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Food Deserts in Oslo

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Abstract

Geospatial analysis has offered a rich interdisciplinary insight into the study of social inequality for decades. While there have been some tentative steps towards the application of these tools in Norwegian research, the study of significant dimensions of inequality in Norwegian society has been hampered by an established pattern of uncritical and typically state-sponsored research interests. "Food deserts", urban areas with limited access to full-service supermarkets, have been just one among many subjects of such studies in the UK and North American settings. This thesis uses established statistical approaches to determine supermarket accessibility in Oslo, Norway and to attempt to identify so-called "food deserts". Additional social demographic data are then considered to establish potential relationships and correlation with accessibility scores for each statistical tract of Oslo.

Abstrakt

Geospasiale analyser har tilbudt en rik tverrfaglig innsikt i studiet av sosial ulikhet i flere tiår. Selv om det har vært noen foreløpige skritt mot anvendelsen av disse verktøyene i norsk forskning, har et etablert mønster av ukritisk og statsstøttet fokuser hindret den fullstendige studien av betydelige dimensjoner av ulikhet i det norske samfunnet. "Mat ørkene", urbanre områder med begrenset tilgang til dagligvarebutikker har vært bare ett av mange temaer i slike studier i Storbritannia og Nord-Amerika. Denne oppgaven bruker etablerte statistiske tilnærminger for å fastslå tilgjengeligheten av dagligvarebutikker i Oslo og forsøker å identifisere såkalte "matørkener". Ytterligere sosialdemografiske data vurderes deretter for å etablere potensielle forhold og korrelasjoner med tilgjengelighet til matbutikker for hver delbydel i Oslo.

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My mother, Berit, deserves a special space in this dedication. Her indomitable resilience and fortitude in the face of adversity inspires the unrelenting determination I carry with me today.

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Chapter 1: Introduction

Food deserts, areas with limited access to supermarkets, have a significant effect on health. Type-2 diabetes is disproportionately prevalent among US Hispanic and Black adults;¹ obesity is statistically significantly more prevalent among women from low-income households than high-income households, and among those without tertiary education.² In addition to heart disease, these conditions have been linked to high-fat and high-sugar diets,³ often the direct result of a systematic lack of food choices among communities, particularly low-income urban neighborhoods. A direct comparison to the Norwegian context is less than straightforward, as racial and ethnic groups are not operationalized as social-analytic categories in official statistics figures; recent studies have found a statistically significant relationship between urban organization and the spatial distribution of health resources and type-2 diabetes prevalence in Oslo, with significant associations found for adjacent operationalizations of ethnicity.⁴ This takes place in the context of recent literature that indicates a wide gap in life expectancy by income in Norway, inequalities that are directly comparable to those found in the US.⁵

Despite rating first place in the 2019 Human Development Index, and despite the fact that it boasts a healthcare system with the highest share of health professionals in Europe, Norway's obesity rate has nearly doubled in the past two decades, and more than one in six Norwegian children suffer from obesity. One in five Norwegians live with heart disease and roughly 7.5% of the adult population has diabetes.⁶ Researchers have begun referring to this contradiction as the "Nordic health paradox", a "seemingly puzzling empirical reality in which, despite the presence of strong welfare policies targeting structural inequalities, distinct health disparities persist in Scandinavian societies."⁷

Few studies have been carried out regarding access to healthy foods in Norway, even though the phenomenon has been of great interest to public health officials and

¹"Statistics About Diabetes," American Diabetes Association, accessed June 1, 2020, <https://www.diabetes.org/resources/statistics/statistics-about-diabetes>. Note that the statistical significance of diabetes prevalence has not been assessed by this author.

²Cynthia L. Ogden, Tala H. Fakhouri, Margaret D. Carroll et al., "Prevalence of Obesity Among Adults, by Household Income and Education - United States, 2011-2014," *Morbidity and Mortality Weekly Report* 66, 2017: 1369-1373, <http://doi.org/10.15585/mmwr.mm6650a1>.

³"Obesity: Preventing and Managing the Global Epidemic," WHO Technical Report Series No. 894, World Health Organization, 2000.

⁴Elias Nosrati et al., "Ethnicity and place," *European Journal of Public Health* 28, no. 1 (2018): 30-34, <https://doi.org/10.1093/eurpub/ckx119>.

⁵"The rich are outliving the poor in both Norway and USA," FHI, published May 14, 2019, accessed February 7, 2021, <https://www.fhi.no/en/news/2019/rich-outliving-the-poor/>.

⁶"Human Development Report 2019," United Nations Development Programme, 2019, <http://hdr.undp.org/sites/default/files/hdr2019.pdf>; "State of Health in the EU: Norway," OECD Country Health Profile, 2019, http://www.euro.who.int/__data/assets/pdf_file/0006/419469/Country-Health-Profile-2019-Norway.pdf; "Cardiovascular Disease in Norway," Norwegian Institute of Public Health, accessed June 1, 2020, last updated January 24, 2020, https://www.fhi.no/en/op/hin/health-disease/cardiovascular-disease-in-norway---; "Diabetes in Norway," Diabetes Forbundet, accessed June 1, 2020, <https://www.diabetes.no/english/>.

⁷Nosrati et al., *ibid*; Klaus Hurrelmann, Katharina Rathmann, and Matthias Richter, "Health inequalities and welfare state regimes," *Journal of Public Health* 19, no. 1 (2011): 3-13, <https://doi.org/10.1007/s10389-010-0359-1>; George A. Kaplan, "Health inequalities and the welfare state," *Norsk Epidemiologi* 17, no. 1 (2007): 9-20, <https://doi.org/10.5324/nje.v17i1.165>; Clare Bambra, "Health inequalities and welfare state regimes," *Epidemiology and Community Health* 65, no. 9 (2011): 740-745, <http://dx.doi.org/10.1136/jech.2011.136333>; Johan P. Mackenbach, "The persistence of health inequalities in modern welfare states," *Social Science & Medicine* 75 (2012): 761-769, <https://doi.org/10.1016/j.socscimed.2012.02.031>; Tim Huijts and Terje A. Eikemo, "Causality, social selectivity or artefacts?," *European Journal of Public Health* 19, no. 5 (2009): 452-453, <https://doi.org/10.1093/eurpub/ckp103>.

sociologists in both Europe and North America for the last five decades. The exceptions are sparse and fairly recent. Kostas Mouratidis carries out a comparable study of general “neighborhood deprivation”, of which supermarket accessibility is part of a broader index in a qualitative study.⁸ Næss et al. consider self-reported grocery accessibility for a sample of respondents living in the periphery of Oslo and Stavanger.⁹ Finally, the most comprehensive study of this nature encountered by this author is Nosrati et al.’s 2018 article on the potentially confounding role in the relationship between ethnicity and type-2 diabetes in Oslo.¹⁰ The latter most closely resembles the present study as it takes a quantitative approach and incorporates concrete measures of accessibility; nonetheless, there are important divergences.¹¹ Chief among them is that the present study relies heavily on direct measures to define access, while Nosrati et al. make exclusive use of self-reported perceived access to health resources.

There are several competing definitions of “food deserts”. As I offer a more abstract discussion of the phenomenon throughout this document, I refer to the broadest interpretation of “food deserts”: urban areas in which a substantial proportion of residents lack geographic access to affordable nutritious foods. A more precise definition will be approached only within a quantitative, computational context. Identifying the processes and patterns by which food deserts emerge is complicated and subject to debate, although the discussion has largely been stifled by conservative commentators and researchers, who posit that supply is an inconsequential factor in determining nutritional inequality, and that the introduction of supermarkets offering nutritious food products to low-income areas affects nutritional inequality by “only” 10%.¹² These arguments entail, in effect, a “culture of poverty” narrative that in any event amount to little more than red herring. The tacit assumption is that so-called cultural variables are to blame for nutritional inequality, a cynical view that remains completely irrelevant as long as low-income households are nonetheless never offered a choice.

As economists continue scrying at the behest of the allegedly blameless state and private market, more informal media provide insights into the lived experience of marginalized communities that are routinely overlooked or ignored by researchers. Michael Che’s 4-minute “[Get the Fiji Water, Son](#)” sketch offers a rich sociological insight into the intersection of gentrification, food deserts, and the culinary background of marginalized groups. “The Itis,” an episode of *The Boondocks*, is another example of the

⁸Kostas Mouratidis, “Neighborhood characteristics, neighborhood satisfaction, and well-being,” *Land Use Policy* 99, 2020, <https://doi.org/10.1016/j.landusepol.2020.104886>.

⁹Petter Næss, Arvid Strand, Fitwi Wolday, and Harpa Stefansdottir, “Residential location, commuting and non-work travel in two urban areas of different size and with different center structures,” *Progress in Planning* 127, 2019: 1-36, <https://doi.org/10.1016/j.progress.2017.10.002>.

¹⁰Nosrati et al., *ibid*.

¹¹Nosrati et al. carry out a logistic regression model using a binary index of “toxic environment”; the present study relies primarily on linear regression models and thereby does not employ bolder definitional operations of e.g. “food deserts” or “toxic environment”. Nosrati et al. do not consider grocery stores, and limit their definitional operationalization to specialty health food stores; this study does the inverse: grocery stores are highlighted as the primary, universally accessible resource points for the satisfaction of dietary needs for the majority of the population.

¹²Hunt Allcott, Rebecca Diamond, Jean-Pierre Dubé et al., “Food Deserts and the Causes of Nutritional Inequality,” *The Quarterly Journal of Economics* 134, issue 4, November 2019: 1793-1844, <https://doi.org/10.1093/qje/qjz015>; Marianne Bitler and Steven J. Haider, “An Economic View of Food Deserts in the United States,” *National Poverty Center* 23, October 2010, http://www.npc.umich.edu/publications/policy_briefs/brief23/policybrief23.pdf.

culturally biased and white-centric double standard applied to communities trapped in an unhealthy double bind. These, among other commentaries, offer a more nuanced picture than the state and private market researcher are willing and able to provide.

In this document, I restrict myself by and large to an exploratory statistical study of supermarket access in Oslo. While I address some explanatory models and offer suggestions and thoughts on the next steps in developing a fuller explanatory model, I do not attempt to explore the direct causes of food deserts. However, to a large degree, I argue that in the bigger picture, the conversation is frankly redundant and pedantic. I conjecture that while cultural barriers may contribute to nutritional inequality, the relationship is specious at best, as it reflects an indirect relationship governed in earnest by the feedback loop caused by the very real and material lack of access in the first place.

In Chapter 2, I offer a review and a limited critique of the prior Norwegian literature on spatial inequalities, as well as of a handful of dominant theoretical frameworks that have been used in the field. This chapter also includes a descriptive analysis of the grocery retailers that dominate the Norwegian markets today. Chapter 3 is an overview of the theories that are ultimately employed in the analysis, and includes a philosophical discussion on the methodological approach taken in this project. Chapter 4 provides an overview and discussion of the data sets used in the analysis, as well as the methods I employ in calculating supermarket accessibility scores. In Chapter 5, I discuss the immediate findings of a battery of linear regression models constructed to determine the predictive value of key socioeconomic variables in supermarket accessibility scores; I also offer a discussion on a prospective logistic regression model. In Chapter 6, I offer overall interpretations of the models (including further statistical explorations and an assessment of model fits). Finally, in Chapter 7, I offer a discussion on the limitations of the studies and potential future studies, followed by some closing remarks on the study where I attempt to address a specific definition of “food deserts” and how the concept applies to Norway in contrast to the North American and general European settings.

Chapter 2: Literature Review

Before outlining the theoretical framework ultimately used in the analysis, I offer a review of the existing literature, beginning with Norwegian studies on spatial inequalities broadly defined in Section 2.1. The existing Norwegian literature relies heavily on the concept of *spatial stigmatization*. While my analysis does not make extensive use of these theories, I believe that a summary and critique (Section 2.2) are important in contextualizing the present study. In Section 2.3, I briefly discuss the so-called *tipping point phenomenon*; while it does not fit entirely into the aforementioned sections, I make use of some of its insights. Finally, I discuss the history of the Norwegian retail industry's development, comparing it with the North American context in Section 2.4.

2.1 Norwegian Studies

Norwegian spatial inequality studies are not nearly as developed as their North American and British cohorts. No geospatial analyses of food deserts or supermarket accessibility have been carried out for Oslo on a systematic, statistical basis. Adjacent studies in public health have been carried out,¹ but none address the structural roots of the inequalities. In fact, when it comes to geospatial analyses in general, the literature remains sparse and suffers extreme conceptual and technical defects.² Nonetheless, there exists a large host of primarily empirical studies of Oslo. Suárez et al. carry out a quantitative study of access to outdoor recreation opportunities;³ Næss et al. address air pollution;⁴ additional studies regarding food access have been mentioned earlier. However, the overwhelming majority of literature that addresses Norwegian spatial inequality from an anthropological/sociological perspective relies primarily on stigmatization theory frameworks, chiefly represented by Wacquant's *advanced marginality* and *territorial stigmatization* concepts. While this has far-reaching consequences for Norwegian spatial inequality studies, I reserve this critique and discussion for the later review of stigmatization theory and dialogue exclusively with the work of the authors I now turn to.

I wish to highlight three recent spatial inequality studies. The first is Rosten's study of Furuset (and the Grorud area more broadly), a northeastern peripheral neighborhood of Oslo.⁵ The second is Danielsen's study of Romsås, another peripheral neighborhood nearly adjacent to Furuset.⁶ Both studies explore the role of the media

¹Anne K. Jennum et al., "Promoting physical activity in a multi-ethnic district," *European Journal of Preventive Cardiology* 10 (5), 2003: 387-396, <https://doi.org/10.1097/01.hjr.0000085244.65733.94>; Anne K. Jennum et al., "Promoting physical activity in a low-income multiethnic district," *Diabetes Care* 29 (7), 2006: 1605-1612, <https://doi.org/10.2337/dc05-1587>; Anne K. Jennum, Catherine A.N. Lorentzen, and Yngvar Ommundsen, "Targeting physical activity in a low socioeconomic status population," *British Journal of Sports Medicine* 43 (1), 2009: 64-69, <https://doi.org/10.1136/bjism.2008.053637>.

²Svein Blom, "Innvandrerens bosettingsmønster i Oslo," *Social and Economic Studies* 107, 2002; Tom Kornstad, Terje Skjerpen, and Lasse S. Stambøl, "Utviklingen i bostedssegregering i utvalgte store og sentrale kommuner etter 2005," (Oslo: Statistics Norway, 2018). See also Conor Kelly, "Segregation in Oslo" (Bachelor's thesis), Norwegian University of Science and Technology (2020) for a critique of the two former papers.

³Marta Suárez et al., "Environmental justice and outdoor recreation opportunities," *Environmental Science & Policy* 108 (2020): 133-143, <https://doi.org/10.1016/j.envsci.2020.03.014>.

⁴Øyvind Næss et al., "Air Pollution, Social Deprivation, and Mortality," *Epidemiology* 18, no. 6 (2007): 686-694, <https://www.jstor.org/stable/20486456>.

⁵Monika Rosten, "Territoriell stigmatisering og gutter som «leker getto» i Groruddalen," *Norsk sosiologisk tidsskrift* 1, no. 1 (2017): 53-70, <https://doi.org/10.18261/issn.2535-2512-2017-01-04>.

⁶Kirsten Danielsen, "Et forsøk på å beskrive det foranderlige," *Norsk sosiologisk tidsskrift* 6 no. 1, 2017: 453-469, <https://doi.org/10.18261/issn.2535-2512-2017-06-03>.

as a symbolic authority and offer a balanced picture of their causal relationship with neighborhood respondents. The authors both discuss how this external influence affects identity formation, symbolic resistance, and ultimately oppositional behaviors among stigmatized residents, striking a reasonable balance between an individualistic normative discourse and the structuralist influence of symbolic authorities. Rosten's analysis in particular powerfully describes the nuanced gendered dimension of the processes, shedding light on Furuset's internal anthropological realities and fitting neatly into a global and intersectional academic discourse often underdeveloped in Norwegian studies. The third is Viggo Vestel's 2004 doctoral dissertation, perhaps the most expansive research project undertaken to study and explore stigmatized neighborhoods of Oslo.⁷ From an anthropological perspective, the detailed accounts of identity formation, social interactions, and semiotic analysis are nothing short of masterful. Like Rosten and Danielsen's studies, one of the strongest points of Vestel's study is the discussion of the role of the media in identity formation and stigmatization. Unfortunately, the buck stops here.

The foremost issue with these studies is a dependence on taken-for-granted analytic "racial" categories never identified as such. The site of inequality is assumed to reside exclusively within an ambiguous concept of "ethnicity". No study addresses (or even acknowledges) the independent intersection between spatial inequality (or stigmatization) and class, gender, or disability, or their potential as operative mediators. On the contrary, the authors tend to uncritically operationalize so-called *drabantbyer* ['peripheral cities'] with reference to the proportion of the neighborhood's population with immigration backgrounds. When gender and class are invoked, it is typically done with reference to the underlying default distinguishing difference represented by race. This is despite the fact that other socioeconomic factors like disability, education, employment, and income shape Oslo's inequalities as much as immigration background. When presenting the neighborhoods' demographics, both Rosten and Danielsen exclusively refer to immigration background. While Vestel is alone in offering a more expansive overview of east-side Oslo's socioeconomic demographics, they are never invoked beyond an almost literary exposition. Rosten's methodology is an interesting (albeit insufficient) exception, as Furuset was not chosen explicitly because of its demographics, but rather for the ubiquity of the welfare state's presence in the neighborhood. Besides the fact that this often serves as a euphemism for "race", the exceptional character of this methodology is rendered meaningless when Rosten fails to address the prospective role of the welfare apparatus as a carceral agent, as well as a symbolic authority that shapes media portrayals of the neighborhood. This is perhaps due to the author's initial role as a "concerned neighborhood bureaucrat".⁸

The second issue is a closely related corollary: the absence of a framework on "race" has two immediate consequences. The first is that the studies lack an underlying explanatory model for how "the uncomfortable experience of growing up in the

⁷Viggo Vestel, "A Community of Differences," (PhD diss., University of Oslo, 2004).

⁸Rosten, *ibid.* In the original Norwegian: «bekymret» bydelsbyråkrat. Critiques of targeted public service interventions and their contribution towards further stigmatization are mentioned in passing in the conclusion, but never explored in depth throughout the study.

‘wrong’ place can have a decisive effect in the transition from youth to adulthood, especially for young men.”⁹ Vestel’s study is perhaps the clearest example: when Vestel discusses school interactions, there is never mention of the tangible outcomes that differential treatment have for respondents’ class trajectories; although views on and interactions with the police are briefly mentioned, they are not pursued in interviews and over half of the references are either recounted by the police department itself, or rely on preconceived and stereotypical notions of the relationship between police and marginalized communities; employment opportunities are intermittently discussed, but only in reference to immigration background; state institutions like NAV [The Norwegian Labour and Welfare Administration] or *Barnevernet* [The Norwegian Child Welfare Services] are never mentioned throughout the study, and certainly never considered through the Foucaultian lens of the carceral archipelago. The second is that stigmatization (including racialization) defaults to a normative individualistic concept that primarily focuses on the denial of identity recognition as the principal problem of racism, underemphasizing the role of unequal access and opportunity.¹⁰ This manifests demonstrably as a benevolent “victim-blaming” that approaches paternalism: oppositional identities are characterized as “playing ghetto” and unequal material conditions are understated through relativization.

This segues neatly into the third and arguably most important issue common to Norwegian spatial inequality studies: owing either to a reluctance to break from the normative discourse surrounding the allegedly egalitarian Nordic social democracy model, an insular focus on individual behaviors and attitudes, and/or the structural vacuum that results from poorly developed frameworks on racialization (the exact reason is hardly important), inequalities are trivialized and/or justified. Because Furuset is described as having a “well-functioning public transit system” where a “large proportion of residents own their own homes”, because “housing conditions are better in comparison to neighborhoods in Sweden and Denmark”, because “the research shows that [those living in Grorud] are largely happy [*trives*], feel safe [*trygge*] and experience good conditions for growing up where they live”, and because of the “welfare-ambitious framework of Scandinavian states,”¹¹ Rosten claims that the effects of living and growing up in stigmatized neighborhoods will “likely be of relatively less consequence for individuals’ opportunities for social mobility,” that compulsory physical geographic limitations have no bearing, and presumably that the encroachment of the penal state has no analogue in Oslo. Of course, nothing could be further from the truth. Between 2015 and 2017, the percentage of households living in crowded dwellings in Grorud remained around 15% (neighboring Alna’s proportion increased from 15.2% to 16.1%), consistently remaining above the municipal average of 13%.¹² Grorud saw

⁹*Ibid.* In the original Norwegian: *Ikke desto mindre har jeg i denne artikkelen vist at den ubehagelige opplevelsen av å vokse opp på «feil» sted kan få avgjørende betydning i overgangen fra ung til voksen, og da spesielt for unge menn.*

¹⁰See Marianne Gullestad, *Plausible Prejudice* (Oslo: Universitetsforlaget, 2006), who more or less takes the same position, although Gullestad’s is a far more developed position.

¹¹Rosten, *ibid.*

¹²“11093: Crowded dwelling. Households (M) (UD) 2015 - 2019,” Statistics Norway, accessed January 14, 2021, <https://www.ssb.no/en/statbank/table/11093>. The only other neighborhoods with higher percentages of crowded dwellings in Oslo were *Sentrum* and *Bjerke*.

the highest rates of violence-related injuries than any other Oslo neighborhood in 2015, with one in twelve youth reporting injuries due to violence.¹³ No other neighborhood (except *Sentrum*) offers fewer green spaces than Grorud, despite the fact that its total land area hovers around the municipal average.¹⁴ Finally, the fact that each year, nearly 1 in 50 children in Grorud and nearly 1 in 77 children in Alna were involuntarily removed from their parents' households and placed in foster care¹⁵ reads more like a deliberate omission in defense of the welfare state than a heinous oversight governed by Hanlon's razor, given the massive and public outcry against *Barnevernet*.¹⁶ Between 2015 and 2019, the European Court of Human Rights accepted 26 hearings against the Norwegian government for *Barnevernet*'s activities and in 2019 found that the agency was in violation of human rights conventions of which Norway is a signatory.¹⁷

I do not wish to argue that social and cultural "capitals"¹⁸ serve no purpose in the analysis of inequalities. Nor do I wish to suggest that the findings of the aforementioned authors are irrelevant or trivial. Rather, I maintain that the one-sided focus on intangible "capitals" like identity formation and validation has come at the expense of downplaying the role of tangible capital and actors' relation to it. This focus has also had the effect of making some forms of inequality visible at the expense of the visibility of other forms; microaggressions, lack of access to education resources, and respectability politics are highlighted while profiling, carceral intervention, and the disinvestment of publicly funded basic resources are ignored or downplayed.

2.2 Spatial Stigmatization Theories

Although I do not endorse the following theories and although they do not factor substantially into my analysis, some elements may be of use in spatial inequality studies. Moreover, I believe that a serious review of these theories is important not only in contextualizing the present study, but also in clarifying the points of departure for the framework I ultimately employ. In the following, I offer review Keene and Padilla's "pathways" framework and recent "territorial stigmatization" literature.

¹³"Sår eller skade grunnet vold (B)," *Statistikkbanken: Oslo Kommune*, accessed January 14, 2021, <https://statistikkbanken.oslo.kommune.no/>. The next leading neighborhood was Frogner with roughly the same figures. The municipal average among neighborhoods was 6.6%.

¹⁴"Arealbruk etter faktisk bruk (D)," *Statistikkbanken: Oslo Kommune*, accessed January 14, 2021, <https://statistikkbanken.oslo.kommune.no/>.

¹⁵"Barn med barnevernstiltak (B), KOSTRA," *Statistikkbanken: Oslo Kommune*, accessed January 14, 2021, <https://statistikkbanken.oslo.kommune.no/>. In Grorud, this figure is twice the municipal average.

¹⁶Elin Brodin, "Barnevernet og menneskerettighetene," *Morgenbladet*, published May 5, 2000, accessed January 14, 2021, <https://morgenbladet.no/2000/05/barnevernet-og-menneskerettighetene>; Gro Hillestad Thune, "Hva kan gjøres?," *Morgenbladet*, published May 22, 2012, accessed January 14, 2021, https://morgenbladet.no/ideer/2012/hva_kan_gjores.

¹⁷European Court of Human Rights, *Case of Strand Lobben and Others v. Norway*, Application no. 37283/13, Strasbourg, France: HUDOC, 2019, accessed January 14, 2021, <http://hudoc.echr.coe.int/eng?i=001-195909>.

¹⁸"Capital" is printed in scare quotes because "cultural capital" and "social capital" are decidedly fictions. One may speak of "cultural resources" or "social resources", but I reserve the uncritical use of "capital" (without scare quotes) for actual capital, i.e. capital as defined in classical Marxist theory.

2.2.1 Spatial Stigma (Pathways)

Keene and Padilla offer a tentative basis for a *spatial stigma* framework via three pathways through which spatial stigma affects health.¹⁹ This framework is served by the expansion of “health” to include not only the immediate physical consequences of spatial inequality, but also their ramifications for mental and social health. There are certainly more than three phenomena mediating the relationship between spatial stigma and health; I therefore refer to their proposal as a tentative basis for a broader theory. Although the authors do not suggest that their proposal forms a fully-fledged theory, I counter that they are too modest in presenting the mediators as mere pathways as opposed to elements of an interdisciplinary panoply of processes that ultimately constitute a framework for studying spatial inequality.

The first pathway is “access to resources”. In Keene and Padilla’s study, “resources” are very broadly defined, including not only the classic Marxist concept of “capital”, but also Bourdieuan concepts of “cultural capital” and “social capital”. Factors like the refusal of services like taxis, food delivery, and in-home healthcare, as well as the disinvestment of “grocery stores, commerce, and regional investments that contribute to the vitality of a community and the health of its residents”²⁰ in stigmatized places are incorporated in “access to resources”; likewise spatial (and thereby it is argued socioeconomic) (im)mobility vis-a-vis hiring and housing application processes that discriminate on the basis of a person’s address or zip-code are included under this definition of “resources” on an equal footing. The biggest strength of this elaboration is that no single conception of “resources” is privileged over another. It is hard to attack this position, given the alternative (discussed shortly), wherein it is held that the traditional Marxist concept of “capital” has lost its relevance entirely, and that Bourdieuan alternatives not only dominate, but supplant the former entirely. This is also the biggest weakness of the “access to resources” pathway, but I will not digress further than to point out that this conflation between types of “capital” at least allows for a more nuanced analysis, even if indiscriminately so.

The second and third pathways are “stress and coping” and “identity formation and management”. While by no means irrelevant, I will later argue that an over-emphasis on these factors hampers an effective study of spatial stigma. They are important elements in understanding how systems of inequality are erected and maintained, but can do great harm if they are conflated with the primary driving forces of these systems, or with the inequalities themselves.

Critique of the Pathways Model

Consider the following quote from a Chicago-to-Iowa migrant:

They act like they really don’t want us here. They try to make like we keep up so much trouble... That’s why *I stay to myself*.²¹

¹⁹Danya E. Keene and Mark B. Padilla, “Spatial stigma and health inequality,” *Critical Public Health* 24, no. 4 (2014): 392, <https://doi.org/10.1080/09581596.2013.873532>.

²⁰*Ibid.*, 396.

²¹*Ibid.*

Don Webb, a former pig factory farmer, reports in a 2017 *Democracy Now!* interview:

I shut my hog operation down... I just couldn't do another person that way, to make them smell that. It is a cesspool that you put feces and urine in, a hole in the ground that you dump toxic waste in. And I've seen dead hogs in them and stuff like that. I've seen it. I've talked to the people. I've seen the little children that say, 'Mom and daddy, why do we got to smell this stuff?' You get stories like 'I can't hang my clothes out. Feces and urine odor comes by and attaches itself to your clothes.' And then people will say, 'We're scared to invite neighbors.'²²

I do not mean to suggest that the reader ought to engage in minimization or relativization. What I want to call attention to is that when engaging with the spatial stigma framework(s), the latter case would be of only incidental interest. When a researcher concerned with purely Bourdieuan concepts of "capital" proceeds, the 500 primarily Black residents in the aforementioned city in North Carolina would have little to offer analysis. It is not only the extremity or shock value that lends relevance: it is also the complex intersection between the emphatically social institutions of state and market in strikingly explicit relief. This 17-minute report features remarkably rare datum countering a chief critique leveled against Marxist analysis: the explicit social dimension of "economy" manifested by Webb, at once an "impersonal" economic subject of alleged Marxist study and a social actor. The striking contrast between the two also reveals potential methodological defects that arise when employing Keene and Padilla's frameworks. There is nothing to gain from discarding the concept of Bourdieuan "capital" as a marker and mediator of inequality; the point is not to enforce the primacy of Marxist class struggle as dogma. In fact, the latter case is a prime example of how these intangible resources are essential. After all, the residents' class characteristics, their relation to the offending industries, and their sociopolitical leverage have all undoubtedly been assumed by the reader (as they have by this author)—educated guesses ultimately never supported by available data. There is clearly a relationship (if not overlap) between capital, traditionally defined, and Bourdieuan "capital" and it would be churlish and dogmatic to claim otherwise. It should nonetheless be obvious to see that these "capitals" are as present in North Carolina as they are in Iowa, but that attempts to collect explicit qualitative data would serve only to alienate the researcher for having the audacity to expend resources on such an obtuse line of inquiry.

Finally, the framework fails to acknowledge power disparities outside the purview of Bourdieuan "capital". The authors subscribe to the one-sided view that "Bourdieu's concept of 'symbolic violence' articulates the way that cultural practices such as stigmatization produce and reproduce relations of power and domination,"²³ overlooking the more substantial manner in which relations of power and domination produce and reproduce cultural practices. This is why the authors e.g. cite the denial of policing

²²Democracy Now!, "North Carolina Hog Farms Spray Manure Around Black Communities; Residents Fight Back," May 3, 2017, video, <https://www.youtube.com/watch?v=eyAFNV4Afgw>.

²³Keene and Padilla, *ibid*, 393.

services to stigmatized neighborhoods²⁴ without critically assessing the relationship between residents and police, the desirability of police presence in these neighborhoods, the varied role of the police, and the radically divergent ways in which policing qualifies and activates Bourdieuean “capital”.

2.2.2 Territorial Stigmatization

Territorial stigmatization (*spatial taint*) is one of six properties of *advanced marginality*. The concept has grown out of the efforts of a group of urban researchers adapting the following analytic principles for the comparative study of urban marginality:

1. Establish a clear demarcation between folk and analytic concepts;
2. Historicize urban forms over the *longue durée*;
3. Use ethnography as an instrument of epistemological rupture and theoretical construction;
4. Differentiate neighborhoods of marginality by condition, position, and function in the metropolitan ensemble;
5. Specify the degree and modality of state penetration into zones of dispossession;
6. Situate the particular territory of relegation in the broader landscape of forms of sociospatial seclusion prevalent in the given city and society.²⁵

Advanced marginality is

the regime of poverty ascendant in the postindustrial cities of advanced society against the backdrop of resurging class inequality, welfare state retrenchment, penal state expansion, and spatial polarization...²⁶

and has the following properties:

1. Growing internal heterogeneity and desocialization of labor;
2. Functional disconnection of neighborhood conditions from macroeconomic trends;
3. Territorial fixation and stigmatization (*spatial taint*);
4. Spatial alienation and the dissolution of place;
5. Loss of a viable hinterland;
6. Symbolic splintering of marginalized populations pulverized beyond the ambit of established instruments of collective voice.²⁷

Territorial stigmatization is the resulting marriage of Goffman’s *stigma* with Bourdieu’s *symbolic power*. Goffman’s microscopic *stigma* perspective wherein “discrediting differentness” manifests from seemingly ordinary interactions informs the tracing of processes in which the “management of spoiled identity” coalesces into organizations across encounters. In Wacquant’s interpretation, Goffman’s *stigma* of “marks of race,

²⁴*Ibid*, 396.

²⁵Loïc Wacquant, “Designing urban seclusion in the 21st century,” *Perspecta: The Yale Architectural Journal* 43 (2010): 165-178, as cited in Loïc Wacquant, Tom Slater, and Virgílio B. Pereira, “Territorial stigmatization in action,” *Environment and Planning A* 46 (2014): 1270-1280; Loïc Wacquant, *Urban Outcasts* (Cambridge: Polity Press, 2008): 7-12, cited in *ibid*.

²⁶*pace*. Wacquant, Slater, and Pereira, *ibid*, 1272.

²⁷Wacquant, *Urban Outcasts*, *ibid*, chapter 8, as cited in *ibid*.

nation, and religion” is extended to include the category “place”. Next, *symbolic power* is exercised by means of “performative nomination” by influential social and symbolic authorities (such as state, science, law, media, etc.); in the *territorial stigmatization* framework, these effects are traced from their macroscopic origins “down to their repercussions upon institutional operations, social practices, and the self.”²⁸

Spatial taint is arguably one of the most important elements of the advanced marginality proposal in the context of spatial inequality. The concrete implications that spatial taint has for the analysis of spatial inequality are spelled out in what the authors allege to be the qualitative differences between this contemporary phenomenon and the “traditional topography of disrepute.” Territorial stigma:

1. is closely tied to, but has become partially *autonomized* from, the stain of poverty, subaltern ethnicity, degraded housing, imputed immorality, and street crime;
2. has become *nationalized and democratized* in that in every country, a small set of urban boroughs have come to be universally renowned and reviled across class and space as redoubts of self-inflicted and self-perpetuating destitution and depravity;
3. has led to the depiction of stigmatized neighborhoods of the postindustrial metropolis as vortexes and vectors of social *disintegration*;
4. has therefore led to *racialization through selective accentuation or fictive projection*;
5. has elicited overwhelmingly negative emotions and stern corrective reactions driven by fright, revulsion, and condemnation... foster[ing] the growth and glorification of the penal wing of the state in order to penalize urban marginality.²⁹

Critique of Territorial Stigmatization

The “advanced marginality” perspective hinges on a few questionable assumptions. This is the focus of the first part of my critique. Yet even if the “advanced marginality” premise were accepted, the qualitative differences the authors assert are borne from this regime are independently questionable. The second part of my critique addresses these points under the pretext of “error carried forward” (ECF). Note that the authors outline these points of departure not as characteristics of contemporary marginality *in general*, but rather as distinctions from an unspecified earlier epoch.

Advanced Marginality: Class Inequality One is inclined to question to what degree class inequality is actually “resurging”, as the advanced marginality perspective maintains. I do not mean to claim that there is nothing fundamentally different about today’s marginality when compared with that which could be seen in e.g. late 19th century London. However, the denial of class or the relevance of capital simply isn’t an accurate assessment of these differences.³⁰ There is no dearth of studies that indicate

²⁸Wacquant, Slater, and Pereira, *ibid*, 1272-1273.

²⁹*Ibid*, 1273-1274. Emphasis original.

