Tampere University

HEIKKI PALVIAINEN

Essays on Poverty, Redistribution and Labour Market Policies in Nordic Countries

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ACADEMIC DISSERTATION
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Tampere April 2022,
Heikki Palviainen

SUMMARY

This thesis consists of an introductory chapter and three empirical essays on public economics and labour economics. The introductory chapter examines the paradox of the Nordic model. It may seem paradoxical how the Nordic countries have combined equality and high taxation with competitive economies. Conventionally, economists have thought that there is a trade-off between equality and efficiency, but the success of the Nordic countries has not been a coincidence. Equality, financial security and dynamic economies can be complementary. The essays examine the evolution of poverty and the effects of social protection systems on income redistribution and employment in Finland and other Nordic countries.

In-work poverty is problematic for the functioning of the Nordic model. The first essay examines the evolution of in-work poverty in Finland between 1990 and 2010. This essay examines in-work poverty with multiple indicators, socio-economic factors behind poverty and income mobility of the poor. The results show that in-work poverty trended upwards but remained at a moderate level. Although poverty risk remained low, poverty risks among risk groups increased substantially. The poverty risk among young persons aged 18–24 increased the most, from four to sixteen percent. Subsistence is more likely to require two earners than before. In this development, single parents were in the weakest position. Social transfers substantially reduced in-work poverty in Finland.

The second essay evaluates the employment effects of a Finnish earnings disregard experiment for social assistance clients using difference-in-differences and coarsened exact matching (CEM). The earnings disregard was introduced as an experiment in 2002, but it became a permanent part of the legislation in 2015. It allowed for earnings disregards up to 100€, and the monthly amount was increased to 150€ in 2005. The earnings disregard is evaluated in an experiment period 2002-2007 when it was applied at the household level. Because the control receiving labour market subsidy did not receive social assistance for one year, the treatment group is to a large extent formed of households that did not receive social assistance for predominantly exogenous reasons or did not ap-

ply for it. As robustness checks, the results are estimated without spouses who belong to the control group and using homeowners as a control group. Because the earnings disregard increased eligibility for social assistance, the treatment variable is defined solely on a pre-treatment period in 2001. On average, the results show no employment effects, but there is some evidence of positive employment effects on women.

The third essay studies the longer-term evolution of key policy outcomes associated with the Nordic model. Based on simulated counterfactuals using EUROMOD, the essay examines the effects of tax-benefit changes on poverty, inequality and employment in Denmark, Finland and Sweden. The Static EUROMOD model is extended to take into account the behavioural effects on employment. The longest examined period covers 2006-2017. The simulated risk-of-poverty rates are supplemented with multidimensional Alkire-Foster (AF) poverty indices. Sweden is expectational among the Nordic countries as both income inequality and relative poverty have increased significantly. According to Eurostat, the poverty risk has reached the EU level. Swedish labour market policies have aimed at efficiency at the cost of equality. The centre-right government's work line policy 2007-2004 aimed at increasing labour supply with policies such as earned income tax credits, lower benefits and active labour market policies. These policies increased incentives to work, but they widened the gap between labour market insiders and outsiders. The results show that the work-line policy increased poverty risk by one percentage point and Gini by 0.4 point. The poverty risk of the unemployed increased substantially, by 1.6 percentage points. Recent participation elasticity literature implies modest employment effects in Sweden. Still, disposable incomes also increased in the lowest deciles, and Sweden fared well in multidimensional poverty. The results show that inequality and relative poverty increased mainly for reasons other than tax-benefit changes. The poverty risk increased by 5.1 percentage points and Gini by 3.5 points during the work-line policy. It is possible that immigration has increased the poverty risk in particular, but the effects of immigration are not isolated in the essay. Compared to Sweden, the Danish flexicurity model has better fulfilled the goals of the Nordic model. The Danish model shows that high benefits can be combined with high taxes and employment. The participation tax rates were 13.6 percentage points and for part-time workers 24.2 points higher in Denmark than in Sweden. Inequality has risen also in Denmark, and policy changes increased Gini by 0.8 point, but they decreased the poverty risk. Finland had the most redistributive policy changes, but it fared least well in multidimensional poverty.

TIIVISTELMÄ

Väitöskirja koostuu johdantoluvusta ja kolmesta empiirisestä esseestä julkistaloustieteen ja työn taloustieteen aloilta. Johdantoluvussa tarkastellaan pohjoismaisen mallin paradoksia. Voi vaikuttaa paradoksaaliselta, miten Pohjoismaat ovat yhdistäneet tasa-arvon ja korkean verotuksen kilpailukykyisiin talouksiin. Perinteisesti taloustieteessä on ajateltu, että tasa-arvolla ja taloudellisella tehokkuudella on vaihtosuhde, mutta Pohjoismaiden menestys ei ole ollut sattumaa. Tasa-arvo, taloudellinen turva ja dynaamiset taloudet voivat täydentää toisiaan. Väitöskirjassa tutkitaan köyhyyden kehitystä ja sosiaaliturvajärjestelmien vaikutusta tulojen uudelleenjakooon ja työllisyyteen Suomessa ja muissa pohjoismaissa.

Pohjoismaisen mallin toimivuuden kannalta työtätekevien köyhyys on ongelmallista. Ensimmäisessä esseessä tutkitaan työtätekevien köyhyyden kehitystä Suomessa vuosina 1990–2010. Esseessä tarkastellaan, miten köyhyyden kuva muuttuu eri mittareilla, köyhyyden taustatekijöitä eri väestöryhmissä ja köyhien tuloliikkuvuutta. Tulosten mukaan työssäkäyvien köyhyysriski 1990-luvun laman jälkeen, mutta on pysynyt alhaisella tasolla. Nuorten 18–24-vuotiaiden köyhyysriski kasvoi eniten, neljästä kuuteentoista prosenttiin. Kotitalouskohtaisesti työntekijöiden toimeentulo edellyttää aiempaa useammin kahta ansaitsijaa. Tässä kehityksessä yksinhuoltajataloudet olivat heikoimmassa asemassa. Riskiryhmien köyhyysriskin kasvusta huolimatta köyhyysriski on pysynyt alhaisena. Tulonsiirrot vähensivät merkittävästi työssäkäyvien köyhyyttä.

Toisessa esseessä arvioidaan toimeentulotuen suojaosan työllisyysvaikutuksia eroeroissa -menetelmän ja CEM-kaltaistamisen avulla. Suojaosa otettiin käyttöön aluksi kokeiluna vuonna 2002, ja siitä tuli pysyvä osa lainsäädäntöä vuonna 2015. Suojaosa mahdollisti toimeentulotukiasikkaiden kuukausittaisen ansiotulojen huomioimatta jättämisen 100 euroon asti, ja enimmäismäärä korotettiin 150 euroon vuonna 2005. Esseessä arvioidaan suojaosan työllisyysvaikutuksia kokeilujaksolta vuosilta 2002–2007, jolloin suojaosaa sovellettiin kotitalouskohtaisesti. Toimeentulotuen kotitalouskohtaisuus pyrittiin huomioimaan usealla tavalla. Koska työmarkkinatukea saava kontrolliryhmä

ei saanut toimeentulotukea vuoteen, kontrolliryhmä muodostui laajassa määrin kotitalouksista, jotka eivät ollet oikeutettuja tukeen tai eivät hakeneet sitä. Robustisuustarkasteluina estimoinnit tehdään omistusasujista koostuvalla kontrolliryhmällä ja ilman kontrolliryhmään kuuluvia puolisoja. Koska suojaosa lisäsi toimeentulotukeen oikeutettuja, kaltaistamisen tehdään ennen toimenpideperiodia vuonna 2001. Tulosten mukaan suojaosalla ei ollut keskimäärin työllisyysvaikutuksia, mutta esseessä esitetään jotain evidenssiä työllisyysvaikutuksista naisille.

Kolmannessa esseessä tutkitaan politiikkatoimien vaikutusta tuloeroihin, köyhyyteen ja työllisyyteen Ruotsissa, Suomessa ja Tanskassa EUROMOD-mikrosimulaatiomallilla. Pisin tarkasteltuperiodi kattaa vuodet 2006–2017. Lisäksi tarkastellaan moniulotteista köyhyyttä Alkiren ja Fosterin AF-menetelmällä. Ruotsin tuloerojen ja suhteellisen köyhyyden kehitys on ollut poikkeavaa, ja Eurostatin mukaan köyhyysriski on kasvanut EU-tasolle. Ruotsi on pyrkinyt tehostamaan työmarkkinoitaan tasa-arvon kustannuksella. Keskustaoikeistolaisen hallituksen vuosina 2007-2014 harjoittama työlinja pyrki kasvattamaan työn tarjontaa esimerkiksi työtulovähennyksillä, alentamalla etuustasoa ja aktivointitoimilla. Toimet lisäsivät työnteon kannustimia, mutta ne kasvattivat kuilua työmarkkinoiden sisä- ja ulkopuolisten välillä. Tulosten mukaan työlinja kasvatti köyhyysriskiä yhdellä prosenttiyksiköllä ja Giniä 0,4 yksiköllä. Työttömien köyhyysriski kasvoi merkittävästi, 1,6 prosenttiyksiköllä. Viimeaikainen luonnollisiin koeasetelmiin perustuva kirjallisuus osallistumisjoustoista ei viittaa merkittäviin työllisyysvaikutuksiin Ruotsissa. Kuitenkin käytettävissä olevat tulot nousivat myös alimmissa desiileissä, ja Ruotsi pärjäsi hyvin moniulotteisessa köyhyydessä. Tulosten mukaan tuloerot ja suhteellinen köyhyys kasvoivat pääosin muista syistä kuin vero- ja etuusjärjestelmässä tapahtuneiden muutosten vuoksi. Työlinjan kanssa samanaikaisesti köyhyysriski kasvoi 5,1 prosenttiyksiköllä ja Gini 3,5 yksiköllä. Ruotsin muista Pohjoismaista poikkeava maahanmuutto on voinut vaikuttaa kasvaneeseen köyhyysriskiin, mutta esseessä ei pystytä eristämään maahanmuuton vaikutusta. Tanskan flexicurity-malli on Ruotsia paremmin toteuttanut Pohjoismaisen mallin tavoitteita. Tanskan malli osoittaa, että korkeat etuudet voidaan yhdistää korkeaan työllisyyteen ja verotukseen. Työllistymisveroasteet olivat 13,6 prosenttiyksikköä Ruotsia suuremmat ja osa-aikaisille 24,2 prosenttiyksikköä suuremmat. Myös Tanskassa tuloerot ovat kasvaneet, ja politiikkatoimet lisäsivät Giniä 0,8 yksiköllä, mutta ne vähensivät köyhyysriskiä. Suomessa politiikkatoimet olivat eniten tuloja uudelleenjakavia, mutta Suomi pärjäsi heikoiten moniulotteisessa köyhyydessä ja työllisyyskehitys on ollut vertailumaita heikompaa.

LIST OF PUBLICATIONS

Chapter 2 has been published in a refereed journal. Palviainen, H. (2018). Työssäkäyvien köyhyys Suomessa 1990-2010. *Kansantaloudellinen aikakauskirja 114*(4), 495-512.

Chapter 3 has been published as a working paper. Palviainen, H. (2021). *Incentivizing last-resort social assistance clients : Evidence from a Finnish policy experiment*. Tampere Economic Working Papers (No.132). Forthcoming, International Tax and Public Finance.

Chapter 4 has been published as a working paper and revised. Palviainen, H. (2019). *Changing Nordic model? A policy analysis*. EUROMOD Working Paper EM 9/19. Institute for Social and Economic Research (ISER): University of Essex.

CONTENTS

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1 INTRODUCTION

Conventional economists' wisdom states that there is a trade-off between equality and efficiency. Taxes create distortions and higher taxes even more so. It may seem paradoxical how the Nordic countries have combined equality and high taxation with dynamic economies. The success of the Nordic countries has not been a coincidence. Equality, financial security and dynamic economies can be complementary. The essays examine the evolution of poverty and the effects of social protection systems on income redistribution and employment in Finland and other Nordic countries.

