses the issue of how, in the light of ongoing health system reform, spatial challenges to health care provision in Sweden and Finland potentially impact morbidity and mortality outcomes. A multivariate cross-section OLS regression model enables us to control for a subset of explanatory variables and examine the effect of a selected independent variable when estimating the effect on health care provision. Our findings indicate that significant regional disparities, continue to exist in respect of health care accessibility and that the marketisation agenda is unlikely to adequately address the existing gap between different types of territory. In policy terms, new technological service solutions such as *e*-health may help, but cannot, in isolation, provide easy remedies.

Keywords: healthcare, accessibility, policy, Finland, Sweden, marketisation, periphery
JEL codes: I14, L33, I38, R53, Z13

Introduction

This paper addresses questions relating to health service provision in rural, peripheral and otherwise spatially disadvantaged areas. Using the notion of Services of General Interest (SGI), we address issues arising from the ongoing administrative and health reform processes in Sweden and Finland, specifically as they relate to the potential impacts of adopting marketisation and patient choice strategies in the health sector.

We attempt to operationalise this question by analysing regional data from Finland and Sweden on morbidity and mortality. This analysis very much however represents a 'first cut'

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and, as such, in our policy extrapolations from it, we take onboard Koivusalo et al's (2007: 190) cautionary note that "while it is possible to limit the focus on health inequalities or inequities in health outcomes more directly to the functions of the health system or causes of morbidity and mortality, […] which are directly related to service provision, it is not possible to make an overall assessment of the equity dimension of a health system merely on the basis of health inequalities or inequalities in outcomes"[1].

As such, we seek also to draw on elements of the health economics literature and on political decision-making surrounding the administrative reform processes in Sweden and Finland – focusing on the notions of 'policy' and 'market' failure - to provide a broader analysis of the potential implications for peripheral and otherwise spatially disadvantaged areas of moving from a socialised to a fully marketised health service delivery system. In addition, we also touch upon issues relating to the innovative use of IT tools as part of the *e*Health agenda which are being promoted – both as long-term 'solutions' and short-term emergency sticking plasters - in Finland to address the specific set of problems arising in respect of service accessibility in such geographically disadvantaged areas as the primary choice and marketisation strategy is rolled out (Hyppönen et al., 2015; Doupi and Ruotsalainen, 2004).

As Sweden embarked upon the reform process first and initially at least more comprehensively, we suggest that the availability of comprehensive post-reform Swedish data can be used to track the potential implications of policy implementation for Finland (even though the data for Finland is currently less comprehensive and more fragmentary) as it begins the implementation segment of its own administrative and health sector reform process in 2019. Moreover, while differences between Sweden and Finland remain in terms of their historical health systems and institutional make up it is clear that the problems faced are similar both on the policy and the practical level. In addition, in organisational terms, there is a discernible process of mimetic isomorphism (DiMaggio and Powell, 1983) at play with health policy diffusion and transfer regularly taking place from Sweden to Finland (Tynkkynen et al., 2016: 227-32).

[1] The comparative 'OECD health at a glance' (2015) indicators for 'health status' in Finland and Sweden are interesting in this regard. While quality of care outcomes and resources per capita for health are roughly comparable, a clear differentiation emerges in terms of health status. For Finland, life expectancy at birth and at 65 are much better for females than for males, with scores in the top third for females and only in the middle third for males. For Sweden, however, the exact opposite is the case, scores for males in both categories are in the top third while those for females are in the middle third of the rankings. The differences between the results for males and females are however significantly larger for the Finnish statistics. Similar systems and similar policies can produce different outcomes. Similarly, the 2014 European Health Consumer Index (ECHI) Finland 4th (of 37) across a range of factors addressing the promotion and delivery of healthcare (EHIC 2014).

Finland and Sweden have a long tradition of health inequalities research (Lahedma et al., 1996; Gertham, 2010; Johansson & Qvist, 1997) but a primary focus on the social determinants of health potentially obscures a deeper problem in respect of spatial inequalities impacting welfare service access and delivery (Humer et al., 2015).

Research on health accessibility has been carried out in various countries in recent years including the US and UK (Ford et al 2016), England, Norway and Sweden (Miani et al 2013), Sweden (Kullberg et al., 2017), Australia (Thomas et al., 2015) and Greece (Oikonomidou et al., 2010), while broader surveys have been produced by Atiyeh et al. (2010) and (OECD, 2014). These studies indicate that already socioeconomically disadvantaged people in rural areas face barriers limiting their access to various services. Time and distance are the main features of these barriers while promoting 'choice' does not, on its own, provide a solution because a sufficient user-base for these services does not exist in many sparsely populated, geographically remote or peripheral areas. This is not only a question of barriers and access, the allocation of resources and services provided needs a more equitable distribution structure, again requiring strategies promoting more geographically-tailored or variated policies in terms of enabling health care utilisation.

Table 1 Population density and age-structure in Finland and Sweden 2005 and 2014. NUTS2 regions.

		Inhabitants per km^2		Share of 0-19 years		Share of 65+ years	
	Size in km^2	2005	2014	2005	2014	2005	2014
Western Finland	64,763	22.9	23.6	23.3	22.2	17.3	20.6
Capital region (Finland)	9,568	158.7	175.3	23.8	22.5	12.2	15.7
Southern Finland	35,378	36.1	36.9	22.3	21.0	17.7	21.8
Northern & Eastern Finland	227,151	6.4	6.4	24.6	22.8	16.8	20.4
Åland Island	1,581	17.5	18.6	23.8	22.1	16.6	19.9
Capital region (Sweden)	16,540	288.6	334.1	24.2	23.9	14.1	15.6
Eastern Mid-Sweden	50,506	39.3	42.0	24.2	22.7	17.4	20.2
Småland with islands	56,815	24.0	24.8	24.3	22.4	19.0	21.7
Southern Sweden	23,966	94.1	103.2	23.5	22.6	17.8	19.6
Western Sweden	43,047	61.5	66.1	24.3	22.8	17.1	19.2
North Mid-Sweden	77,011	12.9	13.1	23.3	21.3	19.9	23.0
Mid-North	81,749	5.2	5.2	23.0	21.6	20.2	22.9
Upper North	178,815	3.3	3.4	23.5	21.3	18.2	21.3