³⁰As Emil Øversveen has pointed out, these perspectives do not claim to “deny” the existence of class, but rather replace it with a neo-Weberian one. Ironically, this has had led to a nomothetic trend in which *ad hoc* categories (notably “race”) become isotropic analytic categories that researchers are at liberty to define in an *ad hoc* manner. Combined with the emphasis on the allegedly declining relevance of capital (in favor of *status*) and the rejection of exploitation as the principal social contradiction, class is “technically” not denied, but rendered irrelevant. To me, this is tantamount to the denial of class.

that income gaps have consistently “surged” ceaselessly in the past four decades.³¹ “Advanced marginality” takes a decidedly ahistorical position that necessarily ignores the fundamentally cyclical nature of capitalism, both locally and globally. Consider the US: between 1964 and 2014, poverty rates spiked in the following intervals: 1972-1975, 1979-1983, 1988-1993, 1999-2003, and 2007-2009.³² Unemployment rates spiked in: 1973-1975, 1979-1982, 2000-2002, and 2006-2010.³³ The US Gini coefficient spiked in: 1974-1975, 1979-1983, 1991-1993, and 2007-2009.³⁴ These figures are not offered as comprehensive reflections of class inequalities, but rather as benchmarks to illustrate (however incompletely) the point.

Similar trends exist for Western Europe, and even for the most advanced and semi-advanced countries in the global South, usually concurrently, sometimes with a lag of 1-2 years. There is nothing mystical about these developments. Nor do they have a uniquely postbellum flavor. From a Marxist perspective that accurately identifies *imperialism as the highest stage of capitalism*, even lags in crises in different parts of the world are straightforward to understand. Researchers at the Economics Institute of the Academy of Sciences of the USSR described, identified, and even predicted capitalism’s cyclical crises as early as 1954:³⁵ “Capitalist crises of overproductions recur at definite intervals of time, every eight to twelve years,” and “the lagging of markets behind growth of production potentialities in the capitalist world, the existence of chronic under-capacity working of enterprises and chronic mass unemployment leads to crises of overproduction becoming deeper and to essential changes taking place in the capitalist cycle.”³⁶ These essential changes are explicitly enumerated: “the length of the cycle is shortened, so that crises become more frequent; the devastating effects of crises grow greater; it is harder to find a way out of the crisis, so that the length of the crisis phase of the cycle becomes greater, as also that of the depression phase, while booms become less stable and less prolonged.”³⁷ No dogma is necessary to accept what empirical reality offers: the 1973 oil crisis, the 1979 oil crisis, the 1986-1995 savings and loans crisis, the 2000-2002 dot-com bubble, the 2007-2009 subprime mortgage crisis, and finally the so-called COVID-19 recession beginning in early 2020. Even those equipped with a particularly dull Occam’s razor can concede that the “post-” label has been prematurely (haphazardly?) applied.

³¹Center on Budget and Policy Priorities, “A Guide to Statistics on Historical Trends in Income Inequality,” last updated January 13, 2020, accessed January 3, 2021, <https://www.cbpp.org/research/poverty-and-inequality/a-guide-to-statistics-on-historical-trends-in-income-inequality>.

³²Ajay Chaudry et al., “Poverty in the United States,” *U.S. Department of Health and Human Services* (March 2016), <https://aspe.hhs.gov/system/files/pdf/154286/50YearTrends.pdf>.

³³Kimberly Amadeo, “Unemployment Rate by Year Since 1929 Compared to Inflation and GDP,” *The Balance*, last updated September 17, 2020, accessed January 3, 2021, <https://www.thebalance.com/unemployment-rate-by-year-3305506>.

³⁴United States Census, “Gini Index of Money Income and Equivalence-Adjusted Income: 1967 to 2014,” last updated September 16, 2015, accessed January 3, 2021, <https://www.census.gov/library/visualizations/2015/demo/gini-index-of-money-income-and-equivalence-adjusted-income--1967.html>. The trend has steadily been increasing since WWII, but these are cases in which the rate significantly increased. See Thomas Piketty, *Capital in the Twenty-First Century* for an in-depth discussion on Gini coefficients.

³⁵See also Rosa Luxemburg, *The Accumulation of Capital*, trans. Agnes Schwarzschild (London: Routledge & Kegan Paul Ltd, 1951). Originally published 1913.

³⁶K.V. Ostrovityanov et al., “Political Economy,” (London: Lawrence & Wishart, 1957), <https://www.marxists.org/subject/economy/authors/pe/index.htm>.

³⁷*Ibid.*

Advanced Marginality: Spatial Polarization and the Penal State Austerity is likewise not by any means unique to the 21st century, nor has the penal state expanded in any qualitatively new ways in recent years. Even Wacquant et al. concede that spatial polarization has been in full force since the very ascent of capitalism. On this point, the authors cite only the fact that “in the 1880s, the upper crust of Victorian London rode crowded buses from their posh enclaves to go on midnight tours of the slums of East London, where they got to witness firsthand the titillating spectacle of ‘pauperism’ and gape at the outlandish sights, sounds, and scenes of destitute fellow Londoners,” contrasting this with the claim that “in the 1980s, no rich Chicagoan would envisage... to drive down and ogle around in the Robert Taylor Homes on the city’s South Side.”³⁸ The first point appears to be to underscore that so-called ‘no-go zones’ represent a new stage of spatial polarization, ignoring the postcolonialist insight of “misery tourism”. The second: that the encroachment of the penal state is intimately tied to this allegedly novel spatial polarization process, as if 1880s East London did not witness a flurry of batons on alternating nights, or that modern policing strategies of isolating neighborhoods represents a qualitative shift in the state’s philosophy rather than a momentary stage of strategic equilibrium governed by rules and principles articulated as early as *The Art of War*. This alternate vision of reality is one in which the Pennsylvania State Police did not firebomb entire city blocks as late as 1985, or where Catholic universities do not send their students to inner cities to hand out Bibles in exchange for selfies to post on the front page of their websites.

Advanced Marginality: The Precariat and the Dissolution of Class Struggle Finally, the territorial stigmatization framework follows Keene and Padilla’s framework in failing to properly situate the source of inequity. In Keene and Padilla’s approach, there is no underlying structuralist framework, and therefore only a vaguely defined collection of “symbolic authorities” in play in a largely interactionist perspective. In the territorial stigmatization framework, the situation is far more dire. Marxist analysis is supplanted by a neo-Weberian perspective where the proletariat has evaporated and left behind only the so-called “precariat”. Besides relying on a mistaken interpretation of the Marxist definition of “class”,³⁹ the perspective similarly locates the responsible parties as nothing less amorphous as “the state”.⁴⁰

What Wacquant et al. refer to in uncertain terms as “postindustrial society” is nothing other than a shift in capitalist society—the very same identified in Marxist analysis. These shifts and their implications for class inequality, the decline of social solidarity, austerity, and the penal state are appropriately identified by several authors as *neo-liberalism*. The impetus for these shifts are explainable in terms of existing economic conditions manifesting in the 1970s. David Harvey, among others, offers a non-mystified account of the development of neo-liberalism.⁴¹

³⁸Wacquant, Slater, and Pereira, *ibid*, 1275.

³⁹See Ellen Wood, *Democracy Against Capitalism*, (Cambridge University Press, 1995), Chapter 3 for an interesting discussion on definitions of “class”.

⁴⁰Wacquant, Slater, and Pereira, *ibid*, 1278.

⁴¹David Harvey, *Spaces of Global Capitalism*, (Verso: 2006), 11-29.

ECF: Spatiality as an Autonomous Analytic Category The authors propose that “spatiality” has become an autonomous analytic category on par with race and class.⁴² The position in which one must defend analytic “categories” like “the stain of poverty” (not poverty—the *stain* of poverty), “degraded housing,” “imputed immorality,” and “street crime” as *autonomous* and irreducible to already-existing analytic categories is already an unenviable, if not odious, one. Having to further stand by the claim that e.g. “degraded housing” is categorically distinct from “spatiality” as a social-analytic category enters the realm of the absurd. The splintering of various forms of oppression into discrete, autonomous identities has not only the banal post-structuralist theoretic effect of obfuscating the social relations that mediate them, but also problematic policy outcomes. The following is an excerpt from Michelle Alexander’s *The New Jim Crow*:

The attention of civil rights advocates has been largely devoted to other issues [than the unprecedented levels of incarceration in the African American community], such as affirmative action. During the past twenty years, virtually every progressive, national civil rights organization in the country has mobilized and rallied in defense of affirmative action. The struggle to preserve affirmative action in higher education, and thus maintain diversity in the nation’s most elite colleges and universities, has consumed much of the attention and resources of the civil rights community and dominated racial justice discourse in the mainstream media, leading the general public to believe that affirmative action is the main battlefield in U.S. race relations—even as our prisons fill with black and brown men.⁴³

If Alexander’s experiences in the ACLU are a grotesque affirmation of political recuperation,⁴⁴ the call for “spatiality” as an analytic category distinct from but comparable to race and class reads as parody. Few allowances are needed to imagine a legal organization that takes libel cases on behalf of an urban district but denies resident calls for housing standards (much like the ACLU refuses to represent Blacks facing minor possession charges, but pumps donations into legal teams to represent petit bourgeois Blacks in Ivy League admissions discrimination cases) satisfactorily represents substantial progress by the *territorial stigmatization* framework’s litmus. In short: the autonomy of analytic categories relevant in urban marginality have not changed from the preceding epoch—the sociologist has merely employed a new sleight of hand, one that ironically (albeit unintentionally) serves further inequality.

⁴²The authors seemingly deliberately avoid invoking these categories by name. “Class” is replaced by outcomes/markers: “the stain of poverty,” “degraded housing,” “imputed immorality,” and “street crime” (where the latter two overlap with other analytic categories like race and gender—again indirectly). Likewise, “race” is replaced by “subaltern ethnicity” under the subdefinition of “national and regional ‘minorities’, recognized or not, and lower-class foreign migrants” or “ethnicity defined in Weberian fashion as a credible claim to a quantum of honor”. Wacquant, Slater, and Pereira, *ibid*, 1273, 1276.

⁴³Michelle Alexander, *The New Jim Crow*, (New York: The New Press, 2011): 9.

⁴⁴Ironically, Alexander’s work has been critiqued for its role as recuperation. See Joseph D. Osel, “Toward Détournement of the New Jim Crow,” *International Journal of Radical Critique* 1, no. 2 (2012), <https://ssrn.com/abstract=2314081>; James Forman, Jr., “Racial Critiques of Mass Incarceration,” *New York University Law Review* 87 (2012): 101-146, <https://www.ncjrs.gov/App/Publications/abstract.aspx?ID=260432>; Greg Thomas, “Why Some Like the New Jim Crow So Much,” *IMWIL!*, published April 26, 2012, accessed January 12, 2021, <https://imixwhatilike.org/2012/04/26/whysomelikethenewjimcrowsomuch/>.

ECF: Racialization, The Reification of To support the claim that contemporary territorial stigma distinguishes itself from prior epochs, the authors refer to Wacquant's 2011 proposal for differentiating "the social and symbolic strategies fashioned by the residents of disparaged districts according to whether they submit to and reproduce, or seek to defy and deflect, spatial stigmas."⁴⁵ The strategies appear to be presented as if exhaustive. Studies that reaffirm these strategies necessarily beg the question, as they explicitly use this very itemization as an analytic framework in collecting data.⁴⁶ Of these strategies, only one involves a positive form of "recalcitrance to resistance," and this is the only strategy not addressed in detail or even approached in a literature review. The conclusion thus appears to be borne of a defeatist position that reads the supposed failure (or rejection) of collective organization into the analysis: stigmatized neighborhoods are seen as "fundamentally dissolute and irretrievably disorganized."⁴⁷ Lest the reader believe that the authors refer only to the *depiction* of stigmatized neighborhoods as such, it should be recalled that Wacquant maintains that "the parties of the Left... are much too preoccupied with their internecine struggles and entrapped in party-machine logics and media coups... to envisage and engage the public policies necessary to stem the spiral of advanced marginality."⁴⁸

The depiction of stigmatized neighborhoods as "vectors of social disintegration" is then cited as the basis for a process of "racialization through selective accentuation or fictive projection". As Gullestad points out, "analyses of social problems can also lead to the reinforcement of stereotypes in terms of the categorization of those very same problems, demonstrating the power of categories to impose the realities that they purport only to describe."⁴⁹ The authors have not only staked the integrity of the theory by reading in preconceptions about the declining relevance of the proletariat (and ascribed to racialized categories class attributes and organizing capacity), but also the nature of racialization itself—here presented as primarily symbolic struggles where material conditions and barriers are at best secondary rather than operative.

2.3 Tipping Point Phenomenon

The concept of *tipping* was originally introduced in the context of racial residential segregation, but can nonetheless apply to other social-analytic categories and phenomena. Although residential segregation in the United States was largely driven by school segregation, the 1954 *Brown v. Board of Education* decision overturning legal school segregation did not by any means lead to significant changes in US cities. The cumula-

⁴⁵Wacquant, Slater, and Pereira, *ibid*, 1275; Loïc Wacquant, "Territorial stigmatization in the age of advanced marginality," *Thesis Eleven* 12, no. 1 (2011): 66-77, as cited in *ibid*. The irony with which Wacquant in the latter accuses social scientists of having "added significantly to the burden of urban infamy by concocting pseudo-scholarly notions that dress up ordinary class and racial prejudices in analytic-sounding languages" and referring to an operationalized category of "underclass area" to explore inequalities is "asinine" is rich.

⁴⁶Danya E. Keene and Mark B. Padilla, "Race, class and the stigma of place," *Health & Place* 16, no. 6 (2010): 1216-1223, <https://doi.org/10.1016/j.healthplace.2010.08.006>; Margaret Kelaher, Deborah J. Warr, Peter Feldman, and Theonie Tacticos, "Living in 'Birdsville'," *Health and Place* 16, no. 2 (2010): 381-388, <https://doi.org/10.1016/j.healthplace.2009.11.010>; Paul Kirkness, "The *cités* strike back," *Environment and Planning A* 46 (2014): 1281-1296, <https://doi.org/10.1068/a45636>; Virgílio Borges Pereira and João Queirós, "'It's not a Barrio, is It?'," *Environment and Planning A* 46, no. 6: 1297-1316, <https://doi.org/10.1068/a46300>.

⁴⁷Wacquant, Slater, and Pereira, *ibid*, 1274.

⁴⁸Wacquant, "Territorial Stigmatization in the Age of Advanced Marginality," 73.

⁴⁹Gullestad, *ibid*, 330.

tive effects of both *de jure* means (e.g. local governments continued to enforce racial segregation via legal alternative land use designation, even after the 1917 *Buchanan v. Warley* Supreme Court ruling outlawed overt “racial zoning” ordinances) and *de facto* means (ranging, e.g., from formal redlining policies, systematic “racial steering” practices, to informal “white flight”) reinforced and sustained racial segregation in practice. Between the late 1950s and early 1970s, a flurry of papers were published by sociologists and statisticians who observed, then measured, a so-called “tipping phenomenon”. More recent studies on the phenomenon have found various “tipping points” for “white flight” in a number of US cities, typically ranging between minority tract proportions between 9% and 15%.⁵⁰

While Card et al.’s study regards residential segregation and the present project regards supermarket locations, there are compelling parallels between the two. A direct reproduction of Card et al.’s study to the case of Oslo is hampered by drastically different operationalizations of the category “race” and the subject of Card et al.’s social interaction framework (i.e. white residents) differs from that of the present study (i.e. regional managers). While the former obstacle may be circumvented in a variety of ways (not all of which may be prudent), the latter is muddied by the multiplicity of factors (e.g. economic business interests are likely to confound the analogous “attitudes and preferences” variable that Card et al. study). An explanatory model is simply beyond the scope of this project, as it would require the design of a qualitative study (or at the very least, a sampling survey) that requires conceptual work in identifying possible causes behind the decisions that lead to inequity. On the other hand, a time-series analysis, a necessary component of any extension of the current project, is well within reach for future studies. The results of the current project may therefore serve as a cursory indication of “tipping” in the context of investment patterns in Oslo that informs and motivates future exploration. Since the results are static, the resulting patterns can at most potentially reflect the predicted outcome of “tipping” in action, but any definitive statements awaits dynamic analyses.

2.4 History of the Retail Industry

In Section 4.1.2, I claim that Joker and Bunnpris represent infeasible grocery options for many households. I draw from not only the prior literature and statistical data on this point, but also from personal experience shopping in bodegas and convenience stores in the US. While the construction of a separate data set excluding Joker and Bunnpris will be justified through descriptive statistics, it is worth considering the divergences between the North American and Norwegian food retail industry.

Eisenhauer traces the development of the industry in North America as follows:

1. Beginning in the 1910s, merchants shifted from full-service stores to a self-service business model.

⁵⁰Thomas C. Schelling, “Dynamic Models of Segregation,” *Journal of Mathematical Sociology* 1, 1971: 143-186; Morten Grodzins, “Metropolitan Segregation,” *Scientific American* 197 (4), 1957: 33-41, cited in Schelling, *ibid*; David Card, Alexandre Mas, and Jesse Rothstein, “Tipping and the Dynamics of Segregation,” *National Bureau of Economic Research* (working paper), 2007, <https://www.nber.org/papers/w13052>; Eleanor P. Wolf, “The Tipping-Point in Racially Changing Neighborhoods,” *Journal of the American Institute of Planners* 29, no. 3, 1963: 217-222, <http://dx.doi.org/10.1080/01944366308978066>.

2. Throughout the 1920s and 1930s, independent grocers retained their role in servicing urban neighborhoods, surviving the encroachment of national and regional chains via political interest groups and subsequent legislation.
3. In the 1940s and 1950s, independent grocers began to shift their inventory towards non-rationed goods, including non-food items. Meanwhile, national supermarket chains capitalized on cheap land in the aftermath of WWII, typically located outside of the cities, and developed a new retail form—the shopping center.
4. Throughout the 1960s, the growth of shopping centers and their success, coupled with technological developments that allowed larger chains to scale considerably, granted significant leverage over both wholesale and retail.
5. By the 1970s, the prior decade’s growth led to intense competition between national chains at great cost to surviving independent grocers.
6. In the 1980s, deregulation (often of the very protections won in the 1920s and 1930s) dealt a final blow to independent grocers; the high price of labor, land, and utilities in urban areas, coupled with the enormous margins that national and regional chains enjoyed in suburban settings, led to a trend of disinvestment from urban neighborhoods that continued in full force until the present.⁵¹

The literature on the 20th century history of the food retail industry in Norway is sparse. As an approximation, it reads much like that of its North American counterpart, compressed to a period between the late-1950s to the early-1990s. Natural and subsistence economy persisted until at least the 1940s; households did not rely on retail for food until the century’s latter half.⁵² Norway received its first self-service store in 1947, and the model did not become widespread until the 1950s.⁵³ Trends towards monopolization were not as strong in Norway as they were in North America, and were largely kept in check by welfare politics rather than anti-trust laws, particularly intensifying in the 1930s and continuing until the 1990s.⁵⁴ This trend was first interrupted in the 1950s and 1960s⁵⁵ before it was almost entirely broken in the 1990s following deregulation.⁵⁶ National expansion of the chains that today dominate the market, as well as the establishment of supermarkets, did not begin in earnest until the late-1980s, with the notable exception of Coop, which broke ground on Norway’s first supermarket in 1968.⁵⁷ Many of the technological advances enjoyed by US industry as

⁵¹Elizabeth Eisenhauer, “In poor health,” *GeoJournal* 53 (2001): 125-133.

⁵²Unni Kjærnes, “Ernæringspolitikk mellom helse og matforsyning,” in *Mellom påbud og påvirkning*, ed. Kari Elvbakken, Svanaug Fjær, and Thor Jensen (Oslo: Ad Notam Gyldenhal, 1994): 137-148; Amund Ringvold and Eva Høberg, “Norsk mat og matkultur,” *Store norske leksikon*, last updated January 6, 2021, accessed January 22, 2021, https://snl.no/norsk_mat_og_matkultur; Fritz Hodne and Ola Grytten, *Norsk økonomi i det 20. århundre* (Fagbokforlaget: 2002), 239.

⁵³Terje Finstad, “Cool Alliances,” in *Transformations of Retailing in Europe After 1945*, ed. Lydia Langer and Ralph Jessen (London: Taylor and Francis, 2012): 195-210.

⁵⁴Kjærnes, *ibid*, 139-145.

⁵⁵In the 1950s, the government repealed an ordinance banning subsidiaries. Coupled with a clause in 1907 trade legislation that exempted cooperative enterprises from the prohibition on horizontal integration and later the establishment of the European Free Trade Association in the 1960s, the forerunner to modern food retail chains was born in the form of Swedish companies, stoking and even encouraging their later development. Hodne and Grytten, *ibid*, 242-243.

⁵⁶Kjærnes, *ibid*, 145-146.

⁵⁷“Historie,” Reitan Gruppen, accessed January 22, 2021, <https://www.reitangruppen.no/historie/>; “146 års dagligvarehistorie,” NorgesGruppen, accessed January 22, 2021, <https://www.norgesgruppen.no/presse/artiklar/verdiskaping/146-ars-dagligvarehistorie>; “Coops historie,” Coop, accessed January 22, 2021, <https://coop.no/om-coop/virksomheten/coop-norge-sa/historie/historie/>.

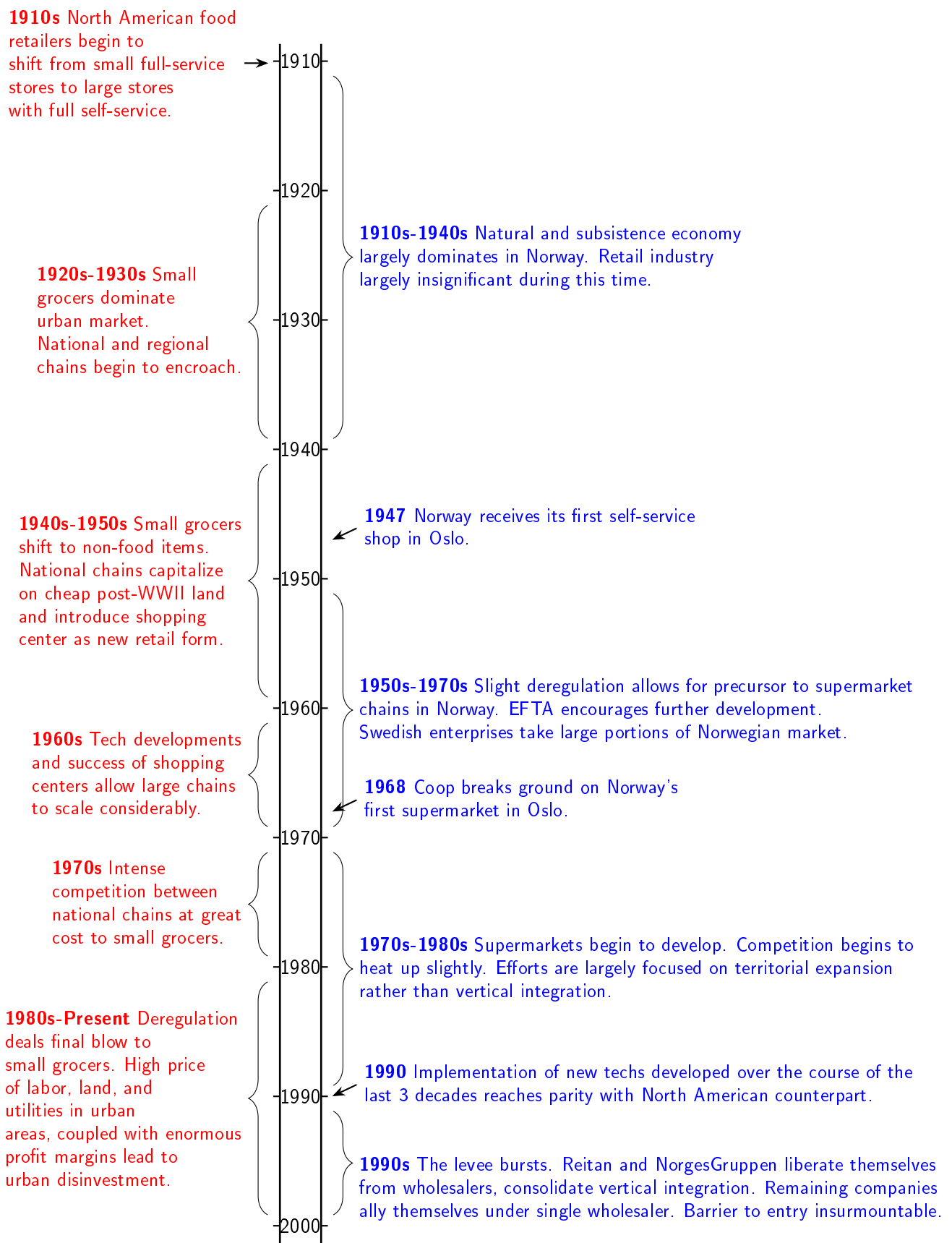


Figure 2.1: Timeline of North American (left) and Norwegian (right) food retail industries.

early as the 1960s did not reach Norwegian markets until later, sometimes as late as the 1990s.⁵⁸ While the North American industry saw companies purchasing large plots of land according to a national plan, the Norwegian industry was largely focused on horizontal integration and cooperative consolidation at an early embryonic stage,⁵⁹ while North American retail was busy restructuring and reinvesting according to urban economic developments, the Norwegian industry was only just beginning their own “manifest destiny”, branching out from their respective flagship cities, occasionally setting sight on rural markets. Comparable strains arising from urban saturation and mass internal migration simply were not as prominent in Norway as they were in the US in the 1980s, and where the North American urban economy could be tumultuous, Norwegian urban economies had been relatively stable, only recently beginning to level off. By 1998, trends in the number of Norwegian supermarkets had yet to plateau; further deregulation only encouraged Norwegian retail companies to develop existing supermarkets rather than revise geographic strategies.⁶⁰ Figure 2.1 on Page 30 illustrates the timeline.

Despite intense competition in a substantially less regulated market, independent grocers can still be found in the US. Bodegas have become a staple of the North American urban landscape. To the outside observer, the complete absence of comparable enterprises in Norway may even appear artificial. I speculate that the continued existence of such enterprises in the US is the legacy of historical coincidence: changes in supply wrought by WWII rationing aligned with the burgeoning of national chains to create conditions for the survival of independent grocers. Urban disinvestment in the 1980s left interstices in the market just large enough to fit the anachronistic corner store in the modern landscape. It may come as a surprise that the corner store—all but vanished from the contemporary Norwegian market—dominated Norway’s cities as late as the 1980s. In the span of a decade, there was not a trace of this former geography to be found. With the exception of *Forbrukersamvirket* (today Coop), which comprised roughly 25% of all grocery stores in Norway, a large collection of grocers representing no more than 3% of all grocery stores apiece made up the industry. These were simple retailers whose inventory was largely dictated by external manufacturers and wholesalers; their agency was mostly limited to providing shelf space.⁶¹ From 1985 onward, grocers began a process of aggressive horizontal integration, with factions of independent grocers merging and/or buying up smaller enterprises, and developing chains and retail concepts.⁶² Shortly thereafter, these factions liberated themselves from wholesaling, either through vertical integration or partnerships, replete with the establishment of store-brand products.⁶³ By 1995, this diversity was reduced to just three food retail companies, representing 97% of the total market volume. By 2019,

⁵⁸Hodne and Grytten, *ibid*, 244.

⁵⁹*Ibid*, 242-243.

⁶⁰Ministry of Trade, Industry and Fisheries, *Oppheving av reglane om forbod mot oppsøkjande handelsverksemd med daglegvarer utanom fast utsalsstad*, Ot.prp. nr. 61, Oslo, Norway: regjeringen.no, 1998, accessed January 22, 2021, <https://www.regjeringen.no/no/dokumenter/otprp-nr-61-1998-99-/id428975/?ch=3>.

⁶¹Johanne Kjuus, “Dagligvarehandel og mat 2010,” (Oslo: NILE, 2010), 8.

⁶²*Ibid*.

⁶³*Ibid*, 9.

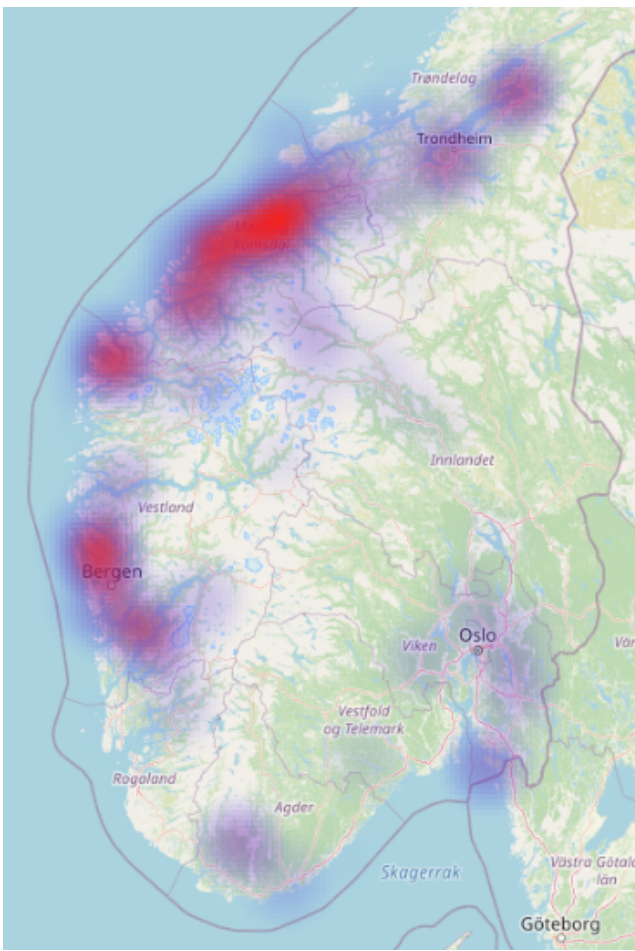
four companies had secured 100% of a 178.4 billion kroner industry: NorgesGruppen at 43.7% (owning *Kiwi*, *Meny*, *Spar*, *Nærbutikken*, and *Joker*); Coop Norge at 29.5%; ReitanGruppen at 23.2% (owning *REMA 1000*); and Bunnpris at 3.6%.⁶⁴ The integration (either through acquisition or establishment) of development and management companies characterized the latter half of the 1990s, setting the stage for an intense geographic rivalry between Hakon Gruppen (later ICA Norge, and ultimately Coop Norge after the latter's acquisition of the former) and NorgesGruppen.⁶⁵ Meanwhile, ReitanGruppen swallowed up properties in Trondheim as the two leading industry giants were preoccupied with the larger-scale geographic battle.⁶⁶ This had far-reaching consequences for the geographic arrangement of supermarkets in Norway.

Bunnpris' stores are thus centralized, almost exclusively urban, and satisfy a largely "bodega-like" demand, as seen in Figure 2.2(a) on Page 33. Convenience, and not discount pricing, appears to be the chief market strategy. REMA 1000 locations, on the other hand, are more homogeneously distributed, reflecting their early start on the rural and suburban markets, as seen in Figure 2.2(b). Coop's pattern and retail concept is predominantly influenced by their initial (less competitive, less profit-oriented) beginnings as *Forbrukersamvirket*, although they have inherited traces of HakonGruppen's earlier skirmishes with NorgesGruppen. As seen in Figure 2.2(c), the distribution is fairly homogeneous, with strong footholds in urban markets. Finally, NorgesGruppen's geospatial patterns (and retail concept) is a mixed bag, the result of an extremely aggressive effort to corner the market with a multitude of strategies. The distribution of NorgesGruppen's supermarket locations as depicted in Figure 2.2(d) is somewhat misleading, as it incorporates all of its concept stores; this can give the impression that the stores are evenly distributed among both rural and urban neighborhoods. On the contrary: *Meny* is an exclusively urban concept, clearly distributed in accordance with population density (and offers mid-range pricing and specialty goods); *Kiwi* is a modestly homogeneously distributed chain, servicing significantly more rural and suburban demographics; *Spar*'s distribution is almost exclusively suburban and is largely absent in the central business districts and high-income neighborhoods of Norway's cities (as the name implies, it is a discount concept chain); *Nærbutikken* and *Joker*'s presence are, in comparison to NorgesGruppen's other retail concepts, highly exaggerated in incidence and better resemble convenience stores with limited selections of high-priced goods. Appendix A on Page 98 gives visual overviews of the distribution of NorgesGruppen's concept stores. Note that all heatmaps offered in this section are produced by weighting incidences by the inverse of the corresponding land areas of demographically designed census tracts at each location.

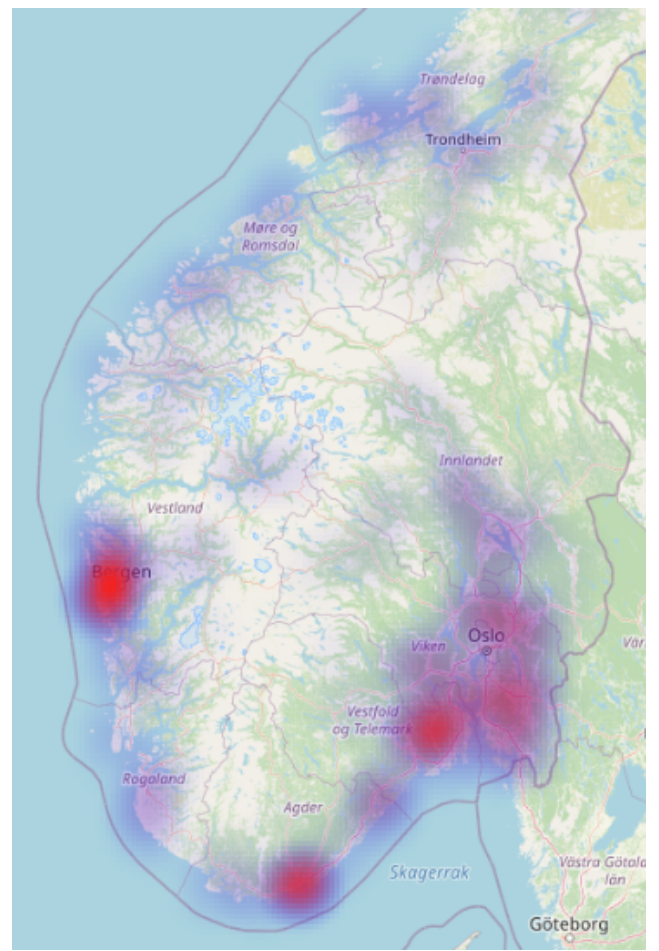
⁶⁴Nielsen, "Lavere Vesks i Norsk Dagligvarehandel i 2019," February 20, 2020, accessed December 27, 2020, <https://www.nielsen.com/no/no/insights/article/2020/lavere-vekst-i-norsk-dagligvarehandel-i-2019/>.

⁶⁵Eivind Jacobsen, Arne Dulrud, and Jan Beckstrøm, "Kampen om lokalen," (Oslo: SIFO, 1998), 26.