This thesis consists of four parts. The first part is an introductory chapter introduction followed by three essays. The first essay studies in-work poverty and redistribution in Finland. The second essay is a quasi-experimental study on an earnings disregard experiment for social assistance clients in Finland. The final essay is a comparative policy analysis of Nordic countries' social and labour market policies. This essay explicitly studies the trade-off between equality and efficiency in the labour market. Although Nordic countries share institutional similarities, Nordic countries have implemented very different labour market and social policies in recent decades.

This introductory chapter is organized in the following way. The following section discusses the paradox of the Nordic model. Section two discusses the challenges of the Nordic model and the evolution of inequality and poverty, and labour market policies in Nordic countries. Section three examines theoretical optimal taxation theory and its policy implications. The final section provides an overview of the essays' methodological choices.

1.1 Paradox of the Nordic model

Nordic countries can be characterised by relatively strong trade unions and collective bargaining, use of active labour market policies in facilitating labour mobility, high-quality

education, extensive social protection, high employment and openness to globalisation [1]. It may seem paradoxical how Nordic countries have combined low wage differences and generous welfare states with high employment and high exposure to global competition. Although inequality has risen in Nordics and Nordic countries have adopted different policies, these countries have been able to combine relatively well equality and equality of opportunity to dynamic economies.

Barth, Moene and Willumsen (2014) discussed how key properties of the Nordic model, notably low wage differences and generous welfare states can be combined with high employment and high exposure to the global competition and why they might form an equilibrium. Barth and co-authors highlight three mechanisms and their interactions. First, the strong role of trade unions and collective bargaining has led to compressed wage distribution. In Scandinavian countries, collective bargaining combines local and centralised bargaining within a two-tier framework. So-called tariff wages are set first at the central level, and then the tariff wages are supplemented by local wage adjustments and a host of other work conditions at the local level. Barth, Moene and Willumsen argue that the two-tier framework has led to microeconomic efficiency at the local level and preferences toward full employment at the central level. Two-tier bargaining is implemented to various degrees in Denmark, Sweden and Norway. In Finland, the bargaining system has been more centralised with less flexibility at the local level (OECD, 2018). Although two-tier bargaining can enhance efficiency, a movement toward firm-level decentralisation has likely led to higher wage inequality (Dahl et al., 2013). Importantly, coordinated wage bargaining has led to compressed wage distribution and a process of creative destruction in the Nordics.

The second mechanism is creative destruction. Wage compression induces creative destruction as low productivity firms are effectively taxed with higher wages, and high productivity firms are subsidised with lower wages[2]. This leads to increased investments,

[1] Interpretations of Nordic countries and the Nordic model vary in the literature. According to Esping-Andersen (1990), Nordic countries pursue equality by universal social programs and consequent decommodification. Andersen et al. (2007, p. 14.) argued that the basis of the model is collective risk-sharing and openness to globalisation. Acemoglu, Robinson and Verdier (2017) claimed that Nordic countries are cuddle economies. Egalitarian Nordic societies are possible because they free ride on the knowledge externalities generated by more dynamic American institutions. Stiglitz (2015) argued that the Nordic model might be better for innovation. Innovations could be higher in the U.S if it adopted some of the Nordic institutions. According to Stiglitz, the Nordic model addresses fairly well to market failures related to innovation, production and dissemination of knowledge. Education, social protection, childcare, unions, public investments in technology and infrastructure, ALMPs and industrial policies affect not only social well-being but also the pace of innovations (Stiglitz, 2015, p. 5)

[2] Barth, Moene and Willumsen developed their theoretical model based on the Rehn-Meidner model. The

innovations and higher profits for more productive firms leaving behind less productive firms. Higher investments and productivity increase demand for labour, reallocation of labour moves a larger share of workers to more productive firms, and equilibrium wages increase.

The third mechanism is related to public welfare spending. First, wage compression is likely to increase the vote share of the left. Second, because welfare provisions such as social insurance, education and health care are normal goods, their demand increases with higher wage compression. Thus, Barth Moene and Willumsen argue that there is a positive complementarity between productivity-enhancing wage compression and the political support for welfare spending. Key to the sustainability of the Nordic model has been its ability to share the benefits of good performance to nearly all groups. The interactions of collective bargaining, investments, and public spending have all reinforced the egalitarian aspects of the model. It would not be possible to achieve the same egalitarian results by simply redistributing income from the rich to the poor. (Barth Moene & Willumsen, 2014)

Daron Acemoglu (2019) uses a similar line of reasoning. According to Acemoglu, shared prosperity and the Nordic model's ability to create good high paying jobs are behind the model's success. Good jobs provide good living standards and allow for a meaningful and fulfilling life. They promote social and political participation and shared prosperity. Acemoglu contrasts Nordic countries with the developments in the United States, arguing that the U.S. economy can no longer supply good jobs, which is a major reason for its grown inequality. According to Acemoglu (p. 3), the Nordic countries' ability to create high-wage jobs has been achieved "primarily via the market process, but crucially guided by regulations and the active role of trade unions." Strong labour unions and collective bargaining have prevented some firms from paying low wages because of their higher bargaining power or lower productivity. In the U.S., the eroded real value of the Federal minimum wage and weak labour unions have given firms incentives to rely on cheap labour and not to invest in their workers' skills and innovations. Wage inequality has not led to a similar process of creative destruction and investments as in Nordic countries. U.S workers have been particularly vulnerable to globalisation, outsourcing and technological change. In Nordic countries, better social protection systems improve

Rehn-Meidner model was a milestone of the Swedish post-war labour market policy (see, e.g. Erixon, 2014). The golden age of the model began in the late 1950s and ended in the early 1970s. The Rehn-Meidner model, among other things, implemented what is known as the solidarity wage policy. Industry-level agreements set a fixed wage for the same job throughout the industry.

peoples' resilience against globalisation and protect from extreme social divisions. Well designed social protection systems and accessible, high-quality education improve job-match for dislocated people and help adjust labour supply against globalisation in the longer run. (Acemoglu, 2019)

Nordic countries have shown that equality, income security, efficiency and openness to globalisation can be complementary. Social protection does not only provide security, but it enhances risk-taking that leads to a more dynamic economy. Extensive social protection systems also act as automatic stabilisers that sustain economic stability. According to Joseph Stiglitz (2015, p. 22), political and social analyses can be even more important than economic analyses in explaining the Nordic model's success. Social and political analyses focus on the effects of economic policies on social cohesion. Extensive social protection systems increase people's resilience and voters' support for globalisation. Stiglitz argues that more equal societies with more social cohesion are more willing to make efficiency-enhancing public investments. The more social cohesion, the greater political support for policies that promote equality and social cohesion, such as more extensive social protection. Barth and Moene (2016) refer to this as an equality multiplier. In addition, societies with more social cohesion are better at solving the collective action problem. Societies respond stronger to large increases in inequality when the initial differences are small (Moene, 2015, p. 66). When inequalities are large, inequality changes are psychologically less perceivable. Thus, individuals tend to perceive, and societies respond to higher inequality from the perspective of current inequalities. Policy responses to inequality changes in high inequality societies are likely smaller. (Stiglitz, 2015, p. 22)

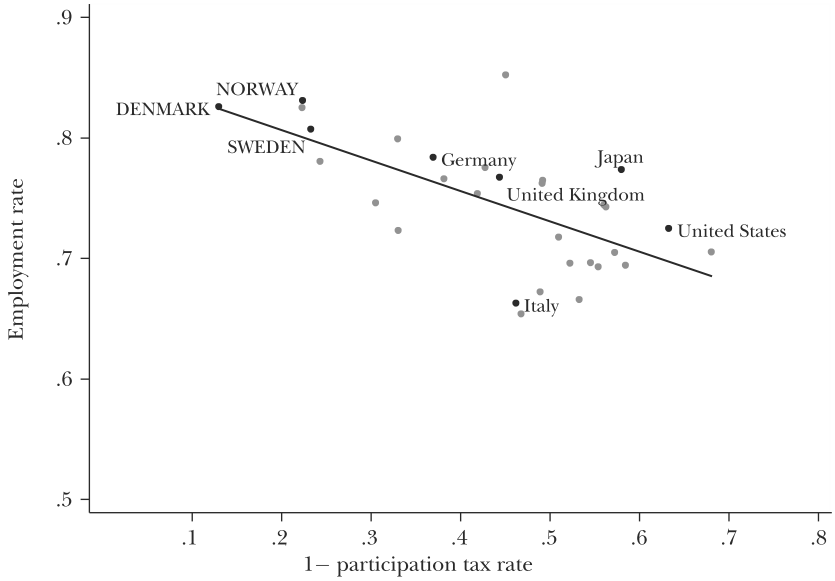
Although Nordic countries share institutional similarities, there are important divergences between them. Nordic countries have responded differently to grown unemployment since the early 1990s, and inequality and poverty rates differ remarkably between Nordic countries. These developments highlight the need to study and compare individual policies between Nordic countries. Much like in other developed Western countries, Nordics have had a tendency to strip social protection, lower taxes, emphasise individual responsibility, and move from the government towards markets. This tendency has been stronger in Sweden in comparison to other Nordic countries.

How can Nordic countries tax so much and perform well according to many efficiency indicators? Nordic countries are among the World's most equal countries, but they have high employment rates. Taxation is a vital aspect of the Nordic model because taxes are used to finance extensive social protection systems and public services. The participation

tax rate is a good starting point for examining tax incentives across countries. It measures the incentives to accept work, thus focusing on the extensive margin. The participation tax rate measures the net gain from working versus not working, taking into account taxes and benefits. For example, if the participation tax rate is 50%, benefits and taxes reduce net earnings by 50% if an individual becomes employed.

Figure 1.1 plots employment rates against participation tax rates across different countries. Scandinavian countries attain high employment rates despite very high participation tax rates. For example, in Denmark, the participation tax rate exceeds 80%, but the employment rate is the highest among the examined countries. The graph only includes Scandinavian countries. In Finland, the corresponding employment rate was 77.5% (Statistics Finland Labour Force Survey, 2018), below its Scandinavian comparison countries but higher than in the United States, for example.

Figure 1.1 Employment rates versus participation tax rates across countries.



Source: Kleven (2014). The employment rates are shown for ages 20-59.

Kleven (2014) proposes several reasons why Nordic countries can tax so much. A major reason for this outcome is that Nordic countries subsidize goods that are complementary to working. These include childcare, inexpensive transportation, pre-school services and high-level education. These increase labour supply and likely weaken the tax distortions related to high marginal taxes (Blomquist, Christiansen & Micheletto, 2010).

Kleven (2014) also argues that there are less tax evasion and tax avoidance in Nordic countries. Tax evasion is lower because of extensive third-party information reporting. For example, employees' taxable income is reported by their employers. In addition, Nordic countries have a low level of tax avoidance because of broad tax bases. The elasticity of taxable income (ETI) provides a good way to measure distortions and behavioural responses to taxes. The ETI measures the broadness of the tax base and involves tax avoidance, for example, through tax deductions and exemptions. It is defined as the proportional change in taxable income as a response to a proportional change in the net-of-tax rate (1 - MTR).

Compared to the estimates found in US studies (see a survey by Saez et al., 2012), the ETI estimates found in Denmark (Kleven & Schultz, 2014), Finland (Matikka, 2018) and Norway (Aarbu & Thorensen, 2001) are considerably smaller. Elasticities of taxable income are likely smaller in the Nordics because of larger tax bases and extensive third-party information reporting (Kleven, 2014). In addition, studies have not found bunching at kink points in tax schedules for wage earners (Bastani & Selin, 2014; Chetty et al., 2011). Bastani and Selin estimated the bunching of taxpayers at a large kink point in the upper middle part of the Swedish tax schedule. The change in the log net-of-tax rate at the kink reached a maximum value of 45.6%, but they found zero elasticity for wage earners. Because behavioural distortions from income taxes are modest, the tax revenues can be used to finance extensive public services such as education, child-care or health care that increase labour supply but also social welfare.