Source: Eurostat, tables [reg_area3], [demo_r_d3dens] and [demo_r_pjanind2]

Much of Finland and Sweden can be characterised as areas of low population density. The population structure in these areas display a declining share of children and an increasing share of elderly (Table 1). The marketisation of healthcare services in such areas will not overcome barriers such as e.g. time and distance – particularly where insufficient population levels exist to sustain a functional healthcare market (Kronick et al., 1993). Moreover, as health care is further commodified, the profit-driven motive of private providers becomes increasingly to deliver productised 'services' to the young and healthy rather than complicated and costly

treatments to the sick, old and infirm. Given the spatially defined age structure of Sweden and Finland's rural and peripheral communities, this suggests that further concern for service delivery in rural and otherwise spatially disadvantaged communities may be warranted under a choice and marketisation rubric.[2]

Conceptual framework: SGI, accessibility and peripherality

Economic theory concedes that all services cannot be wholly subject to market competition while health economists have made particularly strong arguments against the notion of the allocative efficiency of market-based health care (Arrow, 1963; Hsaio, 1994; Haas-Wilson, 2001). Numerous distortions to free and competitive markets exist and are usually labelled 'market failure' thus justifying public action. They include: (1) imperfect competition, including oligopolistic or monopolistic practices and the existence of asymmetrical information between buyers and sellers (2) social priorities such as equity, (3) externalities (e.g. noise, pollution and congestion), and (4) missing markets (Begg et al., 1987). Services of General Interest (Bauby, 2013; Bjørnsen et al., 2015) are, however, considered to operate on a market basis, or at least, to be a part of the interplay of public, market and civic forces in an economy. The provision of a Service of General Interest (SGI) such as health care depends on several different aspects[3]. (1) SGI are provided on a demand/supply basis; (2) specific territorial pre-conditions in the provision of SGI must be taken into account; (3) The SGI setting is deeply embedded into political systems; which may differ in accordance with regional conditions and changes over time; and (4) the political system is shaped by social, demographic, economic and environmental aspects (Humer et al., 2015).

Remote and peripheral areas display very specific conditions when it comes to fulfilling service provision requirements. Huge distances, limiting accessibility, and low population densities make service provision costly and limit both the availability and, potentially also, the quality of a specific service (Humer et al., 2015). Service provision in such areas can often experience market failure, or even missing markets, legitimising public intervention (Barr 1998).

[2] In this early iteration of the paper, we have not discussed how 'choice' rhetoric was used to make claims about equity and accessibility in health care. The outlines of this debate is covered, in a UK context (Barr et al., 2008).

[3] It should be noted however that the notion of SGI and its related concepts, SSGI and SGEI remain somewhat contested in terms of the legitimate placement of boundaries between them, see Hatzopoulos (2012: 46) in respect of the impact of EU law. Moreover, the borderline position of SSGI (social services of general interest) which include the provision of health services has generated a substantial literature on the impact of EU law and policies on national level health service provision, see Greer (2006). These issues however lie beyond the scope of the current paper.

Measures of 'access to health care' are derived from a combination of interdependent aspects ranging from the material-objective conditions of availability to immaterial-subjective factors in utilisation – yet all of these conditions and factors represent distinct types of resources and capacities which are unevenly distributed in social and physical space. In more concrete terms, the spatial organisation of health care and social services results in certain levels of spatial (un)evenness on the 'supply side', i.e. in the geographical distribution of adequate services and state-of-the art technologies, qualified health care professionals, etc., while the demand for health care services, both in terms of quantity and quality, varies across space, embedded in diverse socio-economic and cultural contexts (income, demographic characteristics, perceptions, trust and values).

How does this lack of access to quality services potentially manifest itself in terms of its health outcome consequences? How can we identify and measure this? Many cases of morbidity and mortality can be detected and treated if the provided health care is affordable, available (which refers to entitlement), accessible, of good quality and contains a variety. Huge distances and sparsely populated areas display, in general, low densities in respect of service provision. This is usually labelled *allocation efficiency* (Barr, 1998), including the supply of general practitioners per 100,000 inhabitants (Fearn, 1987; Matsumoto et al., 2010). This clearly limits service accessibility. To limit the costs of service provision in sparsely populated areas, the range of services will be reduced to a basic minimum, i.e. a health station (see Barr 1998 for a general discussion). In general, the quantity of provided health care services in remote and peripheral areas is less than those provided in urbanised and metropolitan areas (Barr, 1998, Frearn, 1987; Morrissey et al., 2008; see also McGrail & Humphries, 2008) and this is likely also to have additional quality implications, thus potentially affecting health outcomes. In sparsely populated areas affordability is not only determined by the cost paid for visiting a GP, but also for long and costly travel to and from the health station. Regional GDP/cap provides an indication of the economic capacity to provide health care services within reasonable reach while disposable household income indicates how much money can be spent on health care, including travels costs.

Possible independent variables could e.g. be the number of GP's per 100,000 inhabitants, the population density per square km, the regional GDP per capita and the average disposable income per household. Possible dependent variables could be e.g. the incidence of heart attacks per 100,000 inhabitants, the number of cancer-related deaths per 100,000 inhabitants and the number of deaths from respiratory diseases per 100,000 inhabitants. The three dependent variables can be justified by three aspects: 1) the morbidity and mortality measures analysed

here are strongly related to the accessibility of medical services; increasing distances to travel lowers accessibility. 2) medical services must be generally affordable; direct cash-contributions from clients reduce the usage of medical services as do long and costly travels to see a doctor or visit a hospital; 3) the provision of medical services is dependent on how much resources the responsible governance level has (the regional level in Sweden; the local level, currently, in Finland).