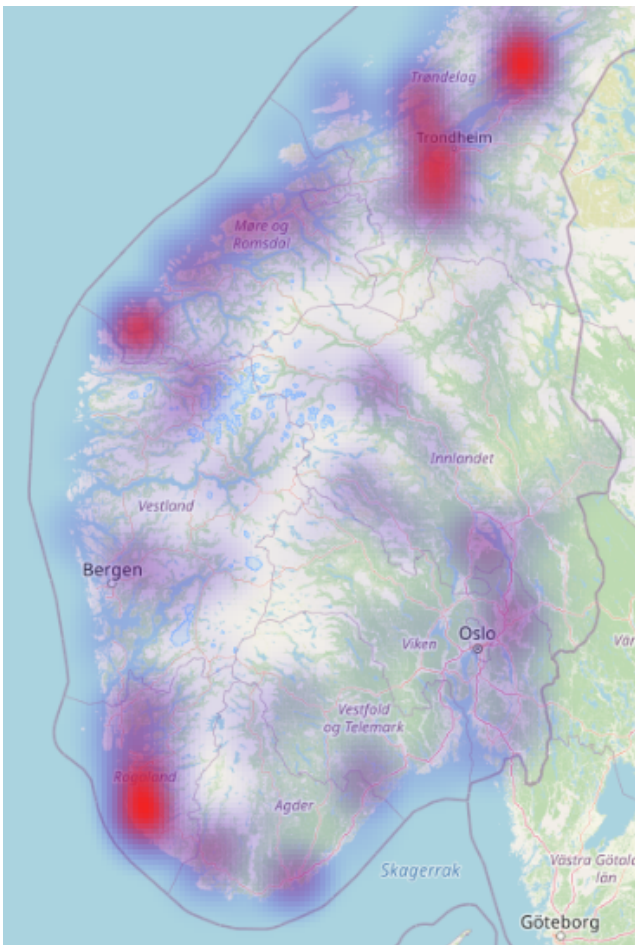
⁶⁶Both NorgesGruppen and ICA Norge were concerned with establishing supermarkets in areas that could guarantee a customer base of at least 5000. I thank Arne Blekesaune for providing me with this information.



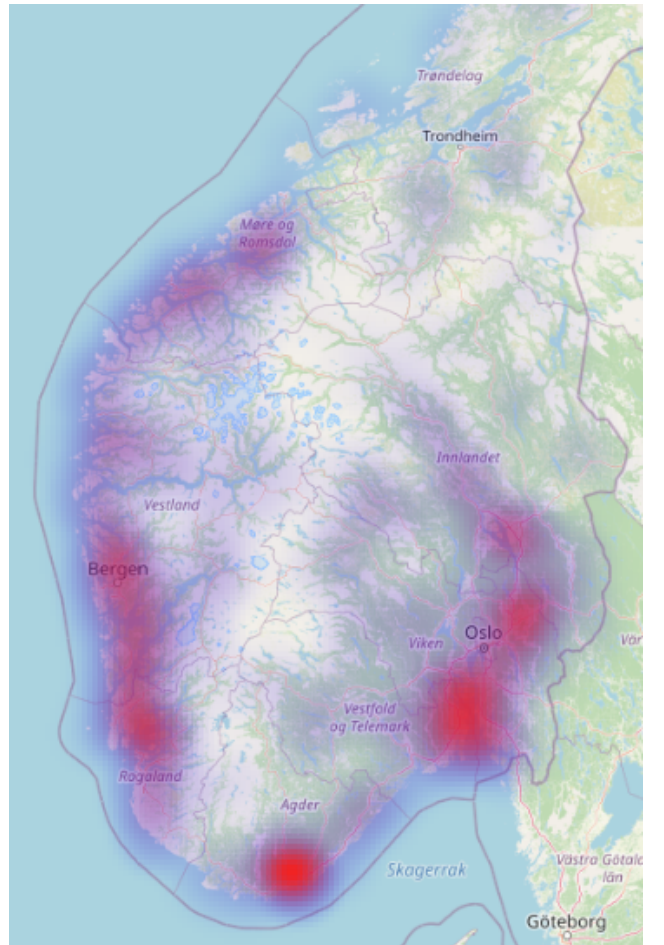
(a) Bunnpris



(b) REMA 1000



(c) Coop



(d) NorgesGruppen

Figure 2.2: Distribution of supermarket locations for the four largest supermarket chains in Norway.

This exposition risks understating the drastic process of vertical integration that made the present situation possible. Just as deregulation of the retail industry sparked consolidation and intense competition in the early-1980s, agricultural deregulation added fuel to the flames. Until this point, wholesalers typically mediated the relationship between producers and retailers, with production cooperatives serving as a bulwark against the encroachment of retailers.⁶⁷ A relationship between the Norwegian government and the cooperatives themselves largely satisfied regulatory roles. However, following political and institutional shifts, a critical tendency towards this social-corporatist model, and its eventual supplanting by a neoliberalist “New Public Management” model, this relationship has largely broken down, and the autonomy of cooperatives has begun to splinter. This much is apparent in the poultry industry: in 2011, REMA 1000 completed their process of vertical integration following a complete take-over of *Norsk Kylling AS*, *Jærkylling* and *Nortura*, the two remaining largest Norwegian poultry producers, have in practice been contractually integrated within Coop and NorgesGruppen, respectively (although they have still retained their independence).⁶⁸ While agricultural cooperatives have maintained a strong position in relation to the vertically integrating retailers, the mettle of the former’s autonomy is being tested by the growing strength of the latter. Even if producers are able to retain their autonomy, the shift from “government” to “governance” wherein the private sector appropriates the role formerly held by public regulatory bodies sets a qualitatively new stage upon which retailers compete in today’s market. It remains to be seen to what degree the Norwegian industry will follow suit with the North American retailers, but in any event, this additional layer poses yet another obstacle to an already nearly-insurmountable barrier to entry.

At the end of 2019, other grocers accounted for < 0.1% of the market share,⁶⁹ down from 0.1% in 2016.⁷⁰ Of the 370 grocery stores registered in Oslo in 2019, only four were listed as “other” grocers (i.e. those not owned by the four aforementioned largest food retail companies in Norway): two are operated by *Iceland Mat*, a British-owned international company that first broke ground in the Norwegian market in 2018; the third is owned by *Istanbul Intermat As*; the fourth is registered under the name *Ullern Dagligvare*. A cursory review of the registered grocery stores from the data set used in this project based on local knowledge revealed a large host of independent grocery stores that were not listed in Trondheim.⁷¹ In other words, of the 4695 establishments classified as “retail sale in non-specialised stores with food, beverages or tobacco predominating” in 2018, the data set used in this project, much like the Nielsen report, considers only the most prominent 3840 establishments, predominantly owned and/or

⁶⁷Hilde Bjørkhaug, Jostein Vik, and Carol Richards, “The Chicken Game,” in *Transforming the Rural* vol 24, ed. Mara Miele et al. (Emerald, 2017), 58; Carol Richards, Hilde Bjørkhaug, Geoffrey Lawrence, and Emmy Hickman, “Retail-driven agricultural restructuring,” *Agriculture and Human Values* 30 (2012): 241.

⁶⁸Bjørkhaug, Vik, and Richards, *ibid*, 58; Richards, et al., *ibid*, 243.

⁶⁹The report lists “other” grocers as accounting for 0.0% of the market share. Nielsen, *ibid*.

⁷⁰Nielsen, “Dagligvarefasiten 2017,” March 2017, accessed December 28, 2020, https://dagligvarehandelen.no/sites/handelsbladet.no/files/dagligvarefasiten_2017_1.pdf.

⁷¹The data set used in this project encompasses supermarkets through the *entirety* of Norway. This author can only speak to a local knowledge of Trondheim, but I maintain that such a pronounced inconsistency between the data set and local realities for Trondheim reflects the data as a whole, including the data for Oslo.

operated by the aforementioned companies.⁷² In 2019, the Nielsen report (like the data set used in the present project) considers only the 3848 predominant food retail establishments, thereby excluding independent grocers. 1379 of these establishments, or roughly 36% of the listed establishments, are located in the top 20 most populous municipalities in Norway, where close to 43% of the country's population resided in 2019. While some of these municipalities entail large and sparse land areas, these figures provide a very rough indication that a comparable suburbanization of the retail industry does not currently exist to the same extent as can be seen in North America. The demographic distribution is also significantly more homogeneous in Norway than in North America (and most Western European countries for that matter). This lends itself to a prospective supermarket access study in *rural* or even *suburban* areas, although this is beyond the scope of this project.

While the presence of independent grocers likely has a substantial effect on neighborhood accessibility to healthy food items in urban areas, their infinitesimal market share suggests that they can be ignored in the present analysis. I cannot speak to the historical role of independent grocers in urban Norway, but it can be surmised that in the contemporary case, they are inconsequential in the final question regarding urban access. If such establishments factor into household accessibility or commercial behavior, their influence is limited exclusively to expanding the variety of goods offered to the consumer household. Given the disproportionate bargaining power monopolized by the four largest food retail companies in Norway, the addition of vaguely worded regulations and poor enforcement of the scant legislation that exist effectively prohibit independent establishments from becoming substantial enough to factor significantly into urban accessibility in the near future.⁷³ Finally, as will be discussed in the following chapter, prior studies on food deserts often operationalize geospatial supermarket data sets with reference to annual revenues. Although this operationalization scheme will not be used in this space, this is nonetheless yet another justification for an analysis that excludes independent establishments in calculating supermarket accessibility scores.

These deliberations also suggest that food deserts, to the degree that they exist in Norway, are of a causally different nature in Norway than their formation in the US. While the North American phenomenon entails the migration of supermarkets to the suburbs, Norwegian supermarkets are by and large located in Norway's largest population centers. The question thus hinges not upon disparities between urban and suburban settings, but rather intra-urban inequities: within the cities themselves, where do supermarket companies opt to open establishments?

⁷²See SSB Table 12910: Principal figures for all enterprises and establishments, by industry (SIC2007), enterprise/establishment, contents and year.

⁷³Iman Winkelman, "Uppreis lov om god handelsskikk," *Finansavisen*, January 22, 2020, accessed December 29, 2020, <https://finansavisen.no/meninger/debattinnlegg/2020/01/22/7490463/virke-gjor-loven-om-god-handelsskikk-enklere>; Jacobsen, Dulsrud, and Beckström, *ibid*, 15.

Chapter 3: Theory

3.1 The Class Struggle and Capitalism

A concrete definition of class cannot be found in Marx's writings. However, the concept is clarified by the particular role it plays in Marx's own analysis:

In the process of production, human beings work not only upon nature, but also upon one another. They produce only by working together in a specified manner and reciprocally exchanging their activities. In order to produce, they enter into definite connections and relations to one another, and only within these social connections and relations does their influence upon nature operate – i.e., does production take place... These social relations between the producers, and the conditions under which they exchange their activities and share in the total act of production, will naturally vary according to the character of the means of production.¹

The capitalist, or *bourgeoisie*, pays the worker, or *proletariat*, some amount of money for the right to apply the worker's labor power to production for the whole day.² This amount reflects that which is needed to maintain or reproduce the labor, i.e. the value of the work that is needed to produce the worker's food, clothing, and housing. As the use of labor power is limited only by the active energy or the physical strength of the worker, the worker can as a rule work more than is needed to produce what is needed to meet their own needs. Therefore, the value of the goods and services produced by the worker in one day when sold on the market by the capitalist is greater than what the worker receives by selling their labor. This *surplus* is then *appropriated* by the capitalist. In other words, a worker that produces 100 units of some good in one hour is compensated by some amount that allows the worker to purchase e.g. 10 units from the capitalist. The worker's hour is then comprised of 6 paid minutes and 54 unpaid minutes. The *class struggle* is centered on the struggle over these 54 minutes: the bourgeoisie attempts to lengthen it, while the proletariat attempts to shorten it.³ All societies generate surplus value, and this surplus value is appropriated by one class at the expense of another in all *class societies*. That the wage system as outlined above mediates the form of appropriation is unique to capitalism, as are the classes bourgeoisie and proletariat, defined in this very relation mediated by the wage system.

The *proletariat* consists of those who can sell only their labor, while the *bourgeoisie* consist of those who purchase labor, appropriate surplus, and leverage their ownership of the means of production. The distinction between productive and non-productive labor need not detain us here. Moreover, the existence of those persons who do not consistently fall into either class does not by any means lead to fatal deficits in the theory. The fluidity of labor and the existence of a sizable class of persons who are temporarily placed outside of the relations of production is by no means an oversight, nor does it need flashy labels like "precariat" to be wielded as crowbars to displace

¹Karl Marx, *Wage Labour and Capital* (International Publishers: 1995), originally published 1849.

²Strictly speaking, *proletariat* and *bourgeoisie* refer to classes of actors, not individual actors.

³This is a dangerous oversimplification that has on occasion led to the one-sided focus on "economism" within the Marxist tradition. As Harvey points out, locating the class struggle exclusively within the struggle between capital and labor over surplus value production has come at the cost of struggles regarding "the geography of infrastructural investments, territorialization of administration and collective action, class alliance formation, and struggles for geopolitical advantage." Harvey, *ibid*, 112.

the basic premise of Marxist analysis (not least when *lumpenproletariat* is available in Marx's original vocabulary). The final complication arises from the distinction of a third intermediate class: either those whose ownership of the means of production is relatively trivial or those who do not produce goods and services, but manage their production, distribution, or exchange: the petit bourgeoisie. Much has been written on this matter (as early as Marx), although the details likewise need not detain us here. The important point is that the role of this class is not overlooked in classic Marxist analysis; while the size of this class has grown considerably, the significance that this growth has for the total relevance of Marxist analysis has been vastly overstated.

Marx further explains that:

By converting part of his capital into labour-power, the capitalist augments the value of his entire capital... He profits, not only by what he receives from, but by what he gives to, the labourer. The capital given in exchange for labour-power is converted into necessaries, by the consumption of which the muscles, nerves, bones, and brains of existing labourers are reproduced, and new labourers are begotten. Within the limits of what is strictly necessary, the individual consumptions of the working class is, therefore, the reconversion of the means of subsistence given by capital in exchange for labour-power, into fresh labour-power at the disposal of capital for exploitation... The maintenance and reproduction of the working class is, and must ever be, a necessary condition to the reproduction of capital.⁴

This has two implications. The first is the immediate and obvious point that the portion of the worker's day that is paid is the reflection of a calculus designed to sustain the work force. A corollary stems from what James O'Connor terms the "first contradiction of capitalism":

The rate of exploitation is both a sociological and economic category. It expresses capital's social and political power over labor, and also capitalism's inherent tendency towards a realization crisis, or crisis of capital over-production. If capital exercises much power over labor, the rate of exploitation will be high, and the risk of a realization crisis will be great; hence, the need for a vast credit structure, aggressive marketing, constant product innovation, and intensified competition will be greater.⁵

The picture is more complicated than the $Rent + Fuel + Sustenance = Wages$ equation. The capitalist, through wages, sustains not only the worker (and meets minimum social demands to ensure stability), but also the consumer.⁶ The internal logic of capital accumulation and the inequality it presupposes leads to overproduction crises.

⁴Karl Marx, *Capital: Volume I*, (Strelbytskyy Multimedia Publishing: 2021), originally published 1867.

⁵James O'Connor, "On the Two Contradictions of Capitalism," *Capitalism Nature Socialism* 2, no. 3 (1991): 107-109.

⁶Nick Hanauer points out in a 2012 TED Talk that "Someone like me makes hundreds or thousands of times as the median American, but I don't buy hundreds or thousands of times as much stuff." It is strictly speaking the *bourgeoisie* as a class that sustains the consumer. Moreover, this is not always the case; in the 1970s, the contradiction between the bourgeoisie's drive to lower wages as well as maintain mass consumption was "resolved" through state and banking intervention: credit and debt expansion.

3.2 Spatial Inequality

This inequality principally manifests as class, although class struggle may take many forms. Some are semi-autonomous and distinguishable from class; others are isomorphic to these consequent forms, to class itself, or to their interplay. Spatial inequality is of the latter quality. Territorial stigmatization is not a form of oppression distinct and autonomous from class oppression and its other primary forms. Inequalities presuppose the formation of boundaries. The boundaries are not cartographic in origin, nor do the social constructions that dictate them lie on the same categorical level as class. Material conditions—and the ideological lens through which they are interpreted—inform map-making and media depictions, not *vice-versa* (the latter may reinforce or perpetuate material conditions and relations, but do not play a fundamentally causal role). Just as pre-colonial censuses were invented from the poops of Spanish galleons—that wherever the earliest conquistadors “went, *hidalgos* and *esclavos* loomed up, who could only be aggregated as such... by an incipient colonial state,”⁷—spaces become stigmatized when stigmatized peoples reside within them, and peoples become stigmatized when there is an ideological basis for doing so. Likewise, this boundary formation is not essentially *Weberian* in the sense that *status*, rather than *capital*, is the fundamental unit of boundary construction. “Status” (and other such so-called “capitals”) is indeed operative, but analytically serves only to obfuscate the underlying relations to production it reflects and reinforces. “If it looks like class struggle and acts like class struggle,” as Harvey observes, “then we have to name it for what it is.”⁸

Spatiality is not a fundamental category of oppression, but a materially specific manifestation of fundamental categories and/or their interplay. Segregation—the basis of spatial inequality—is the by-product of a conglomeration of processes that result from the internal logic of capitalism. It is a) structural, i.e. its perpetuation stems from institutionalized government and industry practices, and b) interactional, i.e. lubricated at opportunistic moments by individual acts of discrimination. Homogeneous class neighborhoods manifest because a) they are geographically situated in areas proximate to the physical spaces in which its residents carry out their productive and reproductive class roles (alternatively geographically distant, but readily accessible to these spaces given the resources of its residents)⁹ and b) its residents are prohibited from residing elsewhere. As the urban landscape develops and matures, the latter interactionism shrinks exponentially, transforming into structural processes, e.g. redlining policies and hindrances arising from property values (property tax for the otherwise upwardly mobile petit bourgeoisie and the higher strata of the proletariat; rent for everyone else on the lower rungs). From this structural phenomenon flow ideology and social construction. White flight is alleged to be a matter of public safety concerns, not racism; poor households are culturally predisposed to poor diets and the market only abides by what they themselves have ultimately chosen; and so on. The ideology of class—the

⁷Benedict Anderson, *Imagined Communities* 2nd ed. (Verso: 1991): 167.

⁸Harvey, *ibid*, 65. See “Neo-liberalism and the restoration of class power” printed in the source cited for an interesting discussion on political recuperation in this regard.

⁹An oversimplification. Globalization and the migration of production fiercely complicates this picture, but the underlying logic remains invariant.

“claims to divinity among rulers and to ‘blue’ or ‘white’ blood and ‘breeding’ among aristocracies”—that which too spawned the “dreams of racism”¹⁰—have been filtered and tinkered and rearranged to allow for the contemporary seemingly-innocuous narrative of what can ultimately be reduced back to its original primitive biological essentialism.

The proletariat does not live in crowded, polluted neighborhoods because they are proletarian; the neighborhood is crowded and polluted because the proletariat lives there. Consider fast food, *mutatis mutandis*, an industry which in the US “exploits existing social conditions through... billboard campaigns in low-income urban neighborhoods, a strong presence in under-funded schools, and race-based advertising.”¹¹ The connection between food deserts and fast food becomes apparent upon considering the vulturous nature of the relationship in West Oakland, California, where “the supermarket is not accessible on foot... [and] fast food restaurants selling cheap and hot food appear on almost every corner.” Freeman outlines a number of cultural factors that have led to a situation in which a disproportionate percentage of US fast food sales come from African Americans and Hispanics.¹² This is not to be confused with “personal choice” arguments, which “are part of a new color-blind rhetoric that refuses to acknowledge the role of race in the challenges faced by communities of color” and “frees corporations and the government from culpability, [allowing] them to maintain the status quo and reap resultant benefits without social accountability.”¹³ More compelling are the economic and political factors that precede the predatory practices that exploit and reproduce these cultural factors. The fast food industry, as *food oppression*, “a form of structural subordination that builds on and deepens pre-existing disparities along race and class lines... stem[ming] from a combination of market forces and government policy”¹⁴ clearly does not constitute an analytic social category *a la* race or class. Nor do spatiality or its attributes. More importantly, it is governed not by individual prejudices (although there is no reason to discount them as secondary factors), but rather market logics. Regional fast food (or supermarket) managers need not be personally racist to carry out racially discriminatory or predatory practices—they need only have no scruples about doing so (or be replaced by those who don’t, or exploit the outrage of inequality into some comparable business strategy); and spatial stigmatization, if it factors into the equation at all, is certainly not necessary.

In summary, spatial inequality is borne of, and reinforces, but is not categorically distinct from, class and racial inequality. The spatial distribution of people along class and racial lines and the resulting spatial inequalities are carried out in accordance with the economic and political logic of capitalism, where the demands of the labor and consumer markets are primary and the individual prejudices of powerful actors are a vastly distant secondary factor, rendered obsolete by a fully developed ideological narrative. Oppressions of novel and innovative forms are concocted to further exploit

¹⁰ Anderson, *ibid*, 149.

¹¹ Andrea Freeman, “Fast Food,” *California Law Review* 95, no. 6 (2007): 2221-2259, <https://doi.org/10.2307/20439143>.

¹² Jonathan S. Goldman, “Take That Tobacco Settlement and Super-Size It!,” *Temple Political & Civil Rights Law Review* 13, (2003): 113-150 as cited in *ibid*, 2228.

¹³ Freeman, *ibid*, 2223.

¹⁴ *Ibid*, 2245.

vulnerable populations and lagging far behind as a wholly optional and by no means operative bonus is the legitimizing force of territorial stigmatization. Authors who maintain that this superstructure has become the principal contradiction in “post-”industrial society (as if the prefix were a magic wand that qualitatively changes the nature of the world’s economic system at whim) apply the same irritant to their own theory as they have the phenomenon they study: a Hegelianism that insists that ideology precedes materiality. Likewise, it is a willful Liberal ignorance that maintains that the only thing holding the entire system of oppression together is discourse: that segregation’s bane is a news program directed by a progressive activist; that without the bourgeoisie’s army of petit bourgeois cultural intelligentsia, there would be nothing left to protect capital from its destruction.

3.2.1 Marxist Spatial Inequality Theories

Peet’s Marxist-Geographic Theory

Richard Peet argues that the basis for a Marxist-geographic theory is that “inequality is not a ‘temporary aberration’ nor poverty a ‘surprising paradox’ in advanced capitalist societies,” but rather that “inequality and poverty are vital to the normal operation of capitalist economies” to “produce a diversified labor force, propriatable surplus, and function as an incentive to work.”¹⁵ Peet argues that

The hierarchy of resource environments which makes up the social geography of the modern city is thus a response to the hierarchical labor demands of the urban economy. Just as the capitalist system of production must lead to a hierarchical social class structure, so it must provide differentiated social resource environments in which each class reproduces itself. Change in the hierarchy of environments, and thus in the sociospatial structure of the city, occurs under the influence of change in labor demand concomitant with economic development... Development also provides the funds necessary for a reorientation of those labor-supplying resource systems which produce workers with needed skills by money channeled through higher wages. By relying primarily on the wage system to produce new labor supplies, capitalism necessarily preserves social inequalities.¹⁶

The theory correctly identifies the internal materialist logic at play in the production and maintenance of spatial inequalities, but falls short in addressing the “racial question”. This Marxist-geographic theory takes, in essence, “race” and racism for granted. Racial inequalities that come to fruition in spatial inequalities are reduced to class inequalities—I argue that this is not necessarily problematic in itself, but rather that the reduction is premature. Although Peet discusses the origins of Black protest, the premature reduction to class leads to a loss of nuance and to an ultimately superficial analysis of racial inequality. More will be said on how the analytic category of “race” is treated in this study in Section 3.4.

¹⁵Richard Peet, “Inequality and Poverty,” *Annals of the Association of American Geographers* 65 (4), 1975: 564-571, [10.1111/j.1467-8306.1975.tb01063.x](https://doi.org/10.1111/j.1467-8306.1975.tb01063.x).

¹⁶*Ibid*, 569.

Uneven Geographical Development

I refer primarily to the work of David Harvey, Henri Lefebvre, and Manuel Castells. While I have categorized these as “uneven geographical development”, only Harvey explicitly uses the term to describe a broader (“unified”)¹⁷ Marxist theory on spatial inequality. Although the theory more accurately applies to the global rather than the local level, I believe that many of the processes described at these higher levels find analogues at the particular, local level.

The theory distinguishes itself from non-Marxist theories chiefly in regards to the causal nature of contemporary urban hierarchical arrangements: namely that “*the urban crisis is a particular form of the more general crisis linked to the contradiction between productive forces and relations of production which are at the basis of the ecological stake.*”¹⁸ Where e.g. Wacquant’s framework identifies (de)industrialization as the driving force of spatial inequality, the Marxist perspective locates the underlying social relations of production as operative and spatiality their expression. This relation is, as Castells points out, “governed by the maximisation of capital accumulation”.¹⁹ From the time of Castells’ observations until the present, Harvey notes that the growth and establishment of neo-liberalism “occurred in decades when many progressives were theoretically persuaded that class was a meaningless category”²⁰ and that subsequent organized resistance was co-opted into the individualistic, legalistic, and state-sanctioned discourse. These changes were already occurring in 1978, as Castells notes that “urban and environmental ideologies have indeed expressed the new social contradictions of advanced capitalism with force, but they have done so within the ideological terms distorted by state technocracy.”²¹ However, despite the important qualitative changes this entails (see Section 2.2.2), at the risk of *ad nauseam*: “if it looks like class struggle and acts like class struggle then we have to name it for what it is.”²² For, as Lefebvre is quick to remind us, “to those who would still doubt its existence, what identifies the working class is segregation and the misery of its ‘to inhabit’.”²³

On the surface, the consequences of this discursive shift may seem to be limited to practical political organization strategies. However, they have more deep-seated implications for theory too. The ideological ambit of neo-liberalism effectively reinvents the causal relationship to read: technology → space → society.²⁴ Not only are “progressive” movements siphoned into conflicts where the bourgeoisie (through the state, its representative) sets the terms and has an overwhelming advantage through their monetary and legal resources, but theorists have been baited by narratives of technological determinism. The aim of organized resistance is then displaced from the sights set by class antagonisms to (de)industrialization as a mechanism whose

¹⁷Harvey, *ibid*, 75.

¹⁸Manuel Castells, *City, Class and Power* (MacMillan Press, 1978), 5. Emphasis original.

¹⁹*Ibid*.

²⁰Harvey, *ibid*, 65.

²¹Castells, *ibid*, 6.

²²Harvey, *ibid*.

²³Henri Lefebvre, “Theses on the City, the Urban and Planning” in *Writings on Cities*, tr. Eleonore Kofman and Elizabeth Lebas (Blackwell Publishers, 1996): 177-181. Originally published 1967.

²⁴Castells, *ibid*.

workings are conceptually external from the social and naturalized; meanwhile, the academy busies itself on a postindustrial theory, “play[ing] down class contradictions and mystify[ing] the historical structural roots of the problems they pose.”²⁵

The theory contains three important elements. First: the extension of global Marxist insights to the urban stage. As Castells argues, “the search for new markets for capital is not achieved simply by the penetration of capital into countries under imperialist domination, but by its penetration into pre-capitalist or semi-capitalist sectors of the economy of ‘metropolitan’ countries.”²⁶ The most substantial force is capitalism’s cycles of overproduction crises. In situations where there is either an abundance of capital or labor and where circulation is stymied, capital applies a “spatial fix”, wherein surpluses are reinvested and relocated in other markets.²⁷ It is at this juncture that one can begin to speak of “deindustrialization”—“postindustrialism” is a label borne of a Netherlands fallacy. Analogous to the temporally compressed development of Norway’s food retail industry, Norway’s industrialization and de-industrialization was similarly compressed to a 30-year period, having deindustrialized almost entirely by the 1990s.²⁸

A more immediately relevant application of the local repercussions of global capitalism, and that which constitutes the second part of the theory, is that the spatial organization of cities is determined by labor market demands. An industrial reserve army provides capital with a steady supply of labor used as leverage to keep the class struggle firmly situated in surplus value production, where its legal and extra-legal institutions and resources are strongest. While the consequences of this logic are largely seen as remnant imprints on the urban landscape, weathered by torrents of gentrification and the peripheral relocation of the working class, it remains as relevant as capital remains transient, mobile, and fluid, in stark contrast to labor. These imprints are nonetheless deep, as the displacement of infrastructure is costlier than that of labor. Thus, “physical investments embedded in the land form necessary preconditions for processes of exchange, production, and consumption. Very specific conditions regulate the circulation of capital in built environments.” As Harvey points out,

The path of such investments can easily run against the grain of standard circulation processes precisely because it works on a different spatio-temporal horizon... Investments of this sort must cohere so that transport relations, working class housing, factories and offices, shopping malls and leisure places, institutions (hospitals, schools, etc.) hang together in physical space in reasonably coordinate and mutually accessible ways. The effect is to concentrate these investments geographically. The concentration entails the production of urbanization as a spatially-ordered physical framework within which capital accumulation can proceed.²⁹

²⁵ *Ibid.*

²⁶ *Ibid.*, 17.

²⁷ Harvey, *ibid.*, 108.

²⁸ *pace.* Hodne and Grytten, *ibid.*, Chapter 19. It is interesting to note that the authors opt to refer Norway’s trajectory towards a “postindustrial” society. This is despite the fact (pointed out by the authors themselves) that of the 120,000 persons employed by Norway’s 11 largest multinational companies in 1991 (roughly 10% of Norway’s workforce), some 41.5% were employed off-soil. This is also despite the fact (pointed out by the authors themselves) that Norwegian foreign direct investments, almost exclusively in Third World countries, equaled a whopping 35% of Norway’s GDP in 1989.

²⁹ Harvey, *ibid.*, 101.

Urban configuration is shaped by the logic of capital accumulation. On the other hand, technologies have allowed for a reshaping of the urban landscape that departs from simplistic adjacency, but the underlying logic behind the spatial arrangement of the city is invariant.³⁰ “We have,” Harvey notes, “largely surrendered our own individual right to make the city after our heart’s desire to the rights of property owners, landlords, developers, finance capitalists and the state. These are the primary agents that shape our cities for us and thereby shape us.”³¹

This leads to the third element of the theory: the superstructural practices that sustain it and offer interstices for minor changes to the spatial arrangement. This driving force logic of capital accumulation and the contradictions inherent to it

not only condition consumption, reinforcing the use of certain products (through advertising, styles, etc.) and determining the life styles of people as a function of the greatest profit from capital investment in such-and-such a type of product, but also, and above all, provoke lacunae in vast areas of consumption which are essential to individuals and to economic activity. Such is the case, for example, in housing, socio-cultural facilities, public transport and so on, i.e. the whole sector which the economists call ‘collective goods’ ...³²

Moreover, Castells argues that these consumptive goods will fluctuate from one category to another as a function of capital cycles, supply created by demand, and ultimately state intervention in cases where sectors and services are unprofitable from the perspective of capital, but nonetheless necessary for the reproduction of labor or for the appeasement of social conflicts. We may very well add the food industry to this category, but not without noting the irony in the Norwegian state’s intervention in the sale of alcoholic beverages, leaving the food industry itself unhindered (despite efforts and calls to intervene over the course of the last 7 decades).³³ This applies likewise (in tandem?) to governance, in the sense that Bjørkhaug, et al. hypothesize: “when some sectors lose control, other regulation evolves through competing structures of governance.”³⁴ In the wake of the 1980s neoliberal wave, the interstices in authority have been filled by “self-regulating” enterprises.

Drawing these points together, it becomes clear to see how the inertia of labor, infrastructure, and capital deign to first generate, then perpetuate segregation. Contemporary developments have moreover led to unexpected consequences that are nonetheless explained by the theory. Food deserts, lacunae of the sort Castells proposes will be filled by state intervention, have been exploited by none other than capital itself in the form of the fast food industry.

³⁰Castells, *ibid*, 24-27.

³¹*Ibid*, 89.

³²*Ibid*, 18.

³³Kjærnes, *ibid*; Ranveig Hansen, *Den hensigtsmessige ernæringspolitikken* (SIFO, 1990).

³⁴Bjørkhaug,, Vik, and Richards, *ibid*, 47.

3.3 Critical Realism³⁵

Castells writes that

The social sciences have accumulated a fantastic mass of data and relations between data which have been unable to put forward any analysis which could go beyond a few *ad hoc* hypotheses or descriptions of particular situations which are always impossible to generalise from. True, these studies can be primary material for the reflection upon the real tendencies of urban development; but they often could have been more useful if their data collection had followed and not preceded [sic] theoretical reflection on the given problem. The difficulty arises precisely because the theory is weak, and it becomes safer to gather a few bits of information, to use one's common sense, and to prove one's professional competence at the level of the methodological treatment of information.³⁶

Castells' rebuke smarts particularly, given my approach to the present project, although I believe his critique salient. In the present project, statistical analysis precedes the theoretical framework. One may be inclined to label such an approach *inductive*, a form of reasoning that makes generalizations from specific observations. Conversely, given this document's exposition, the study carries a preconceived hypothesis on spatial inequality in Norway; and perhaps, on a deeper level, is governed by a preconceived Marxist narrative replete with its assumptions about the nature of social democracy as a capitalist society. There is then evidence for an underlying *deductive reasoning*, a form of reasoning that begins with a generalization to reach a specific conclusion based on an analysis of specific observations. The resulting approach is in reality closer to *abduction*, a form of reasoning in which theory and empiry develop concurrently, dialectically. In an early draft of this project, this approach manifested as follows: a) mechanically apply the data sets available to produce a measure of supermarket accessibility, b) establish statistically (in)significant relationships between this measure and a battery of socioeconomic variables, c) read these results into a framework of Marxist class struggle, and d) assess inconsistencies and gaps to: i) critique the preconceived Marxist framework, ii) offer it nuance in the case study of Oslo, and/or iii) attempt to bridge these gaps with additional theories.

Castells suggests that in developing urban studies, "the focus should have been the historical transformation of the urban, rather than the conceptual deployment of Marxist theory, i.e. Marxism should have been reconsidered through an analysis of history, rather than through the codification of recent history according to Marxist schemata."³⁷ While I concur with this general argument, I do so with reservations, regarding the call to engage with "a new type of Marxism, a Marxism rooted in the theory of class struggle rather than in the logic of capital"³⁸ excessive, somewhat obtuse,

³⁵In an initial draft, I pursued a form of naïve realism where, in an extreme Manichean reaction to poststructuralist epistemology, I aligned myself altogether too dogmatically with positivism. I thank Emil Øversveen for his critiques of this draft and his encouragement and guidance in taking seriously the matter of interrogating my own philosophical commitments.

³⁶Castells, *ibid*, 8.

³⁷*Ibid*, 12.