A Danish economist Torben Andersen (2015) argues that Scandinavian countries have high employment rates –despite generous benefits – because social transfers are to a large extent employment conditional. According to Andersen (2007), the basic flexicurity properties were already in place during the 1970s and 1980s when unemployment was high and persistent. The Danish labour market performance changed because of a series of reforms during the 1990s. The focus was shifted from passive labour market policies to more active labour market policies and job search. Some of the employment conditions are stringent in Denmark. For example, a social assistance recipient has to work at least 225 hours a year to be entitled to the full amount of social assistance. A recipient is also required to search for a job actively. Active labour market policies increase the opportunity cost of receiving benefits reducing the adverse selection and moral hazard problems. Andersen argues that a higher opportunity cost acts as a screening device by at least in part separating the needy from those who can support themselves. Activation

policies that impose job search requirements can reduce the moral hazard problem. Thus, Andersen argues that economic incentives can be maintained without lowering benefit levels. Compared to other Nordic countries, the Danish flexicurity model involves higher benefit levels. The final essay studies changes in tax-benefit systems and associated labour market policies across Nordic countries.

Cultural factors are likely to play a role. Nordic countries have a strong aim at equality. Historically, the independent position of peasants, who were not subordinated to work on large farms or feudal conditions as in central Europe, laid the foundations for the progressive Nordic model (e.g. Stråth, 2004). Different agrarian culture, free peasantry, better education and transport opportunities, and the Protestant church facilitating a strong central administration and the rule of law all contributed to the Scandinavian success (Nolan, 2012, p. 21; Meinander, 2021 p. 22). In addition, gender equality has affected high female employment rates in the Nordics. Giavazzi et al. (2013) show that cultural factors such as attitudes towards women causally influence on female labour force participation and hours worked. Surveys show that individuals who believe that the poor are unlucky support more often redistributive policies. This belief is more commonly found in Nordic countries (Kleven 2014, p. 17). High female labour supply and preferences towards larger redistribution help to explain why Nordic countries have high labour supply combined with high level of taxes.

Nordic countries have a high level of social trust. There is empirical evidence that trust is linked to higher economic growth. Algan and Cahuc (2010) show that countries with higher social trust tend to have higher economic growth (Algan & Cahuc, 2010). Higher economic growth is also related to higher tax revenues. A connection has also been established between social trust and welfare state size (Bergh & Bjørnskov, 2011). These papers do not base their analysis on mere correlations. They base their analysis on a causal relationship between trust and the outcome variables.

1.2 Challenges of the Nordic model

Income inequality grew fast in the Nordics since the early 1990s, and it has trended upwards, although inequality remains low by international standards (Pareliussen et al., 2018). Inequality, very much like poverty, is a complex social issue. Should inequality be measured with income or wealth? Should inequality of opportunity or inequality of outcomes be concerned? Tony Atkinson (2015, pp. 9-11) argues that equal opportunities

level the playfield, but inequality of outcomes matters. First, individuals may exert effort, but they encounter misfortune such as illnesses. In Nordics, extensive social transfers can be interpreted as insurance, but their income inequality reducing effect has decreased (Pareliussen et al., 2018). Second, inequality of outcomes shapes the "price distribution" that is a social and economic construction. For example, in Nordics, the grown top incomes are shaped by capital incomes taxed with lower rates than labour income. Very high top incomes have the potential to change the political and economic power structure of a society. Third, Atkinson argues that inequality of opportunity matters because it directly affects equality of opportunity for the next generation: "Today's ex-post outcomes shape tomorrow's ex-ante playing field". Today's winners of inequality of outcome can bring an unfair advantage to their children tomorrow. This raises concerns about social mobility as distributions of income and wealth become more unequal.

There are other instrumental reasons for being concerned about inequality. Karl Ove Moene (2015, p. 51) writes citing Tocqueville: "Equality makes people more like one another. Equals show more reciprocity, feel stronger social identification with each other, become 'more compassionate regarding their miseries (Tocqueville 1840/2000, p. 533)'". Thus, inequality can be detrimental to Nordic social cohesion and trust. There is also causal evidence that high income inequality has damaging health and social consequences (Pickett & Wilkinson, 2015). In addition, higher income inequality is related to higher poverty (Atkinson 2015, p. 25). The poor are socially powerless, and poverty is related to damaging mental and physical issues. Some endorse the "focus on poverty" strategy, while others see inequality and poverty as interdependent policy issues. It is also evident that some level of inequality is needed for a functional economy, but it is difficult, if not possible to define the optimal level of inequality.

Globalisation and related skill bias have challenged the Nordic model, but tendencies towards widening market income and wage dispersions have been relatively weak in Nordic countries (Pareliussen et al., 2018). The interplay of key Nordic institutions has likely weakened the effects of globalisation and technological change on inequality. According to Pareliussen et al. (2018, p. 18), key Nordic institutions such as collective bargaining, active labour market policies and accessible high-quality education have reinforced each other and allowed for a compressed wage distribution and extensive redistribution to co-exist with high employment.

To some extent, Sweden has followed a different path compared to other Nordic countries, although its institutional structure is similar to other Nordic countries. Swedish

labour market policies have aimed at efficiency at the cost of equality. Work incentives have been increased, but benefits lowered, and income differences between labour market insiders and outsiders have increased (Gottfries, 2018). Sweden is expectational among Nordic countries as both income inequality and relative poverty have increased significantly. According to Eurostat, poverty risk has trended upwards in Sweden, and it reached the EU level in 2019 (see Figure 1.2, p. 27).

The Nordic model has shown resilience against globalisation. Still, youth, low educated and particularly low educated men, and immigrants with non-Western backgrounds struggle in the labour market (Gottfries, 2018; Andersen, 2021). Nordic countries, in particular Sweden, have received a large influx of immigrants from developing countries and conflict areas. Poor integration of the immigrant population can increase the Us-vs.-Them mentality, decrease social cohesion and fuel populism. Ageing populations add pressure on public finance and inequality.

1.2.1 Evolution of inequality and poverty, and the role of redistribution in Nordic countries

Although inequality remains low in international comparison, income inequality grew fast in Nordic countries after the early 1990s. Pareliussen et al. (2018) studied inequality and factors affecting it from an OECD perspective. The largest Gini coefficient growth rates were in Sweden and Finland. The Gini coefficient has grown by eight percentage points in Sweden, five points in Finland and four in Denmark. In Finland, the inequality growth occurred between the 1990s and early-2000s. In Denmark and Sweden, the inequality growth has been more persistent. In Norway, inequality rose in the mid-2000s, but it returned to a similar level as in the early 1990s. Iceland had a temporary inequality growth due to the financial crisis in 2008. After 2010, inequality has been relatively stable in Nordic countries except for Denmark and Sweden. (Pareliussen et al., 2018, pp. 19-20)

In Nordics, the inequality growth was much higher than the average growth of around two percent across the OECD countries between the 1990s and early-2000s, but the inequality growth started from a very low level in the 1980s (Pareliussen et al., 2018, p. 19). Although, inequality remains low in international comparison, the growth in inequality is problematic for the egalitarian Nordic welfare model. Aaberg et.al. (2018) provide in-depth analysis to inequality development in Nordic countries.

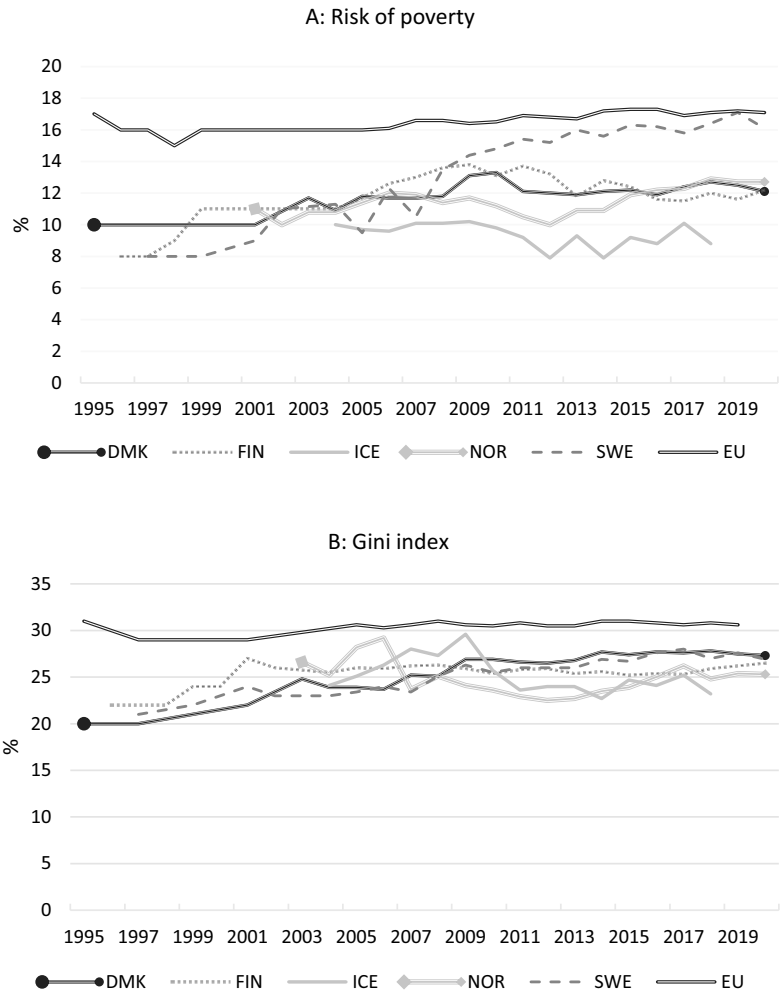
Figure 1.2 shows poverty risk and Gini index developments based on the Eurostat data used in the third paper. In Sweden, the growth in poverty risk has been exceptional among the Nordic countries, and it reached the EU level in 2019[3] The risk of poverty rate doubled from the mid-1990s till the 2020s. In 2020, the risk-of-poverty rate was 16.1% if 60% of the median income was used as a threshold. This is approximately four points higher than in Denmark, Finland and Norway. In Iceland, the risk of poverty and inequality have been the lowest among the Nordic countries after the financial crisis.

Increases in top-income shares have been important contributors to increased income inequality in the Nordics. This strand of literature has received a lot of attention among academics after Thomas Piketty's original work *Les hauts revenus en France au XXe siècle: Inégalités et redistributions, 1901–1998*, published in 2001, and among the public after his book (2014) *Capital in the Twenty-First Century*. Nearly all countries experienced a decline in top incomes until 1980, and after that, top-income shares started to increase in most countries, particularly in Anglo-Saxon countries (see a review by Roine & Waldenström, 2015). This increase is more moderate but still clear in Sweden, Finland, and Norway, but less clear in Denmark (Roine & Waldenström, 2015, p. 496). The top one percentile mainly drives the increases in top incomes. Increased capital incomes have been the primary reason for the increased income inequality (e.g. Atkinson & Piketty, 2007). In the Nordics, dual income tax systems were introduced in the early 1990s. They increased incentives to shift labour income to capital income taxed with a lower flat rate (Pirttilä & Selin, 2011; Alstadsæter & Jacob, 2016). In addition, corporate taxes and real estate taxes have been lowered, and inheritance taxes have been abolished in Sweden and Norway and lowered elsewhere, which raises questions about intergenerational income mobility (Pareliussen et al., 2018, p. 53).

Widening market incomes and wage disparities are potential sources of income inequality. Globalisation and related technological change tend to induce a skill bias in labour demand. The first essay shows that the in-work risk of poverty for low educated more than doubled from 4.1% to 9.3% between 1990 and 2010. There is also evidence of labour market polarization (Böckerman, Laaksonen & Vainiömäki, 2019; Heyman,

[3]The reported risk-of-poverty rates differ between Eurostat and National Statistics Sweden (SCB). For example, Statistics Sweden reports that the risk-of-poverty rate was 14.7% and Eurostat 16.1% in 2020. The statistical definitions and data differ significantly, and they are not fully comparable. Statistics Sweden uses a national equivalence scale, while EU-SILC uses the OECD-modified equivalence scale. The household in the Swedish national statistics is based on a dwelling concept (folkbokförda på lägenhet), while households in SILC are based on actual living arrangements. EU-SILC excludes capital gains, while those are included in the national data. Eurostat uses register-based income sources in Sweden, but EU-SILC is a sample. For more information, see a report by Statistics Sweden (2018).

Figure 1.2 Risk-of-poverty rate and Gini index developments in Nordic countries and EU between 2005 and 2020.