This leads us to three testable hypotheses:

Hypothesis 1 (H_1): The higher regional number of general practitioners per 100,000 inhabitants, the lower morbidity and mortality.

Hypothesis 2 (H_2): The higher regional population density, the lower morbidity and mortality.

Hypothesis 3 (H_3): The higher regional GDP per capita, the lower morbidity and mortality.

Administrative and health care reform in Sweden and Finland

European health systems continue to undergo significant redesign. Rising costs coupled with an increasing demand for 'health' have seen the cost containment and 'efficiency savings' approaches associated with NPM dominate policy thinking since the 1980s. On their own however, these tools provide a policy backstop rather than comprehensive solutions. In the Nordic countries, health system reform is now generally coupled with an administrative reform package designed to address a broad range of service financing, production and delivery problems. Since the financial crisis of the late 2000s, they have all enacted or tabled comprehensive regional administrative reform processes, encompassing major health reforms (Saltman et al., 2012) although debates over precisely how and what to change have been ongoing for decades (Saltman & Van Otter, 1992, 1995).

These reform processes are interesting for two reasons. Firstly, because of the nature of the administrative structures developed across the various Nordic countries, with power, authority and democratic legitimacy historically lodged at the local/municipal level but now slowly being recentralised after the decentralisation experiments associated with NPM and, secondly, because of the tough spatial and geographical conditions pertaining across much of the area and the impact that this has had and will continue to have on service delivery in the more rural and/or geographically peripheral areas.

Unlike Norway and Denmark, where the administrative reform processes were brought to a conclusion relatively speedily, the Swedish process has dragged on and continues to generate political controversy, while in Finland, the so-called SOTE administrative reform process, designed to patch the health reform process together within a new regionalised

governance structure, will not be put in place until at least 2019 and again continues, even at this late stage, to face significant opposition and uncertainty.

Intriguingly, in both the Finnish and Swedish cases, the health reform element of the plan was not generated by demand from either the general public or from within the public health system itself[4]. Rather, this appears to be an essentially ideological choice – to promote patient choice and marketisation as the primary drivers of health care provision - made for partisan political reasons backed by commercial pressure to commodify health and productise health systems, procedures and outputs for international sale (Tritter et al., 2010; Koivusalo et al., 2007). In both national systems, initial public disquiet over implicit care rationing (causing long queues to access some procedures) was labelled as 'policy failure' and used to promote health service provision as a 'political' problem in need of fundamental reform (Smith and Rauhut, *forthcoming*).

Table 2 Health Governance Re-centralisation

		Finland		Sweden	
		CURRENT (2017)	'SOTE' (2019)	CURRENT (2017)	ENVISAGED 2007[a]
Administrative unit	Municipalities	295[c] Only two regions currently have democratically elected regional councils. Åland (permanent) and Kainuu (pilot project)	No change, but municipal mergers are encouraged	290	180-200. 75 municipalities are considered too small population wise and an additional 30 will be too small by 2030. These municipalities are encouraged to merge.
	Regional level units	19	18	21	6-9
Health units	Responsible for primary care	Municipalities	Regions	Regions	Regions
	Responsible for secondary care	Inter-municipal cooperation	Regions	Regions	Regions
	Hospital districts	20	12d	21	6-9[b]
	Specialist hospitals	5	5	7	6-9
Economic unit	Taxation / financing	Mixed but primarily municipal	Central government	Regions	Region

a. This reform was proposed by Ansvarskommittén (2007a, 2007b), but it was never implemented due to lacking support.
b. Ansvarskommittén (2007b) is not explicit, but the number of hospital districts should preferably equal the number of regions.
c. Not including Åland. 313 in total.
d. The 12 hospital centres include the 5 traditional 'University hospitals' plus an additional 7 other regional facilities. Only two of these – in Oulu and Rovaniemi – will cover the northern half of Finland. this means that residents of Utsjoki in the north-eastern tip of Finland have a journey of almost 400km to their nearest hospital centre.

Source: Smith and Rauhut (*forthcoming*)

[4] Pronouncements of 'policy failure' at the municipal/local level have been utilised as a major driver for comprehensive administrative reform although it was the initial wave of NPM implementation (1980s in Sweden, early 1990s in Finland) that introduced the budgetary reforms which devolved 'responsibility' to provide and pay for health services to the local level. The small average size of Finnish municipalities in particular – Finland has half the population of Sweden but a similar number of municipalities – has generated much debate over municipal mergers, though there is very little support for this. Similarly, public dissatisfaction with waiting lists and implicit health care rationing has been utilised politically to drive forward the process of market reform but has not been translated into declining public support for the public service system as a whole in the numerous surveys carried out in Finland. See for instance Kallio (2007) referenced in Tritter et al. (2010: 146) which reports on survey material indicating that citizen support for choice and marketisation declined in relation to its implementation at the policy level, suggesting that 'demand' for marketisation as a means to address 'policy failure' was manufactured rather than robust.

Building on the initial *tranche* of NPM-style reforms focusing on driving cost efficiencies through financial decentralisation and greater budgetary discipline, a second wave of reforms promoted purchaser-provider splits and quasi-markets in health (Le Grand & Bartlett, 1993). This approach had however only a limited effect in both Sweden and Finland because of the implementation power held by the local level administrations and because the financial incentives in respect of payment systems to promote market-based behaviour were simply not available (Tynkkynen et al., 2016). This realisation led to the promotion of patient choice as a system driver (making funding follow the patient) and to greater support for 'real' markets including, ultimately, rules promoting free establishment for private sector actors and the corporatisation of formerly public-sector providers to promote a 'level legal playing field' across all service providers.