³⁸*Ibid*.

and ultimately revisionist. Harvey's position is more responsible: "A much broader theoretical framework [is] required, in which the theoretical insights already available from elaborating on Marx's theory of capital accumulation [can] be embedded and transformed rather than abandoned."³⁹ In my perspective, it is operationally impossible to study class struggle without in turn studying the process of capital accumulation (i.e. the logic of capital). How the class struggle, to which the analysis should in principal be reducible, becomes epistemologically accessible without reference to the logic of capital, is unclear to me. Meanwhile, it would be foolhardy to believe that mechanical quantitative studies suffice to reveal anything about the logic of capital—not least the class struggle—without serious theoretical analysis. Therefore, to the ultimately positivist initial approach, I incorporate insights from critical realism (CR), principally characterized by the view that there exists an external, objective reality and that it is possible—albeit fallibly—to observe it and form a subjective account of it. Harvey's revamping of space as a keyword (and the consequent matrix of spatiality reproduced in Table 3.1 on Page 46) becomes promising at this stage.⁴⁰

The first and most important insight I adapt from CR is its critical naturalism, where by *naturalism* I mean "the thesis that there is (or can be) an essential unity of method between the natural and the social sciences."⁴¹ I consider the view of the scientific method as an approximation to objective reality to be the most useful. All physicists begin, undertake, and even conclude their basic and intermediate training with one fundamental object: the perfectly spherical, smooth, massless, chargeless, exactly observable ball subject to no external forces that exists within and interacts with a perfectly frictionless vacuum. It is only when this ball is dropped from some height that it (and the other, slightly larger idealized ball we stand upon) gains mass. It is only when it collides with the larger ball that it gains charge. It is not until this ball is located within the sun that its position is expressible only as a probability distribution. It is not until it rotates along its major axis that its oblate shape is revealed. And so on. The natural sciences are contingent upon an idealized model proven applicable to the study of virtually every known physical phenomenon. Conversely, this means that all known physical phenomena are reducible to a single model. The method can then be regarded as nomothetic only if by "nomothetic" we mean universally applicable provided countless *ad hoc* explanations are introduced for the specific conditions of the given phenomenon. These specific conditions exist, regardless of whether they are observed; but more importantly, their objective effects exist, however trivially, regardless of whether they are observed. The same applies to the study of the social sciences.

The second insight I adapt from CR is the *critical* component of critical naturalism. While underlying methodological principles are as applicable to the social as to the natural sciences, there are qualitative differences between them that require redress. The first arises from the *diversity* of units. Two protons are non-idealistically *exactly*

³⁹Harvey, *ibid*, 116.

⁴⁰*Ibid*, 143.

⁴¹Roy Bhaskar, *The Possibility of Naturalism* 4th ed. (Routledge: 2015), 2. Bhaskar further refines critical naturalism by distinguishing it from *reductionism*, "which asserts that there is an actual identity of subject-matter" and *scientism*, "which denies that there are any significant differences in the methods appropriate to studying social and natural objects."

	Material space (experienced space)	Representations of Space (conceptualized space)	Spaces of Representation (lived space)
Absolute Space	useful commodities, concrete labor processes, notes and coins (local moneys?), private property/state boundaries, fixed capital, factories, built environments, spaces of consumption, picket lines, occupied spaces (sit-ins); storming of the Bastille or Winter Palace...	Use Values and Concrete Labors exploitation in the labor process (Marx) vs work as creative play (Fourier); maps of private property and class exclusions; mosaics of uneven geographical developments	alienation vs creative satisfaction; isolated individualism vs social solidarities; loyalties to place, class, identity, etc.; relative deprivation; injustice; lack of dignity; anger vs contentment
Relative Space (Time)	market exchange; trade; circulation and flows of commodities, energy, labor power, money, credit or capital; commuting or migrating; depreciation and degradation; information flows and agitation from outside	Exchange Values (Value in Motion) Accumulation schemas, commodity chains; models of migration and diasporas; input-output models. theories of spatiotemporal 'fixes,' annihilation of space through time, circulation of capital through built environments; formation of the world market, networks; geopolitical relations and revolutionary strategies	money and commodity fetish (perpetual unfulfilled desire); anxiety/exhilaration at time-space compression; instability; insecurity; intensity of action and motion vs repose; "all that is solid melts into air..."
Relational Space (Time)	abstract labor process; fictitious capital; resistance movements; sudden manifestations and expressive irruptions of political movements (anti-war, '68, Seattle...); "the revolutionary spirit stirs..."	Money values Value as socially necessary labor time; as congealed human labor in relation to the world market; laws of value in motion and the social power of money (globalization); revolutionary hopes and fears; strategies for change.	Values capitalist hegemony ("there is no alternative"); proletarian consciousness; international solidarities; universal rights; utopian dreams; multitude; empathy with others; "another world is possible"

Table 3.1: Harvey's matrix of spatialities for Marxian theory, adapted from Harvey, *ibid.*, 143.

identical in every regard in the way social objects (regardless of operationalization: communities, individuals, etc.) are not and cannot be. An immediate corollary is that social objects can be and often are in a state of flux that the fundamental units of the natural studies cannot be and are not in. The external reality of the natural sciences is therefore inherently static, while that of the social sciences is inherently dynamic.⁴² Finally, the fundamental units of social sciences have *agency* arising from the structures that govern them in a way that the fundamental units of the physical sciences do not and cannot have. Therefore, where the natural sciences operationalize events as the units of causal relationships, CR operationalizes *generative mechanisms* as the unit of causal relationships.⁴³

This entails treating capitalist society as it is understood in Marxist analysis as the substratum and race, gender, and indeed even spatiality as n^{th} order emergent mechanisms, with causal relations moving between them. Other than the class struggle as a starting point for the analysis, I remain as agnostic as possible on the matter of the immediate causes of given urban conditions. Despite intermittent speculation scattered throughout the document, I do not “assign automatic priority to structure versus agency when accounting for causation.”⁴⁴ Finally, I endorse the CR critique of Hume’s conflation of causality and constant conjunctions as part and parcel in the strategy for operationalizing generative mechanisms rather than events, i.e. I do not offer the empiricist’s binary interpretation of statistically (in)significant results. Statistically (in)significant relationship(s) between supermarket accessibility and socioeconomic variable(s) do not yield final, definitive statements about the causal relationship(s) between them, or lack thereof: they serve only to bring into relief the elements of a broader prospective mechanism.

In summary, I treat this quantitative study as *explorative*. Its results (fallibly) clarify the conditions on the ground that produce questions rather than answers. These questions are not of the positivist form “Does a statistically significant relationship exist between X and Y?,” but rather “What is the underlying mechanism that leads to such (in)significant relationships?” The aforementioned *abductive* approach effectively becomes a *retroductive* one. Each iteration in the dialectic process between the empirical and the theoretical generalizations (in CR, the latter is said to belong to the “Domain of Actual”) is an approximation to the objective causal mechanisms (said to reside in the “Domain of Real” in CR) that govern the theoretical constructions. The philosophy then treats the underlying mechanisms (regardless of whether or not a given dialectic iteration makes or can make them known in their entirety) as emergent, and thus open to the possibility that they may exist even if they are not necessarily actualized in the abductive dialectic, either because the conditions that trigger them are not present, or because other mechanisms obstruct their actualization. The result is an initially seemingly empiricist approach where the matter of “ontological reflexivity” is

⁴²I do not dwell here on the question of whether or not social phenomena are equally part of external reality as the physical, although I agree (with early reservations) with Archer’s position in the affirmative. Margaret Archer, “The Morphogenetic Approach” in Peter Róna and László Zsolnai (ed.) *Agency and Causal Explanation in Economics* vol. 5 (Springer: 2020): 137-150.

⁴³Bhaskar, *ibid*, 9.

⁴⁴Archer, *ibid*, 137.

addressed as a part of the analysis rather than the research design stage. Nonetheless, I dedicate a brief discussion below on one important subjectivity that has left its imprint from the very start of the study.

3.4 Racialization

Operationalizing a “racial” variable is the thorniest ontological question. In contrast to North American and British studies that rely on censuses wherein respondents self-report their “race”,⁴⁵ this category “does not exist” to the Norwegian statistician. Racism exists. “National minorities” exist.⁴⁶ Persons with immigration backgrounds exist (and are grouped by origin countries according to geopolitical considerations). “Ethnicity” exists. Yet, there is no such thing as “race”—not in its pseudo-scientific North American usage, nor in its contemporary understanding as a social analytic category. All persons born to South African parents living in Norway are, according to SSB, “African”, regardless of what language(s) they speak, the cultural customs they observe, or their lived experiences. When Norwegian researchers carry out studies employing the data that results from this operationalization scheme and conclude with any statement regarding “the link between x and ethnicity” or “ y (in)equality on the basis of ethnicity”, they do so under the assumption that a Black South African and a white South African have an identical “African” “ethnicity”.

Unfortunately, this is unavoidably the case for the present study as well. Despite attempts to the contrary, the best available data are limited to these categories. I therefore use them as strictly analytic categories, noting that they are *at best* as unreliable as the North American categories (at worst they are meaningless, since the self-reported nature of the US census allows for a closer understanding of the categories—and thus the mechanisms—actually relevant to social actors). I therefore highlight *racialization*, “the categorization of people on the basis of characteristics that are assumed to be innate.”⁴⁷ Normative racial categories (“white”, “Black”) are perpetually moving approximations (“non-white Hispanic”, “*utlending*”) to noumenal categories of intrinsic differences between people where the operative (unanswerable) questions quickly become “Is Islam a race?” or “Is Rachel Dolezal Black?”. Instead, I treat the racializations themselves as the true noumena, approximated by these simplified normative racial categories; there is an exactly defined process of social categorizations of race that both comprise and transcend biological, cultural, linguistic, and economic factors external to normative racial categories. I then pose questions of the form: “How does the racialization of population group x mediate some y material and observable outcome?”

If processes of racialization are unknowable, it is because of their complexity, transience, and historical contingency. If all physical events are reducible (with their necessary bells and whistles) to the idealized ball, then racialization processes are

⁴⁵Using highly problematic—both conceptually and politically—checkboxes. See Anderson, *ibid*, Chapter 10 for an interesting discussion on a related issue.

⁴⁶There are, according to the Norwegian government, exactly 5: Kvens/Norwegian Finns, Jews, Forest Finns, Roma, and Romani people/Tater. The Department of Sami and Minority Affairs, “National minorities,” *government.no*, accessed February 26, 2021, <https://www.regjeringen.no/en/topics/indigenous-peoples-and-minorities/national-minorities/id1404/>.

⁴⁷Gullsetad, *ibid*, 222.

likewise reducible to the base relations of production inherent to class society. The very real, drastic differences between the discrimination of North African/Middle Eastern refugees and the discrimination of Eastern European migrant laborers in Norway cannot and should not be reduced to a simplified framework of Marxist class struggle. Such an exercise would be obtuse overkill in the context of a study on spatial inequality and would come at great expense to its analytic purchase. Nonetheless, we ought to seek an explicit ontology in the study of racialization if we ever hope to achieve transformative clarity leading to an explanatory model. Somewhere between the megalomaniac project of a nomothetic Marxist framework on “race” and a concession to normative categorization schemes lies the way forward. Below are some early thoughts on theories that may be of use in this direction. They are not strictly speaking incorporated in the present study, but may be used to clarify its results in a future study. In the following, I use “nations” as synonyms for “race” unless otherwise specified.

3.4.1 Stalin’s Nations

The earliest synthesized Marxist position on “race” was articulated by Stalin as early as 1913, where he defines a *nation* as

a historically constituted, stable community of people, formed on the basis of a common language, territory, economic life, and psychological make-up manifested in a common culture.⁴⁸

Contrary to popular conception, Stalin did not by any means play a minor role in the construction of socialism in the USSR, nor was his prominence as a leader in the Soviet Union a begrudging concession or afterthought of Lenin, or an arbitrary happenstance that resulted from his death. On the contrary, Stalin was appointed as the first People’s Commissar of Nationalities for his expertise knowledge on the national question both in terms of organizing experience⁴⁹ and his theoretical contribution to the national question. Notwithstanding *whataboutism* of varying degrees of integrity with varying degrees of influence from Nazi propaganda material⁵⁰ in regards to Stalin’s credibility in defining the Marxist position on the national question, the significance, scope, and implication of Stalin’s *nations* for Marxist theory cannot be denied. Naturally, it can be critiqued, but not without substantial argument, and certainly not by means of misattribution or disregard. If for no other reason than those enumerated above, the prevalence of Stalin’s *nations* as an analytic category applied to practice in virtually every other context than the academy calls for its serious consideration.

⁴⁸Joseph Stalin, “Marxism and the National Question,” *Prosveshcheniye*, nos. 3-5, (March-May 1913), <https://www.marxists.org/reference/archive/stalin/works/1913/03a.htm>.

⁴⁹Interestingly, it was his early errors as a member of the Tiflis Committee of the Russian Social Democratic Labour Party where he called for the splintering of the Georgian Marxist movement from the Russian movement and, in effect, for the departure from Marxist internationalism that led to his later recant of what many of his contemporaries referred to as “Georgian Bundism,” a movement he later critiqued in length.

⁵⁰Douglas Tottle, *Fraud, Famine, and Fascism*, (Toronto: Progress Books, 1987): 49-51; Grover Furr, “The ‘Holodomor’ and the Film ‘Bitter Harvest’ are Fascist Lies,” *CounterPunch*, March 3, 2017, <https://www.counterpunch.org/2017/03/03/the-holodomor-and-the-film-bitter-harvest-are-fascist-lies/>; Grover Furr, *Blood Lies*, (New York: Red Star Press, 2013), Chapter 1.

The Third International had, for instance, adapted the “Black Nation Thesis” as early as 1928⁵¹ persisting as the official line of the Communist Party of the United States until the 1950s.⁵² Even though the Second International eventually dissolved in 1920 over several matters (among them the national question),⁵³ the precursor meetings and organizations that would eventually replace it as the Third International had already articulated a critique of the former which would serve as the backbone of this Stalinist nation-based approach to so-called “racial” inequality.⁵⁴ In contrast to international Marxist consensus, Peet overlooks the international and imperialist dimensions of racial inequality in the United States and thereby fails to recognize the Black nation as a superexploited internal nation subject to the same *logic*⁵⁵ of imperialism as colonial subjects analyzed within the same framework.

3.4.2 Internal Colonialism Perspective

More recently, following the destabilization of the international Marxist movement in the late 1970s and 1980s⁵⁶ and the resurgence of (primarily US Black and Latin@ militancy) the *internal colonialism* perspective rose to prominence. I argue that this perspective is a modern adaptation of Stalin’s *nations* articulated in the language of (post-)colonial theory. Omi and Winant characterize its elements as follows:

- A colonial *geography* emphasizing the territoriality or spatial arrangement of population groups along racial lines;
- A dynamic of *cultural domination and resistance*, in which racial categories were utilized to distinguish between antagonistic colonizing and colonized groups, and conversely, to emphasize the essential cultural unity and autonomy of each;
- A system of *superexploitation*, understood as a process by which extra-economic coercion was applied to the racially identified colonized group, with the aim of increasing the economic resources appropriated by the colonizers.
- Institutionalization of *externally-based control*, such that the racially identified colonized group is organized in essential political and administrative aspects by the colonizers or their agents.⁵⁷

⁵¹*pace*. Linda Burnham and Bob Wing, “Toward a Communist Analysis of Black Oppression and Black Liberation,” *Line of March*, 1981: 21-88.

⁵²*pace*. Michael Omi and Howard Winant, *Racial Formation* (New York: Routledge, 1986), 46.

⁵³The dissolution of the Second International was by and large primarily the result of practical considerations, i.e. the Balkanization of its member organizations into national constituencies following its functional collapse during WWI. However, ideological strife over, among other issues, the national question precipitated and contributed to this functional collapse and naturally, the failure to reform after 1920 and its splintering into multiple international organizations. See Røde Fane, “Tilbake til marxismen i det nasjonale spørsmålet,” *Tjen Folket Media*, September 26, 2020, <https://tjen-folket.no/index.php/2020/09/26/tilbake-til-marxismen-i-det-nasjonale-sporsmalet/> for an interesting discussion.

⁵⁴Minutes of the Fourth Session of the Second Congress of the Communist International, June 25, 1920, Report on National and Colonial Question, <https://www.marxists.org/history/international/comintern/2nd-congress/ch04.htm>.

⁵⁵**NB:** I do not claim that they are subject to the same *dynamic*, but rather the same *logic*.

⁵⁶To be clear, this period of destabilization occurred after the counterrevolutionary coup in China in 1978 and the subsequent collapse of the last remaining socialist camp in the world and not, as some commentators would have it, with the collapse of the revisionist and emphatically anti-socialist USSR in 1989.

⁵⁷Omi and Winant, *ibid*, 91-92.

The key distinction between Stalin's *nations* and the internal colonialism perspective is that nationality (or its analogue) is defined in relation to external antagonisms. However, the perspective does not articulate an operational definition of key terms like "racial lines" and "cultural unity" nor the manner in which population groups coherently become autonomously "colonized". I argue that between the two concepts, there is a compatible degree of overlap: the common territory of nations are identically colonial geographies; a common culture, and even language, are incorporated within the colonizing and colonized groups' "essential cultural unity"; to some degree, the common economic life of nations is identifiable with the superexploitation of internal colonies. The insight afforded by the internal colonialism perspective is that identity formation becomes relevant only in the context of antagonism, a position I endorse. However, the claim to superexploitation as a process of "extra-economic coercion" serves to needlessly divorce class from race (after all, what is class exploitation if not a process of coercion guaranteed at end by extra-economic means?), allowing ample space to veer in a Bundist direction as the constitution of a population group is undefined and subject to the researcher's prerogative. This is especially pertinent when the line between Soviet social imperialism and autonomous nations in pre-Khrushchev USSR is blurred by revisionism; critics of Marxist theory are thus offered the low-hanging fruit of conflating the post-Stalinist USSR with Marxist theory in general.

3.4.3 Anderson's Theory of Nations

Benedict Anderson's definition of the "nation" is perhaps closer to the contemporary mainstream Marxist position: "an imagined political community—and imagined as both inherently limited and sovereign".⁵⁸ imagined, in that "the members of even the smallest nation will never know most of their fellow-members... yet in the minds of each lives the image of their communion";⁵⁹ limited, in that "even the largest of them...has finite, if not elastic, boundaries, beyond which lie other nations";⁶⁰ sovereign, in the sense that it is freedom-seeking; and a community in the sense that "regardless of the actual inequality and exploitation that may prevail in each, the nation is always conceived as deep, horizontal comradeship."⁶¹ However, I note here that Anderson's concept of "nation" more closely corresponds to its common usage than to its placeholder as a euphemism or cognate of "race". Anderson moreover treats "nation" and "race" as separate, semi-autonomous categories⁶² and relies heavily on linguistic developments to explain the differentiation of peoples into nations.⁶³

⁵⁸Anderson, *ibid*, 6.

⁵⁹*Ibid*.

⁶⁰*Ibid*, 7.

⁶¹*Ibid*.

⁶²*Ibid*, 93.

⁶³For this reason, Anderson's concept of nations fails to capture the racialization of e.g. Irish, Scots, and presumably Chinese minorities. For Anderson, differentness in the sense of racialization is contingent upon self-conscious nationalisms. Thus, in Anderson's nations framework, the gap between Scottish assimilation and Irish occupation is explained by the strength of national identity vis-a-vis the pervasiveness and development of respective national languages. Yet, this framework is not capable of describing contemporary Albaphobia.

3.4.4 Summarizing the Relevance of “Race” in the Study

This study is dedicated to the straightforward application of supermarket accessibility measures based on established methods to the case of Oslo’s neighborhoods. The results of this assessment without further investigation or theoretical commentary can strictly speaking serve as an independent and complete empirical study, however little it may clarify causal mechanisms of inequality. Moreover, the introduction of even the most general theories would serve to flesh out a discussion on the structuralist underpinnings of the phenomenon. Nonetheless, this document heavily emphasizes so-called “racial” variables in both the quantitative models offered as well as the theoretical discussion surrounding them. I would therefore like to clarify the connection between spatial inequality, racialization, and food deserts before proceeding.

The spatial inequality theories reviewed are intimately (although not exclusively or exhaustively) related to *racialization*. We have seen that the spatial stigma framework argues that contemporary spatial stigmatization differs from earlier historical epochs in facilitating “racialization through selective accentuation or fictive projection...” and that populations of

disparaged districts are nearly always painted in darker and more exotic hues than their demography warrants. Their cultural differences are exaggerated and turned into divergence if not hostility to dominant national norms—with religion often serving as the surreptitious agent of sedition—while their vulnerable class position is downplayed...⁶⁴

This fits neatly with Gullestad’s observation that

Interpretations of differences are not universal but emerge in historically specific processes as human beings give meaning to what goes on around them. When some physical features appear as particularly visible, this is not only due to the features themselves but to historically specific frames of interpretation that have become self-evident and self-explanatory for many people. Visibility, in the sense of prominent features that are invested with particular meanings, is not natural and universal but is historically specific and culturally produced and reproduced through fleeting and shifting negotiations.⁶⁵

In the Norwegian context, the fact that “racist discrimination takes place not only on the basis of visible differences” and that “recent analyses also report that Eastern Europeans are racialized in Western Europe in terms of degrees of whiteness” adds another important and unique dimension to the analysis.⁶⁶ This is underscored by recent Norwegian studies that not only describe racializing processes of Eastern European migrant workers in Norway, but also the specifically geospatial dimension of

⁶⁴Wacquant, Slater, and Pereira, *ibid*, 1274.

⁶⁵Gullestad, *ibid*, 232.

⁶⁶John Rex, *Race and Ethnicity* (Stony Stratford: Open University Press, 1986), as cited in *ibid*, 233; Gabriella Lazaridis, “Racialized Exclusions,” (paper presentation, Anthropological Perspectives on New Racism in Europe, 6th Biennial EASA Conference, Krakow, July 26-29, 2000), as cited in Gullestad, *ibid*.

the processes and outcomes.⁶⁷ Despite these insights, cursory models that incorporate the proportion of Eastern European immigrants find that this particular categorization in the context of supermarket access is statistically insignificant, although given these trends and commentaries, it is worth further investigation in another space.

The connection between spatial inequality and racialization is not only well-established by the prior literature, but manifests uniquely in the Norwegian context. The link between spatial inequality and supermarket accessibility is so tightly woven it is almost trivial: access to crucial health resources is clearly an integral piece of the spatial inequality puzzle. The relationship between racialization and supermarket accessibility mediated by the bridge of spatial inequality is relatively straightforward; the argument that follows is, on the other hand, more subtle and perhaps arguably more tenuous.

The key point is that the role of racialization should not be overstated in the formation and maintenance of spatial inequalities. In fact, as the preceding paragraphs indicate, racialization (and spatial inequality) is informed by, at least as much as it informs, class inequality; and when it comes to the logic of the capitalist market and its demand for cheap, fluid labor, the relationship is much more unidirectional, where relations of production predominantly inform racialization rather than vice-versa. This is reinforced by the fact that “immigrant” neighborhoods in Oslo were historically built for the working class and continue to be occupied by it. Similar phenomena exist in a multitude of other Western European and North American settings.⁶⁸ Fundamentally, this claim appears to presuppose that the principal site of Norwegian racialization is situated among predominantly Eastern European labor: that the driving force behind racialization is the logic of capital accumulation. Yet, in Norway, (principally North African and Middle Eastern) refugees factor more prominently in racialization processes in the public consciousness, especially regarding racialization of the visual variety.⁶⁹ The obvious retort is that for the most stigmatized and marginalized racialized populations in Norway, the role played by imperialism and its displacing effects is far more salient.⁷⁰ This is not, however, the point I wish to make. Rather, my argument is that imperialism and the domestic labor market are inseparable entities, although it is immediately obvious that they manifest in different ways and lead to radically divergent outcomes in racialization. In other words, if interpretations of differences are historically specific, produced and reproduced through fleeting and shifting negotiations, then interpretations of difference are also contingent upon intrahistorical and even intracultural political, economic, and ultimately social configurations that yield diverse and nuanced categories that are as intersectional as they are autonomous. This much is obvious from a theoretical perspective and it is

⁶⁷Jakub Stachowski, “Positioning in ‘relational claustrophobia,’” *Journal of Rural Studies* 78 (August 2020): 176-184, <https://doi.org/10.1016/j.jrurstud.2020.06.001>; Jakub Stachowski, “Processes of socio-spatial exposures and isolations among Polish labour migrants in rural Norway,” *European Urban and Regional Studies* 27, no. 4 (June 2020): 379-297, <https://doi.org/10.1177/0969776420930758>; Mariann Villa, “Local ambivalence to diverse mobilities,” *Sociologia Ruralis* 59, no. 4 (October 2019): 701-717, <https://doi.org/10.1111/soru.12263>.

⁶⁸Castells, *ibid*, Chapter 3.

⁶⁹Gullestad, *ibid*.

⁷⁰I thank Emil Øversveen for bringing this point to my attention.

consistently confirmed by the high rates of multicollinearity encountered in virtually any quantitative socioeconomic study. The observation that relations of production dominate in the racialization of Eastern European labor immigrants does not imply that relations of production necessarily dominate racialization in Norway generally speaking.

Picking apart the nuanced racialization mechanisms in Norway and their implications for the urban landscape is precisely what needs to be done in order to fully understand racial inequalities in Norway, and lends credence to a CR approach to the issue. However, this takes us too far afield from the subject of this study, and the discussion will be tabled for another space.

Chapter 4: Data and Methods

4.1 Geographic Data

Since January 2017, 615 basic statistical units (*grunnkretser*, hereafter “BSU”) have been defined within Oslo’s municipal borders. With a land area of 426.4km², Oslo’s January 2020 population of roughly 693,500 persons inhabit just 131.45km² of the total area, making the city relatively automobile-dependent in contrast to many of Norway’s leading largest population centers. Both commercial zoning and populations are distributed in sporadic density loci, limiting the city’s walkability, as can be seen in Figures 4.1 and 4.2 on Pages 56 and 57, respectively. The public transportation light rail network spans 125km with an estimated annual ridership of roughly 398 million in 2019, including bus and train lines.

Given the fineness offered by these BSU, I maintain that the more accurate analysis must be carried out on this level. As Blom points out in the case of statistical analyses of segregation, “the finer the overall area is divided, the higher the values [of] the dissimilarity index... because potential inequalities between the areas within smaller subordinate areas are captured with a finer division and are ‘overlooked’ with a coarser ‘sieve’.”¹ Unfortunately, important demographic data are not available to this author at the basic statistical units level for several variables. In fact, only population counts by country background (limited to four country groupings) are publicly available at this level. The next finest geospatial unit offered by SSB, “urban districts” (*bydeler*) contain a drastically coarse 17 units in Oslo.² Alternatively, Oslo Kommune has independently defined a geospatial classification one level above basic statistical units, “*delbydeler*”. Let D be the set of all *delbydeler* and G the set of all BSU where $\forall g \in G : \bigcap_{g \in G} = \emptyset$. Then

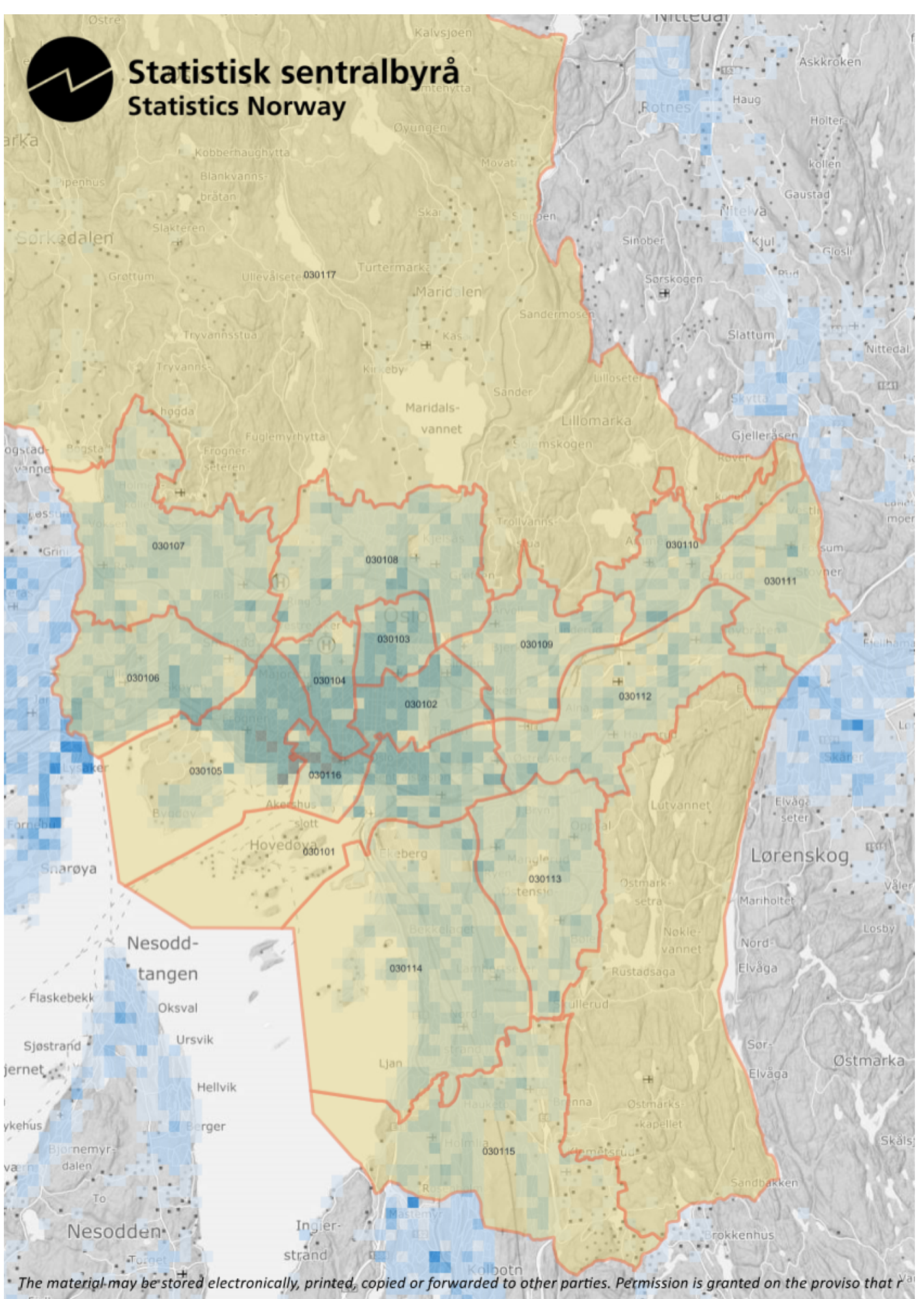
$$\forall g \in G, \exists! d \in D : g \in d \text{ and } \forall d \in D : d = \bigcup_{g \in d} g, \quad (4.1)$$

i.e. no BSU overlap, all BSUs belong to exactly one *delbydel*, and the entire area of a given *delbydel* is covered by the union of the BSUs that belong to them. There are a total of 98 *delbydeler* defined within Oslo. Moreover, Oslo Kommune has also made data sets with important sociodemographic variables publicly available at the *delbydel* level.

Therefore, I use BSUs from SSB to calculate supermarket accessibility scores and include population counts before aggregating the data into the units offered by Oslo Kommune for comparison with other sociodemographic variables. The data are from 2017, the most recent year of availability common to all variables.

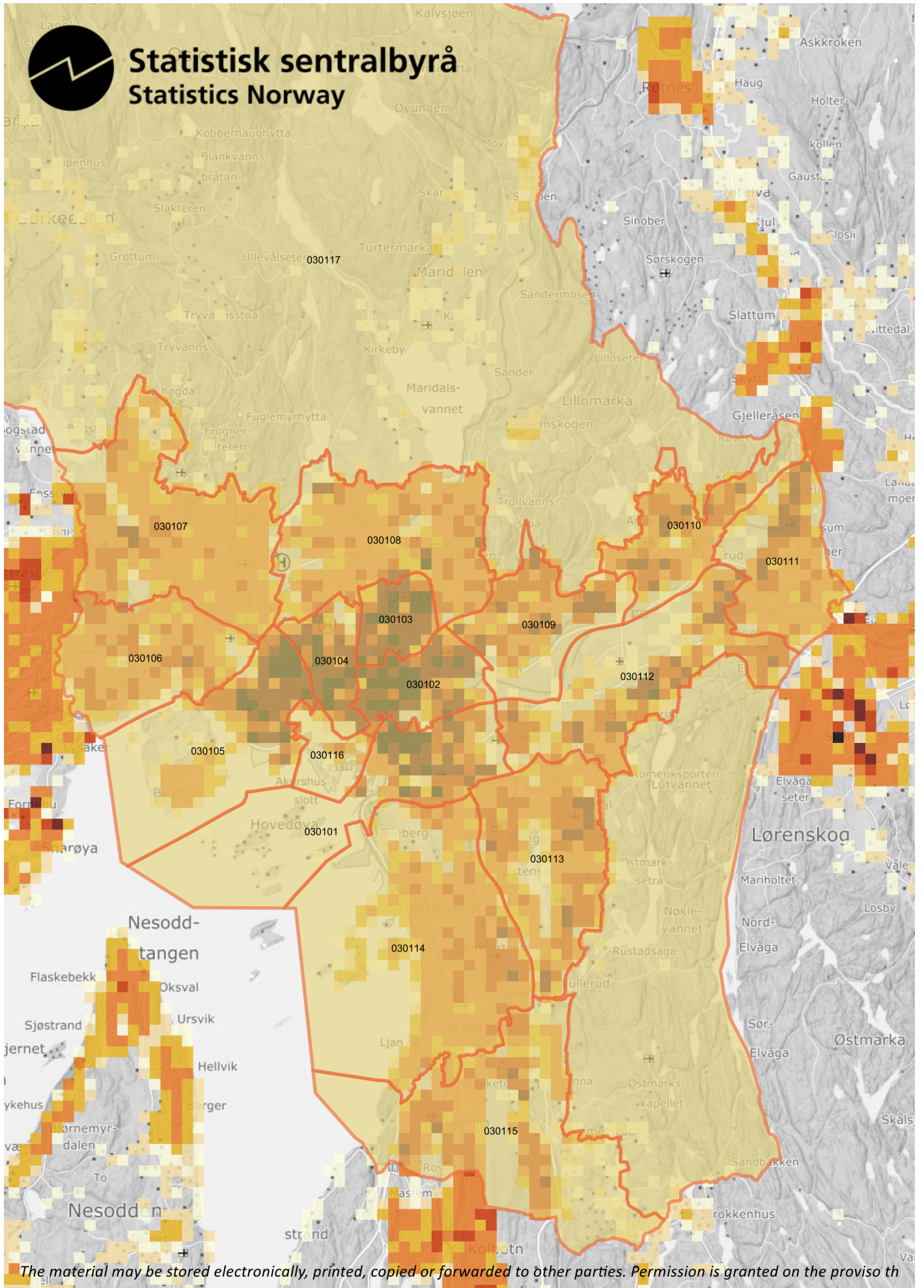
¹Blom, *ibid.* This author’s translation.