Note: 60% of the median income is used as a threshold. There are data breaks in the early years. Data breaks have been connected with previous and and following data points.
Source: Eurostat, Income and living conditions.

2016). Berglund et al. (2020) found a clear tendency toward polarisation in Denmark and upgrading, that is, an increase in employment in high skilled occupations in Norway between 2000 and 2015. Sweden lied between these two in terms of polarisation and upgrading. Still, tendencies toward widening market income and wage dispersions have been relatively weak in Nordic countries (Pareliussen et al., 2018, p. 27). According to Pareliussen et al. (2018, p. 51), this can be explained by the strong role of trade unions

and collective bargaining, employment protection legislation and education systems that have provided high skilled labour.

Declining redistribution has been a major reason for the increased inequality in Denmark, Finland and Sweden. The inequality-reducing effect of taxes and social transfers is simply defined as the difference between the Gini coefficient for household market incomes and disposable income. As caveats, this type of analysis does not take into account behavioural responses to policy changes, cyclical employment effects, consumption taxes and transfers in-kind such as education or healthcare. In Nordic countries, a part of the decline in redistribution is explained by the business cycle recovery and reductions in structural unemployment since the recessions in the mid-1990s. The decline in redistribution is larger than the employment effect, although it is not straightforward to isolate the two effects. Denmark, Finland and Sweden had some of the largest declines in redistribution, bringing them relatively close to the OECD average in 2014 since the early 1990s. Changes in cash transfers were a major reason for the declined redistribution in Denmark, Finland and Sweden since the 1990s, but income taxes also had an important role in Iceland. The role of taxes and transfers has been quite stable after the mid-2000s, except for Sweden, where redistribution has declined. (Pareliussen et al., 2018, pp. 44-48)

The analysis discussed above does not isolate the effects of tax-benefit changes on redistribution from other changes. The third essay isolates policy changes in tax-benefit systems using the EUROMOD microsimulation model in Denmark, Finland and Sweden between 2006(7) and 2017. In Sweden, inequality and relative poverty rose particularly during the 'work-line policy' of the centre-right government between 2007 and 2014. At the same time, the Gini index grew by 3.5 percentage points and the risk of poverty by 5.1 points (see Figure 1.2). Tax-benefit changes increased the risk of poverty by one percentage point and Gini by 0.4 during the work-line policy, implying that other factors substantially affected the risk of poverty and Gini. In Denmark, the policy changes decreased the risk of poverty, but they increased the Gini coefficient by 0.8 point between 2007 and 2017. Finland had the most redistributive policy changes, and they decreased poverty risk by 1.4 percentage points and the Gini coefficient by 0.9 between 2007 and 2017.

The third essay does not isolate the effect of population structure changes on redistribution. Demographic factors such as household and age structures, immigration and education can significantly affect inequality and poverty. In the Nordics, the household structure has changed towards more single persons and couples without children except

for Sweden, where the ageing trend has been more benign. A larger share of single-person households tends to increase inequality and relative poverty since these households do not benefit from economies of scale in consumption. In addition, single-person households tend to be in a weaker socio-economic position. The increasing share of single-person households is more pronounced in Finland, and it has the fastest ageing population in the Nordics. (Pareliussen and Robling, 2018, pp. 147-148)

Pareliussen and Robling (2018) studied the effect of demographic trends on inequality and poverty. They re-weighted subgroup sample weights of the population by their population shares in 1995 to construct counterfactual income distribution in Denmark, Finland, Norway and Sweden between 1995 and 2013. Their results show that demographic trends increased disposable income inequality by approximately 1.4 Gini points in Norway, 1.1 in Denmark, 0.9 in Finland, and 0.6 in Sweden. Demographic trends increased poverty risk by approximately 2.4 percentage points in Norway, 0.5 in Denmark, 0.4 in Finland, and 1.2 in Sweden. Thus, demographic factors have significantly increased relative poverty in Norway and Sweden, but demographics are not the main factor behind increased inequality in the Nordics. In Finland, the ageing population and changed household structure significantly increased market income inequality which was not fully offset by cash transfers.

Nordics have received a large share of refugees and asylum seekers. They tend to have a higher risk of poverty and social exclusion that is, in many cases, intra-generational. Sweden is exceptional among Nordic countries as it has received the largest number of refugees and asylum seekers, and 26.3% of its population is of foreign background (SCB Population Statistics, 2022). In 2015, 36% of foreign-born men and 44% of foreign-born women were unemployed or not in the labour force, although the share of immigrants who are not in the labour force has decreased over time (Gottfries, 2018). Pareliussen and Robling (2018) also studied the effects of immigration on inequality and relative poverty in Denmark and Sweden between 1995 and 2013, and between 2000 and 2013 in Norway. Immigration increased inequality by approximately 0.5 Gini point in Norway, 0.4 in Denmark and 0.2 in Sweden. Relative poverty increased by 0.7 percentage point in Norway, 0.3 in Denmark and 0.4 in Sweden. After taking into account the changing composition of immigrants from non-European countries, the results are two to three times greater than the main estimates. Still, the estimates are surprisingly small which raises methodological questions for future research (Calmfors & Roine, 2018, p. 11). In addition, the estimates do not include the asylum seekers that reached Nordic countries

in 2015.

In Denmark and Sweden, inequality growth has been more persistent. Sweden is exceptional as both inequality and risk of poverty have increased significantly. Poverty risk is no longer at Nordic level. The third essay shows that the Swedish tax-benefit policies have not been redistributive despite growing inequality and relative poverty. Still, likely because of incentives enhancing policies, disposable incomes also increased in the lowest deciles, and Sweden fared well in multidimensional poverty. The results of the third paper imply that factors other than tax-benefit changes affected the risen risk of poverty and inequality. It is unlikely that wage differentials are the main driver behind the increased inequality and increased risk of poverty. Sweden has the most equal wage distribution in the EU, and it has been very stable since 2001 (Gottfries, 2018). Market incomes have risen partly due to increased capital incomes, but market income changes are not exceptionally large compared to other Nordic countries (Pareliussen et al., 2018, pp. 26-27). The high influx of immigrants can be behind the risen poverty risk in Sweden, but this question is beyond the scope of the third paper. It is also likely that stripping social protection has intensified social exclusion and contributed to more growing poverty risk and inequality than the microsimulations show. In addition to Sweden, inequality growth has been persistent in Denmark. Inequality has also risen in Denmark, and policy changes increased Gini by 0.8 point, but they decreased the poverty risk. Finland had the most redistributive policy changes, but it fared least well in multidimensional poverty.

1.2.2 Labour market policies in Nordic countries

Several authors have argued that high employment rates are a key policy question facing Nordic countries, particularly with ageing populations (Andersen et al., 2007; Andersen, 2008). Financing extensive social transfers and public services require that a large proportion of the population is employed. Redistributive goals and work incentives require balance as income-dependent social transfers impose high marginal tax rates for low-income individuals. The Nordic social contract aiming at social equality through transfers and benefits sets a lower limit for wages and employment because in-work poverty is not a policy option, although in-work poverty has risen in Sweden.[4]. Nordic countries have responded with different social and labour market policies to the employment

[4]According to Eurostat (2022), the in-work poverty rate was 7,8% in Sweden and only 3.8% in Finland in 2020. In Denmark, the poverty risk was 6.1% and in Norway 6.0% for ages 18-64 .

challenge. (Andersen, 2008)

Reforms towards the Danish flexicurity model were initiated in the early 1990s as a response to high unemployment. The Danish model combines low employment protection (easy hiring and firing) with a generous social safety net and active labour market policies. The reforms tightened eligibility for unemployment benefits and their duration and introduced workfare elements into unemployment insurance and social policies (Andersen & Svarer, 2007). A central property of the flexicurity model is high labour mobility, and the model has been fairly resilient to the shocks caused by the 2008 global financial crisis and COVID-19 (Andersen, 2021). According to Andersen (2021), a possible downside of a high job-to-job mobility is lower human capital investments at the firm level if workers' training is useful in other firms as well. Low employment protection and relatively stringent employment conditions to benefits are compensated with a generous income safety and tailored job counselling. These measures add legitimacy to the Danish model.

In Sweden, the central-right government (2006–2014) introduced an 'arbetslinjen' (the work–line) policy aimed at increasing labour supply and reducing unemployment. Several supply-side reforms were introduced starting in 2007. These included sizeable in-work tax credits (EITC), tightening of sickness insurance, household service deductions, a lower amount of unemployment insurance benefits and active labour market programmes. Although it is difficult to quantify the trade-off between inequality and efficiency, Sweden has aimed at more efficiency over equality (Andersen & Mailbom, 2020, p. 395). It is not clear how much these policies actually increased employment. The effect depends on how elastic the labour force participation decision is to changes in taxes and benefits. The participation elasticity literature is examined in detail in section 1.3.2.

The ability to reform the labour market has been weaker in Finland, and there is no clearly identifiable model like in Denmark or Sweden. This can be at least partly explained by a weaker macroeconomic performance and budgetary constraints. Finland was hit particularly hard by the recession in the early 1990s, and the GDP growth was sluggish after the 2008 global financial crisis. After the 1990s recession, the benefit levels and coverage of social services were reduced, and long-term structural employment became a prolonged phenomenon (e.g. Kiander, 2001). After the recession, attempts to remove income traps and increasing work incentives became a guiding policy in Finland. Like in other Nordic countries, there has been a tendency to decrease income taxes. Income taxes were reduced in all income classes, and the top marginal tax rate decreased

from about 65% to 54% between 1995 and 2009 (Harju, Kosonen & Matikka, 2016, p. 5).

Despite high benefits and participation tax rates, Denmark fares relatively well in terms of employment rates. According to OECD (2022), the employment rate was 74.7% in 2020 in Denmark. The Danish model shows that it is possible to combine high-income taxation and high benefits to relatively good employment. Although Sweden performs well in terms of employment rates (75.5% in 2020), Sweden is clearly behind Iceland. In Iceland, the employment rate was 80.3% in 2020. The Icelandic labour market can be characterized by a high willingness to work, high union density and flexibility (Ólafsdóttir, 2020). Compared to other Nordic countries, Iceland and Norway are, to some extent, exceptional as their production relies more on natural resources. In Norway, the employment rate was 74.7% in 2020. The Finnish employment rates have lagged behind other Nordic countries, and the rate was 71.2% in 2020[5]. Several factors affect employment rates, macroeconomic conditions being one. The recovery from the financial crisis in 2008-2009 was considerably slower in Finland than in other Nordic countries, and it was followed by weakened cost-competitiveness and other structural problems such as the fall of Nokia and the ICT sector. (Mäki-Fränti & Vilmi, 2016; Pohjola, 2022).

It is possible that the trade-off between redistribution and efficiency was binding in the Nordics during economic recessions at the beginning of the 1990s (Pareliussen et al., 2018, p. 45). This may have been the case in Finland, but to some extent also in Sweden. The recession in the early 1990s hit hard to Finland partly because of the collapse of the bilateral trade with the Soviet Union. The benefit levels and coverage of social services were reduced (Kvist, 1999). After the recessions, Nordic countries implemented a series of reforms aimed at improving work incentives. The generosity of unemployment insurance schemes has decreased, but the initial levels and policies vary. In Sweden, the net unemployment benefit replacement rate for a newly unemployed dropped from around 65% in 2001 to close to 40% in 2015 for a worker with average earnings. The average rate of personal income tax and employee's social security contributions dropped by almost nine percent points in Sweden and six percentage points in Denmark. (Pareliussen et al.,

[5]Several explanations have been given to the lower employment rates in Finland. For example, Alatalo, Larja and Räsänen (2019) examine these explanations. Employment rates for the older population are lower in Finland, and part-time work is less common. Finland is distinctive in its passive structure of active labour market policies among the Nordic countries. In Sweden, active labour market policies emphasize employment subsidies, and Denmark emphasizes disabled persons and training, while Finland is exceptional in its heavy focus on training. The share of active measures out of total labour market policy expenditure was about one third between 2008-and 2016, while the best performing Nordic countries have reached about two-thirds level, and funding for public employment services has been lower compared to other Nordic countries. (Alatalo, Larja & Räsänen, 2019)

2018, pp. 48-49)

It is not evident that the benefit or taxes changes have yielded significant employment effects in the Nordics. Harju, Kosonen and Matikka (2016) reviewed the labour supply literature in Finland and Nordic countries. They concluded that the effects of income tax changes on labour supply are at most modest. Recently the Finnish basic income experiment did not yield any positive labour supply effects despite a sizeable increase in work incentives (Verho, Kanninen & Hämäläinen, 2022). The experiment lowered participation tax rates by 23 percentage points for full-time employment. Although the incentive is quite modest, the third essay does not show employment effects on social assistance clients on average. The labour force participation decision is a key policy question for public finance because entering the labour force can significantly increase tax revenues and decrease social transfers. Conventionally, the sizeable elasticities at the extensive margin are based on the U.S. earned income tax credit and its extensions, but recently Kleven (2021) has seriously questioned the sizeable employment effects. He finds zero effects. Recently Lundberg and Norell (2020) reviewed the participation elasticity literature. Based on their literature review, participation elasticities have decreased over time, and their proffered population-wide participation elasticity is quite modest, between 0.1-0.2.