The service-delivery limitations of the existing public health systems in Finland and Sweden – particularly as they relate to the delivery of health services in geographically disadvantaged areas - were used to advocate support for system change. Choice and marketisation were supposed not only to increase equity in accessibility terms, but also save money. What is not clear, however, is how a reform process driven by patient choice and marketisation[5] can produce a better, more cost-efficient service while also specifically addressing the 'access to health' needs of spatially and geographically disadvantaged areas.

Data and method

A multivariate cross-section OLS regression model was used to estimate the relative impact of spatial challenges on three chosen indicators of morbidity and mortality. This method was chosen as it enables us to control for a subset of explanatory variables and to examine the effect of a selected independent variable when estimating the effect on health care provision.

[5] Patient Choice is defined here as the ability for patients to choose service providers (Dixon et al., 2010). In traditional public provider systems this is usually not possible. Patient Choice fundamentally alters the traditional approach to health funding in Sweden and Finland changing the funding system from one driven by population ratios amended to reflect regional disparities to one where funding is market driven, essentially following patient choices. Marketisation ostensibly refers to the process of moving from a planned to a market-based economy or to the exposure of an industry to market-forces. In practice however, as reference to the health sector shows, there are a number of intermediate stages between wholly public and wholly private provision, ranging from quasi- to planned and finally to regulated markets. The key factors here are participation of private sector actors in competition with public providers and the existence of a public 'principal' who continues the overall planning function within the system. When the system sees the 'principal planner' role replaced by commercial contracting and 'planned' markets replaced by 'regulated' markets (Saltman and Von Otter (eds) 1995: 71) we can postulate that a system has been effectively marketised.

Table 3 Variables by scale, year, producer and country

FINLAND	**Geographical scale**	**Year**	**Data producer**
Cancer deaths / 100,000 inhabitants	Hospital district*	2014	Finnish Cancer Registry
Incidence coronary diseases / 100,000 inhabitants	Region (NUTS3)	2013	National Institute for Health and Welfare
Deaths by respiratory diseases / 100,000 inhabitants	n/a	n/a	n/a
Medical Doctors / 100,000 inhabitants	Hospital district*	2012	SOTKAnet
Population / km^2	Region (NUTS3)	2013	Statistics Finland
Disposable household income	Region (NUTS3)	2013	Eurostat
GDP/capita	Region (NUTS 3)	2013	Eurostat
SWEDEN	**Geographical scale**	**Year**	**Data producer**
Cancer deaths / 100,000 inhabitants	Region (NUTS3)	2005, 2014	National Board of Health and Welfare
Incidence heart attacks / 100,000 inhabitants	Region (NUTS3)	2005, 2014	National Board of Health and Welfare
Deaths by respiratory diseases / 100,000 inhabitants	Region (NUTS3)	2005, 2014	National Board of Health and Welfare
Medical Doctors / 100,000 inhabitants	Region (NUTS3)	2005, 2014	National Board of Health and Welfare
Population / km^2	Region (NUTS3)	2005, 2014	Statistics Sweden
Disposable household income	Region (NUTS3)	2005, 2014	Statistics Sweden
GDP/capita	Region (NUTS3)	2005, 2014	Statistics Sweden

* Generally overlapping with NUTS3 regions. In three cases they are not, and estimations have been made at NUTS3 level.

In the databases of the National Board of Health and Welfare (*Socialstyrelsen*) and Statistics Sweden adequate data is available (Table 3). The data situation for Finland is unfortunately not very good. Not all indicators exist for the regional level on the homepages of Statistics Finland and the National Institute for Health and Welfare. As such, it has been necessary to use other data producers to produce estimations of geographical entities to create a decent dataset. Furthermore, not all indicators available for Sweden are available for Finland (Table 3). The data for Finland has been chosen by availability. In the case of Sweden, the studied years have been chosen to include the period before the major (consumer choice) reform in the Swedish health care sector as well as the immediate period after the reform was implemented.

A simple correlation test between the independent variables (see Appendix) shows that the disposable household income indicator in Finland 2013 and in Sweden 2005 and 2014 exceeds a .750-correlation with some other variables and hence generates multicollinearity (Ramanathan, 1995). To avoid multicollinearity problems, the income indicator is excluded from the data set.

Based upon the conceptual framework and the methodological considerations a basic model can be specified. The model will be tested for three dependent variables: The incidence of heart attacks per 100,000 inhabitants, the number of deaths from cancer per 100,000 inhabitants and the number of deaths from respiratory diseases per 100,000 inhabitants. The three dependent variables have been chosen to illustrate the importance of accessibility to health care. The incidence of heart attacks not only illustrates the share of the population at risk due to unhealthy lifestyle choices, but also problems with accessibility to health care. When

accessibility to health care is good, the chances of detecting cancer and lethal respiratory diseases increases; with good accessibility to health care it is possible to induce lifestyle changes thus reducing risk. If accessibility to health care is bad, those with serious medical conditions may not come into contact with the healthcare system until it is too late, increasing morbidity and mortality rates unnecessarily. The chosen dependent variables reflect this accessibility aspect.[6]

$$Y = \alpha_1 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon \qquad (1)$$

The independent variables are the number of medical doctors per 100,000 inhabitants (X_1), population density (X_2) and the regional GDP per capita (X_3). The natural logarithm has been calculated for the variables and consequently the coefficients will express elasticities. The model is specified as shown in equation 1.

Estimations and results

With one exception, none of the determinants of the selected morbidity and mortality indicators in Finland 2013 and 2014 at a regional level display any statistically significant coefficients. The exception is the impact of the number of general practitioners per 100,000 inhabitants 2013 on the number of deaths from cancer per 100,000 inhabitants 2014. An increase in the number of general practitioners per 100,000 inhabitants by one per cent will lead to a decrease in the number of deaths from cancer per 100,000 inhabitants by 0.554 per cent.

Table 4 Multiple regression analysis of the determinants of selected morbidity and mortality indicators in Finland 2013 and 2014 at a regional level (N=19). *t*-stats within brackets.