²There is an intermediate classification defined by SSB, “statistical tracts” (*delområder*), of which there are 60 within Oslo, but to this author’s knowledge, it has never been used in publicly available data sets. The use of urban districts is also problematic because there are only a total of 38 urban districts defined throughout the entire country, delegated among 3 additional cities: Stavanger (9), Bergen (8), and Trondheim (4). While researchers may be able to glean some information from the 17 urban districts in Oslo, the classification of the remaining cities is far too coarse to be of any sociological interest, making comparisons roughly impossible.



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Figure 4.1: Commercial establishments as of 2017 overlaid on a map of Oslo and its urban districts. Density of establishments per 250m x 250m grid indicated by blue squares, with the darkest color indicating a local maximum density of establishments per square meter.



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Figure 4.2: Population count overlaid on a map of Oslo and its urban districts. Population per 250m x 250m grid indicated by red squares, with the darkest color indicating an local maximum density of persons per square meter.

4.1.1 Supermarket Data

I define a supermarket as any location with any number of employees operated by any of the following companies: ReitanGruppen, Bunnpris, Coop, and Norgesgruppen, as well as stores coded by the source dataset as “other grocers”, based on registry data made available by IPER.³ In contrast to similar studies, I forego a restriction on number of employees, as I assume that availability of grocery selection is not affected by this property. The emergence of self-checkout services and Norway’s relatively small population size and density are conjectured to limit the relevance of number of employees.

4.1.2 Supermarket Preference

In a preliminary analysis, I treated each supermarket as a monolith, making no distinction between the major grocers that service Oslo. However, not all supermarkets are equally preferred by the population. While some of these preferences amount to individual personal preference and marketing efficiency, much of these household decisions are informed by affordability. For instance, of the 10 largest supermarkets in Norway, the market basket value of both Bunnpris and Joker were fully one standard deviation more expensive than the mean market basket value and 31.4% and 26.4% more expensive than the cheapest alternative (Rema), respectively. When considering only fresh produce, Bunnpris’ goods were one standard deviation more expensive than the mean price.⁴ In essence, such stores may more closely resemble convenience stores or gas stations in terms of affordability and grocery selection for large portions of the population: choices that simply cannot be justified by low-income households.

One approach to this obstacle has been to define supermarkets as those foodstores with at least 2 million USD in annual sales,⁵ but since these data are not available to this author at the time of writing for the Norwegian setting, I opt to run the analysis a second time after removing Joker and Bunnpris from the list of available “closest facilities” from each centroid point.

4.1.3 Geospatial Isolation Measures

Following the results of postestimation analyses of initial linear regression models discussed later in Section 5.2, I introduce three geospatial isolation measures to construct improved models.

³“Butikkregister,” Geodata, map service, accessed June 3, 2020, <https://ntnu-gis.maps.arcgis.com/home/item.html?id=ba016d37a6354f0abd16cfb946e23650>. In addition to data made available by IPER AS, the data set includes historical data from Nielsen Norge, which in turn includes self-reported data on “other grocers” via Virke, the Enterprise Federation of Norway. As discussed in Chapter 3, the set is incomplete.

⁴Halvor Ripegut, “Test av matpriser,” *Nettavisen*, accessed July 7, 2020, published 21 June, 2019, <https://www.nettavisen.no/okonomi/test-av-matpriser-sa-stor-er-prisforskjellen-mellom-billigste-og-dyreste-kjede/3423802483.html>.

⁵Michele Ver Ploeg, David Nulph, and Ryan Williams, “Mapping Food Deserts in the United States,” *USDA*, accessed June 7, 2020, published December 1, 2011, <https://www.ers.usda.gov/amber-waves/2011/december/data-feature-mapping-food-deserts-in-the-us/>.

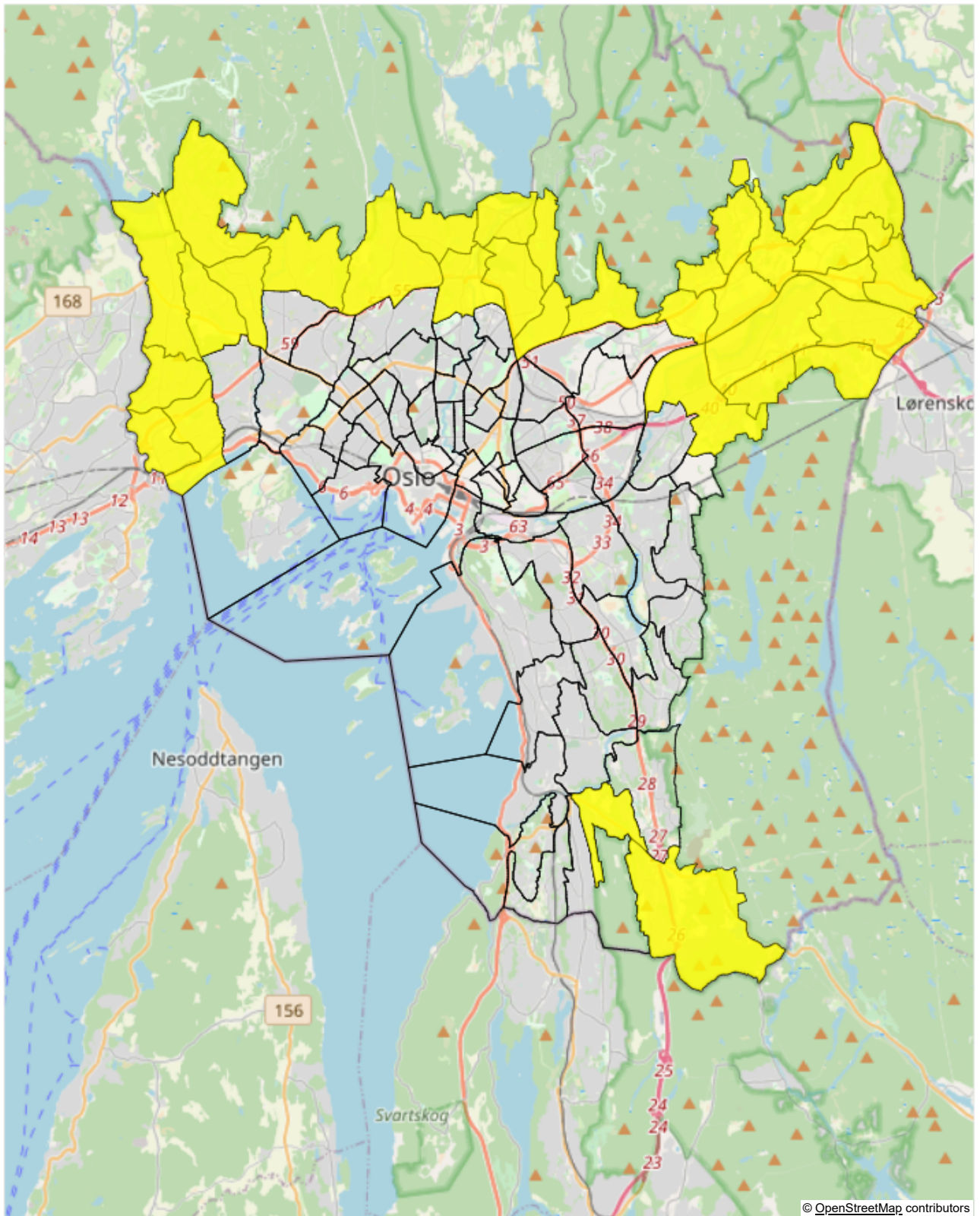


Figure 4.3: Map indicating the *delbydeler* that are coded with Peri=1.

The first is *Dist*, measuring the relative distance between each *delbydel* centroid to the centroid of the *Sentrum* unit (manually assigned as the central business district). The values are first calculated in meters using the native “shortest path” algorithm in QGIS along the street network constructed as discussed in Section 4.3. These values are then rescaled to order (and measure) distances relative to the *delbydel* closest to *Sentrum*. The centroids of *Bispevika*, *Ljan*, and *Bygdøy* were manually spatially translated to the nearest point along the pedestrian network, as the the two former units had centroids located in water regions and the latter is situated on a peninsula where the network fails to find a feasible path when computed in QGIS. For *Bispevika* in particular, this may be compelling grounds for its removal from the data set altogether. Lastly, I allow for a topology tolerance of 100 meters to account for shortcomings in the street network data set.

The second is *Peri*, a dummy variable indicating whether or not the *delbydel*: 1) lies along the periphery of Oslo or 2) lies along its near-periphery *and* is at least five units separated from *Sentrum*. Beginning with the second westernmost *delbydel* in Figure 4.3, the following are coded with *Peri*=1: Lilleaker, Ullern, Ullernåsen, Røa, Hovseter, Holmenkollen, Holmen, Slemdal, Nordberg, Korsvoll, Tåsen, Kjelsås, Grefsen, Myrer, Disen, Årvoll, Veitvet, Rødtvet, Nordtvet, Ammerud, Grorud, Romsas, Vestli, Rommen, Fossum, Stovner, Haugenstua, Høybråten, Ellingsrud, Furuset, Lindeberg, Trosterud, Bjørnerud, and Bjørndal. At the eastern periphery, I consider the *Marka* unit to constitute the municipal border, marked in blue in Figure 4.3, and code *delbydeler* that bordering *Marka* without having the municipal border as another neighbor with *Peri*=0. I furthermore code Holmlia Nord, Holmlia Syd, and Prinsdal with *Peri*=0, despite satisfying the criteria outlined above. These *delbydeler* are highlighted in yellow in Figure 4.3 on Page 59.

Finally, I introduce a third dummy variable, *water*, indicating whether or not the geographic area spanned by the given *delbydel* contains a substantial proportion of water areas. This is to account for the possibility that influential outliers may arise from computational errors in the data set (although of those *delbydeler* coded with *water*=1, only *Bygdøy* appears in influential outlier estimates as in Figures 5.3(a) and 5.3(b), discussed later in Section 5.2). The following *delbydeler* were coded with *water*=1: *Bygdøy*, *Skillebekk*, *Bispevika*, *Bekkelaget*, *Nordstrand*, *Ljan*, and *Holmlia Nord*.

4.2 Demographic Data

4.2.1 Immigration Background

In both sources (SSB and Oslo Kommune) on immigration background, the operationalization definitions used by both entities stifles the study of racial inequalities. SSB table 12610, for instance, offers the following categories of country background: 1) EU/EEA countries; 2) European countries outside EU/EEA; 3) Asia including Turkey; 4) Africa; 5) North America; 6) South and Central America; 7) Oceania; 8) Stateless; 9) and Unknown.⁶ Oslo Kommune’s categorizations are even more troublesome, offering

⁶“12610: Immigrants and Norwegian-born to immigrant parents,” Statistics Norway, accessed January 6, 2021, <https://www.ssb.no/en/statbank/table/12610/>.

just four categories: 1) Norway; 2) Western Europe, USA, Canada, Australia, and New Zealand; 3) Eastern European EU countries; and 4) Asia, Africa, Latin America, and Eastern European countries outside the EU.⁷ Table 4.1 provides an overview of the countries included in the “Western Europe” and “Eastern Europe” Oslo Kommune categories; the fourth category listed above contains all remaining countries besides Norway, the USA, Canada, Australia, New Zealand, and those countries listed in Table 4.1.

Country Grouping	Countries
Western Europe	Denmark, Finland, Faroe Islands, Iceland, Sweden, Belgium, Andorra, France, Gibraltar, Greece, Ireland, Italy, Malta, the Netherlands, Liechtenstein, Luxembourg, Monaco, Portugal, San Marino, Spain, UK, Switzerland, Austria, the Vatican, Guernsey, Jersey, Isle of Man
Eastern Europe in the EU	Bulgaria, Estonia, Croatia, Latvia, Poland, Lithuania, Czechia, Hungary, Slovakia, Slovenia

Table 4.1: Table of country groupings as defined by both Oslo Kommune and SSB for the “Western Europe” and “Eastern Europe” groupings.

The first issue, inherent to both classification schemes, is rather obvious. Persons with immigration backgrounds from e.g. “Israel” clearly have different experiences than those from e.g. Pakistan, but are nonetheless coded as identically having immigration backgrounds from “Asia” (in Oslo Kommune’s classification scheme, further coded with those from African, Latin American, and non-EU Eastern European countries). Not only does the classification scheme collapse differences among persons from the same “world region”, but it also erases the similarities between persons from settler-colonial (almost exclusively Western European) states like South Africa or “Israel” and those from Western European countries. Insights into the socially constructed process of “racialization” are also imprinted in the largely arbitrary distinction between “Western Europe” and “Eastern Europe” (for which there is no consistent geological, universal geopolitical, or even administrative distinction).⁸

Secondly, the classification regards only first- and second-generation immigrants, erasing the identity of Norwegians who may have cultural identities at odds with these classifications, and who may experience discrimination on the basis of actually existing physical markers, linguistic, or other “racial” variables. While the classification scheme offered by Oslo Kommune is despite its relative coarseness a great improvement over that offered by SSB (SSB codes those born in Norway to parents born in differing countries as having no immigration background; Oslo Kommune uses the

⁷“Befolkningen etter landbakgrunn (G),” *Statistikkbanken: Oslo Kommune*, accessed January 19, 2021, <https://statistikkbanken.oslo.kommune.no/>.

⁸According to Kåre Vassenden, the distinction between Eastern and Western Europe reflects “political divisions from when the iron curtain still existed [*Europa ellers er delt mellom øst og vest i samsvar med den politiske delingen da jernteppet ennå eksisterte*]” and further argues that the distinction is still relevant in the context of migration to Norway. Vassenden also adds that Turkey has been removed from the European classification and placed in a category with Asia because “demographically speaking, migration between Norway and Turkey do not follow a Western European pattern.” Kåre Vassenden, “Landgrupperinger og deres betegnelser,” in *Innvandrere i Norge*, ed. Kåre Vassenden (Statistisk sentralbyrå, 1997): 237-238.

mother's background), the data sets are clearly not reflective of a socially constructed understanding of "race", and certainly not of the lived experiences of the social subject that this construction entails.

The resulting variable used in this project employs Oslo Kommune's data set to create a "non-Western European immigration background" category consisting of Eastern European EU countries, Asia, Africa, Latin America, and Eastern European countries outside the EU. The PropNonWest variable refers to the *delbydel* proportion of persons with non-Western European immigration backgrounds.

4.2.2 Income

To consider income in the analysis, I use the "total income after tax per consumption unit, average" dataset from Oslo Kommune, hereafter referred to as Income. This is household income after taxes, including wages, salaries, capital income, and miscellaneous deposits. The income is scaled by household size to create a variable that can be compared across households of different sizes. More information can be found on [Oslo Kommune's webpages](#).

Due to multicollinearity issues that become apparent in Section 5.1, I use another measure of income as a socioeconomic variable offered by Oslo Kommune: the proportion of low-income households in any given *delbydel*, hereafter referred to as LowInc. For this statistic, household incomes are defined by gross financial capital, including: bank deposits; units in equity, bond, and money market funds; stock shares; bonds; and other securities. "Low income" is defined using the EU scale. A household is said to be "low-income" if the household income after taxes per consumption unit is below 60% of the household median income for the municipality in question. The statistic excludes student households. More information can be found on [Oslo Kommune's webpages](#), as well as on [SSB's webpages](#).

4.2.3 Additional Demographic Data

In addition to LowInc and PropNonWest, I also consider the percentage of persons in a given *delbydel* with registered disabilities ("*redusert funksjonsevne*" ["*reduced functioning ability*"]) between the ages of 16 and 66, hereafter Dis. This includes those persons registered in the national welfare system under the following categories: those receiving sickness benefits, disability pensions, and those persons who, due to illness, injury, or other reasons require extra follow-up to receive or maintain employment.

Furthermore, I also add the proportion of persons aged 16 or older who have not attained tertiary education (i.e. have attained at most *videregående* education, roughly comparable to the US high school level), hereafter LowEdu, also made available on Oslo Kommune's webpages.

4.3 Accessibility Scores

As in Smoyer-Tomic et al.'s report on food deserts in Edmonton, Canada,⁹ I use slightly coarser units (*delbydeler*) to minimize aggregation errors at the BSU level and calculated the supermarket accessibility for each *delbydel* with the following equation:

$$A_i = \frac{1}{P_i} \sum_{k \in i} w_k \min(d_{kj}) \quad (4.2)$$

where A_i is the supermarket accessibility of *delbydel* i , P_i is the population of *delbydel* i , w_k is the population of BSU k and d_{kj} is the distance between the centroid of BSU k and supermarket j .

First, I calculate the distance between each BSU centroid and the nearest supermarket within the county (*fylke*) using the OD-matrix analysis tool from the QNEAT3 plug-in for QGIS, measured in walking times; the shortest distance for each BSU is selected in Python.¹⁰ Supermarkets for the entire *fylke*, as some outside the municipal borders may lie closer to the centroids of some BSUs. To allow for a direct comparison with the results for accessibility using public transit, I modify Eq. 4.2 by measuring d_{kj} in minutes, using a default walking speed of 5km/hr. As the calculation does not include obstacles or elevation, the measures are equivalent.

To account for public transit-based accessibility, I modify Eq. 4.2 by measuring d_{kj} in travel time (in minutes) rather than walking distance (in meters) from the centroid of BSU k and supermarket j . First, route schedules made available by *Entur*, along with street network data made available by *Statens vegvesen*¹¹ are used to create a public transportation network layer. While the network data are from 2020 and the demographic data are from 2017, I conjecture that the network data have remained relatively fixed in the interceding 3 years (i.e. that streets have remained relatively unchanged and that public transit routes span roughly the same service areas as before) and will therefore not present any significant issues to the calculation. Since this data set is not coded with pedestrian accessibility fields, two layers from the set were used: *ERFKPS* and *ERFKPS_bike*, where the latter contains street data including bike paths and footpaths. Those features in the *ERFKPS* set with a *RoadClass* field value of '0' or '1' or a *IsBikeRoad* value of '1' were assumed to include feasible pedestrian paths.¹² The resulting figures are a reflection of a minimization problem in *ArcGIS* using a combination of walking time (from centroids to the nearest public transit stop, then from the final public transit stop to the nearest grocery) and transit time.

⁹Karen E. Smoyer-Tomic, John C. Spence, and Carl Amrhein, "Food Deserts in the Prairies?," *The Professional Geographer* 58, issue 3, 2006, <https://doi.org/10.1111/j.1467-9272.2006.00570.x>.

¹⁰The walking estimates were carried out using QGIS rather than ArcGIS due to the latter's (seemingly arbitrary) limitations on maximum distances.

¹¹This includes both bicycle paths and lanes, as well as streets. Note that the data do not include sidewalk layer data. However, I assume that street layers, especially within the more densely populated urban areas considered, provide a reasonable approximation to the sidewalk grid. Moreover, I conjecture that in cases where streets are limited to non-pedestrian highways, that 1) unrecognized footpaths compensate for the more direct routes afforded by highways and 2) the precision of the network is irrelevant, as accessibility scores are much higher than the threshold for defining a "food desert" in these areas anyway.

¹²The remaining field values for *RoadClass* were '2': highway, '3': highway ramp, '4': ferry crossing, '5': roundabout intersection, and '6': major road.

4.4 Missing Data and Limitations

4.4.1 Demographic Data

A number of important demographic variables could not be included in this analysis. In principle, the number of independent variables is limited only by the sociological imagination. Some have even been explicitly outlined in the prior literature, and still fewer have been incorporated in comparable studies of food deserts. Some of these have already been mentioned. The first is a more reliable operationalization of “race”. Another more subtle direction for improvement is the operationalization of “class”. There are several options here. The first is to employ the post-Marxist concept of the “precariat” and rely heavily on Bourdieuean notions of “cultural”, “social”, or “symbolic” “capital”, as has become the norm. Although I have offered a harsh critique of this approach, I will not dismiss it out of hand; on the contrary, I believe that incorporating some of these *resources* by means of lifestyle-related questionnaires, or even more qualitative methods, like ethnography or interviews, would yield interesting and useful variables that can be directly applied to the present study, provided that they are duly situated within a broader materialist framework. In this scenario, one could allow the data to stand on their own, or perhaps construct a composite scale measuring access to these forms of “capital” by neighborhood.

Alternatively, one might similarly make use of Lenin’s definition of class:¹³

Classes are large groups of people differing from each other by the place they occupy in a historically determined system of social production, by their **relation... to the means of production**, by their **role in the social organisation of labour**, and, consequently, by the **dimensions of the share of social wealth of which they dispose** and the **mode of acquiring it**.¹⁴

These are options worth exploring in future studies, not necessarily exclusively in the context of the study of spatial inequalities.

A more immediate improvement is afforded by access to household vehicle ownership, a highly cited factor in the prior literature. There are many junctures where this data can be incorporated. Taken together with Dis and the street networks, the prospective variable may be of use in calculating improved supermarket accessibility scores on the side of the dependent variable; or, perhaps the variable can be added to the right-hand side of a linear regression model, alongside household access to resources. Ultimately, however, I believe that the model is best served by such a variable by using it to define a “food desert”, a question that represents the Achilles’ Heel of the present study. Unfortunately, this data has not been made available on the level of any comparable geospatial units for Oslo. The finest unit where this variable is provided by

¹³It has been suggested to this author that Marx’s definition of class should be referred to instead. The point is well-taken. I opt to use Lenin’s definition because a) I believe it faithfully reflects Marx’s insights, b) it is better suited to operationalization, and c) it offers a concrete application of Marx’s abstract concept to social analysis, i.e. it demonstrates the manner in which Marxist theory develops without the need for invoking Weberian fictions to fill imagined lacunae.

¹⁴Vladimir Lenin, “A Great Beginning,” in *Collected Works* vol. 29, ed. Brian Baggins and David Walters, (marxists.org, 1999): 408-434, <https://www.marxists.org/archive/lenin/works/1919/jun/19.htm>. My emphasis.

SSB, *Statens vegvesen*, and *Opplysningsrådet for veitrafikken* alike is at the county unit,¹⁵ which is far too coarse to be of use in this study; furthermore, these are measures of vehicle registration and ownership that do not necessarily measure household access. Future studies may make use of estimation procedures in order to incorporate such a variable.¹⁶

4.4.2 Geospatial Data

Supermarket accessibility need not necessarily be exclusively affected by the socioeconomic factors enumerated above. Indeed, pollution, historical revenues trends, crime, zoning considerations, and other “environmental” factors can have a substantial impact on decisions to (dis)invest. Nonetheless, many of these factors may be difficult to causally differentiate from a neighborhood’s demographic features. As environmental racism studies have shown, while there typically exists a strong positive correlation between environmental bads and the proportion of low-income or predominantly non-white households in a given area in many North American cities,¹⁷ the causal relationship has not entirely been clarified, but has generally been accepted as more or less simultaneous. Analogously, presented with some hypothetical established pattern of disinvestment from predominantly non-Western European neighborhoods that also feature a statistically significantly high incidence of environmental bads, it would be difficult to directly identify the true nature of the relationship between the three factors.

I note here as well that the data used in this study are subject to limitations related to the operationalization of a “supermarket”. The data does not, as mentioned in Sections 4.1.1 and 4.1.2, take into consideration the number of employees at a given supermarket, nor its revenue. The data set additionally does not include any supermarkets not operated by the four largest grocery retail companies in Norway, save a handful of exceptions. This will be discussed in greater detail in Section 7.1.2.

¹⁵The latter offers vehicle ownership and registration data at the level of postal codes, however; unfortunately, postal codes are not comparable to the geospatial units where other important demographic data are available.

¹⁶E.g. using density grids based on postal code data to estimate the number of households that own registered vehicles in a given BSU or *delbydel*.

¹⁷See Robert Bullard, “The Threat of Environmental Racism,” *Natural Resources & Environment* 7, no. 3, 1993: 23-26; 55-56, <http://www.jstor.org/stable/40923229>.

Chapter 5: Results

Table B.1 on Page 105 gives the *delbydel* supermarket accessibility scores when considering all supermarkets, including Joker and Bunnpris. Table B.2 on Page 106 provides the accessibility scores when considering all supermarkets, excluding Joker and Bunnpris. When considering walking scores, the removal of Joker and Bunnpris from the layer of supermarkets resulted in changes to just 34.4% of the *delbydeler's* accessibility scores.¹ However, when considering public transit scores, the removal of Joker and Bunnpris resulted in changes to 79.2% of accessibility scores.²

In the following, “Marka” was removed from the data sets, as 1) Tables B.1 and B.2 clearly show that it is an outlier, 2) it is a non-contiguous geospatial unit and therefore prone to computational errors in determining accessibility scores, and 3), its population accounts for less than 0.01% of the city’s total. “Sentrum” was also removed due to computational difficulties arising in inconsistent measures (like “Marka”, this accounted for < 0.2% of the city’s total population).

This chapter is organized as follows. Section 5.1 offers a brief discussion on integrity measures for the independent variables, followed by four linear regression models and their immediate improvements. Section 5.2 provides the results of assumptions testing and outlier analyses for the four models, along with two immediate models that result from improvements informed by assumptions testing. Section 5.3 gives the results of models that result from improvements related to insights gleaned from outlier analyses, loosely revolving around the theme of geospatial isolation measures. Finally, Section 5.4 includes a brief discussion on a prospective logistic regression model. Throughout the chapter, I will also present a number of quantile and robust variants for selected models, based on assumptions testing and postestimation. Table 6.1 on Page 83 provides an overview of the various models ultimately constructed throughout this project.

5.1 Preliminary Model and Assumptions Testing

Before carrying out a series of linear regression analyses, I ran a correlation analysis on the independent variables. The results are given in Table 5.1. Since all the variables are highly correlated, multicollinearity is likely to be present. Due to the nature of the variables, one would be hard-pressed to argue that any variables are redundant; dropping any of them leads to conceptual deficits.

	Income	PropNonWest	Dis	Edu
Income	1			
PropNonWest	-0.72	1		
Dis	-0.71	0.82	1	
LowEdu	-0.65	0.82	0.91	1

Table 5.1: Correlation analysis of independent variables.

Instead, I replaceIncome with LowInc. This establishes a conceptually neater measure of economic inequality that uses the same scale as the three remaining variables. A correlation analysis of the variables is given in Table 5.2.

¹The mean absolute value percentage change was 1.9%, corresponding with a total mean change of 0.06.

²The mean absolute value percentage change was 15.57%, corresponding with a total mean change of 0.02.

	LowInc	PropNonWest	Dis	LowEdu
LowInc	1			
PropNonWest	0.68	1		
Dis	0.40	0.82	1	
LowEdu	0.37	0.82	0.91	1

Table 5.2: Correlation analysis of independent variables, using LowInc.

Although there remains mild to moderate correlation between LowInc and the remaining measures, one can expect to suffer significantly fewer multicollinearity issues in a linear regression model using LowInc rather than Income. I therefore carry out four linear regression models with PropNonWest, LowInc, an interaction term between the two, Dis, and LowEdu as the independent variables, and where the dependent variable is supermarket accessibility scores with: walking scores, including Joker and Bunnpris (model 1); walking scores, excluding Joker and Bunnpris (model 2); public transit scores, including Joker and Bunnpris (model 3); and public transit scores, excluding Joker and Bunnpris (model 4). The models are governed by:

$$y_p = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_1 x_2 + \beta_4 x_3 + \beta_5 x_4 \quad (5.1)$$

where $p \in (1, 2, 3, 4)$ refers to the dependent variable for the p^{th} model, x_1 refers to PropNonWest, x_2 refers to LowInc, x_3 refers to LowEdu, x_4 refers to Dis, the β terms are the regression coefficients for their respective terms, and β_0 is an intercept term.

	Model 3			Model 4		
	Coeff	St. Err.	p	Coeff	St. Err.	p
const	0.18	0.05	<0.001	0.14	0.04	0.001
PropNonWest	-0.40	0.13	0.003	-0.30	0.10	0.005
LowInc	-0.95	0.29	0.002	-0.67	2.32	0.005
Interaction	2.22	0.70	0.002	1.54	0.56	0.007
LowEdu	3.6×10^{-3}	0.001	0.004	2.9×10^{-3}	0.001	0.005
Dis	-8.5×10^{-3}	0.004	0.022	-5.4×10^{-3}	0.003	0.067

Table 5.3: Results of linear regression models 3 and 4.

All models were statistically significant (model 1, $p = 0.013$; model 2, $p = 0.016$; model 3, $p < 0.001$; model 4, $p = 0.002$). Despite their statistical significance, models 1 and 2 accounted for 14.7 and 18.9% of the explained variance, respectively (adjusted $R^2 = 0.099$ and 0.093), and none of the independent variables statistically significantly predicted outcomes in accessibility scores in either of the models ($p > 0.27$ for all variables, for both models). They are therefore dropped for the remainder of the analysis in favor of models 3 and 4. Model 3 accounted for 24% of the explained variance in the population (adjusted $R^2 = 0.198$). Model 4 accounted for 21.8% of the explained variance in the population (adjusted $R^2 = 0.175$). The results of both models are given in Table 5.3. In both models, all independent variables were statistically significant, except Dis in model 4 ($p = 0.067$).

5.2 Improved Models, Assumptions Testing and Outlier Analysis

Using a RESET, both models were found to exhibit non-linear regression curves ($p \approx 0.03$ in both cases). I therefore remove the interaction term, adding two additional terms to the equation: quadratic terms in `LowInc` and `PropNonWest`, referring now to models 3.1 and 4.1, governed by:

$$y_p = \beta_0 + \beta_1x_1 + \beta_2x_2 + \beta_3x_3 + \beta_4x_4 + \beta_5x_1^2 + \beta_6x_2^2 \quad (5.2)$$

where p refers to the dependent variable used in the p^{th} model.

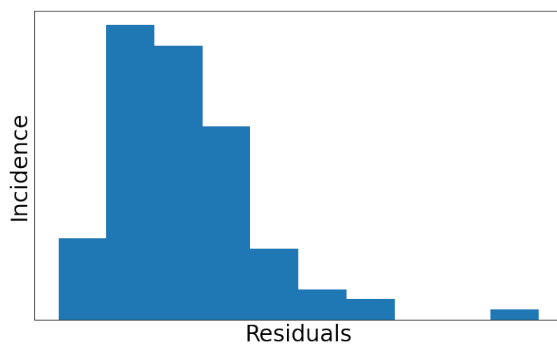


Figure 5.1: Distribution of the residuals of model 3.1

This improved both models and the results of RESETs revealed correctly specified models ($p = 0.91$ and $p = 0.21$ for models 3.1 and 4.1, respectively). Based on the results of log-likelihood tests, the models were found to be better fits than their initial counterparts. A Breusch-Pagan test was carried out on both of the models; both exhibited homoscedasticity ($p = 0.28$ and $p = 0.83$ for model 3.1 and 4.1, respectively).

Only VIF scores for `Edu` and `Dis` were below the threshold of 10 for both models (VIF = 7.6 and 6.9, respectively), while VIF scores for `PropNonWest`, `LowInc`, and their quadratic counterparts ranged between 22 and 31. However, this is expected for models that include both linear variables and quadratic counterparts, and I assume that multicollinearity is not an issue, despite the results of correlation analysis.

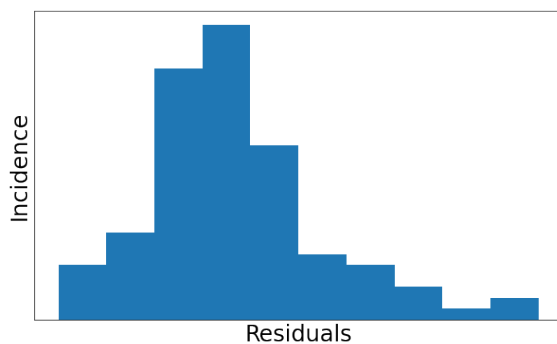


Figure 5.2: Distribution of the residuals of model 4.1

The residuals of model 3.1 are decidedly non-normally distributed, exhibiting not only severe skewness (in addition to an outlier), but also fairly severe leptokurtosis (kurtosis=4.3), as seen in Figure 5.1; Lilliefors' and Shapiro-Wilk tests reinforced the violation of the assumption of normally distributed residuals ($p = 0.002$ and $p < 0.001$, respectively). On the other hand, while the distribution of the residuals of model 4.1 statistically significantly violated normality assumptions (Lilliefors' $r = 0.04$ and Shapiro-Wilk $r = 0.002$), its skewness arises from comparable outliers and its leptokurtosis is substantially less extreme than that of model 3.1 (kurtosis=1.3) as seen in Figure 5.2.

The results of these models are given in Table 5.4. All independent variables

The results of these models are given in Table 5.4. All independent variables

statistically significantly predicted outcomes in supermarket accessibility in model 3.1 and the model accounted for 27.8% of the explained variance (adjusted $R^2 = 0.229$). All variables statistically significantly predicted outcomes in supermarket accessibility in model 4.1 except *Dis* and the quadratic *LowInc* term ($p = 0.085$ and $p = 0.07$, respectively) and the model accounted for 25.3% of the explained variance (adjusted $R^2 = 0.203$). In both models, *PropNonWest* and *LowInc* decreased accessibility scores (the score is reverse-coded, i.e. higher scores correspond with less access). However, in both models, there was a statistically significant positive relationship between the quadratic *PropNonWest* term and accessibility scores; in model 3.1, there was a statistically significant positive relationship between the quadratic *LowInc* term and accessibility scores. In both models, *edu* was statistically significantly positively related to accessibility scores. In model 3.1, *Dis* was statistically significantly negatively related to accessibility scores, but was statistically insignificant in model 4.1.

	Model 3.1			Model 4.1		
	Coeff	St. Err.	p	Coeff	St. Err.	p
const	0.21	0.053	<0.001	0.17	0.043	<0.001
<i>PropNonWest</i>	-0.45	0.18	0.014	-0.35	0.14	0.016
<i>LowInc</i>	-1.50	0.63	0.019	-1.02	0.50	0.045
<i>LowEdu</i>	3.7×10^{-3}	0.001	0.004	2.9×10^{-3}	0.001	0.004
<i>Dis</i>	-7.9×10^{-3}	0.004	0.030	-5×10^{-3}	0.003	0.085
<i>PropNonWestSq</i>	0.51	0.21	0.016	0.38	0.17	0.024
<i>LowIncSq</i>	4.25	1.94	0.031	2.85	1.55	0.070

Table 5.4: Results of models 3.1 and 4.1.

This suggests that as the *delbydel* proportion of low-income households increases, accessibility scores decrease (i.e. access increases) before reaching a turning point of roughly 18%, thereafter increasing quadratically as a function of proportion of low-income households. Similarly, when *Joker* and *Bunnpris* are included (as in model 3.1), accessibility scores decrease as the *delbydel* proportion of persons with non-Western European immigration backgrounds increases before reaching a turning point at roughly 44% and increasing quadratically. This relationship will be explored in further detail in Chapter 6. While *Edu* and *Dis* were statistically significant in model 3.1 and the former statistically significant in model 4.1, their effects on the predicted accessibility score for a *delbydel* were vanishingly small: roughly one hundred and one thousand times smaller than the effects of *PropNonWest* and *LowInc* (and their quadratic counterparts), respectively.