Relatively strong labour unions and collective bargaining are key properties of the Nordic model. Collective bargaining tends to decrease wage dispersion, and it is capable of internalising externalities such as macroeconomic competitiveness in the wage setting. Like in other OECD countries, in the Nordics, labour union membership has declined except for Iceland, but union membership is still the highest among the OECD countries (Pareliussen et al., 2018, p. 31). Denmark, Norway and Sweden can be characterised as organised and collective co-ordinated systems (OECD, 2018, p. 81). Institutions and practices vary across countries, but generally, in organised and collective co-ordinated systems, sector-level agreements provide a general framework but leave room for lower-level agreements at the firm level. Tendencies towards decentralisation can increase employment, but they have been observed to increase wage dispersion in Denmark (Dahl et al., 2013). Finland can be characterised as a predominantly centralised and co-ordinated collective bargaining system (OECD, 2018, p. 81). Sector-level agreements have a strong role, and wage co-ordination is strong across sectors, but deviations from a higher level to a lower firm level are limited.

1.3 Optimal Income Taxation Theory

In the Nordic context, interest lies in how low-income individuals should be taxed. Social planners cannot focus on low-income individuals only because public goods and social transfers need to be taxed from higher incomes. Social welfare increases with a larger redistribution, but higher taxes and social transfers distort incentives to work. The optimal income tax theory takes into account this trade-off between efficiency and equity.

The following provides a short introduction to the modern history of optimal income tax theory and its policy implications. The focus is on low-income individuals' taxation. Unfortunately, the policy implications are somewhat limited. Theoretical models cannot capture every aspect of a tax system, and the results depend on social preferences and behavioural responses to taxes. Broadway (2012) reviews the policy implications of the optimal tax theory.

1.3.1 Literature Overview

The modern income taxation theory is rooted in the Nobel prize winner James Mirrlees' model (1971). In his model, a social planner maximises the social welfare function subject to the government's budget and incentive constraints. Individuals only differ in their ability and decide how much they supply labour for a given tax rate. Information is asymmetric because the social planner is unable to observe individuals' abilities. The government would like to redistribute based on skills but can only observe earnings. If taxes are too high, there is an incentive for high-ability individuals to mimic low-ability individuals. This creates efficiency costs and reduces social welfare.

The analytical results of Mirrlees' model were fairly general. The optimal marginal tax rate is always positive if the government wants to redistribute from high-income earners to low-income earners. The marginal tax rate on the lowest earner is zero if everyone supplies positive work hours at the optimum (Seade, 1977). The most surprising and discussed result was zero marginal tax rate for the highest earner (Sadka, 1976). Intuitively, if the top earner decides to work more because of the decreased marginal tax rate, the government is not worse off, but the top earner's utility and the welfare of the whole society increases.

Mirrlees' original model produced somewhat constant marginal tax rates with a negative income tax (NIT) for low-income earners. Modest progressive taxation has been a

relatively consistent result for a wide range of inequality aversion (Boadway, p. 136). According to Tuomala (2016, p. 152), this result is restrictive and depends on the functional form and skill distribution. For example, a quadratic utility function, different skill distribution and moderate redistribution preferences yield a basic income and increasing marginal taxes. Assuming a constant labour supply elasticity, Diamond (1998) and Saez (2001) find a U-shaped marginal tax pattern, which is observed in many countries. Mirrlees' model involved only intensive margin labour supply responses. For example, Diamond (1980) and Saez (2002) have studied extensive margin responses, and they show that negative taxes can be optimal. Unless the social welfare function is very risk-averse and non-participating individuals are unable to work or identifiable by the social planner, a negative participation tax is optimal for low-income workers (Boadway, 2012, p. 137). After Mirrlees, optimal tax research has shown how non-linear tax formulas can be expressed in terms of elasticities which provides an important link between tax theory and empirical literature on behavioural tax responses (Saez, 2001; Saez, 2002).

1.3.2 Policy Implications

Saez (2002) incorporates labour force participation into his theoretical model and shows that in-work benefits such as the U.S earned income tax credit (EITC) can be optimal if participation elasticities are sufficiently high. Intuitively, a subsidy for low-income workers with a positive phase-out rate induces some individuals to work more, which reduces social transfers and adds tax revenues. Some workers who are not entitled to the in-work benefit may decrease their labour supply to take advantage of the in-work benefit. If this intensive margin response is low enough and the extensive margin response high enough, implementing an in-work benefit is the optimal policy.

Conventionally, empirical labour supply literature has found that the extensive margin response is much more elastic than the intensive margin response. Thus, there has been a considerable empirical justification for in-work benefits and earned income tax credits. Among Nordic countries, Sweden has introduced sizeable earned income tax credits (EITC) in several phases between 2007 and 2014. Based on the participation elasticity literature, the final essay combines behavioural responses to the EUROMOD microsimulation model and studies labour market policies across Nordic countries.

The consensus that earned income tax credits have sizeable extensive margin effects is based to a large extent on studies on the U.S. EITC and its expansions (Eissa & Liebman,

1996; Meyer & Rosenbaum, 2001; Hotz et al., 2006; Meyer, 2010). Recently Kleven (2021) has seriously questioned this consensus. He finds null results for single mothers. The EITC was introduced in 1975 at federal level and expanded in 1986, 1990 and 2009 along with state supplements between 1984-2018. Using both federal and state variation Kleven does not find any significant employment effects expect for the 1993 reform. According to Kleven, the 1993 reform is associated with large positive employment effects, but these effects are confounded with changes from welfare reform and the macroeconomy.

Following reviews extensive margin elasticity literature on Nordic countries, which is still quite limited. Sigurdsson (2019) and Stefánsson (2019) estimated labour supply responses to the Icelandic tax holiday. In Iceland, the tax system was changed so that Icelanders did not pay any income taxes in 1987. Sigurdsson builds a life-cycle diffierence-in-differences model using adjacent cohorts as control groups and estimates 0.1 participation elasticity for the whole population. Stefánsson shows that the participation rate had no trend deviation in 1987, implying a zero participation elasticity (Lundberg & Norell, 2021, p. 71). Kosonen (2014) exploited municipal variation in the Finnish child-care benefits and estimated a participation elasticity of 0.83 for mothers. The high elasticity may be explained by a lower labour force participation of Finnish mothers. Similar child-care schemes from other Nordic countries have not resulted in positive labour supply effects (Lundin, Mörk & Öckert, 2008; Havnes & Mogstad, 2011). Jäntti et al. (2015) estimated participation elasticities using Luxemburg Income Survey (LIS) data and group IV. They found participation elasticities of 0.21 and 0.17 for Denmark and Finland respectively, and a non-significant estimate for Sweden. Bartels and Schupe (2022) used EUROMOD to calculate participation tax rates and group IV to estimate participation elasticities for breadwinners and secondary earners across European countries including Denmark and Sweden. Their point estimates do not exceed 0.2 for Denmark and Sweden, although the elasticities are bigger for secondary earners.

In Sweden, several studies have estimated elasticities for various sub-groups. Selin (2014) utilised the 1971 change in the taxation of Swedish married couples. Before 1971, married couples were taxed jointly and after the reform separately. The separate taxing increased work incentives for secondary earners. Using women married to low-income earners as a control group, Selin found a unitary participation elasticity for women married to high-income earners. Bastani et al. (2021) estimated a participation elasticity for low-income married women using a housing benefit reform introduced in 1997 and found a 0.13 participation elasticity. Laun (2017) utilised the larger Swedish EITC for

older workers – above the age of 65 – and found a 0.22 participation elasticity.

Recently Lundberg and Norell (2021) did a meta-analysis on extensive margin elasticity literature, updating Chetty's et al. (2013) earlier analysis. Lundberg's and Norell's preferred extensive margin elasticity is between 0.1 and 0.2. Based on their meta analysis, Chetty et al. (2013) suggested using a 0.25 extensive margin elasticity. Chetty et al. focused mainly on U.S. and U.K studies, and their review included only 15 papers, while Lundberg and Norell used 35 papers in their analysis. According to Lundberg and Norell, participation elasticities have decreased over time, and women are more responsive to changed incentives. Some groups exhibit higher elasticities, such as single mothers. The likely reason for this is that they have a lower labour force participation and more room to increase their labour supply. Similarly, elasticities tend to be lower in Europe than in the United States, likely because of a higher female labour supply. As female labour supply is among the highest in OECD countries, it is possible that population-wide participation elasticities are even lower in Nordic countries than in the rest of Europe.

The extensive margin literature points towards modest elasticities particularly in Nordic countries. Still, population wide elasticities are not well known. Although some papers estimate population wide elasticities, it is in most cases not possible to find and construct a credible control group as policies affect all individuals. Furthermore, external validity is an issue in experimental studies. For example, the Iceland tax holiday studies estimate intertemporal Frisch elasticity, but long-term participation elasticities are still not well known in this literature.

Saez (2002) also examines optimal taxation when the behavioural response is concentrated along the intensive margin. In this case, the optimal policy is a negative income tax program with substantial guaranteed income support with a high phasing-out tax rate. The benefits of NIT are low administration costs and that nobody is excluded or stigmatized. However, incentives to work are lower, and the classical negative income tax is often seen as too costly. Instead, partial basic income, which provides less than basic needs, or participation income have been suggested. For example, Tony Atkinson (1996) proposed a conditional basic income. In order to receive the basic income, people would need to participate in society. This could involve active work search, paid work or unpaid work such as caregiving, volunteering or education.

1.4 Methodology

1.4.1 Poverty Measurement

tion, poverty in developed countries is related to limited social capacity caused by a lack of economic resources (e.g. Townsend, 1979; Foster, 1998; Atkinson 1998). Limited social capacity refers to an individual's inability to live in a manner that is generally accepted by society. In other words, poverty is *relative*. Poverty is also a multifaceted phenomenon that cannot be defined unequivocally.

The following will focus on economic poverty measurement. Poverty measurement involves two distinct problems. The first problem is the identification of a poverty line that separates the poor from the non-poor. A commonly used method is to set the poverty line at 50% or 60% of national average income or expenditures. The second problem is aggregation which requires constructing a poverty index. A poverty index describes the intensity of poverty and characteristics of those under the poverty line.

The most commonly used poverty measure is the head count index:

$$H = \frac{1}{N}\sum_{i=1}^{N} I(y_i < z), \tag{1.1}$$

where an indicator function $I(\cdot)$ assigns the value of 1 if a person's income (or expenditure) y_i is below the poverty line z and otherwise 0. N is the number of people in a population or sub-sample. The headcount index has been strongly criticized for being insensitive to the distribution of income among the poor. Watts (1968) argued that poverty is not a discrete condition. Poverty is essentially gradient, and a poverty index should be insensitive to small changes in a poor person's income. Sen's (1976) highly influential work introduced an axiomatic approach to poverty measurement. Many poverty researchers have refined Sen's fundamental axioms and proposed new measures (see, e.g. Shorrocks, 1995; Chakravarty, 1997). In particular, the headcount index does not take into account how poor the poor are. Sen argued that the index violates the monotonicity and transfer axioms. For example, a transfer from a less poor to a poorer would not change the headcount index. Zheng (1997) reviews the axiomatic properties of different poverty measures.