	Ln Incidence of coronary diseases per 100,000 inhabitants 2013	*Ln* Number of deaths from cancer per 100,000 inhabitants 2014	*Ln* Number of deaths from respiratory diseases per 100,000 inhabitants
constant	2344.177	594.996	n/a
	(1.799)	(.999)	
Ln GP's/100,000 inhab.	-.019	-.554*	n/a
	(-.087)	(-2.591)	
Ln population density	-.311	-.105	n/a
	(-1.101)	(-.372)	
Ln Regional GDP/cap	-.381	-.124	n/a
	(-1.423)	(-.464)	
Adj-R^2	.285	.287	n/a
F-value	3.395*	3.416*	n/a

*** Statistically significant at the 0.001 level
** Statistically significant at the 0.01 level
* Statistically significant at the 0.05 level

[6] Accessibility to health care can be derived by combining a number of interdependent variables. Concretely, the spatial organisation of health care services results in certain levels of spatial (un)evenness on the 'supply side', i.e. in the geographical distribution of adequate services and state-of-the art technologies, qualified health care professionals, etc., while the demand for health care services, both in terms of quantity and quality, varies across space, embedded in diverse socio-economic and cultural contexts (income, demographic characteristics, perceptions, trust and values). The responsiveness of the healthcare system to people's health needs and perceptions is a key aspect of 'access' at the junction of supply/availability and demand/utilisation.

The determinants of the selected morbidity and mortality indicators in Sweden 2005 and 2014 at a regional level display several statistically significant coefficients. A major health care reform was implemented in 2009, stimulating patient choice and marketisation in health care services. The results indicate more statistically significant coefficients after the reform (2014) than before (2005).

The incidence of heart attacks per 100,000 inhabitants displayed a statistically significant coefficient for the number of general practitioners per 100,000 inhabitants in 2005. When the GP's/100,000 inhabitants increased by 1 percent, the incidence of heart attacks decreased by 0.446 percent. In 2014, the coefficients for the number of general practitioners per 100,000 inhabitants, the population density and the regional GDP/capita all displayed statistically significant coefficients. We can infer from this that marketisation appears to have had a negative impact on the out-

Table 5 Multiple regression analysis of the determinants of selected morbidity and mortality indicators in Sweden 2005 and 2014 at a regional level (N=21). *t*-stats within brackets.

	Ln Incidence of heart attacks per 100,000 inhabitants		*Ln* Number of deaths in cancer per 100,000 inhabitants		*Ln* Number of deaths in respiratory diseases per 100,000 inhabitants	
	2005	2014	2005	2014	2005	2014
constant	10.423***	11.491***	7.940***	10.093***	3.006	9.177***
	(9.145)	(9.613)	(8.125)	(12.312)	(1.691)	(9.312)
Ln GP's/100,000 inhab.	-.446*	-.317*	-.383	-.433**	.254	-.608***
	(-2.553)	(-2.327)	(-1.784)	(-3.192)	(1.130)	(-4.624)
Ln population density	-.275	-.407**	-.177	-.212	-.616**	-.293*
	(-1.592)	(-2.906)	(-.833)	(-1.519)	(2.769)	(-2.162)
Ln Regional GDP/cap	-.269	-.425**	-.231	-.492**	.004	-.236
	(-1.498)	(-3.011)	(-1.046)	(-3.501)	(.015)	(-1.727)
Adj-R^2	.527	.671	.282	.674	.215	.692
F-value	8.416***	14.581***	3.623*	14.755***	2.827*	16.011***

*** Statistically significant at the 0.001 level
** Statistically significant at the 0.01 level
* Statistically significant at the 0.05 level

come of the studied regional morbidity and mortality in Sweden. Geographically peripheral and otherwise spatially disadvantaged areas have lower GDP/cap, lower population density and a fewer doctors / 100,000 inhabitants than the metropolitan/central areas, so the negative values actually tell us that this is a particular problem for peripheral areas. These (quantitative) findings confirm the (qualitative) findings by Kullberg et al. (2017).

None of the coefficients for the independent variables determining the number of deaths in cancer per 100,000 inhabitants was statistically significant in 2005. After the reform, the number of general practitioners per 100,000 inhabitants and the regional GDP/capita displayed statistically significant coefficients. When the GP's/100,000 inhabitants increased by 1 percent, the number of deaths from cancer decreased by 0.433 percent and when the regional

GDP/capita increased by 1 percent, the number of deaths from cancer decreased by 0.492 percent.

The number of deaths from respiratory diseases per 100,000 inhabitants displayed a statistically significant coefficient for the population density in 2005. When population density increased by 1 percent, the number of deaths in respiratory diseases decreased by 0.616 percent. In 2014, the coefficients for the number of deaths in respiratory diseases per 100,000 inhabitants and the population density displayed statistically significant coefficients. An increase in these two independent variables led to a decrease in the number of deaths from respiratory diseases.

The results for Sweden in 2005, i.e. before the marketisation reform, display similarities with the pre-SOTE data in 2013-2014 for Finland. Almost none of the coefficients for the independent variables are statistically significant for the pre-reform periods in Finland and Sweden. After the reform, at least two out of three independent variables display statistically significant coefficients, indicating that spatiality suddenly has a statistically significant impact on health care provision. Since Finland opted to substantially copy much of the justifications and mechanisms for the upcoming SOTE reform, adopting the basic Stockholm 'model' across the whole of Finland (Tynkkynen et al., 2016; Tritter et al., 122-24), it is not unreasonable to anticipate that similar results can be expected after reform implementation in Finland.

The number of general practitioners per 100,000 inhabitants in Sweden appears, generally speaking, to be higher in the regions with bigger cities and high population density, Peripheral areas are not well placed to benefit from market reforms which could potentially undermine the primary goal of equity in access to health care, even in a publicly financed health care system (Kullberg et al., 2017). Accessibility to health care is higher in densely populated areas while low population densities and large distances between settlements in peripheral areas make it unprofitable for private sector actors to offer universal services there.