While I maintain that the sample size makes the non-normal distribution of model 3.1 and 4.1's residuals less problematic in inference testing, I now turn to the outliers seen in Figures 5.1 and 5.2. Figures 5.3(a) and 5.3(b) provide influence plots for models 3.1 and 4.1, respectively, by plotting studentized residuals of each model versus leverage. The size of each data point is a function of the square root of Cook's D for that observation.

Leverage refers to the potential for a given observation to influence the fit of the model while influence (reflected by Cook's D) is a measure of the degree to which the

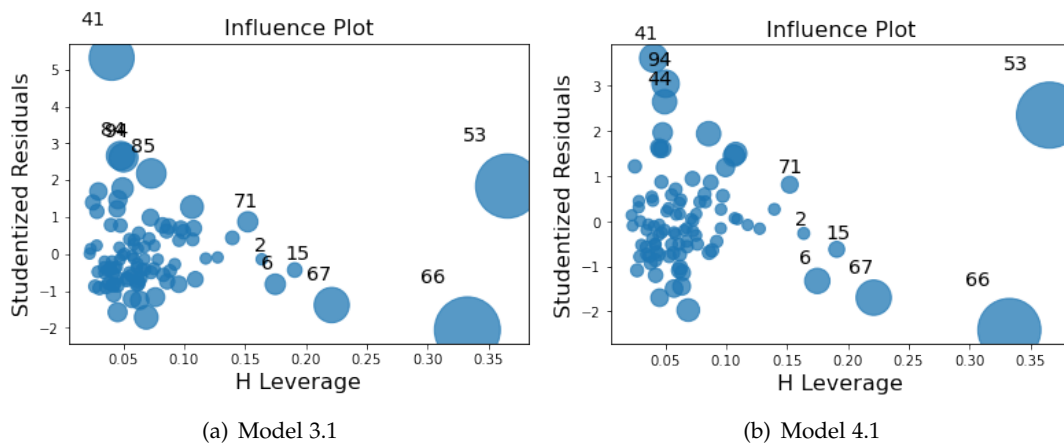


Figure 5.3: Influence plots for models 3.1 and 4.1.

model’s regression estimates are affected by the inclusion of the observation. While the explained variances of both models are modest for social research contexts, it is the robustness of the models that is in question at this juncture. In both models, observations 66, 53, 67, 41, 6, 15, and 71 have the largest influence measures (in descending order, with the exception of observation 41, which is less influential in model 3.1 than in model 4.1). These points correspond with: Fossum, Nordberg, Rommen, Holmenkollen, Bispevika, Løren, and Furuset. These units are highlighted in yellow in the map pictured in Figure 5.4 on Page 72.

These *delbydeler* are demographically radically disparate. Løren, Furuset, Rommen, and Fossum (Løren is the most central *delbydel* highlighted in Figure 5.4; the remaining three are the easternmost *delbydeler* highlighted) are considered to be historically working-class neighborhoods of Oslo. As of 2018, Fossum had the lowest average household income among all *delbydeler* in Oslo, followed closely by Rommen; Furuset was among the 10 lowest household average incomes. A whopping 24.2% of Fossum’s population between the ages of 16 and 66 had registered disabilities in 2017, followed by Furuset’s figure of 23.8%—the two had the highest proportion out of all other *delbydeler*. Between 63 and 68% of Furuset, Rommen, and Fossum’s populations are comprised of persons with non-Western European immigration backgrounds, fully 10% greater than the proportion living in the two next-leading *delbydeler* of Bjørnerud and Bjørndal (58.7 and 58.6%, respectively).³ Fossum, Rommen, and Furuset were the *delbydeler* with the first, second, and fifth highest proportion of persons without tertiary education in the entire municipality, with the former seeing figures as high as 76.7%!

By contrast, Holmenkollen (the westernmost *delbydel* highlighted in Figure 5.4) ranked third in terms of mean household income in 2018; only 9% of its residents had registered disabilities; fully 93.6% of its population was comprised of persons with no coded immigration background or Western European immigration backgrounds; and the proportion of the population that has attained tertiary education equals nearly

³The latter is the southernmost *delbydel* pictured in Figure 5.4 on Page 72; the former is the westernmost *delbydel* that adjoins the latter.

that which has not attained tertiary education in the easternmost influentially outlying *delbydeler*. While Nordberg (the nearest *delbydel* highlighted in Figure 5.4 to the east of Holmenkollen) features a more modest mean household income and has an uncharacteristically high proportion of persons with non-Western European backgrounds,⁴ it has the lowest proportion of persons with registered reduced functional capacity of all *delbydeler* and the highest proportion of persons with tertiary education than any other *delbydel* in Oslo.

To those familiar with Oslo—and particularly *østkantens pøbelvelde*—this should come as no surprise. Indeed, when these demographics are superimposed on a gradient map of Oslo, the word “ghetto”⁵ inexorably springs to mind. Similar maps displaying the *delbydel* proportions of persons with registered disabilities and proportions without tertiary education appear to be quite literally red-lined along a neatly drawn north-south border (tapering off, of course, to close off the southernmost *delbydeler*). The glaring inequalities that these visualizations attest to are so demonstrable that one wonders with what audacity and/or blind delusion in the ersatz social democratic myth of the “post-racial” that commentators—private and public—can so flippantly informally acknowledge what policy makers appear to be able to so unabashedly orchestrate in Norway’s capital. In the following, I will attempt to identify common features of these outliers to improve upon the preceding models by introducing geospatial isolation measures.

⁴I discuss why this is so uncharacteristic for the unit in just a moment; suffice to say that the figure is nonetheless dwarfed by those found in the eastern and southern districts of the city, and hovers around the average measure for the whole city.

⁵In its strictly common and non-academic usage—this has been assessed, albeit with limitations—in another spaces. See Kelly, *ibid.*

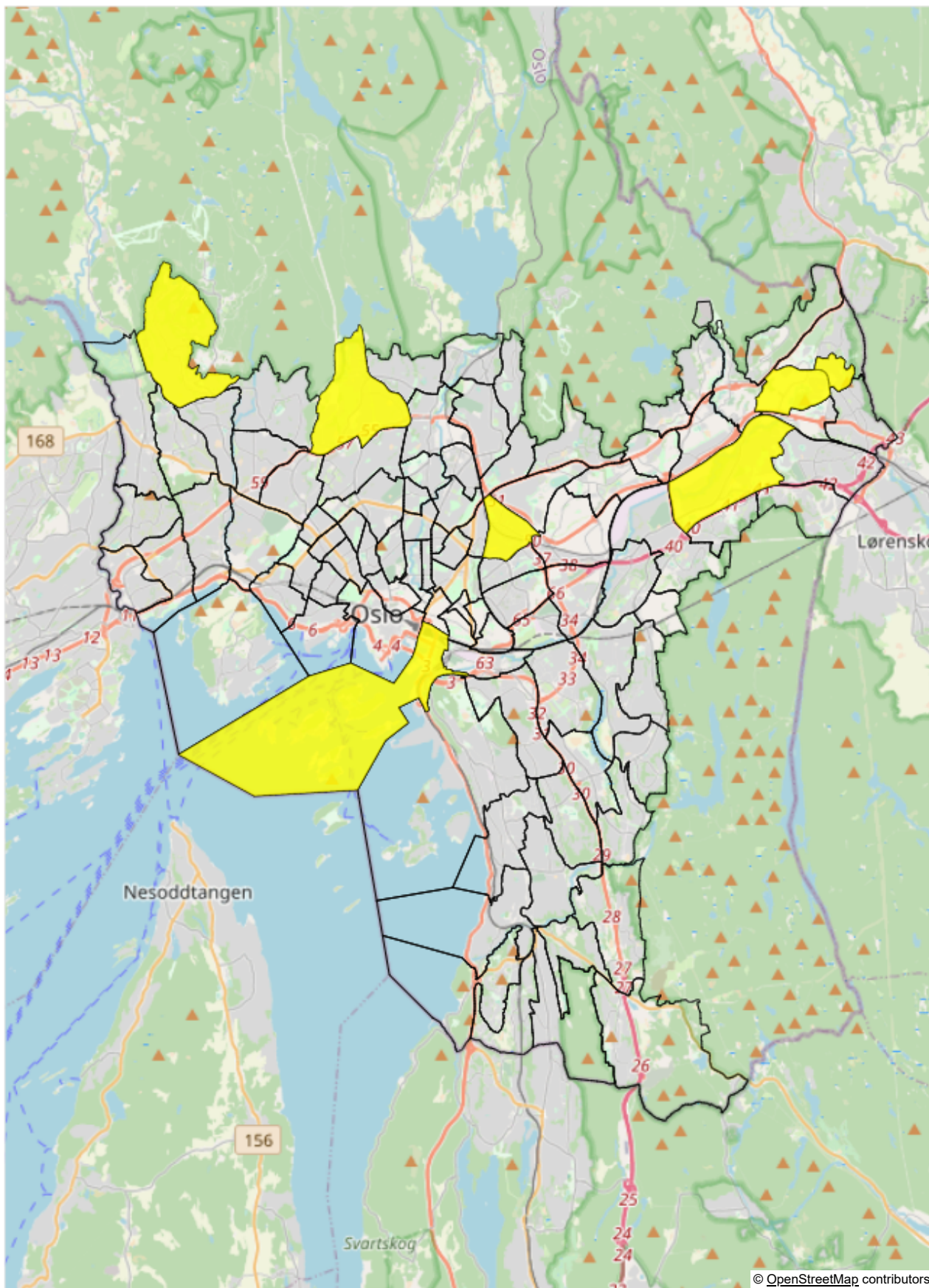


Figure 5.4: Map of Oslo indicating the *delbydel* that serve as influential outliers in models 3.1 and 4.1.

5.3 Incorporating Geospatial Isolation Measures

It becomes immediately clear that with the exception of Bispevika (the southernmost *delbydel* highlighted in Figure 5.4) and Løren, influential outliers for the models tend to encompass those *delbydeler* that are geospatially peripheral with respect not only to the municipality’s geographic centroid (c.f. Figure 4.2 on Page 57), but also its central business district(s) (c.f. Figure 4.1 on Page 56).

I therefore introduce three additional independent variables as discussed in Section 4.1.3 and three corresponding classes of models.

5.3.1 Relative Distance from Central Business District

Models 5.1 and 5.2 are governed by:

$$y_p = \beta_0 + \beta_1x_1 + \beta_2x_2 + \beta_3x_3 + \beta_4x_4 + \beta_5x_1^2 + \beta_6x_2^2 + \beta_7x_5 \quad (5.3)$$

where, as in Eqs. 5.1 and 5.2, y_p refers to the dependent variable in models $p \in (5.1, 5.2)$, where supermarket accessibility is measured in public transit times with and without the inclusion of Joker and Bunnpris, respectively, and x_5 is the relative walking distance between the centroid of a given *delbydel* and the centroid of the *Sentrum* tract.

	Model 5.1			Model 5.2		
	Coeff	St. Err.	p	Coeff	St. Err.	p
const	0.18	0.05	0.001	0.13	0.04	0.002
PropNonWest	-0.26	0.18	0.150	-0.17	0.14	0.224
LowInc	-1.05	0.62	0.093	-0.58	0.48	0.227
LowEdu	1.9×10^{-3}	0.001	0.132	1.2×10^{-3}	0.001	0.211
Dis	-7.7×10^{-3}	0.003	0.027	-4.7×10^{-3}	0.003	0.076
PropNonWestSq	0.25	0.215	0.252	0.13	0.17	0.440
LowIncSq	3.11	1.88	0.102	1.75	1.46	0.235
Dist	1.1×10^{-3}	<0.001	0.002	1.1×10^{-3}	<0.001	<0.001

Table 5.5: Results of models 5.1 and 5.2.

The results are given in Table 5.5. Not only were the models statistically significant ($p < 0.001$ in both cases), but models 5.1 and 5.2 were statistically significantly better fits than models 3.1 and 4.1, respectively, based on the results of a likelihood-ratio test.

When considering Joker and Bunnpris (model 5.1), only Dis and Dist were statistically significant predictors ($p = 0.027$ and $p < 0.001$, respectively), and the former had an infinitesimal effect via its regression coefficient. When excluding Joker and Bunnpris (model 5.2), only Dist was statistically significant ($p < 0.001$). Both models were statistically significant ($p < 0.001$), with models 5.1 and 5.2 accounting for 35.4% and 36.8% of the explained variance, respectively. While both models statistically significantly satisfied model specification assumptions based on the results of RESETs ($p = 0.76$ for model 5.1 and $p = 0.89$ for model 5.2), neither satisfied homoscedasticity assumptions based on the results of Breusch-Pagan tests ($p = 0.005$ for model 5.1 and $p = 0.04$ for model 5.2), nor the assumption of normally distributed residuals, exhibit-

	PropNonWest	LowInc	Dis	LowEdu	Dist
PropNonWest	1.00				
LowInc	0.68	1.00			
Dis	0.82	0.40	1.00		
LowEdu	0.82	0.37	0.92	1.00	
Dist	0.49	0.08	0.62	0.70	1.00

Table 5.6: Results of a correlation analysis of independent variables used in models 5.1 and 5.2.

ing the heavy-tailed distributions as in the preceding models. In both models, the null hypothesis of Lilliefors' tests were rejected; the null hypothesis for the Shapiro-Wilk test was rejected for model 5.1, although not for model 5.2 (for model 5.1, $p_l = 0.01$ and $p_{sw} < 0.001$; for model 5.2, $p_l = 0.04$ and $p_{sw} = 0.08$).

These diagnostic results indicate that while the initial statistical significance of the independent variables (excluding Dist) was overstated and confounded by the relationship between accessibility scores and Dist, Dist is likely to be correlated with several other independent variables. Indeed, as Table 5.6 shows, there is moderate to high correlation between Dist and all predictor variables with the exception of LowInc. Efforts to introduce interaction terms between Dist and highly correlated predictors did not resolve assumptions violations, although such models typically restored the statistical significance of several predictors in models 5.1 and 5.2, and the quadratic terms were statistically significant as well.

Huber robust linear models were carried out to account for the non-normal distribution of the residuals of models 5.1 and 5.2, i.e. to reduce the influence of outliers. The results are given in Table 5.7. In contrast to models 5.1 and 5.2, LowInc and its quadratic counterpart were statistically significant in the robust variants; Dist remained statistically significant in both robust models, while Dis remained statistically significant (insignificant) in the robust variant of model 5.1 (model 5.2). The effects of Dist were dampened when compared with OLS models 5.1 and 5.2, suggesting that outliers not only exaggerated the confounding effect of relative distance from the central business district, but also undermined the significance of LowInc.

Next, quantile regression models were carried out to account for the heteroscedas-

	(Robust) Model 5.1			(Robust) Model 5.2		
	Coeff	St. Err.	<i>p</i>	Coeff	St.Err.	<i>p</i>
const	0.17	0.04	<0.001	0.15	0.04	<0.001
PropNonWest	-0.25	0.145	0.089	-0.25	0.14	0.070
LowInc	-1.25	0.49	0.012	-1.00	0.465	0.031
LowEdu	1.9×10^{-3}	0.001	0.068	1.5×10^{-3}	0.001	0.124
Dis	-5.6×10^{-3}	0.003	0.041	-3.5×10^{-3}	0.003	0.170
PropNonWestSq	0.25	0.17	0.147	0.22	0.16	0.170
LowIncSq	3.93	1.51	0.009	3.22	1.42	0.023
Dist	8×10^{-4}	<0.001	0.006	8×10^{-4}	<0.001	0.002

Table 5.7: Results of robust regression variants of models 5.1 and 5.2.

	(Quantile) Model 5.1			(Quantile) Model 5.2		
	Coeff	St. Err.	p	Coeff	St.Err.	p
const	0.14	0.05	0.007	0.15	0.05	0.002
PropNonWest	-0.24	0.17	0.152	-0.42	0.16	0.010
LowInc	-1.50	0.58	0.011	-1.13	0.54	0.038
LowEdu	2.5×10^{-3}	0.001	0.040	3.1×10^{-3}	0.001	0.006
Dis	-3.2×10^{-3}	0.003	0.325	-6×10^{-3}	0.003	0.048
PropNonWestSq	0.18	0.20	0.367	0.40	0.19	0.037
LowIncSq	4.71	1.76	0.009	3.67	1.645	0.028
Dist	6×10^{-4}	<0.01	0.071	6×10^{-4}	<0.001	0.040

Table 5.8: Results of quantile regression variants of models 5.1 and 5.2.

ticity of models 5.1 and 5.2. The results are given in Table 5.8. In the quantile variant of model 5.1, the effects of LowInc, LowEdu, and LowIncSq were statistically significant, while the effects of Dis and Dist became statistically insignificant. When taken together with the results of (robust) model 5.1, this suggests that influential outliers obscure the effect of LowEdu while potentially exaggerating the effects of Dis and Dist.

Meanwhile, in the quantile variant of model 5.2, all predictors were found to be statistically significant in predicting outcomes in accessibility scores. Again, when comparing these results with those of (robust) model 5.2, influential outliers exaggerated the effect of Dist on predicted outcomes in accessibility scores while obscuring the effects of PropNonWest (and its quadratic counterpart), LowEdu, and Dis.

5.3.2 Peripheral Dummy Variable Models

Models 6.1 and 6.2 are governed by:

$$y_p = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_5 x_1^2 + \beta_6 x_2^2 + \beta_7 x_5 \quad (5.4)$$

where the terms are interpreted as in Eq. 5.3, where x_5 now refers to Peri and $p \in (6.1, 6.2)$. The results are given in Table 5.9.

In model 6.1, all independent variables statistically significantly predicted super-market accessibility scores except the quadratic PropNonWest term and Peri ($p = 0.064$ and $p = 0.357$, respectively). The model was statistically significant ($p < 0.001$) and accounted for 28.5% of the explained variance (adjusted $R^2 = 0.228$). The independent variables of model 6.1 affected the predicted outcome in scores in the same direction as in model 3.1 and to comparable magnitudes.

On the other hand, while model 6.2 was statistically significant ($p < 0.001$) and accounted for 28.2% of the explained variance (adjusted $R^2 = 0.225$), only LowEdu statistically significantly predicted outcomes in scores ($p = 0.009$).

Neither model 6.1 nor 6.2 were statistically significantly better fits than those offered by models 3.1 and 4.1, respectively, based on the results of likelihood-ratio tests. Furthermore, the addition of Peri did not improve the residual distribution of the models, as seen in Figures 5.5(a) and 5.5(b); both Lilliefors' and Shapiro-Wilk tests

	Model 6.1			Model 6.2		
	Coeff	St. Err.	p	Coeff	St. Err.	p
const	0.20	0.055	<0.001	0.14	0.044	0.001
PropNonWest	-0.40	0.20	0.039	-0.27	0.15	0.077
LowInc	-1.39	0.64	0.033	-0.84	0.505	0.099
LowEdu	3.5×10^{-3}	0.004	0.006	2.6×10^{-3}	0.001	0.009
Dis	-0.01	0.004	0.035	-4.6×10^{-3}	0.003	0.104
PropNonWestSq	4.29	0.23	0.064	0.25	0.18	0.167
LowIncSq	3.93	1.98	0.050	2.32	1.55	0.138
Peri	0.01	0.015	0.357	0.022	0.012	0.062

Table 5.9: Results of models 6.1 and 6.2.

attested to this (for model 6.1, $p_l = 0.003$ and $p_{sw} < 0.001$; for model 6.2, $p_l = 0.01$ and $p_{sw} = 0.002$).

In a final effort to incorporate Peri, I drop the quadratic PropNonWest and LowInc terms from model 6.1 (to form model 6.3) and model 6.2 (to form model 6.4). The results are given in Table 5.10. Both models were statistically significant ($p < 0.001$) and accounted for between 21% and 24% of the explained variance (adjusted $R^2 = 0.166$ and 0.198, respectively). The proportion of persons with registered disabilities was found, as in models 3.1 and 6.1, to be statistically significant in model 6.3 ($p = 0.046$); but not, as in models 4.1 and 6.2, statistically significant in model 6.4 ($p = 0.117$). In both models 6.3 and 6.4, LowEdu and Peri were statistically significant predictors; all other variables were statistically insignificant. In both models, peripheral and semi-peripheral *delbydeler* had statistically significantly higher predicted accessibility scores than those not designated as peripheral or semi-peripheral. Ultimately, the fits of models 6.1 and 6.2 were statistically significantly better than those of models 6.3 and 6.4, respectively, based on the results of log-likelihood tests. Furthermore, the distribution of the residuals of both models 6.3 and 6.4 remained decidedly non-normal.

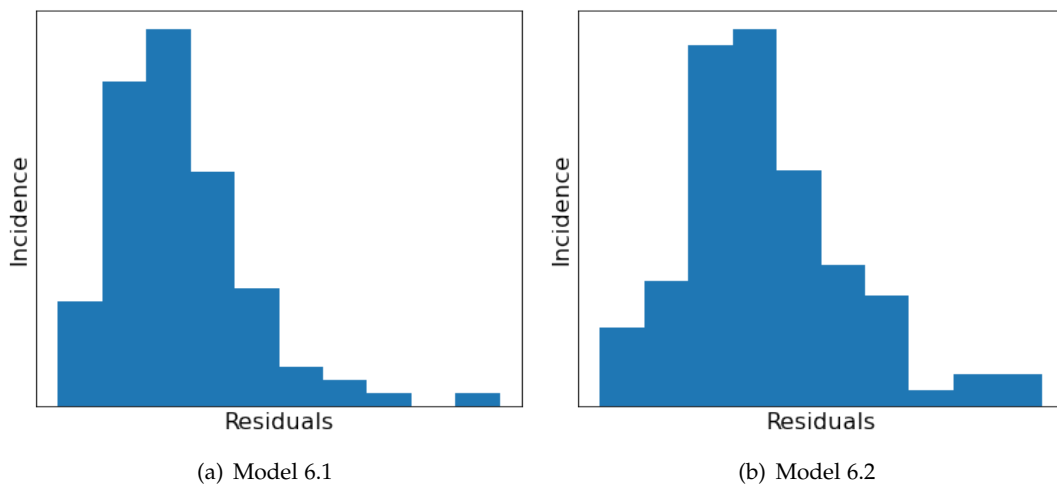


Figure 5.5: Distribution of the residuals of models 6.1 and 6.2.

	Model 6.3			Model 6.4		
	Coeff	St. Err.	<i>p</i>	Coeff	St. Err.	<i>p</i>
const	0.08	0.038	0.037	0.07	0.03	0.015
PropNonWest	-0.11	0.09	0.219	-0.10	0.07	0.150
LowInc	-0.17	0.18	0.353	-0.12	0.14	0.396
LowEdu	0.003	0.001	0.009	2.6×10^{-3}	0.001	0.010
Dis	-0.01	0.004	0.046	-4.5×10^{-3}	0.003	0.117
Peri	0.03	0.01	0.014	0.0345	0.011	0.002

Table 5.10: Results of models 6.3 and 6.4.

To conclude the exploration into geospatial isolation measures, two additional Huber robust regression counterparts to models 6.1 and 6.2 were carried out to account for influential outliers and the models' non-normal residual distributions. The results are given in Table 5.11.

In stark contrast to model 6.1, all predictors were statistically significant in predicting outcomes in accessibility scores in its robust variant with the exception of Peri. Similarly, all predictors were statistically significant in the robust variant of model 6.2 with the exception of Dis and Peri. I maintain that due to Peri's initial statistical insignificance in OLS models 6.1 and 6.2, the apt comparison is not with the robust variants of models 5.1 and 5.2 (where in OLS models 5.1 and 5.2, the analogous geospatial isolation measure Dist was statistically significant), but rather with prospective robust variants of models 3.1 and 4.1 (explored in the next chapter). Unlike the relationship between model 5.1 and its robust variant (wherein influential outliers were found to exaggerate the confounding effect of the geospatial isolation measure and undermine the significance of LowInc), the robust variant has served to reinforce the reliability of model 6.1 (and possibly that of model 3.1), despite its non-normally distributed residuals. On the other hand, the results of the robust variant of model 6.2 suggest that influential outliers serve to undermine the statistical significance of several socioeconomic demographic factors when Joker and Bunnpris are excluded; accounting for the violation of the assumption of normally distributed residuals cannot account for the effects of these influential outliers.

	(Robust) Model 6.1			(Robust) Model 6.2		
	Coeff	St. Err.	<i>p</i>	Coeff	St.Err.	<i>p</i>
const	0.18	0.04	<0.001	0.15	0.04	<0.001
PropNonWest	-0.33	0.15	0.027	-0.32	0.12	0.013
LowInc	-1.40	0.51	0.006	-1.11	0.44	0.012
LowEdu	3.1×10^{-3}	0.001	0.002	2.6×10^{-3}	0.001	0.002
Dis	-5.9×10^{-3}	0.003	0.040	-3.8×10^{-3}	0.002	0.122
PropNonWestSq	0.36	0.18	0.048	0.32	0.16	0.039
LowIncSq	4.17	1.58	0.008	3.35	1.36	0.014
Peri	9.8×10^{-3}	0.01	0.418	0.0175	0.01	0.094

Table 5.11: Results of robust regression variants of models 6.1 and 6.2.

5.3.3 Accounting for Water-Area Related Computational Errors

Models 7.1 and 7.2 are governed by:

$$y_p = \beta_0 + \beta_1x_1 + \beta_2x_2 + \beta_3x_3 + \beta_4x_4 + \beta_5x_1^2 + \beta_6x_2^2 + \beta_7x_5 \quad (5.5)$$

where again, the only difference between this equation and Eq. 5.3 is that x_5 refers to water. The results are given in Table 5.12. Model 7.1 accounted for 30.1% of the explained variance (adjusted $R^2 = 0.245$), while model 7.2 accounted for 26.1% of the explained variance (adjusted $R^2 = 0.203$). Both were statistically significant ($p < 0.001$).

In model 7.1, all predictors were statistically significant except water ($p = 0.091$). Compared with model 3.1, this suggests that while water is statistically insignificant, controlling for whether or not a given *delbydel*'s area is comprised of a substantial proportion of water areas serves to slightly intensify the existing relationships between predictors and accessibility scores (by at most 7.1% for the linear PropNonWest term). Similarly, when Joker and Bunnpris are excluded (as in models 4.1 and 7.2), when controlling for whether or not a *delbydel* is comprised of a substantial proportion of water areas, the existing relationships between the predictors and accessibility scores are intensified, although to a much lesser degree than in the preceding comparison (by at most 6.25%, again for the linear PropNonWest term). Moreover, Dis and the quadratic LowInc term remained statistically insignificant in predicting accessibility score outcomes in model 7.2, as in model 4.1.

Models 7.1 and 7.2 followed suit with models 5.1, 5.2, 6.1, and 6.2 in failing to resolve residual distribution non-normality (using Lilliefors' and Shapiro-Wilk tests), although both were heteroscedastic based on Breusch-Pagan tests ($p_{7.1} = 0.57$ and $p_{7.2} = 0.92$) and correctly specified based on RESETs ($p_{7.1} = 0.11$ and $p_{7.2} = 0.26$).

	Model 7.1			Model 7.2		
	Coeff	St. Err.	p	Coeff	St.Err.	p
const	0.21	0.05	<0.001	0.16	0.04	<0.001
PropNonWest	-0.42	0.18	0.020	-0.34	0.144	0.020
LowInc	-1.50	0.62	0.018	-1.02	0.50	0.045
LowEdu	3.5×10^{-3}	0.001	0.005	2.8×10^{-3}	0.001	0.005
Dis	-7.5×10^{-3}	0.004	0.039	-4.8×10^{-3}	0.003	0.100
PropNonWestSq	0.49	0.21	0.021	0.37	0.17	0.029
LowIncSq	4.31	1.92	0.028	2.87	1.55	0.068
water	0.04	0.02	0.091	0.02	0.02	0.317

Table 5.12: Results of models 7.1 and 7.2.

5.4 Logistic Regression Model

Thus far, I have considered a whopping total of 20 linear regression models. In the following chapter, I offer two additional robust linear regression models. Despite finding compelling results that indicate a statistically significant relationship between socioeconomic variables (immigration background, household income, level of educa-

tion, disability, and geospatial isolation measures), I have not at any point approached the definitive question of what, precisely, defines a “food desert”.

This assessment is hampered by the lack of data on household vehicle access. While *Statens Vegvesen* and the Information Council for Road Traffic (OFV) have collected data on vehicle accessibility via the “National Travel Habits Survey” (RVU), this data is limited to the municipal level (or, at best, at the postal code level, which are incomparable with the present geospatial units employed in this paper, for which data on socioeconomic variables is available), as discussed in Section 4.4. Other components of a composite measure of “food deserts” include “low-income census tracts” and supermarket accessibility. This last point serves as an appropriate rough estimate of the overall measure, though future studies should incorporate transportation alternatives. Definitions offered in the prior literature are inconsistent and may not be universally applicable. Beside distinctions between urban and rural settings, alternative sources of fresh foods like community gardens and food banks, and the incorporation of public transit networks,⁶ the definition (and subsequent results) typically hinge upon a threshold distance for measuring “low access”. The USDA thresholds of 1 mile and 0.5 mile are not informed by descriptive statistics or market behavior studies. By the most liberal USDA definition (using low access and low income), only one *delbydel* can be defined as a “food desert” (Grorud, where the average distance to the nearest supermarket is 0.52km and where roughly 23% of households are “low income”).

I define a “food desert” as any *delbydel* in which:

1. The average distance to the nearest supermarket is at least 1.5 standard deviations greater than the mean.⁷
2. At least one of the following is true:
 - A. The proportion of low-income households is at least two standard deviations greater than the mean.⁸
 - B. The proportion of persons with registered disabilities is at least two standard deviations greater than the mean.⁹

Regardless of whether or not Joker and Bunnpris were included in computing accessibility scores, the following eight *delbydeler* were found to be “food deserts” under the preceding definition: Ensjø, Etterstad, Majorstuen nord, Veitvet, Ammerud, Grorud, Trosterud, and Nordstrand. These are highlighted in yellow in Figure 5.6 on Page 81.

A battery of logistic regression models were carried out loosely modeled after the preceding linear regression models. In all cases, the models were typically poor fits

⁶Alana Rhone, “Documentation,” *Economic Research Service*, last updated October 31, 2019, accessed December 21, 2020, <https://www.ers.usda.gov/data-products/food-access-research-atlas/documentation>; Haoluan Wang, Feng Qiu, and Brent Swallow, “Can community gardens and farmers’ markets relieve food desert problems?,” *Applied Geography* 55, (December 2014): 127-137, <https://doi.org/10.1016/j.apgeog.2014.09.010>; Anna Lena Phillips, “Making Better Maps of Food Deserts,” *American Scientist* 99 no. 3 (May-June 2011): 209-211, <https://doi.org/10.1511%2F2011.90.209>; Junfeng Jiao et al., “How to Identify Food Deserts,” *American Journal of Public Health* 102 no. 10 (October 2012): 32-39, <https://dx.doi.org/10.2105%2FAJPH.2012.300675>.

⁷This places the threshold at 0.37km for the present study. The means and standard deviations for scores computed with and without Joker and Bunnpris were nearly equivalent. The mean distance to the nearest supermarket for all *delbydeler* was roughly 200 meters and the standard deviation was 111 meters.

⁸This places the threshold at 23.46%.

⁹This places the threshold at 21.98%.

(pseudo $R^2 < 0.1$) and predictors were generally statistically insignificant. This poor fit is reinforced and reflected by the distribution of the model residuals, which were routinely not bimodally distributed as logistic regression presupposes. This, in turn, reflects the fact that the variable is not well-distributed among *delbydeler*, with roughly 8% of *delbydeler* being designated as “food deserts”. Relaxing the definition of a “food desert” to include *delbydeler* where the average distance to the nearest supermarket is greater than one standard deviation above the mean introduced three additional *delbydeler*: Linderud, Nordtvedt, and Lindeberg. Relaxing conditions on the proportion of persons with registered disabilities and low-income households made no difference in the set of food deserts. Moreover, such a move replaces the threshold of 400 meters to roughly 310 meters, already far below the original UDSA threshold, undermining the definition’s validity.¹⁰

Ultimately, these results suggest that food deserts are simply not as widespread in Oslo as they are in other North American and Western European urban settings. This is, however, not by any means to suggest that Oslo differs fundamentally from other North American or European cities in terms of social inequalities: only that the binary concept of “food deserts” does not apply in the Oslo setting. As discussed in Chapter 7, these findings nonetheless have important implications for inequalities in Oslo. Unequal access to supermarkets is enough to attest to this based on the linear regression models. The mere existence of even one food desert in Norway’s capital has far-reaching implications for the dominant lesser-evil narrative of the Nordic social democratic model as a beacon of equality in a sea of crisis-laden austerity capitalism.

¹⁰For perspective: the average able-bodied adult between the ages of 20 and 60 uses roughly 5 minutes to walk 400 meters, assuming no obstacles, adequate road and sidewalk conditions, and flat surfaces.

Chapter 6: Discussion

6.1 Overall Interpretation of Models

Before offering a more detailed interpretation of the results of the models, I offer an overview of the rather numerous models constructed in this project. The preceding sections have included a total of 20 models. Table 6.1 on page 83 contains an overview of these models. Table 6.2 on Page 84 contains a matrix of models comparing their fits based either on the results of a likelihood-ratio test or a comparison of their Akaike information criterion (AIC). Model 5.1 was found to be a better fit when compared with every other model pairwise; the next best-fitting model was 7.1, which was a better fit than all other models, except model 5.1.

In earnest, a better approach is to consider pairwise comparisons between models that use the same set of supermarkets to compute accessibility scores; thereafter, the best-fitting model can be selected among those models that are found to be the best fit for their respective supermarket sets. Therefore, pairwise comparisons between models including Joker and Bunnpris appear in **bold** in Table 6.2, while pairwise comparisons between models excluding Joker and Bunnpris appear in *italics* in Table 6.2. The number in parenthesis in the “Total” column in Table 6.2 refer to the total number of pairwise comparisons in which the model labeled by the respective column is a better fit between models matching its supermarket set.

Among models that included Joker and Bunnpris, model 5.1 was found to be the best fit (the next best-fitting models were 3.1 and 7.1). Among models that excluded Joker and Bunnpris, model 5.2 was found to be the best fit (the next best-fitting model was, surprisingly, model 6.4). Model 5.1 was found to be a better fit than model 5.2 (although, since $\Delta df = 0$, the assessment does not include a statement about statistical significance). Since model 5.1 statistically significantly violated heteroscedasticity assumptions, one may speculate that model 3.1 (which was found to be a statistically significantly better fit than model 7.1) is superior.