Commonly used supplement for the headcount index is the poverty gap index:

$$HI = \frac{1}{N}\sum_{i=1}^{N}[1-\frac{y_i}{z}]I(y_i < z). \tag{1.2}$$

The poverty gap index measures the depth of poverty. It is defined as the average of the poverty gaps $(z - y_i)$ as a proportion to the poverty line. It can be interpreted as the minimum sum to lift all poor individuals to the poverty line. The poverty gap index satisfies the continuity axiom, but it is insensitive to the distribution of income among the poor. The squared poverty gap index averages the squares of the poverty gaps relative to the poverty line. This measure is distribution sensitive because it adds more weight to the poorer individuals. This measure and its higher powers belong to the Foster-Greer-Thorbecke (FGT) class of poverty measures (Foster, Greer & Thorbecke, 1984).

Because the headcount and poverty gap indices are not sensitive to the income distribution of the poor, distribution sensitive measures have been proposed. Sen (1976) proposed his measure:

$$S = H\Big(1-(1-G_p)\frac{\mu_p}{z}\Big), \tag{1.3}$$

where G_p is the Gini coefficient for the poor and μ_p average income of the poor. The drawback of this measure is that it is not subgroup consistent. That is, poverty at the population level is not equal to the weighted mean of the sub-group poverty, where sub-group population shares are used as weights. Both the headcount index and poverty gap index satisfy this decomposability property. The Sen index has been modified by many others. For example, the Sen-Shorrocks-Thon index (Shorrocks, 1995) decomposes poverty into the headcount index, poverty gap index and the Gini coefficient of the poverty gap ratios.

The above-discussed indices are best seen as partial poverty indices. The choice of a poverty line and measure tend to be arbitrary, and various measures may identify different persons as poor. Two important strands of poverty measurement literature have tried to solve these issues. The first strand of literature has evolved from the stochastic dominance theory (Atkinson, 1987; Foster & Shorrocks, 1988), and the second is related to multidimensional poverty measurement (Alkire & Foster, 2011).

The first-order dominance condition tests whether poverty is dependent on the choice of the poverty line, for example, between two years. Let $F_A(y)$ and $F_B(y)$ be two cumulative income distributions. First-order stochastic dominance of A by B implies that $F_A(y) \geq F_B(y)$ up to the maximum conceivable poverty line z_{max}. This means that the

headcount index of individuals below the poverty line is always greater in A than in B for any poverty line that is not above z. If the first-order stochastic dominance does not hold, the second-order stochastic dominance condition can be applied. This condition focuses on the poverty gap. Second-order stochastic dominance of A by B implies that the average poverty gap in A is larger than in B, for all poverty lines up to z_{max}. If this is inconclusive, a higher-order dominance test can be used. Another strand of research that has received considerable research attention is multidimensional poverty measurement.

It is commonly acknowledged that poverty is essentially multidimensional, but still, it is often measured using only the income dimension. If poverty is defined as a failure to achieve a minimum level of capabilities (Sen, 1995), poverty should be measured multidimensionally. This is because capability is not only a function of income but also a function of public goods such as education, social security, health, housing conditions and so on. In recent years, Alkire's and Foster's (2011) work on multidimensional poverty measurement has been very influential. Their approach to poverty measurement is axiomatic, and the AF framework satisfies certain desirable properties, such as decomposability. This framework is utilized in the final essay.

1.4.2 Causal Inference

In recent decades, empirical economists have started to take causal inference seriously. Angrist and Pischke (2010) call this process the credibility revolution. Hendry (1980) showed in a paper titled Econometrics – Alchemy or Science that rainfall caused inflation using standard methods of his day. At the time, regressions often lacked causal interpretation due to reverse causality or omitted variable bias. Nowadays, economists aim at better and more clearly stated research designs.

The key to a good research design is a clear causal inference. In a policy evaluation setting, let Y_i denote the observed outcome for an individual i and D_i treatment status. In Rubin's potential outcome framework:

$$Y_i = \begin{cases} Y_{1i} \;\; if \;\; D_i = 1 \\ Y_{0i} \;\; if \;\; D_i = 0 \end{cases}$$

Now the causal effect is $Y_{1i} - Y_{0i}$ for an individual i. That is the observed outcome minus the unobserved counterfactual outcome. The observed average treatment effect on the

treated can be decomposed into the average effect on the treated and selection bias:

$$
\begin{aligned}
&E[Y_i|D_i=1]-E[Y_i|D_i=0] \\
&=\underbrace{E[Y_{1i}|D_i=1]-E[Y_{0i}|D_i=1]}_{Average\ treatment\ effect}+\underbrace{E[Y_{0i}|D_i=1]-E[Y_{0i}|D_{0i}=0]}_{Selection\ bias}
\end{aligned}
$$

The first term is the average difference in outcome between the treated and what would have happened to them if they had been treated (*causal effect*). However, the second term adds a selection bias. A negative or positive selection bias arises if the outcomes for the treated if they had not been treated differ from the outcomes of untreated. For example, in job training programs more motivated and more skilled individuals are more likely to join the programs. However, these individuals would have higher earnings also without the program. This kind of selection issue would create an upward bias. A random assignment of D_i would remove the selection bias. Although randomized controlled trials remain the cold standard of policy evaluation, in many cases it is not feasible to conduct them because of ethical or cost reasons.

Instead, economists rely on quasi-experimental methods. A properly designed quasi-experimental setting allows for estimating the causal effect of an intervention without a random assignment. Difference-in-differences approach is used in the second essay. Much like in randomized controlled trials, a researcher selects control and treatment groups. Difference-in-differences is combined with coarsened exact matching (CEM) to make the treatment and control groups more comparable (Iacus, King & Porro, 2012). The key identifying assumption is the parallel trend assumption. In the absence of treatment, the difference between the treatment and control group is constant over time, conditional on covariates X . That is, the control group provides a counterfactual to the trend that the treatment group would have followed if they had not been treated, and the selection bias disappears. Other commonly used quasi-experimental methods are regression discontinuity and instrumental variables.

1.4.3 Microsimulation

Randomised controlled trials and quasi-experimental designs can be used to estimate the behavioural effects of a variety of interventions. Often randomised controlled trials or even credible quasi-experimental research settings are not feasible options. Even though

it is feasible to estimate reform effects using a quasi-experimental design, policy changes may be small concerning only a small sub-group, and there can be inattention due to optimisation frictions. External validity can also be an issue because of time dependency related to economic cycles, for example.

Microsimulation can be used to create simulated counterfactual scenarios in tax-benefit systems. Microsimulation models apply coded tax and benefit policy rules to micro-level data on individuals and households. Detailed tax-benefit simulation models allow for an examination of how social contributions, taxes and benefits affect disposable income. The EUROMOD model is used in the final essay. The model is unique in the sense that it is harmonised across countries, allowing for meaningful policy comparisons. The simulations are based on EUROMOD version H1.0+. The input data are based on the European Union Statistics on Income and Living Conditions (EU-SILC). They are collected by individual countries and combine surveys and registers in Nordic countries. EUROMOD is static, but the final essay takes into account behavioural effects by employing various labour supply elasticities to predict employment changes.

Microsimulation models allow for creating counterfactual scenarios. It is crucial to isolate changes in a tax-benefit system from changes in the underlying economy and population structure. For example, over time, a tax-benefit system may appear more equal in terms of income distribution even though the real driver is an increase in the number of pensioners. To isolate other time-varying effects from policy changes, the following counterfactual is simulated in the final essay:

$$\Delta_{policy} = \underbrace{D(y_t^{market}, S_t, X_t)}_{Base} - \underbrace{D^*(y_t^{market}, \rho S_{t-j}, X_t)}_{Counterfactual}, \tag{1.4}$$

where the baseline disposable income D is presented as a function of the market income y_t, tax-benefit system S_t and demographic characteristics X_t. The counterfactual disposable income D^* is a function of the tax-benefit system at time $t-j$, holding constant the market income and population characteristics. The monetary values (benefits and tax thresholds) of the counterfactual tax-benefit system are uprated with a factor ρ to bring them to the baseline level.

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2 IN-WORK POVERTY IN FINLAND 1990-2010

Abstract

In-work poverty is problematic for the functioning of the Nordic model. This paper examines the evolution of in-work poverty between 1990 and 2010. This study examines in-work poverty with multiple poverty measures, socio-economic factors behind poverty and income mobility. The results show that the risk of poverty remained at a moderate level. The risk of poverty increased after the recession in the early 1990s and remained relatively stable in the 2000s. Although the risk of poverty remained low at the population level, poverty risks among risk groups increased substantially. The risk-of-poverty among young persons aged 18–24 increased the most, from 4% to 16%. Subsistence is more likely to require two earners than before at the household level. The results show that single parents are in the weakest position. Social transfers have significantly reduced in-work poverty.[1]

Keywords: In-work poverty, Nordic model, social protection systems
JEL: I32, I38, H55

2.1 Introduction

There have been several changes in poverty in Finland over the past decades. Relative poverty decreased from the 1970s until the beginning of the 1990s (Riihelä, 2009). After

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the beginning of the 1990s, the number of the poor and the poverty gap started to increase. In-work poverty has developed similarly. At the beginning of the 1970s, in-work poverty started to decrease, reaching a low level by the beginning of the 1990s (Airio, 2008). After a deep recession, in-work poverty increased until the end of the 1990s, after which the growth has levelled off.

In-work poverty is problematic for the functioning of the Nordic model and labour market incentives. Still, in Finland, in-work poverty is an under-researched phenomenon, and earlier research is limited to the time before the beginning of the 2000s. This paper studies the long-term development of in-work poverty. The studied period covers two decades, between 1990 and 2010. This period covers the deep recession at the beginning of the 1990s and the first years of the global financial crisis. In work-poverty trended upwards after the recession in 1990s, but it remains at a moderate level. According to Eurostat (2022), in-work risk of poverty was 3.7% in 2020.

In this study, the term working poor refers to a person who has been working either as an employee or entrepreneur for at least six months and whose income falls below the set poverty threshold. In the literature, there are several definitions for in-work poverty that depend on the meanings of work and poverty. In-work poverty is a multidimensional phenomenon that cannot be defined unambiguously, very much like poverty itself. Part-time work, complex combinations of entrepreneurship and paid labour, and altering between unemployment and employment pose problems for studying in-work poverty.

The focus of this study is on individuals living in households. However, individuals' economic well-being need to be examined as a part of the entire household. Because income is often shared within families, one member's income loss can be compensated from the income of other household members. In addition to the income of other household members, an individual's economic well-being also depends on the other members' consumption needs.

The consumption needs of a household depend on the size and structure of the household. Because of returns to scale, larger households gain economic benefit from collective consumption. Because households differ in size and consumption needs, households' disposable income is divided by the modified OECD scale, which makes the incomes of households comparable.

The results show that the risk of poverty increased slowly after the 1990s recession but remained at relatively a low level. Although the risk of poverty at an aggregate level remained low, risk groups' risk-of-poverty rates increased significantly. In 1990, the risk-

of-poverty rate was only 3.8 per cent for the working youth, but in 2010, every sixth lived in a poverty risk. In terms of the household structure, subsistence is more likely to require two earners than before. Single parents are in the weakest position. The increase in risk groups' risk-of-poverty rates implies higher inequality than before.

This paper is organized as follows. The next section provides an overview of earlier research. Section three discusses the definition of poverty and describes the data. Sections four and five include the results from cross-sectional and panel examinations, and the last section concludes.

2.2 Related literature

Although research has shown that the in-work poverty rate is moderate, poverty rates increased after the beginning of the 1990s (Kauhanen, 2005). The phenomenon is problematic because the employed include individuals with high risk-of-poverty rates. The risk of poverty is particularly high for single parents, low educated, youth and individuals in atypical employment relationships (Kauhanen, 2005; Airio & Niemelä, 2004). Low pay (less than 2/3 of full-time workers' median gross earnings) directly relates to in-work poverty. According to Ilpo Airio's study (2007), the reason for poverty was low pay for 29% of the working poor, while for the rest, the reasons were recurring unemployment or part-time work.