A high population density also says something about the population structure. In general, areas with a high population density have a higher share of young in the population and a higher share of elderly (see figures B2-B3 in appendix B). A relatively young population can be assumed to be relatively healthier than a relatively old population. Hence, the statistically significant coefficients for population density also provide information on the demographic structure. The negative correlation between population density and morbidity as well as mortality indicates differences not only in the number of persons per km^2, but also differences in the age structure.

Similarly, variable Regional GDP per capita indicates more than just how 'wealthy' a region is, though this is important from a provider perspective. The check for multicollinearity showed that the variables - regional GDP per capita and disposable household income per region - displayed the same patterns (Appendix A). A high disposable household income per region indicates the relatively high affordability of health care services, i.e. a demand function. The negative relationship in 2014 between variable regional GDP per capita and the incidence of heart attacks per 100,000 inhabitants as well as the number of deaths from cancer per 100,000 inhabitants tell us two things: (1) the higher regional GDP per capita the more health care service can be provided resulting in a lower incidence of heart attacks and fewer deaths from cancer; (2) the higher disposable household income the higher is the chance that the population is able to afford medical visits and examinations, resulting in a lower incidence of heart attacks and fewer deaths from cancer.

A formal hypothesis test shows that the zero hypothesis is rejected when it comes to the impact of the regional number of general practitioners per 100,000 inhabitants on the number of deaths from cancer per 100,000 inhabitants in 2014, i.e. hypothesis 1 (H_1) is true. Hypothesis 2 (H_2) is false and Hypothesis 3 (H_3) cannot not be tested.

For Sweden, the zero hypothesis cannot be rejected in 2005 for the number of deaths from cancer per 100,000 inhabitants and the number of deaths from respiratory diseases per 100,000 inhabitants; in all other cases, the zero hypothesis is rejected and hence Hypothesis 1 (H_1) is true. Regarding the second hypothesis, the zero hypothesis cannot be rejected for the number of deaths from cancer per 100,000 inhabitants in 2005 and 2014, and in 2005 for the incidence of heart attacks per 100,000 inhabitants. H_2 is false in these cases. The zero hypothesis is however rejected in 2014 the incidence of heart attacks per 100,000 inhabitants and in 2005 as well as 2014 regarding the number of deaths from respiratory diseases per 100,000 inhabitants. H_2 is true in these cases. Finally, in 2014, the zero hypothesis is rejected for the incidence of heart attacks per 100,000 inhabitants and for the number of deaths from cancer per 100,000 inhabitants; hence, H_3 is true. In all other cases, the zero hypothesis cannot be rejected and hence H_3 is false.

To control for the impact of regional political majorities in Finland and Sweden we inserted a dummy variable into the models. None of the coefficients for the independent interaction variables were statistically significant.[7] As the marketisation, consumer choice and

[7] The dummy was set at 1=right wing majority or dominance in coalition; 0=left wing majority or limited right wing influence in coalition.

New Public Management reforms implemented in Sweden 2007-2009 were 'top-down' processes, as is the current SOTE reform in Finland (Smith & Rauhut, *forthcoming*), the marginal impact of the regional parliaments is not surprising.

Competition, equity and efficiency

In policy terms, health provision can be conceptualised as a 'wicked problem' - there are no easy solutions in the sense of definitive answers (Rittel & Weber, 1973). Rather, proposed 'solutions' to the effective provision of healthcare – balancing cost and equity – depend on how the issue is framed by stakeholders, with problems generally conceptualised in a way that legitimises preferred stakeholder solutions, while technological, fiscal and social constraints change over time and definitive answers remain elusive.

This is clearly reflected in the literature on health reform processes as 'policy' and 'market' failure proponents talk past each other while costs and demand continue to rise and previous policy interventions have perverse effects – 'contracted out' services cost more while technological advances and knowledge asymmetry between physician and patient potentially induce further demand[8]. Nevertheless, the political argument appears to have been won by the proponents of 'policy' failure, so it is to the likely impacts of potential 'market' failure to which we must now turn.

While the 'free establishment' element of the current Finnish reform process promotes market entry for private providers, allowing them to compete on the same legal basis as formerly public-sector providers in the provision of hospital services for instance, free exit remains more problematic, particularly if the operator is a local monopolist in a rural or otherwise spatially disadvantaged community.

The expectation that market power will be absent – particularly in rural, peripheral and otherwise spatially disadvantaged areas - is therefore unrealistic because the costs of providing the necessary level of service to ensure reasonable geographical equity are high while potential

[8] These issues go to the heart of the discipline of Health Economics. As the smaller Finnish municipalities were incentivised by budgetary changes to 'out-source' health service delivery in the mid-1990s they were tied into long-term contracts which enabled providers to use their market power to increase costs over time. It is only relatively recently that these contracts are coming up for renewal and a significant amount of re-municipalisation is taking place (JHL 2015). Similarly, 'choice' raises patient expectations inducing demand for additional and potentially unnecessary treatments, or treatments that the patient would not otherwise be willing to pay for (generating moral hazard), while on the supply side, 'choice' can encourage physician-induced demand (PID) even in situations where prices are regulated as, for instance, the envisaged Finnish private provider market under SOTE is essentially a differentiated product oligopoly with competition based on quality not price (Bhattacharya et al., (2014: 91).

profit opportunities are likely to be low unless the government creates a payment system, which effectively subsidises private providers.[9]

Moreover, the two core selling points for choice and marketisation, namely, that they increase efficiency and deliver significant cost savings[10] are highly controversial with the inevitable IT cost overruns alone lightly to eat up all of the envisaged savings. More importantly however is the notion of efficiency in economics where it is well understood that competition is not the best way to improve social welfare as it promotes the over-production of status goods (Rice 2003: 36).