These considerations may nonetheless indeed be overscrupulous in the bigger picture. When including Joker and Bunnpris, Dis was statistically significant; with the exception of model 5.1, LowEdu was consistently statistically significant; with the exception of models 5.1 and 6.3, PropNonWest and LowInc were statistically significant. Even then, robust and quantile variants of models 5.1 and 6.1 indicate that the “base” predictors (PropNonWest, LowInc, LowEdu, and Dis) were statistically significant when accounting for the models’ non-normally distributed residuals, as well as the quadratic PropNonWest and LowInc terms. Similarly, the results of model 5.2 and its robust and quantile variants indicate that the “base” predictors and their quadratic counterparts were consistently statistically significant in predicting outcomes in accessibility scores (except Dis) when accounting for non-normally distributed residuals.

Table 6.3 on Page 85 gives an overview of the results for each independent variable for each model. If the effect of a given independent variable was statistically significant, the regression coefficient has been given; otherwise, statistically insignificant variables are marked with “N”.

Model	Predictors*	Score	Joker & Bunnpris	Reg. Type	R^2	Norm. Res.	Het. sced.	RESET
1	PropNonWest \times LowInc	W	Yes	OLS	14.7	–	–	–
2	PropNonWest \times LowInc	W	No	OLS	18.9	–	–	–
3	PropNonWest \times LowInc	T	Yes	OLS	24	N	–	N
4	PropNonWest \times LowInc	T	No	OLS	21.8	N	–	N
3.1	PropNonWest ² + LowInc ²	T	Yes	OLS	27.8	N	Y	Y
4.1	PropNonWest ² + LowInc ²	T	No	OLS	25.8	N	Y	Y
5.1	PropNonWest ² + LowInc ² + Dist	T	Yes	OLS	35.4	N	N	Y
5.2	PropNonWest ² + LowInc ² + Dist	T	No	OLS	36.8	N [†]	N	Y
5.1(r)	PropNonWest ² + LowInc ² + Dist	T	Yes	RLM	–	–	–	–
5.2(r)	PropNonWest ² + LowInc ² + Dist	T	No	RLM	–	–	–	–
5.1(q)	PropNonWest ² + LowInc ² + Dist	T	Yes	Q	–	–	–	–
5.2(q)	PropNonWest ² + LowInc ² + Dist	T	No	Q	–	–	–	–
6.1	PropNonWest ² + LowInc ² + Peri	T	Yes	OLS	28.5	N	–	Y
6.2	PropNonWest ² + LowInc ² + Peri	T	No	OLS	28.2	N	–	Y
6.3	Dist	T	Yes	OLS	21	N	–	–
6.4	Dist	T	No	OLS	24	N	–	–
6.1(r)	PropNonWest ² + LowInc ² + Peri	T	Yes	RLM	–	–	–	–
6.2(r)	PropNonWest ² + LowInc ² + Peri	T	No	RLM	–	–	–	–
7.1	PropNonWest ² + LowInc ² + water	T	Yes	OLS	30.1	N	Y	Y
7.2	PropNonWest ² + LowInc ² + water	T	No	OLS	26.1	N	Y	Y

Table 6.1: Overview of the 20 models explored thus far. “OLS” refers to ordinary least squares, “RLM” refers to robust linear models and “Q” refers to quantile regression. “Score” indicates if the model uses walking times (W) or public transit times (T) to calculate accessibility scores. “Norm. Res.” refers to whether or not the residuals of the models are normally distributed. “Het. sced.” refers to whether or not the model is heteroscedastic. Finally, “RESET” refers to whether or not the model was found to be correctly specified based on the results of a RESET test.

(*) - All models include at least the following predictors in addition to those listed: PropNonWest, LowInc, LowEdu, and Dis.

([†]) - The residuals were found to be statistically significantly normally distributed based on Shapiro-Wilks only.

	1	2	3	4	3.1	4.1	5.1	5.2	6.1	6.2	6.3	6.4	7.1	7.2
1	–	1(0)	3(0)	4(0)	3.1(1)	4.1(1)	5.1(2)	5.2(2)	6.1(2)	6.2(2)	6.3(0)	6.4(0)	7.1(2)	7.2(2)
2	1(0)	–	3(0)	4(0)	3.1(1)	4.1(1)	5.1(2)	5.2(2)	6.1(2)	6.2(2)	6.3(0)	6.4(0)	7.1(2)	7.2(2)
3	3(0)	3(0)	–	4(0)	3.1(1)	4.1(1)	5.1(2)	5.2(2)	6.1(2)	6.2(2)	6.3(0)	6.4(0)	7.1(2)	7.2(2)
4	4(0)	4(0)	4(0)	–	3.1(1)	4.1(1)	5.1(2)	5.2(2)	6.1(2)	6.2(2)	6.3(0)	6.4(0)	7.1(2)	4(2)
3.1	3.1(1)	3.1(1)	3.1(1)	3.1(1)	–	3.1(0)	5.1(1)	5.2(1)	3.1(1)	6.2(1)	3.1(1)	3.1(1)	7.1(1)	7.2(1)
4.1	4.1(1)	4.1(1)	4.1(1)	4.1(1)	3.1(0)	–	5.1(1)	5.2(1)	4.1(1)	4.1(1)	4.1(1)	6.4(1)	7.1(1)	4.1(1)
5.1	5.1(2)	5.1(2)	5.1(2)	5.1(2)	5.1(1)	5.1(1)	–	5.1(0)	5.1(0)	5.1(0)	5.1(2)	5.1(2)	5.1(0)	5.1(0)
5.2	5.2(2)	5.2(2)	5.2(2)	5.2(2)	5.2(1)	5.2(1)	5.1(0)	–	6.1(0)	5.2(0)	5.2(2)	5.2(2)	7.1(0)	5.2(0)
6.1	6.1(2)	6.1(2)	6.1(2)	6.1(2)	3.1(1)	4.1(1)	5.1(0)	6.1(0)	–	6.1(0)	6.1(2)	6.1(2)	7.1(0)	6.1(0)
6.2	6.2(2)	6.2(2)	6.2(2)	6.2(2)	6.2(1)	4.1(1)	5.1(0)	5.2(0)	6.1(0)	–	6.2(2)	6.4(2)	7.1(0)	6.2(0)
6.3	6.3(0)	6.3(0)	6.3(0)	6.3(0)	3.1(1)	4.1(1)	5.1(2)	5.2(2)	6.1(2)	6.2(2)	–	6.3(0)	7.1(2)	7.2(2)
6.4	6.4(0)	6.4(0)	6.4(0)	6.4(0)	3.1(1)	6.4(1)	5.1(2)	5.2(2)	6.1(2)	6.4(2)	6.3(0)	–	7.1(2)	6.4(2)
7.1	7.1(2)	7.1(2)	7.1(2)	7.1(2)	3.1(1)	7.1(1)	5.1(0)	7.1(0)	7.1(0)	7.1(0)	7.1(2)	7.1(2)	–	7.1(0)
7.2	7.2(2)	7.2(2)	7.2(2)	4(2)	7.2(1)	4.1(1)	5.1(0)	5.2(0)	6.1(0)	6.2(0)	7.2(2)	6.4(2)	7.1(0)	–
Total	1(0)	0(0)	2(1)	4(2)	9(5)	8(4)	13(6)	10(6)	9(3)	7(3)	5(2)	7(5)	12(5)	5(1)

Table 6.2: Matrix of best fits when comparing models pairwise. Values in parenthesis denote the difference in the degrees of freedom between the two models. When $\Delta df = 0$, a comparison between the Akaike information criterion (AIC) values for the two models in question were compared. The model with the lowest (*non-absolute*) AIC was considered the best fit. Otherwise, when $\Delta df > 0$, a likelihood-ratio test was carried out to determine the best-fitting model. Pairwise comparisons between models that include Joker and Bunnpris appear in bold; pairwise comparisons between models that exclude Joker and Bunnpris appear in italics.

	PropNonWest	PropNonWest ²	LowInc	LowInc ²	PropNonWest × LowInc	LowEdu	Dis	Dist	Peri	water
1	N	-	N	-	N	N	N	-	-	-
2	N	-	N	-	N	N	N	-	-	-
3	-0.40	-	-0.95	-	2.22	3.6×10^{-3}	-8.5×10^{-3}	-	-	-
4	-0.30	-	-0.67	-	1.54	2.9×10^{-3}	-8.5×10^{-3}	-	-	-
3.1	-0.21	0.51	-1.50	4.25	-	3.7×10^{-3}	-7.9×10^{-3}	-	-	-
4.1	-0.35	0.38	-1.02	N	-	2.9×10^{-3}	N	-	-	-
5.1	N	N	N	N	-	N	-7.7×10^{-3}	1.1×10^{-3}	-	-
5.2	N	N	N	N	-	N	N	1.1×10^{-3}	-	-
5.1(r)	N	N	-1.25	3.93	-	N	-5.6×10^{-3}	8×10^{-4}	-	-
5.2(r)	N	N	-1.00	3.22	-	N	N	8×10^{-4}	-	-
5.1(q)	N	N	-1.50	4.71	-	2.5×10^{-3}	N	6×10^{-4}	-	-
5.2(q)	-0.42	0.4	-1.13	3.67	-	3.1×10^{-3}	-6×10^{-3}	6×10^{-4}	-	-
6.1	-0.4	N	-1.39	3.93	-	3.5×10^{-3}	-0.01	-	N	-
6.2	N	N	N	N	-	2.6×10^{-3}	N	-	N	-
6.3	N	-	N	-	-	0.003	-0.01	-	0.03	-
6.4	N	-	N	-	-	2.6×10^{-3}	N	-	0.0345	-
6.1(r)	-0.33	0.36	-1.40	4.17	-	3.1×10^{-3}	-5.9×10^{-3}	-	N	-
6.2(r)	-0.32	0.32	-1.11	3.35	-	2.6×10^{-3}	N	-	N	-
7.1	-0.42	0.49	-1.50	4.31	-	3.5×10^{-3}	-7.5×10^{-3}	-	-	N
7.2	-0.34	0.37	-1.02	N	-	2.8×10^{-3}	N	-	-	N

Table 6.3: Table of results for each of the independent variables for each of the models carried out in this project until this point. If the variables were found to be statistically significant in the given model, their regression coefficients are given; otherwise, statistically insignificant variables are denoted with "N"; if a variable was not included in the given model, they have been omitted and denoted with "-".

6.1.1 Initial and Second-Order Simple Models

Models 3.1 and 4.1 were of primary interest in this study, as both were statistically significant, had relatively high rates of explained variance when compared with typical social research statistical models, and largely satisfied the assumptions of linear regression. The predicted supermarket accessibility score of a given *delbydel*, calculated using public transit times and including Joker and Bunnpris is given by

$$y = 0.21 - 0.21x_1 - 1.5x_2 + 0.0037x_3 - 0.0077x_4 + 0.51x_1^2 + 4.25x_2^2 \quad (6.1)$$

where y is the predicted value of the supermarket accessibility score of a given *delbydel*, x_1 is the proportion of persons with non-Western European immigration background, x_2 is the proportion of low-income households, x_3 is the proportion of persons aged 16 years or older who have at most completed *videregående* education (i.e. with no tertiary education), and x_4 is the proportion of persons with registered disabilities.

Similarly, the predicted supermarket accessibility score of a given *delbydel*, calculated using public transit times and excluding Joker and Bunnpris is given by

$$y = 0.165 - 0.35x_1 - 1.02x_2 + 0.0029x_3 - 0.0079x_4 + 0.38x_1^2 + 2.84x_2^2 \quad (6.2)$$

where y , x_1 , x_2 , etc. are to be interpreted as in Eq. 6.1.

To isolate the independent effects of income and immigration background, I also carry out four additional (simple) linear regression models with supermarket accessibility scores as the dependent variable and: a) PropNonWest and PropNonWestSq as the independent variables, including Joker and Bunnpris; b) PropNonWest and PropNonWestSq as the independent variables, excluding Joker and Bunnpris; c) LowInc and LowIncSq as the independent variables, including Joker and Bunnpris; d) LowInc and LowIncSq as the independent variables, excluding Joker and Bunnpris. The results are given in Table 6.4.

All models statistically significantly predicted outcomes in supermarket accessibility scores ($p_a = 0.003$, $p_b = 0.01$, $p_c < 0.001$, $p_d = 0.003$), but accounted for significantly less of the explained variance than the previous models considered ($R_a^2 = 0.117$,

	Model a			Model b		
	coeff	std.	p	coeff	std.	p
const	0.189	0.025	<0.01	0.165	0.020	<0.01
PropNonWest	-0.556	0.164	<0.01	-0.401	0.130	<0.01
PropNonWestSq	0.672	0.216	<0.01	0.502	0.172	<0.01
	Model c			Model d		
	coeff	std.	p	coeff	std.	p
const	0.261	0.041	<0.01	0.213	0.033	<0.01
LowInc	-2.099	0.593	<0.01	-1.431	0.475	<0.01
LowIncSq	5.9005	1.942	<0.01	3.991	1.554	0.012

Table 6.4: Results of simple linear regression models a)-d).

$R_b^2 = 0.094$, $R_c^2 = 0.155$, $R_d^2 = 0.121$). RESETs carried out on the models found only models a) and c) to be statistically significantly linear ($p_a = 0.16$, $p_b = 0.03$, $p_c = 0.23$, $p_d = 0.03$). Breush-Pagan tests found models a)-d) to be statistically significantly homoscedastic ($p_a = 0.08$, $p_b = 0.85$, $p_c = 0.09$, $p_d = 0.73$). Only the residuals of models b) and d) statistically significantly conformed to a normal distribution following the results of both Lilliefors' ($p_a < 0.05$, $p_b = 0.15$, $p_c < 0.05$, $p_d = 0.25$) and Shapiro-Wilk tests ($p_a = 0.001$, $p_b = 0.15$, $p_c = 0.002$, and $p_d = 0.25$).

All predictors for models a)-d) were statistically significant. The equations are:

$$y_a = 0.189 - 0.556x_1 + 0.672x_1^2 \quad (6.3)$$

$$y_b = 0.165 - 0.401x_1 + 0.502x_1^2 \quad (6.4)$$

$$y_c = 0.261 - 2.099x_2 + 5.9x_2^2 \quad (6.5)$$

$$y_d = 0.213 - 1.431x_2 + 3.991x_2^2 \quad (6.6)$$

where y_i is the supermarket accessibility score, x_1 is the proportion of persons with non-Western European immigration backgrounds, and x_2 is the proportion of low-income households. Visualizations of the relationships between the variables and supermarket accessibility scores based on Eqs. 6.3 - 6.6 are given in Figure 6.1 on Page 88.

The roots of Eqs. 6.3 - 6.6 are given by $x_{1a} \approx 0.41$, $x_{1b} \approx 0.40$, $x_{2c} \approx 0.18$, and $x_{2d} \approx 0.18$. These turning points are comparable to those found for models 3.1 and 4.1. These results also indicate that the relationship between accessibility scores and LowInc as well as that between accessibility scores and PropNonWest are unlikely to be spurious, as the introduction of either LowInc or PropNonWest (and their quadratic counterparts) do not significantly affect the coefficients nor the p values of either variable when compared to the simple linear regression models regardless whether or not Joker and Bunnpris are included. While the magnitudes of the coefficients reported in Table 6.4 are on the whole lower than those found in models 3.1 and 4.1, the differences are proportional and do not affect the overall behavior of the regression curve. Interestingly, while the quadratic income term was statistically significant in model d, its effect became insignificant following the addition of other independent variables in model 4.1, suggesting that the integrity of the proposed relationship between income and supermarket accessibility scores may be compromised. Ultimately, however, it has been demonstrated through the use of quantile and robust models that the relationship is not likely to be spurious, even in light of potential confounding.

Clearly, there is a positive relationship between the proportion of low-income households in a given *delbydel* and the *delbydel's* supermarket accessibility score. Likewise, there is an independent positive relationship between the proportion of persons in the *delbydel* with non-Western European immigration backgrounds and the *delbydel* supermarket accessibility score. Since the supermarket accessibility score is reverse coded, i.e. higher scores mean less access, these results suggest that both persons with non-Western European immigration backgrounds and low-income households tend to have less access to supermarkets. While the threshold for LowInc's impact on the predictability of the increase in the Score measure was consistently low (between 18

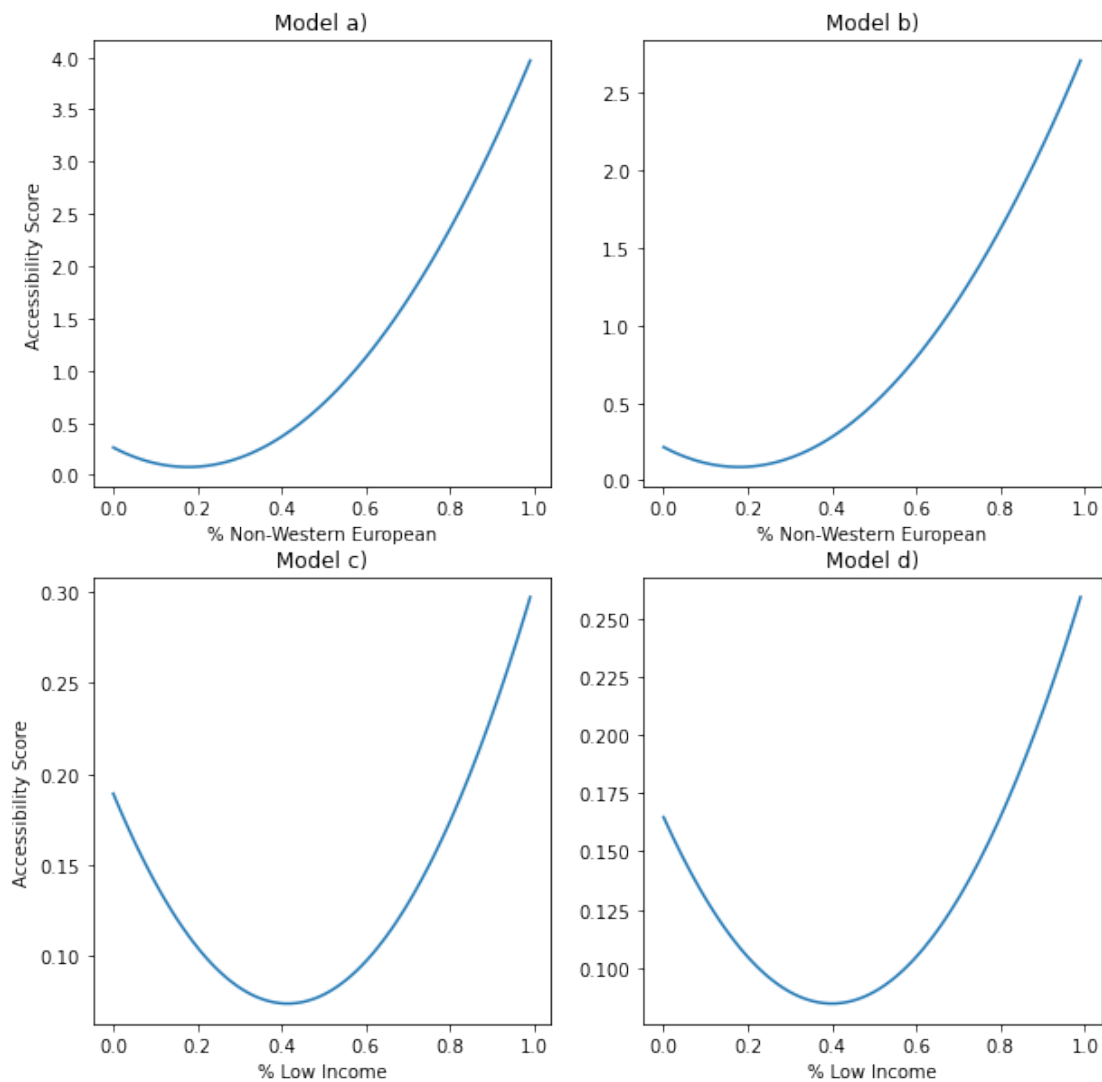


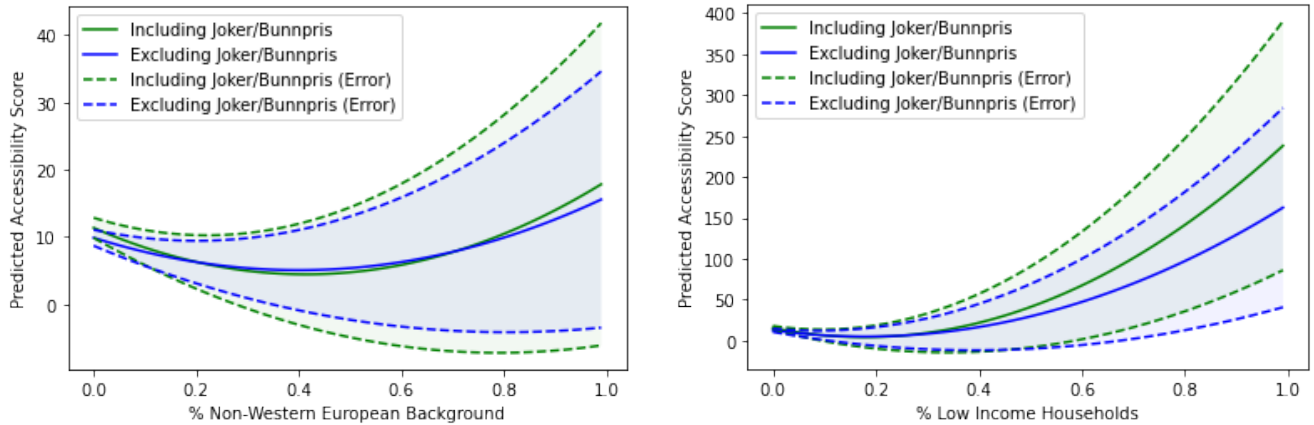
Figure 6.1: Predicted curves for models a)-d).

and 20%), the threshold for PropNonWest 's impact on the predictability of the increase in the Score measure was remarkably higher (roughly 40%). This cannot be explained by reference to simple population counts (although one may perhaps appeal to population *densities*), since the calculation of accessibility scores (Eq. 4.2) adjusts for population. A more compelling explanation may lie with so-called "tipping point" theories, as discussed in Section 2.3.

In general, the inclusion or exclusion of Joker and Bunnpris appeared to have a modest effect on the relationship between supermarket accessibility scores and the two variables PropNonWest and LowInc when calculated using public transit times. Figures 6.2(a) and 6.2(b) show the effects of the inclusion or exclusion of Joker and Bunnpris based on the results of models a)-d).

The removal of Joker and Bunnpris displaced the curvilinear relationship between Score and PropNonWest by just 0.7% (absolute $\Delta y(x_1) = 0.08$). On the other hand, the

removal of Joker and Bunnpris displaced the curvilinear relationship between Score and LowInc by a more drastic 19.9% ($\Delta y(x_2) = 0.22$). Nonetheless, the predicted scores were well within error margins of each other when considering the four simple models alongside their Joker/Bunnpris counterparts.



(a) Predicted values of supermarket accessibility scores as a function of PropNonWest based on Eqs. 6.3 and 6.4.

(b) Predicted values of supermarket accessibility scores as a function of LowInc based on Eqs. 6.5 and 6.6.

Figure 6.2: Predicted values of supermarket accessibility scores as functions of PropNonWest and LowInc with and without Joker and Bunnpris.

6.1.2 Geospatial Isolation Models

Models 5.1 and 5.2 and their robust and quantile counterparts, in which the relative distance from the centroid of each *delbydel* to the centroid of the *Sentrum* unit was added as a predictors, were decidedly the strongest models in this section. Although RESETs indicated that misspecification was statistically significantly avoided in models 3.1 and 4.1, they explained a larger proportion of variance in accessibility scores than models 3.1 and 4.1. Despite this, models 5.1 and 5.2 failed to resolve the issue of non-normally distributed residuals that was present in models 3.1 and 4.1; and models 5.1 and 5.2 additionally violated homoscedasticity assumptions. Robust and quantile models were introduced to account for these issues; the disparity in inference testing results between models 5.1 and 5.2 and their robust/quantile counterparts revealed that the OLS models were poor fits. Thus, controlling for the effects of geospatial isolation revealed its statistical significance in predicting outcomes in accessibility scores, but inappropriately suggested that the statistical significance of a number of sociodemographic variables was overstated in models 3.1 and 4.1.

By contrast, models 6.1 - 6.4 and their robust counterparts, in which peripheral and semi-peripheral *delbydeler* were manually selected to form a dummy variable, were decidedly poor models in improving models 3.1 and 4.1. None of these models were statistically significantly better fits than models 3.1 or 4.1 based on the results of likelihood-ratio tests, and none resolved residual normality assumption violations. The geospatial isolation variable itself, Per_i , was also statistically insignificant in predicting

outcomes in accessibility scores.

Finally, models 7.1 and 7.2 revealed that the proportion of water areas in a given *delbydel* was not only statistically insignificant when predicting supermarket accessibility score outcomes, but also lead to no confounding of the remaining independent variables. These results may be interpreted as a check for the technical integrity of the data sets, both those utilized from external sources, as well as those produced following this author’s manipulation of those data sets. In contrast to several of the other models explored throughout this space, the models that introduced the water variable led to no changes in the statistical (in)significance of any of the independent variables that were initially statistically (in)significant in models 3.1 and 4.1. Furthermore, the introduction of water either made no changes to the regression coefficients of the other independent variables or affected them by $< 1\%$, far below any established threshold for statistically significant confounding.

6.2 Robust Initial Model

Had the robust regression model been introduced before a more detailed assessment of influential outliers, the intuition that the confounding effects of geospatial isolation measures are overstated would have been immediately confirmed. Huber robust regression models constructed in direct analogy to models 3.1 and 4.1 indeed demonstrate the statistical significance of all predictors (except *Dis* in model 4.1), and also indicate that the regression estimates have not been significantly affected by linear regression assumptions violations. The results are offered in Table 6.5 for completeness.

An important result of the robust variants of models 3.1 and 4.1 taken together with models 5.1 and 5.2 (and their robust and quantile variants) is that all predictors that were statistically significant in models 3.1 and 4.1 were statistically significant when accounting for outliers (i.e. after accounting for residual non-normality and heteroscedasticity) and that the parity and scale remained unaffected by robust and quantile regression methods. This entails that the discussion in the preceding section vis-a-vis the quadratic relationship between accessibility scores and *LowInc/PropNonWest* is accurate (and is not compromised by the violation of linear regression assumptions), even if the true values of the turning points may differ from those computed above. A parallel, almost identical interpretation can be made for a comparison between models

	(Robust) Model 3.1			(Robust) Model 4.1		
	Coeff	St. Err.	<i>p</i>	Coeff	St.Err.	<i>p</i>
const	0.18	0.04	<0.001	0.17	0.037	<0.001
PropNonWest	-0.38	0.15	0.010	-0.397	0.124	0.001
LowInc	-1.46	0.51	0.005	-1.253	0.435	0.004
LowEdu	3.3×10^{-3}	0.001	0.001	2.9×10^{-3}	0.001	0.001
Dis	6.2×10^{-3}	0.003	0.035	-4×10^{-3}	0.002	0.108
PropNonWestSq	0.42	0.17	0.013	0.440	0.145	0.002
LowIncSq	4.31	1.59	0.007	3.675	1.343	0.006

Table 6.5: Results of robust regression variants of models 3.1 and 4.1.

3.1 and 4.1 (and their robust/quantile variants) and models 7.1 and 7.2. Similarly, robust regression carried out on variants of models 7.1 and 7.2 indicate that influential outliers exaggerate the confounding effect of the water geospatial isolation measure.

Since the residuals of the models in which Joker and Bunnpris were not considered in computing accessibility scores tended to approach a more normal distribution than those in which Joker and Bunnpris were considered, these models are likely to be more robust and reliable. Therefore, based on not only the results reported in Table 5.4, but also the results of improved models and robust/quantile regression models, I maintain that *Dis* is ultimately not consistently statistically significant in predicting outcomes in supermarket accessibility scores.

Chapter 7: Conclusion

I have demonstrated that there exists a statistically significant relationship between neighborhood proportions of persons with non-Western European immigration backgrounds and supermarket accessibility scores, where access improves slightly as the proportion rises, before deteriorating at a “tipping point” of roughly 44%. Similarly, I have demonstrated that there exists a statistically significant relationship between neighborhood proportions of low-income households and supermarket accessibility scores, where access improves slightly as the proportion rises, before deteriorating at a “tipping point” of roughly 20%. Although their effects are substantially smaller, I have also demonstrated that there exists a statistically significant relationship between neighborhood education and neighborhood registered disability rates and neighborhood supermarket accessibility. As the proportion of persons without tertiary education increases, supermarket access consistently tends to decrease; as the proportion of persons with registered disabilities increases, supermarket accessibility tends to improve.

When measuring supermarket accessibility scores as a function of walking distance, these socioeconomic variables have all failed in predicting outcomes in supermarket access for Oslo’s various neighborhoods. However, when considering supermarket accessibility as a function of both walking distance *and* public transportation options, these relationships become significant. The relationship between neighborhood immigration background and supermarket access is far more consistent when Joker and Bunnpris are removed from the list of supermarkets. On the other hand, the relationship between income and access is far more consistent when the scores are computed using both Joker and Bunnpris. While I have offered some comments on the possible cause of these divergences throughout the text, the statistical significance of these two primary relationships have been reinforced following the results of quantile and robust regression models. Ultimately, I conclude that the “tipping point” proposition based on immigration background and household income best explains the nature of supermarket access in Oslo, although not necessarily the mechanisms that govern it.

At several points in the analysis, controlling for various geospatial isolation measures threatened to compromise these prospective relationships. For instance, when controlling for a neighborhood’s relative distance from Oslo’s central business district, nearly all independent variables became insignificant. However, the results of robust and quantile regression models suggest that the confounding effect was overstated, and that at the very least, the relationship between low-income households and supermarket accessibility scores was preserved; when dropping Joker and Bunnpris, the remaining relationships were also retained. The introduction of these quantile and robust models was not as an *ad hoc* attempt to “save” this author’s hypothesis, but rather implemented as reasoned measures to account for linear regression assumptions violations. The same applies when geospatial isolation was operationalized using “peripheral” and “semi-peripheral” measures.

7.1 Limitations

7.1.1 Regression Models

While there is every indication that models 3.1, 4.1, 5.1, 5.2, and a)-d) are indeed reliable predictors of supermarket accessibility scores, only the distribution of models b) and d) were statistically significantly normal. Only when Joker and Bunnpris were excluded did the distribution of model residuals approach (but never reach statistically significant) normality, with the partial exception of model 5.2; these were also the models in which kurtosis violations were less extreme. I conjecture that the ubiquity of Joker and Bunnpris—the very assumption that justified their removal in a separate set in the first place—is also responsible for the non-normal residual distributions in models 3.1, 5.1, a), and c). Therefore, despite failing normality tests, I maintain that these models are nonetheless reliable. This is also reinforced by the consistency of inference testing for all the independent variables in the models, along with the results of robust variants of each model.

7.1.2 Data Limitations

Aside from the linear regression models themselves, there is ample room for critical reflection on the data sets. As indicated earlier, the network layer was created with liberal estimates for pedestrian paths, where streets—as long as they were not highways—were assumed to include pedestrian paths, a layer which was later supplemented by bike path data. As a counterpoint, in creating the network layer, I also assumed that “major roads” did not include pedestrian paths, potentially removing several plausible computation paths. I speculate that these factors serve to balance each other out, as an informal and cursory visual inspection of the created network layer reinforces.

Moreover, it is rather likely that the optimization computation of nearest supermarkets from each BSU centroid failed to capture Oslo’s fine-grained physical and social realities. In addition to unaccounted-for obstacles, social actors have unique, socialized, embodied, and nuanced engagements with their environments. They “connect and integrate the various regions of their daily lives and identities, which sociologists... too often treat as separate, autonomous entities.”¹ I do not mean to say that individual preferences captured vis-a-vis ethnographic research are paramount in the study of food deserts. Quite the contrary: this leaves ample room for the “culture of poverty” explanations (apologia) for unequal access. Rather, the themes discussed by Kusenbach in her proposal for “go-alongs” have the potential to not only capture more minute cultural characteristics of the people living in certain neighborhoods, but also to articulate the manifold dimensions of the social subject’s (geospatial) *social architecture* and *social realms*.² In effect: to account not for where subjects may *prefer* to shop and thus *actually* shop, but rather where they feel that it is plausible, permissible, and/or safe to shop, and therefore can *possibly* shop.

¹Margarethe Kusenbach, “Street phenomenology,” *Ethnography* 4 (3), 2003: 455-485, <https://doi.org/10.1177/2F146613810343007>.

²*Ibid.*

Eisenhauer points out that when the introduction of supermarkets in otherwise underserved neighborhoods fail to lead to changes in community health, “lifestyle” and “culture” variables are rarely, if ever, the underlying explanation. Indeed,

Even the stores which are most integrated into their neighborhoods can also diminish these communities in other ways. In 1990, Pathmark was the first chain to locate a store in downtown Newark, NJ since 1967, when the area saw both race riots and the closing of their last supermarket. Pathmark worked with the city and the neighborhood to offer reduced taxes on purchases, a revenue sharing arrangement, amenities like a grocery delivery service, and a product mix which meet the needs of a diverse community of residents and commuters. While clearly integrated with the neighborhood, the store is also set apart in important ways. Less than half of the management staff was drawn from the local community, and the store itself has been described as ‘a fortified oasis (whose) uniformed private security guards control mechanical barriers that let vehicles out of a parking lot rimmed by a high wall and an iron fence.’³

Even considering an explanatory model, it is apparent that even the exploratory study—of supermarket access as a standalone effect of an undetermined causal mechanism—can benefit from mixed methods. Wacquant’s call to “use ethnography as an instrument of epistemological rupture and theoretical construction” may be useful.⁴ Qualitative methods—including interviews, but particularly “go-alongs”—can uncover rich data that not only supplements the quantitative, but more intimately informs it.

To better illustrate how qualitative methods and process tracing can be used to understand these complex mechanisms, I offer an excerpt from Mariann Villa’s 2019 study of a rural Norwegian community:

A local man described his mother’s shopping routines during the tourist season: She “drives out of the local community for shopping... in order to avoid crashing into crowds... or finds a time of the day when you suppose people are skiing” [...] A woman who lives in a nearby rural area recounted: [...] “We shop in neighbouring municipalities or in the city when we go there. Any city. Here [in the local community] the prices are three or four times higher than normal prices, because they are meant for the second home owners, and they shop without hesitating.”⁵

Although Villa’s informants sometimes discuss shopping outside of the context of supermarkets, the study reveals an important and temporally contingent element, where the local and global economies are inexorably and irreconcilably intertwined with micro-level household behaviors that constitute access, including to supermarkets.

Closely related to the interaction perspective, there are possible shortcomings in the data that may have quantitative solutions as well. The problem associated with

³Eisenhauer, *Ibid.*

⁴Wacquant, Slater, and Pereira, *ibid.*

⁵Villa, *ibid.*, 19-20.

studying “racial” discrimination when bureaucratic authorities refuse to operationalize a sociodemographic analytic category upon which real persons are discriminated against in very real ways has already been mentioned, but cannot be overstated. The Norwegian government’s transparent strategy of obscuring unemployment by partially conflating it with disability is another point of contention. Finally, the coarseness of the geospatial units employed has the effect of understating the realities on the ground.