Based on earlier research, the household structure has an important connection to in-work poverty. Deviations from the dual-earner model increase the risk of poverty (Airio, 2008, p. 72). According to Airio (2006, p. 304), the profile of the working poor has shifted over time, from families with children in the 1970s and 1980s, towards single person households although the results are somewhat contradictory (Kauhanen, 2005, p. 17). According to Kauhanen's study, in 2000, the largest poverty group was couples with children (58%), whereas in Airio's study, the largest group was individuals who lived alone (43%). The differences in employment definitions and data may cause discrepancies between the results. In Kauhanen's study, an individual was defined as employed if the household had at least one person whose main activity status was employed at the end of the year. In Airio's study, an individual was employed if there was at least one full-time worker in a household and the individual had worked for at least 27 weeks, either part-time or full-time during a year.

In Finland, poverty risks among working individuals are low, like in other Nordic

countries (see, e.g. Peña-Casas & Latta, 2004; Airio, 2008). The highest poverty risks are found in Southern European and Anglo-Saxon countries. In Nordic countries, social transfers significantly reduce in-work poverty risks (Peña-Casas & Latta, 2004; Airio, 2008; Penttilä, 2005). For example, Irmeli Penttilä's study found that social transfers reduced households' in-work poverty risk by two-thirds in 2001.

2.3 Definitions and Data

2.3.1 The Definition of a Working Poor

International studies often use a six-month threshold for employment. According to this definition, an individual has been actively working or seeking employment for at least six months. However, some studies have used active job-seeking as a definition without month limits (For a summary of different definitions, see Peña-Casas and Latta, 2004, p. 7). The differences in definitions depend on how work and poverty are defined. Some studies emphasize an individual's attachment to the labour market so that poverty is not only caused by a lack of work (Airio, 2008, p. 59). Still, individuals' employment history can involve atypical work, such as part-time or short-term work, which justifies defining them as working-poor.

This study follows Eurostat's relative income method in defining in-work poverty. Individuals are identified as working poor if they have been working full-time, part-time or as an entrepreneur for at least six months, and their equivalent household income is less than 60 percent of the equivalent median income. The equivalent income is the sum of a household's disposable income divided by consumption units. The consumption units are based on the modified OECD scale that makes household types comparable. The age limit for working individuals is 18–64 years.

2.3.2 Poverty Measurement

The most common method to measure poverty is the *headcount index*. The headcount index shows the proportion of individuals whose income is below a poverty line relative

to the whole population or another group:

$$H = \frac{1}{n}\sum_{i=1}^{n} I(x_i \leq z), \tag{2.1}$$

where the indicator function $I(\cdot)$ is assigned a value of 1 if a person's i income x_i is at the poverty threshold z or below it and 0 otherwise. The small letter n is the total number of individuals in the population or a subgroup. The problem with this measure is that it does not show how poor the poor are below the poverty threshold. For example, if the income of the poor below the poverty threshold halves, the poverty indicator does not change. The *poverty gap index* takes into account the number of poor people and the depth of poverty:

$$HI = \frac{1}{n}\sum_{i=1}^{n}[1 - \frac{x_i}{z}]I(x_i \leq z). \tag{2.2}$$

The poverty gap describes the difference between the poverty line z and income x_i. The index takes the average difference and expresses it as a proportion to the poverty line. The poverty gap index shows how much income would have to be given to the poor to bring them to the poverty line.

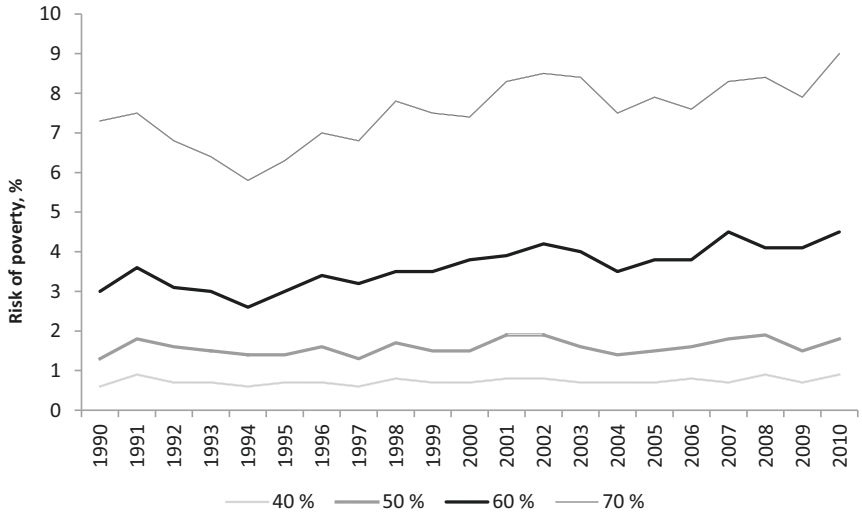
The data is based on the Income Distribution Statistics (IDS) collected by Statistics Finland. The IDS is a representative sample of individuals containing rich variables on income, socio-economic status, and regional characteristics. Each year involves more than 25 000 observations. The IDS does not include a long time series that would allow for studying the long-term poverty dynamics. Previous research has shown that poverty is higher the shorter is the examined income period because random factors such as short-term unemployment affect the results (Björklund, 1998). However, this study utilizes the rotating panel feature of the IDS data to study the short-term poverty dynamics.

2.4 The Development of In-work Poverty in Finland 1990-2010

During the deep recession at the beginning of the 1990s, the risk of poverty first increased and, after that, decreased. After the recession, the risk-of-poverty rate increased slowly to more than four percent by the end of the 2000s if the poverty threshold is less than 60% of the equivalent median income. To see whether the risk of poverty depends on the chosen

poverty line, Figure 2.1 shows the results using four poverty lines. Different poverty lines draw somewhat different pictures on the development of the risk of poverty. When the risk of poverty is examined using the OECD poverty line, 50% of the median equivalent income, the risk of poverty has remained stable at about two per cent over the studied period. Compared to the whole population's poverty risk (13.5 % in 2010), work provides good protection from poverty. However, it is important to note that the relative risk of poverty follows the median income. When the median income decreased during the first years of the recession, the risk-of-poverty thresholds and rates decreased, although this did not correspond to the weakening living conditions.

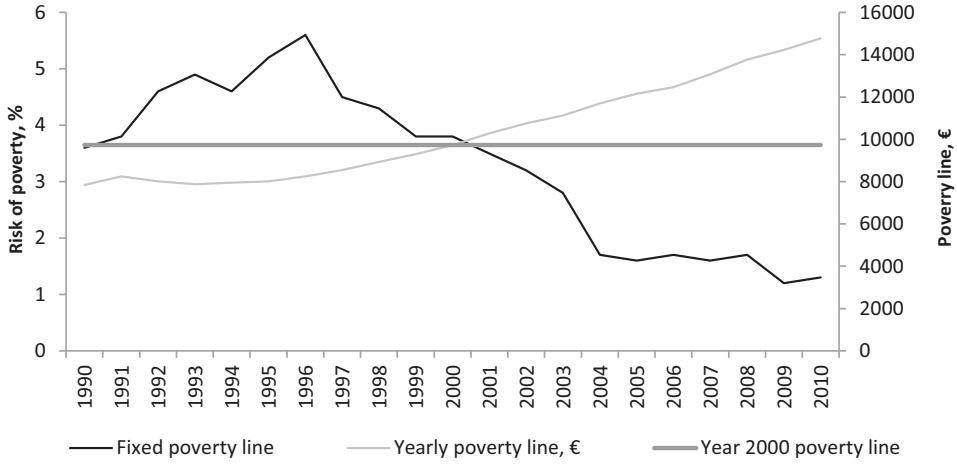
Figure 2.1 Development of risk-of-poverty rates using four poverty lines between 1990-2010.



Source: IDS, author's own calculations.

A fixed poverty line can be used to examine the income development of the working poor when the poverty line is inflated by consumer price index changes. Figure 2.2 shows the fixed risk-of-poverty rate using the year 2000 threshold. It should be noted that a fixed poverty line is not suitable for studying poverty over a long period of time. As the economy grows and real income increase over time, the poverty threshold decreases to a low level, and it no longer takes into account the deviation from prevailing standards of living. Figure 2.2 shows that risk-of-poverty increased quickly during the recession years at the beginning of the 1990s and, after that, decreased steadily. This shows that the real incomes increased after the recession.

Figure 2.2 In-work poverty risk with a fixed poverty line 1990-2010.

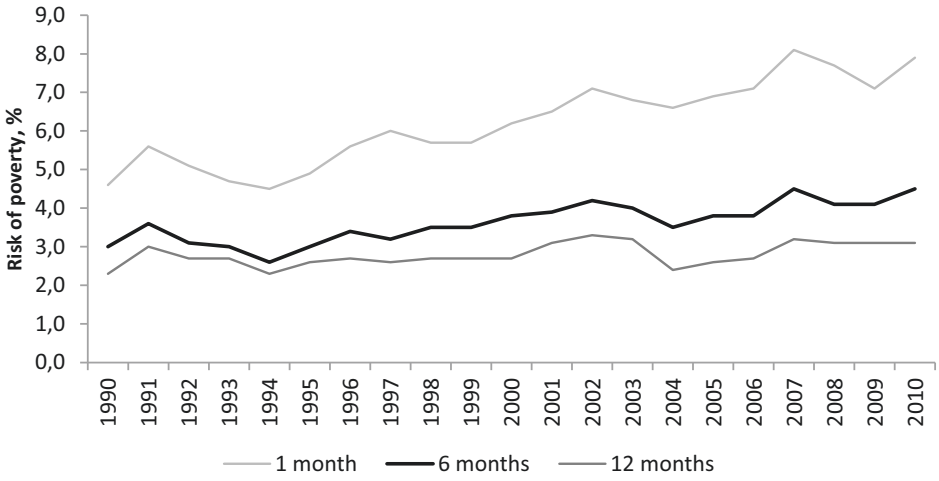


Source: IDS, author's own calculations.

Figure 2.3 examines in-work poverty based on different lengths of employment. In addition to the minimum requirement of at least six months of employment, periods of at least one month and 12 months are examined. If the employment condition is set for at least one month, periods of unemployment and atypical work are emphasised. By defining the employment condition at 12 months, an individual is strongly attached to the labour market. Figure 2.3 shows that the risk of poverty among individuals with atypical work relationships increased significantly in the 2000s. It is surprising how similar the poverty risks for people who worked 12 months compared to those who worked for at least six months. The difference increased somewhat in the 2000s but remained within one percentage point. Approximately three percent of the working Finns did not rise above the poverty threshold even though they worked every month of the year.

Figure 2.4 shows the poverty gap. The poverty gap measures how much income on average (median income) a working poor would need to reach the risk-of-poverty line. The indicator measures the depth of poverty and the structure of income of the poor. The poverty gap is based on the 60% of the equivalent median income threshold. The poverty gap was at its deepest level during the recession at the beginning of the 1990s. After the recession, it has slowly decreased to approximately 12% in 2010. The poverty gap is index is sensitive to changes in the risk of poverty and changes in the depth of poverty (distance from the poverty line). While relative income poverty decreased in the recession in the early 1990s, the poverty gap increased implying that the measure gives more weight to

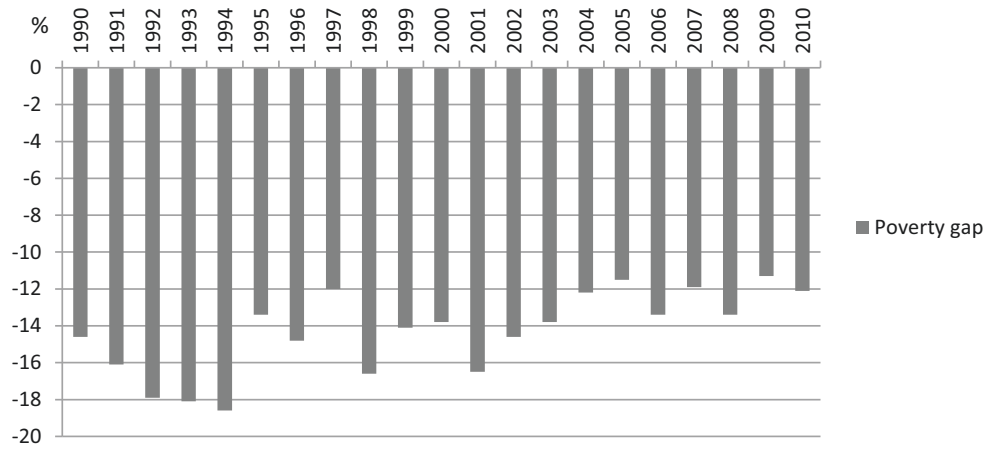
Figure 2.3 In-work poverty risk based on different lengths of employment.