Finally, information asymmetry is emblematic of the principal-agent relationships which dominate in the health sector. Given the significant political pressure to adopt the choice and marketisation agenda (Rehnberg & Garpenby, 1995; Green-Pedersen, 2002; Lehto et al., 2014), the potential for innovative technological 'solutions' to ease accessibility and service delivery problems has been advanced in a number of forms – from telemedicine and telehealth to the more all-encompassing *e*Health; including variations on the 'choose and book' system; and the creation of Public Service Platforms (PSP's). These innovations should however be scrutinised for their likely systemic impact as the digitalisation of service provision is being conceived with rather different goals in mind depending on the type of organisation concerned (Ranerup et al., 2016). These tools and innovations parenthetically deal with questions of accessibility but they are primarily designed to address the problems of information asymmetry in the market provision of health care services.

Increased IT usage in – or the digitalisation of - health care can be seen as potentially serving five linked but separate functions. Firstly, there is clearly an element of professional-to-professional knowledge creation and sharing. Secondly, we have professional-to-patient remote consultation and monitoring. Thirdly, there is a broader system-administration-to-patient knowledge gathering and status determination (both medical and financial/insurance) function. Fourthly, we can see an important element of national industrial strategy (Sweden/Finland-rest of the world) designed to promote national economic and commercial benefit. And fifthly, we have a commercial strategy (commercial enterprises-customers) which envisages the 'bundling' of health data and information with direct product marketing.

[9] In addition to market failure, a further issue of importance here is raised by Epple and Romano (1995) in their discussion of service provision in systems with mixed public and private providers, where the continuing quality of public provision depends on public providers retaining support among the middle classes ensuring that they do not choose to 'exit' the public system for private provision leaving it as a residual service only.

[10] In 2015, Finnish healthcare-related spending was 9.6% of GDP (OECD average 9.1%) or €21bn. The SOTE advocates claim that the reform will save an annual €3bn by 2030 (PSI 2017).

Clearly the impact that each of these functions potentially has on the provision of health services in rural and other geographically and/or spatially disadvantaged areas differs with some having a neutral effect, some a positive effect and others a potentially negative effect. What remains in dispute however is the overall impact and the ability for IT to substitute for on-site professionals as, for instance, vacancies rise as the 'baby boomer' generation of health care professionals retire[11]. As a policy tool, the short-term expectations in respect of digitisation and *e*Health may be optimistic in terms of addressing ongoing accessibility issues in the light of system marketisation.

Concluding remarks

Between 2005 and 2014 several healthcare reforms were implemented in Sweden (marketisation, consumer choice, *e*Health, etc.) ostensibly to improve e.g. accessibility and strengthen the position of the consumer. Seen from a spatial perspective, the results are rather disappointing. The morbidity and mortality rates for the three chosen indicators not only rose, the coefficients also changed from statistically insignificant to significant.

Seen from a spatial perspective, the Finnish data for 2013 indicate that Finland is in a similar situation to that of Sweden in 2005. Since 2015, Finland has moved towards implementation of the SOTE reform encompassing marketisation, consumer choice and *e*Health. As such, while every health system is different and national institutional arrangements play a key role, given the diffusion of policy models from Sweden to Finland and the planned implementation of an even more radical version of choice and marketisation, we can perhaps expect to see a similar set of developments occurring in Finland as can now be observed in Sweden in respect of mortality and morbidity statistical measures as they are applied to areas already facing particular geographical or spatial disadvantages.

Accessibility to health care is higher in densely populated areas while low population densities and large distances between settlements in peripheral areas make it unprofitable for private sector actors to offer additional universal services there. The findings in this study therefore suggest that peripheral areas may not be well placed to benefit from market reforms. These reforms could potentially undermine the primary goal of equity in access to health care, even in a publicly financed health care system.

[11] Between 2000 and 2013, the percentage of doctors aged 55 years or above rose, in Finland, from 15-26% and in Sweden from 21-34% (OECD 2015). Unfilled physician vacancies represent an additional limiting factor in accessibility term in rural and otherwise spatially disadvantaged areas. Data for unfilled vacancies, particularly in the most spatially disadvantaged areas is however notoriously difficult to source for obvious reasons though references have been made to the number of temporary or agency hires used (JHL 2015).

This paper offers some insight on why health care provision is not spatially neutral and why 'one-size-fits-all' policies does not work. It suggests that what may work well, i.e. promoting accessibility and consumer choice in metropolitan areas may lead to completely different outcomes in peripheral areas with low population densities and long travel distances to health care facilities. Moreover, while digitisation and *e*Health do address aspects of accessibility, these tools suffer from a number of drawbacks in that they cannot substitute for face-to-face care and they are being developed primarily in a 'for-profit' context adding further to the general commodification of the health sector.

Sweden has a higher number of doctors per 1000 population than Finland while the clustering of ratio scores per NUTS2 level is less differentiated across its territory with no fundamentally disadvantaged outliers (OECD 2015: 127). Marketisation has likely had an outcome effect, as the results for Sweden reported here show, but what perhaps may not be so clear is precisely what this effect has been. For instance, in Sweden's case, accessibility may also be curtailed by the increase in additional cost factors to access care (out-of-pocket payments) than by geographical proximity to services *per se* as is more likely to be the case in parts of Finland. As such, the results in respect of mortality and morbidity reported here may be multi-causal. Further detailed investigation is clearly required.