Some immediate improvements can nonetheless be made. In Chapter 4, I offered a critical evaluation of the geospatial supermarket data set used to compute accessibility scores, making a distinction between Joker and Bunnpris and the remaining supermarkets. However, the data set does not include many independent grocers, and the effect of their exclusion has largely been overlooked throughout this paper. On one hand, “food that is available from independent [US] urban grocers may cost 10-60% more than what is sold in larger chain stores.”⁶ On the other, despite their negligible market share, the expanded variety of goods offered by independent grocers may play an important role in shopping habits, particularly for households with non-Western European immigration backgrounds, despite higher prices. A future study that takes such businesses into consideration when computing accessibility scores would also need to take into consideration in-depth reviews of the quality of food items offered at such establishments. This endeavor may also furthermore be hampered by legislative thresholds for registering and reporting enterprises that have annual revenues that are too inconsequential to be captured by data collection agencies like IPER.

Closely related to this point is the more careful treatment of the individual supermarkets that make up the present data set. The qualitative differences between Joker and Bunnpris have already been discussed in great length. However, future studies may take into consideration the nuanced differences between additional supermarkets, and compare and contrast the resulting patterns with the strategies employed by the four dominating companies. This would also allow a more in-depth discussion on if, how, and to what degree the food retail industry’s regional decisions shape the urban configuration, and if, how, and to what degree these decisions shape urban culture and spatial class differentiation, giving rise to cleavages. This insight can immediately be extended to Walker et al.’s observation that “while many studies focus on the presence or absence of supermarkets, few examine the dynamic interaction between other food venues (restaurants, corner stores, gas stations, etc.) as places, where residents purchase food.”⁷ Yet again, this can be extended to include discourse analysis and media studies to consider the ways in which marketing and narratives intersect with material realities to shape dietary patterns.⁸ This becomes particularly important in light of “racial”

⁶Joe Kane, “The Supermarket Shuffle,” *Mother Jones* 9, 1984: 7, as cited in Eisenhauser, *ibid*; Carol Emert, “Pathmark joins Inner-City group,” *Supermarket News* 45 no. 22, 1995: 14, as cited in Eisenhauser, *ibid*.

⁷Renee Walker, Christopher Keane, and Jessica Burke, “Disparities and access to healthy food in the United States,” *Health & Place* 16 (2010): 882.

⁸Sigvat Brustad, “Bærekraft, omdømme og maktmuligheter,” R-3/14, Trondheim, Norway: Norsk senter for bygdeforskning, 2014, accessed March 25, 2021; Annechen Bugge, “Food advertising towards children and young people in Norway,” *Appetite* 98 (2016): 12-18.

disparities in access in Norway.⁹

Finally, the most substantial limitation of this paper has been the incomplete logistic regression model following the poor operationalization of “food deserts”. The lack of data regarding household vehicle access is only one problem for such an endeavor, although it is a crucial one. Any future study that seeks to undertake an operationalization (and subsequent analysis) of food deserts in Oslo would not be served by a rote application of the prior literature. A more intimate assessment of the geospatial and sociospatial realities of Oslo and its neighborhoods must be made before any useful definition of a “food desert” can be applied.

7.2 Closing Remarks

There are far more improvements that need to be made to the present analysis. Many are contingent upon greater access to data not available to this author at the time of writing. This is a particularly important point, as without this access, no definitive statement about the operational definition of “food deserts” can be made, nor can such a definition be implemented in the context of Oslo. The only exception was Grorud, which was found to be a food desert using the most liberal USDA definition. Seven additional neighborhoods were found to be “food deserts” when the definition’s thresholds were relaxed. Nonetheless, logistic regression models failed to find statistically significant relationships with this dichotomous “food desert” variable. Other improvements entail a more careful approach to operationalization schemes. Above all, however, the analysis lacks an explanatory framework. While this project is an emphatically exploratory one, I have dedicated a large space to the review and critique of relevant theories. While I have expressed a dissatisfaction with many of these theories, I have also conceded that elements of the dominant trends in the sociological study of territorial stigmatization are of great use to researchers—with or without political reservations. Nonetheless, the task remains to connect these theories (or elements thereof) to the Norwegian context. This means not only determining the degree to which the theories are relevant in the study of Norway’s urban neighborhoods, but more importantly using them in an auxiliary manner to flesh out an explanatory model of the phenomenon.

In this author’s opinion, the analytic framework offered by Castells is the most compelling when considering the case of Oslo. When a country’s primary and secondary sectors begin to migrate across borders and even continents, it gives rise to new labor demands, new consumption demands, and new conditions for reproducing labor and consumption. The urban landscape transforms in response to these new demands. This applies to Norway, even though I conjecture that the effect has been partially mitigated by an enduring fishing and oil industry. Likewise, these urban transformations yield new social cleavages, as well as lacunae in consumption. These lacunae, as the results

⁹Laura Terragni, Charles Arnold, and Sigrun Henjum, “Food Skills and Their Relationship with Food Security and Dietary Diversity Among Asylum Seekers Living in Norway,” *Journal of Nutrition Education and Behavior* 52, no. 11 (2020): 1026-1034; Sigrun Henjum, et al., “I worry if I will have food tomorrow,” *BMC Public Health* 19 (2019); Sigrun Henjum, Bess Caswell, and Laura Terragni, “I Feel like I’m Eating Rice 24 Hours a Day, 7 Days a Week,” *Nutrients* 11 (2019); Ida Barbala et al., “Mat for fremtiden,” *Norsk tidsskrift for ernæring* 4 (2019); Laura Terragni et al., “Migration as a Turning Point in Food Habits,” *Ecology of Food and Nutrition* 53 no. 3 (2014): 273-291; Unni Kjærnes, Mark Harvey, and Alan Warde, *Trust in Food* (Palgrave, 2007).

of this paper demonstrate, are mild in Norway, but perhaps embryonic of an incipient “urban crisis”. After all, the contemporary state of the Norwegian retail industry mirrors that of the US industry in the late 1980s, and the mechanisms that gave rise to the current Norwegian situation did not begin in earnest until the early 1980s, several decades after they occurred in the US. A current study on fast food restaurants in Oslo is underway, and its preliminary results are not suggestive of a North American parallel, although this may only reinforce the conjecture that an analogous situation is currently developing at an early stage. An interesting direction for future studies is the reproduction of Castells’ analysis of the French urban development seen through the combined lens of state intervention and market logics to the Norwegian setting.¹⁰

While the situation vis-a-vis supermarket access is indeed far less severe in Norway when compared with the US, data and technical limitations may serve to understate conditions, and there nonetheless exists a statistically significant pattern of inequality in “egalitarian” Norway. It is not necessary to be convinced that the present situation calls for urgent redress in order to motivate further investigation. Even if one claims, as many Norwegian researchers have, that the totality of various inequalities in Norway are *relatively* “mild”, the idea that current dynamics will necessarily remain static is a vacuous one, built on the pipe-dream of sustainable social democracy. Those less inclined towards doomsaying can nonetheless concede that even “mild” patterns of inequality by definition reflect an underlying logic of the Norwegian system and are for this reason alone worth investigating further.

¹⁰Castells, *ibid*, Chapter 3.

Appendix A: Additional Heat Maps of Norges- Gruppen's Supermarkets

This appendix contains heat maps of the distribution of NorgesGruppen's stores, including *Joker*, *Kiwi*, *Nærbutikken*, *Spar*, and *Meny*. These offer important visual nuances that give meaning to the seemingly homogeneous distribution of the stores as depicted in Figure 2.2(d) on Page 33. Note that as in the figures offered on Page 33, the heat maps are produced by weighting each location incident by the inverse of the geographic land area of the administrative unit that it is situated in (in this case, the unit offered by the source data is *tettsteder*), measured in km².

The first figure appears on the following page.

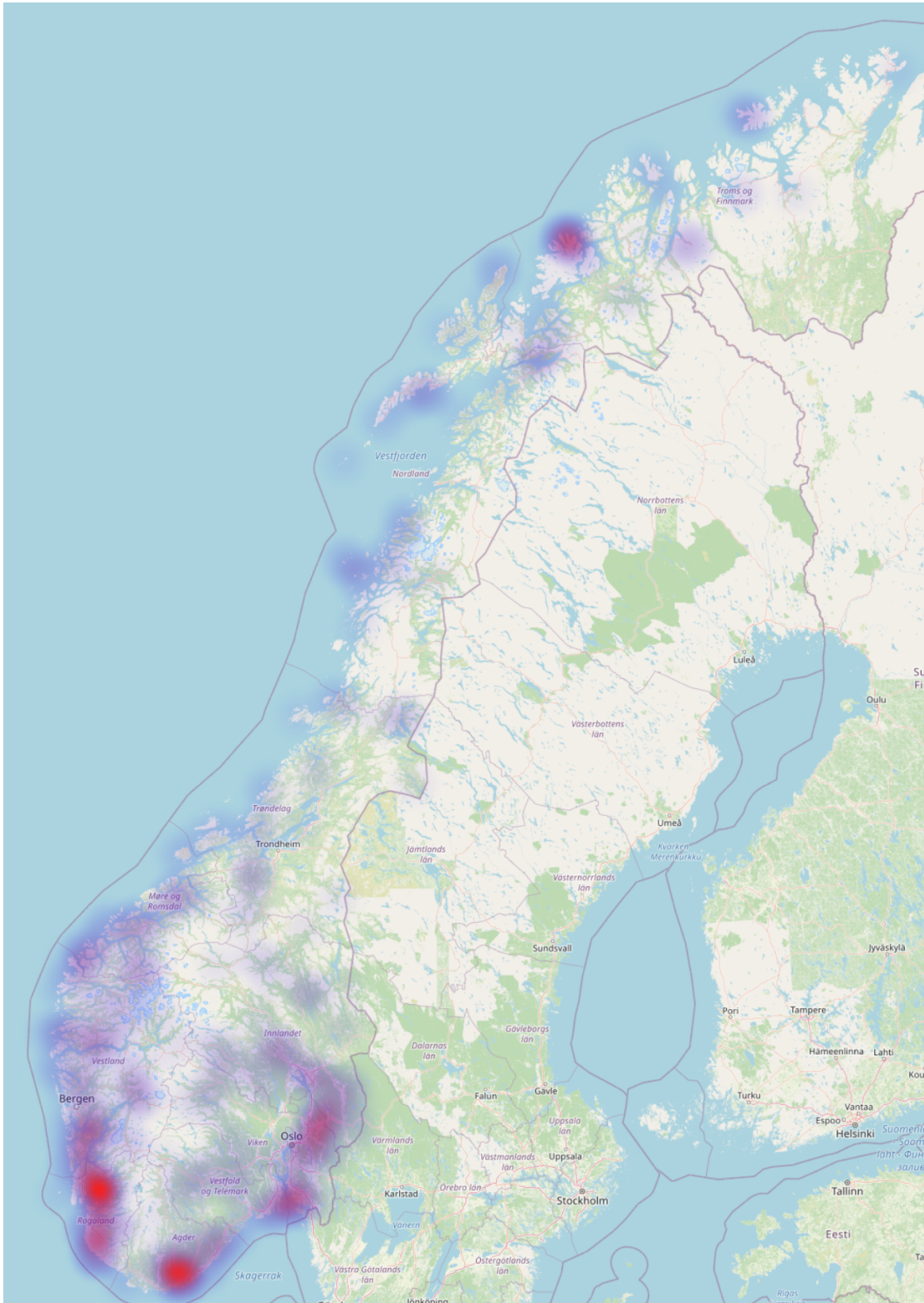


Figure A.1: Distribution of Joker locations. Each point is weighted by the inverse land area of the demographically designed census tracts at each location.

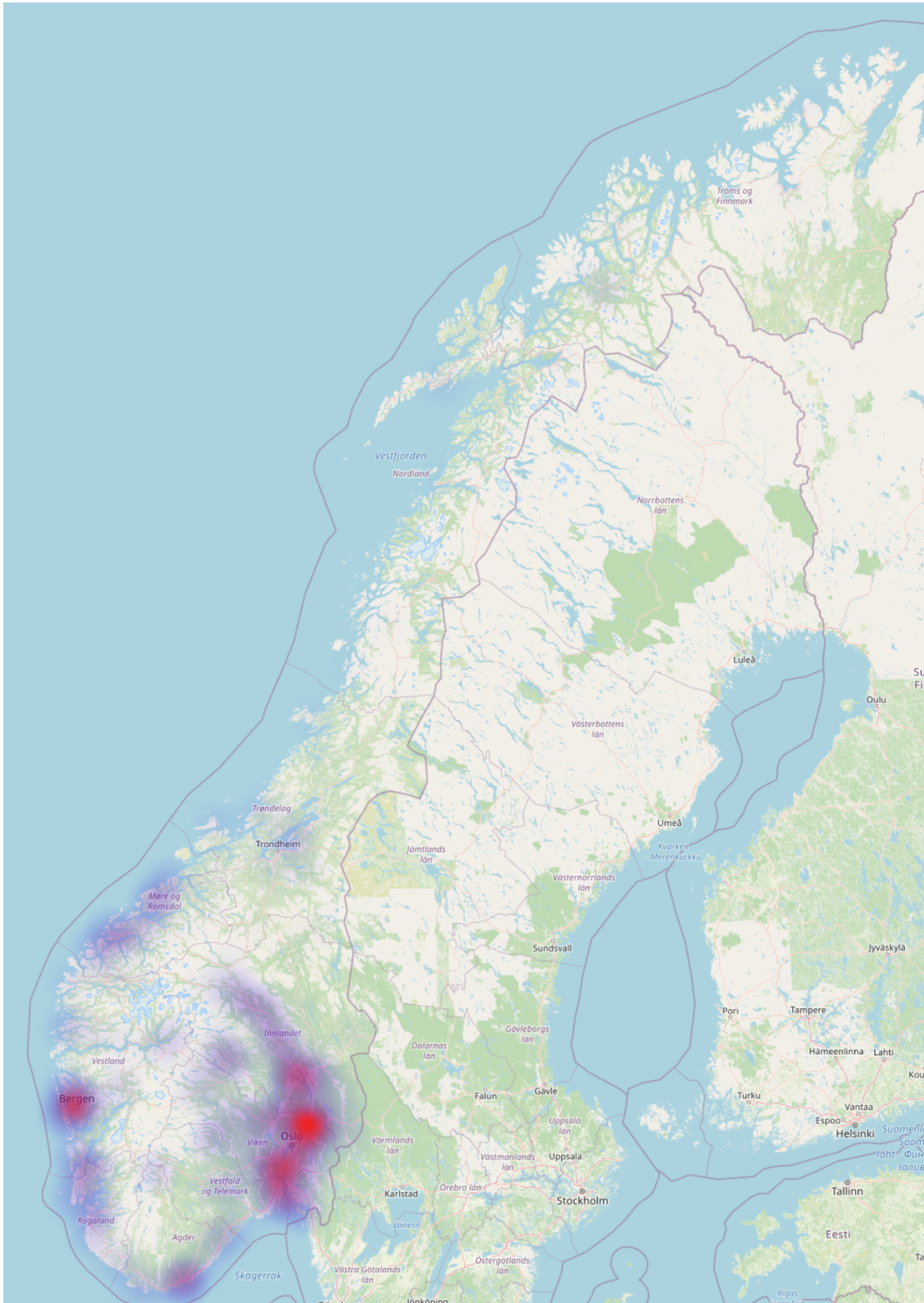


Figure A.2: Distribution of Kiwi locations. Each point is weighted by the inverse land area of the demographically designed census tracts at each location.

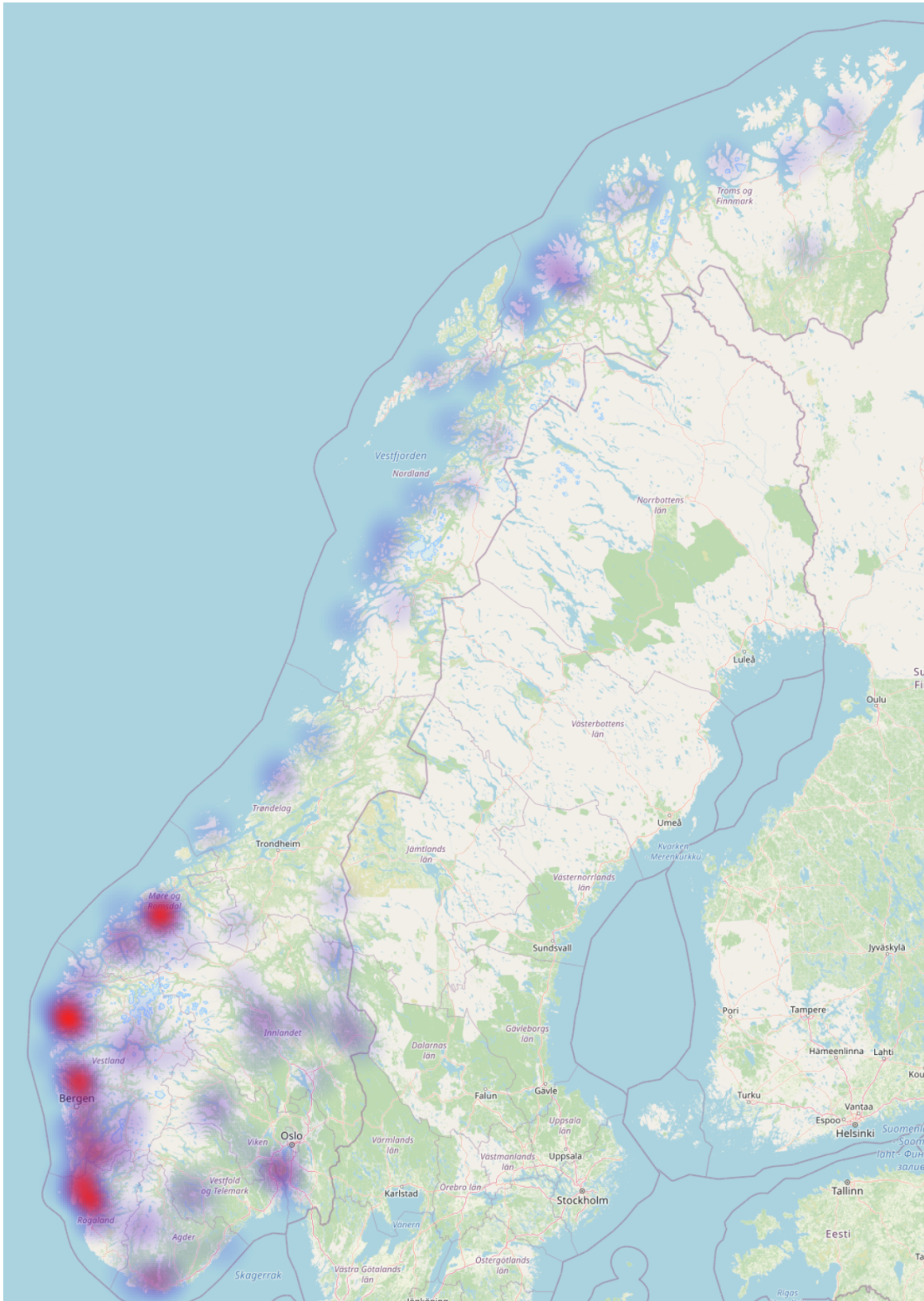


Figure A.3: Distribution of Nærbutikken locations. Each point is weighted by the inverse land area of the demographically designed census tracts at each location.

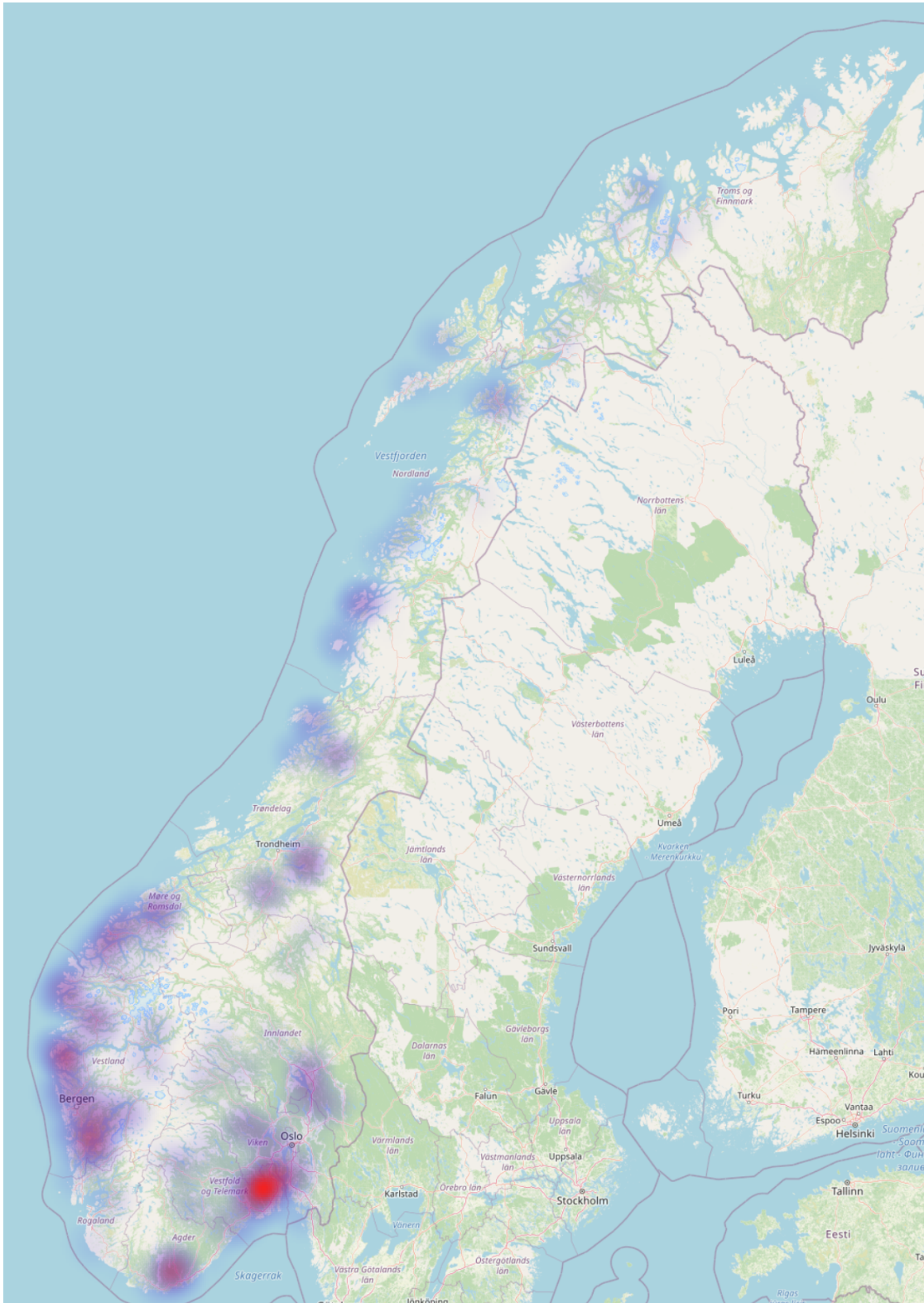


Figure A.4: Distribution of Spar locations. Each point is weighted by the inverse land area of the demographically designed census tracts at each location.

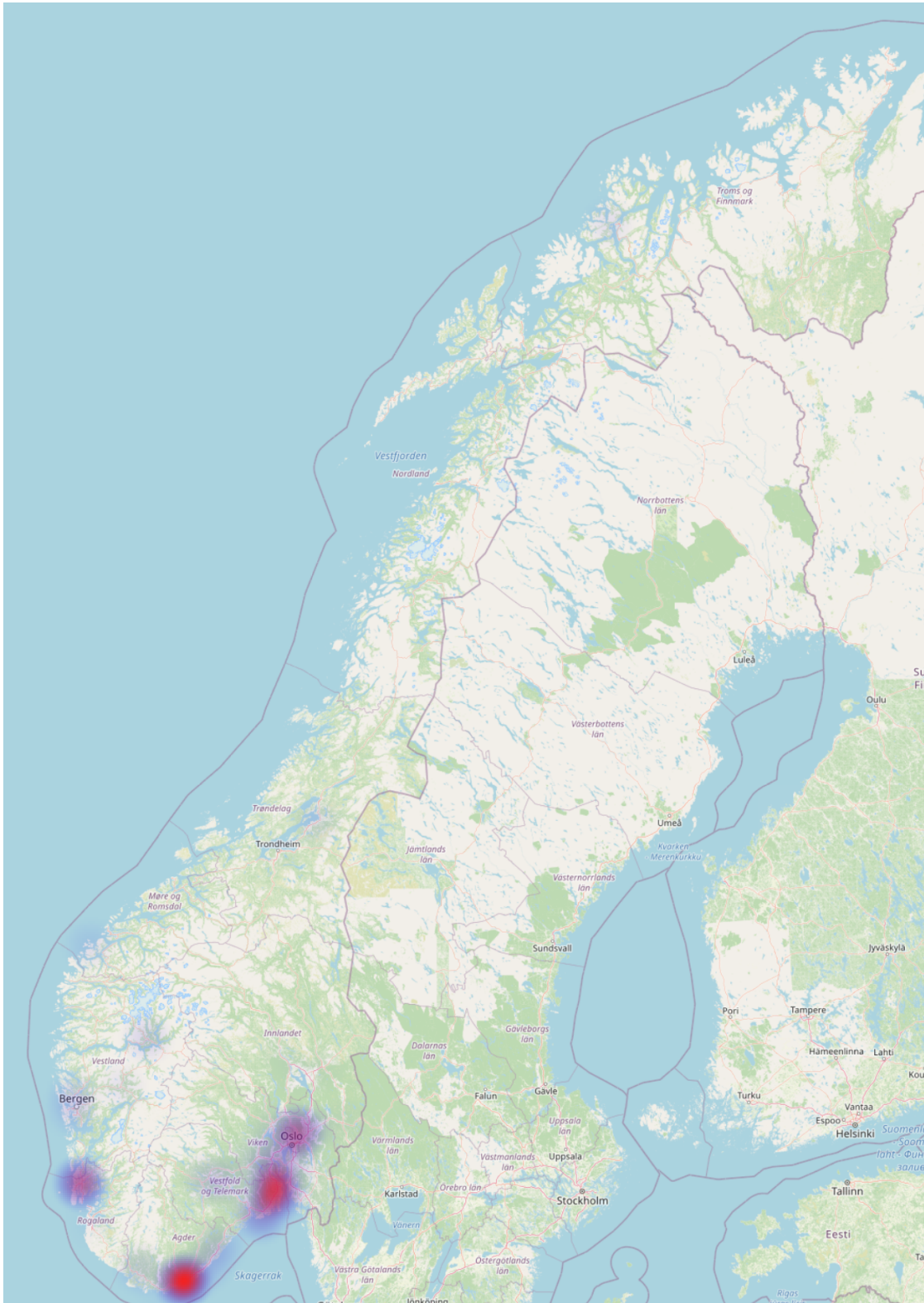


Figure A.5: Distribution of Meny locations. Each point is weighted by the inverse land area of the demographically designed census tracts at each location.

Appendix B: Tables of Supermarket Accessibility Scores

This appendix contains additional tables reporting the supermarket accessibility scores for the *delbydeler* (*delområder*) calculated using both walking times and public transit times, with and without the inclusion of Joker and Bunnpris in the supermarket layers.

Due to the large number of geospatial units, the tables are large and have been given their own page. The first table begins on page [105](#).

Delbydel	Score (W)	Score (T)	Delbydel	Score (W)	Score (T)	Delbydel	Score (W)	Score (T)
Grønland	1.79	2.01	Uranienborg	2.56	3.00	Fossum	4.59	3.41
Enerhaugen	3.51	2.87	Skillebekk	2.38	2.11	Rommen	3.845	4.21
Nedre Tøyen	1.45	3.00	Ullernåsen	1.15	7.47	Haugenstua	5.28	7.36
Kampen	4.73	3.02	Lilleaker	3.92	13.17	Stovner	5.26	7.40
Vålerenga	3.98	4.52	Ullern	2.67	11.68	Høybråten	1.88	5.21
Kværnerbyen	2.30	4.88	Montebello-Hoff	5.99	11.72	Furuset	4.72	8.29
Bispevika	0.36	2.79	Skøyen	2.86	7.16	Ellingsrud	4.91	4.10
Ensjø	7.36	5.65	Røa	3.12	6.27	Lindeberg	6.285	4.93
Etterstad	8.46	3.97	Holmenkollen	5.09	24.54	Trosterud	8.53	6.92
Grünerløkka vest	3.76	3.28	Hovseter	5.92	6.43	Hellerudtoppen	3.91	10.69
Grünerløkka øst	.052	1.20	Holmen	5.585	7.00	Tveita	4.23	7.67
Dælenenga	2.59	3.27	Slemdal	4.99	13.07	Teisen	2.48	3.96
Rodeløkka	2.165	2.15	Grimelund	2.60	8.90	Manglerud	3.58	7.75
Sinsen	1.88	2.95	Vinderen	3.62	10.63	Godlia	1.73	5.69
Sofienberg	1.00	2.84	Disen	3.605	10.21	Oppsal	1.28	4.01
Løren	1.70	2.82	Myrer	4.655	6.67	Bøler	2.25	5.71
Hasle	4.80	5.99	Grefsen	2.605	4.50	Skullerud	4.23	2.96
Iladalen	4.2	2.70	Kjelsås	4.90	4.08	Abildsø	3.2	14.10
Sagene	1.53	1.82	Korsvoll	4.21	4.89	Ljan	3.72	17.79
Bjølsen	4.28	2.43	Tåsen	5.75	6.51	Nordstrand	12.125	17.99
Sandaker	3.23	2.48	Nordberg	4.26	11.25	Bekkelaget	4.06	10.65
Torshov	1.89	2.24	Ullevål hageby	1.37	7.18	Simensbråten	2.83	6.73
Hammersborg	0.66	1.66	Veitvet	7.23	5.08	Lambertseter	5.60	3.63
Bislett	1.54	2.75	Linderud	6.29	5.52	Munkerud	3.85	8.19
Ila	1.74	3.41	Årvoll	4.69	7.75	Holmlia Syd	3.78	4.78
Fagerborg	4.90	3.41	Refstad	1.19	7.86	Holmlia Nord	5.66	6.85
Lindern	4.24	5.81	Ulven	3.71	7.14	Prinsdal	5.14	7.62
Bygdøy	5.82	9.42	Ammerud	7.92	10.16	Bjørnerud	2.66	9.10
Frogner	2.65	5.87	Rødtvet	3.40	4.02	Mortensrud	3.97	13.81
Frognerparken	1.00	2.73	Nordtvet	5.75	3.84	Bjørndal	0.31	7.27
Majorstuen nord	8.14	3.64	Grorud	1.02	9.23	Sentrum	3.65	1.55
Majorstuen syd	1.45	2.60	Romsås	6.13	6.85	Marka	1.98	94.13
Homansbyen	1.21	2.81	Vestli	3.89	6.06			

Table B.1: Supermarket accessibility scores by *delbydeler* when considering all supermarkets, including Joker and Bumpris. Scores are given in minutes. (W) denotes scores using walking time and (T) denotes scores using public transit time.

Delbydel	Score (W)	Score (T)	Delbydel	Score (W)	Score (T)	Delbydel	Score (W)	Score (T)
Grønland	1.52	2.91	Uraniensborg	2.64	3.47	Fossum	4.59	3.41
Enerhaugen	3.51	3.20	Skillebekk	2.37	3.92	Rommen	3.845	4.21
Nedre Tøyen	1.57	3.29	Ullernåsen	1.28	9.54	Haugenstrua	5.28	7.30
Kampen	4.73	5.73	Lilleaker	3.92	6.93	Stovner	4.50	7.54
Vålerenga	3.98	4.48	Ullern	2.67	8.44	Høybråten	1.86	7.36
Kvæernerbyen	2.30	5.46	Montebello-Hoff	5.99	9.93	Furuset	4.72	8.29
Bispevika	0.36	1.93	Skøyen	2.86	7.16	Ellingsrud	4.91	4.93
Ensjø	7.36	5.30	Røa	3.06	6.84	Lindeberg	6.285	4.93
Etterstad	8.46	3.97	Holmenkollen	5.09	17.10	Trosterud	8.53	6.92
Grünerløkka vest	3.80	3.28	Hovseter	5.92	6.43	Hellerudtoppen	3.91	9.12
Grünerløkka øst	0.52	1.48	Holmen	5.585	9.21	Tveita	4.23	7.67
Dælenenga	2.59	3.47	Slemdal	4.99	13.59	Teisen	2.48	6.82
Rodeløkka	2.165	2.19	Grimmelund	2.60	8.48	Manglerud	3.58	8.22
Sinsen	2.09	3.40	Vinderen	3.62	10.63	Godlia	1.73	5.11
Sofienberg	1.13	3.01	Disen	3.84	10.57	Oppsal	1.28	3.78
Løren	1.70	2.87	Myrer	4.655	8.15	Bøler	2.25	5.71
Hasle	4.80	5.99	Grefsen	2.605	4.50	Skullerud	4.23	2.84
Iladalen	4.02	3.45	Kjelsås	49.00	3.98	Abildsø	3.86	12.86
Sagene	1.55	2.43	Korsvoll	3.61	7.07	Ljan	3.90	13.70
Bjølсен	4.30	2.63	Tåsen	5.75	5.65	Nordstrand	12.125	9.81
Sandaker	3.23	2.83	Nordberg	4.09	10.57	Bekkelaget	4.06	10.72
Torshov	1.95	2.87	Ullevål hageby	1.335	7.27	Simensbråten	2.83	6.73
Hammersborg	0.66	1.73	Veitvet	7.23	7.28	Lambertseter	5.91	3.92
Bislett	1.62	3.08	Linderud	6.29	5.52	Munkerud	3.85	7.59
Ila	1.77	4.01	Årvoll	4.69	7.63	Holmlia Syd	3.78	4.78
Fagerborg	5.21	6.04	Refstad	1.19	7.68	Holmlia Nord	5.66	9.35
Lindern	4.24	8.32	Ulven	3.71	7.14	Prinsdal	5.14	6.78
Bygdøy	5.82	8.33	Ammerud	7.92	10.16	Bjørnerud	2.66	8.74
Frogner	2.65	6.18	Rødvet	3.40	4.02	Mortensrud	3.97	13.49
Frognerparken	1.00	2.77	Nordtvet	6.30	7.36	Bjørndal	0.31	7.13
Majorstuen nord	8.14	3.96	Grorud	10.15	10.25	Sentrum	3.74	3.24
Majorstuen syd	1.64	2.88	Romsås	5.05	10.93	Marka	1.98	50.28
Homansbyen	1.26	2.90	Vestli	3.89	6.06			

Table B.2: Supermarket accessibility scores by *delbydel* when considering all supermarkets, excluding Joker and Bunnpris. Scores are given in minutes. (W) denotes scores using walking time and (T) denotes scores using public transit time.

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