Appendix A

Table A1 Correlation matrix independent variables for Finland 2013

		lnrgdp13	lninkm13	lngp12	lncome13
lnrgdp13	Pearson Correlation	1	,599**	,094	**,895****
	Sig. (2-tailed)		,007	,702	,000
	N	19	19	19	19
lninkm13	Pearson Correlation		1	,360	,538*
	Sig. (2-tailed)			,130	,018
	N		19	19	19
lngp12	Pearson Correlation			1	,130
	Sig. (2-tailed)				,595
	N			19	19
lncome13	Pearson Correlation				1
	Sig. (2-tailed)				
	N				19

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Table A2 Correlation matrix independent variables for Sweden 2005

		lngp05	lninkm05	lnrgdp05	lndinc05
lngp05	Pearson Correlation	1	,353	,432	,373
	Sig. (2-tailed)		,117	,050	,096
	N	21	21	21	21
lninkm05	Pearson Correlation		1	,412	,681**
	Sig. (2-tailed)			,063	,001
	N		21	21	21
lnrgdp05	Pearson Correlation			1	**,804****
	Sig. (2-tailed)				,000
	N			21	21
lndinc05	Pearson Correlation				1
	Sig. (2-tailed)				
	N				21

**. Correlation is significant at the 0.01 level (2-tailed).

Table A3 Correlation matrix independent variables for Sweden 2014

		lngp14	lninkm14	lnrgdp14	lndinc14
lngp14	Pearson Correlation	1	,263	,289	,224
	Sig. (2-tailed)		,250	,204	,330
	N	21	21	21	21
lninkm14	Pearson Correlation		1	,368	,598**
	Sig. (2-tailed)			,101	,004
	N		21	21	21
lnrgdp14	Pearson Correlation			1	**,797****
	Sig. (2-tailed)				,000
	N			21	21
lndinc14	Pearson Correlation				1
	Sig. (2-tailed)				
	N				21

**. Correlation is significant at the 0.01 level (2-tailed).

Appendix B

Figure B1 Scatter diagram average age and population density in Finland 2013

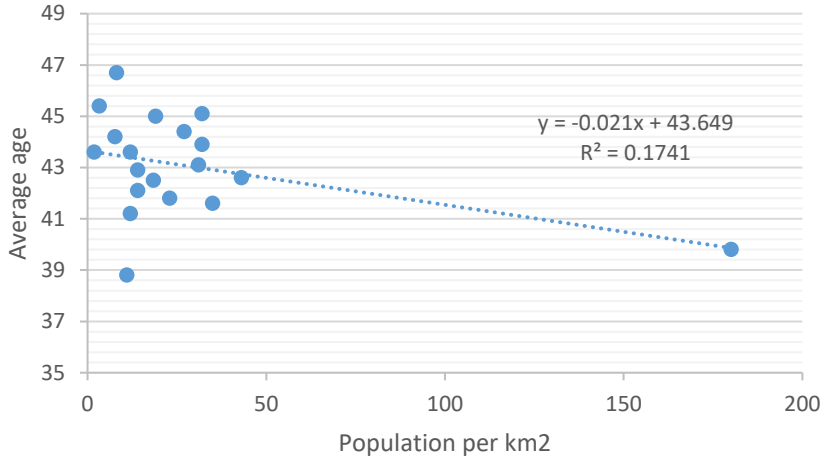
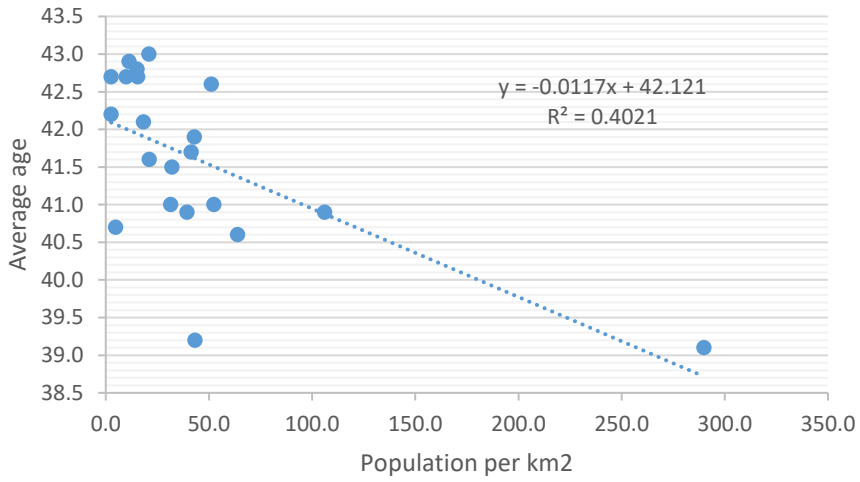
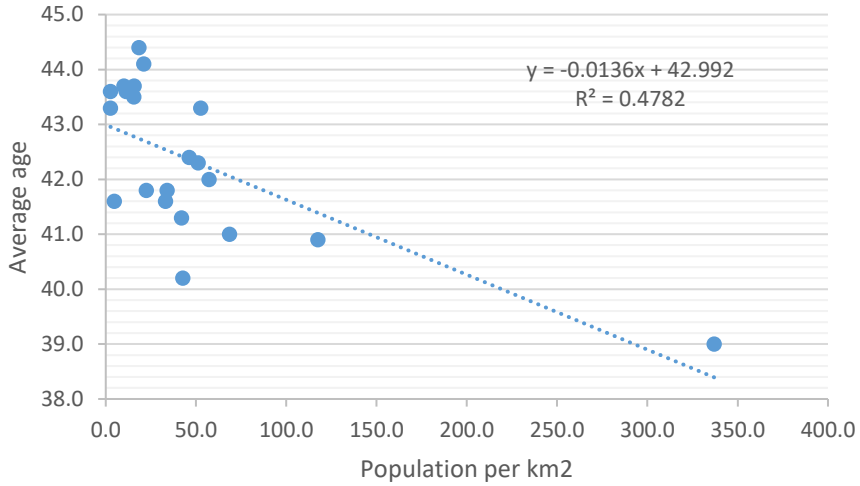


Figure B2 Scatter diagram average age and population density in Sweden 2005



Note: If the Stockholm region (outlier) is excluded the correlation drops to R^2=0.2477

Figure B3 Scatter diagram average age and population density in Sweden 2014



Note: If the Stockholm region (outlier) is excluded the correlation drops to R^2=0.3564

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