Source: IDS, author's own calculations.

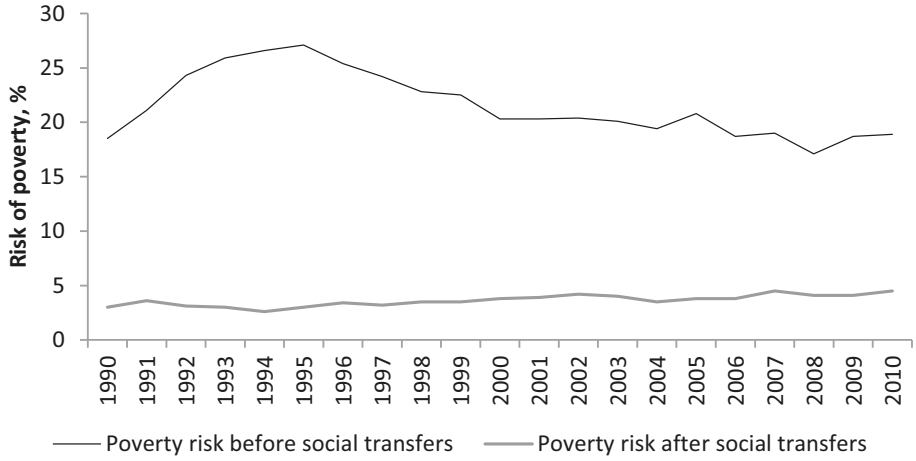
the income distance from the poverty line.

Figure 2.4 The poverty gap between 1990 and 2010.



Source: IDS, author's own calculations.

Figure 2.5 The effect of social transfers on in-work poverty.



Source: IDS, author's own calculations.

Figure 2.5 shows the risk-of-poverty rates before and after receiving social transfers. The figure shows that during the recession in the early 1990s, social transfers had a significant role in reducing poverty. After the recession, the effect decreased to the level of 1990. Social transfers had the highest effect on poverty reduction in 1995, when transfers lifted as many as six out of seven people above the poverty threshold. Still, in 2010, social transfers lifted three out of four above the poverty threshold. Social transfers are an effective way to reduce in-work poverty. In international comparison, the role of social transfers is one of the most important factors that explain in-work poverty. For example, Ilpo Airio (2008, p. 69) found that in the United States and the United Kingdom social transfers did not reduce the in-work poverty risk at all in 2000.

2.4.1 Who Are the Working Poor?

The previous sections examined the general development of in-work poverty in Finland. The following examines poverty risks related to the household type and individual characteristics. The focus is on the household type and households' labour market status. Previous research has shown that the household type is related to in-work poverty, particularly in Europe (Strengmann-Kuhn, 2002).

Table 2.1 The risk of poverty by age, education, and the share of women by age groups among the working poor.

	1990	1995	2000	2005	2010
Age groups					
18-24 years old, %	3.8	9.1	7.8	7.8	16.4
25-34 years old, %	3.4	3.3	4.0	2.9	4.9
35-44 years old, %	2.9	3.6	3.5	2.7	3.7
45-54 years old, %	2.8	3.6	3.4	2.3	3.4
55-64 years old, %	4.7	2.7	2.3	3.5	2.6
Education level					
Elementary, %	4.1	4.0	5.2	7.1	9.3
Middle education, %	2.6	3.0	4.0	3.9	4.7
High education, %	0.8	0.1	0.8	0.9	2.2
Proportion of women by age groups among the working poor					
Female, 18-24 years old, %	61.0	54.7	68.8	49.3	46.5
Female, 25-34 years old, %	48.5	36.1	44.6	40.7	31.0
Female, 35-44 years old, %	42.2	45.6	40.0	45.3	37,5
Female, 45-54 years old, %	37.8	36.6	41.2	36.0	60.1
Female, 55-64 years old, %	36.4	47.4	36.5	26.7	40.4

Table 2.1 shows the risk-of-poverty rates by age, gender and education level. Particularly young persons' (aged 18-24) poverty risk increased substantially in the 2000s, being as high as 16.4% in 2010. Based on Table 2.1, the risk of poverty among primary educated individuals more than doubled to 9.3% over the studied period. Education has become a more critical factor in securing income. From the gender perspective, men had higher poverty risks than women. However, between 1990 and 2000 women's proportion is substantial in the 18–24 age group.

Table 2.2 shows risk-of-poverty rates by the household type and labour market status. In 1990, poverty risks were more evenly distributed, but by the end of the 2000s, the risk-of-poverty rates among households other than two adult earners increased. By the year 2010, the risk of poverty among single-parent households and households with a weak attachment to the labour market increased most significantly. Based on table 2.2, single parents had the highest risk of poverty among the working population.

A high risk of poverty does not imply that the number of individuals in that particular group is large. Thus, table 2.2 also shows the proportions of working poor by the household type. The table shows that couple with children (32.2%) and individuals who live

Table 2.2 Risk-of-poverty by household structure and labour market status.

	1990	1995	2000	2005	2010
Household structure					
Lives alone, %	6.6	5.9	7.5	6.7	7.4
Single parent, %	5.1	6.7	6.3	10.1	12.4
Single parent, one child, %	4.1	7.2	7.0	7.2	8.8
Single parent, two children, %	6.1	7.0	10.6	6.1	17.9
Couple, no children %	2.2	2.7	2.1	2.2	3.1
Couple, one child, %	2.8	2.2	3.1	2.9	3.4
Couple, two children, %	2.3	1.9	2.9	3.5	3.9
Household labour market status					
Couple, both employed, %	1.8	1.5	1.7	1.7	1.7
Couple, one employed, %	4.9	4.8	6.7	7.7	9,0
Couple, one full-time employed, %	3.8	4.7	5.2	6.0	7.6
Couple, one part-time employed, %	3.4	2.4	9.6	10.6	20.1
Proportions of poor households					
Couple without children,%	14.7	24.8	14.7	15.5	21.9
Couple with children, %	40.8	34.7	36.9	39.4	32.2
Single parent, %	9.5	8.1	6.6	9.5	9.9
Lives alone, %	28.8	28.7	32.6	28.8	29.1
Others not classified, %	6.3	3.7	9.3	6.8	6.9

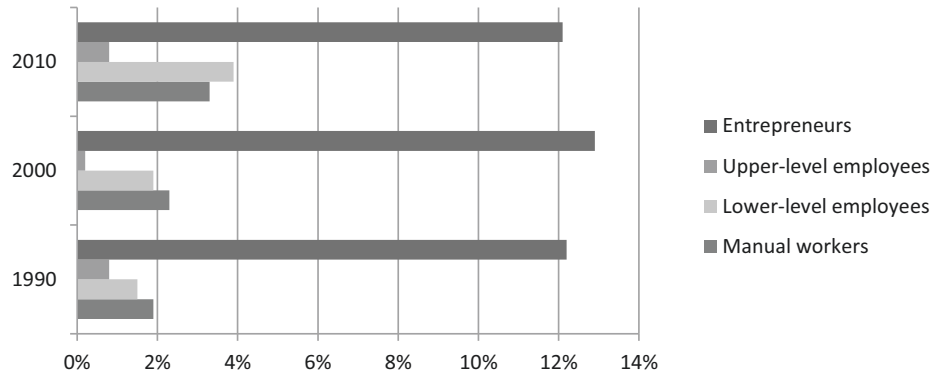
Note: Because of small number of observations, the poverty risks are not shown for families with more than two children.

alone (29.1%) were the largest groups in 2010. Despite growing number of single-person households, their proportion have remained stable or even decreased since the 1990s.

The following examines in-work poverty based on the socio-economic status. Figure 2.6 shows the in-work poverty risks for four different socio-economic groups. The risk of poverty among upper-level employees was less than one percent in all the examined years. In 2010, the risk-of-poverty among manual workers ws 3.3% and for the lower-level employees it was 3.8 %. The high risk of poverty among entrepreneurs is noteworthy, each year higher than 10 percent. This high poverty risk can be explained by a high number single entrepreneurs, over-indebtedness and insufficient income data (Talousneuvosto, 2001).

Table 2.3 shows the risk-of-poverty rates based on the employment type. Full-time salary work offers the best protection against poverty. Part-time employees and single entrepreneurs have a substantial poverty risk. The risk of poverty among part-time employees and their proportion of the working poor have more than doubled since the be-

Figure 2.6 In-work poverty by socio-economic status.



Source: IDS, author's own calculations.

Table 2.3 In-work poverty risks by the employment type.

	1990	1995	2000	2005	2010
Employment type					
Part-time employee, %	5.7	4.7	6.2	8.0	12.1
Full-time employee, %	1.7	1.1	2.0	1.9	2.4
Entrepreneur, %	9.1	10.8	11.8	10.8	10.8
Single entrepreneur, %	11.7	17.2	17.2	15.0	15.6

ginning of the 1990s. Thus, it can be assumed that a significant portion of the increased the-risk-poverty rate can be explained by the increased amount of part-time work.

However, part-time work is often voluntary. This is problematic since poverty is by definition involuntary. The data does not allow for distinguishing between voluntary and non-voluntary part-time work. However, involuntary part-time work has been studied before. According to Kauhanen, Nätti and Miettinen (2012), the proportion of non-voluntary part-time workers was 27 percent in 2010.

2.4.1.1 Logit Regressions for the Years 2000 and 2010

Tables 2.4 and 2.5 present the results from logit models for the years 2000 and 2010. The outcome variable receives the value of 1 if the person is defined poor and otherwise 0. For

clarity, only marginal effects are shown. In the case of dummy variables, marginal effects show the change in probability of being poor when the value of an explanatory variable changes from zero to one, and all other explanatory variables are kept constant at their means. The models allow for studying the statistical association, for example, between socio-economic status and the probability of poverty. The results should be interpreted as associations rather than causal relations.

In 2010, low educated individuals, part-time workers, single parents and people who live alone had the highest probabilities of being poor. Single parents are the largest risk group. On average, the probability of being poor declines with age. Gender does not have a statistical association to poverty in the comparison years. In 2000, being married decreased slightly poverty probability, but there is no longer effect in 2010. The place of residence has no statistically significant association to poverty. When comparing the years 2000 and 2010, single parents' poverty probability increased by 5.5 percentage points when couples without children are used as a reference group. The probability of being poor for alone living individuals decreased three percentage points in 2010.

Table 2.4 Marginal effects, dependent variable is a dummy for being working poor (0,1) in 2000.

Variable	Marginal effect	*SE*	*p-value*	[95% confidence interval]	
EDUCATION					
High	Ref.	Ref.	Ref.	Ref.	
Middle	0,018	0,125	0.138	-0,006	0,043
Low	0,035*	0,021	0.092	0,005	0,076
SOCIO-ECONOMIC STATUS					
Entrepreneurs	Ref.	Ref.	Ref.	Ref.	
Manual workers	-0,079***	0,006	0,000	-0,092	-0,067
Upper-level employees	-0,058***	0,006	0,000	-0,070	-0,047
Lower-level employees	-0,082***	0,006	0,000	-0,095	-0,068
EMPLOYMENT TYPE					
Full-time	Ref.	Ref.	Ref.	Ref.	
Part-time	0,115***	0,020	0,000	0,075	0,155
HOUSEHOLD TYPE					
Couple without children	Ref.	Ref.	Ref.	Ref.	
Lives alone	0,085***	0,016	0,000	0,052	0,118
Single parent	0,102***	0,028	0,000	0,045	0,159
Couple with children	0,027***	0,008	0,001	0,011	0,043
Other unclassified	-0,003	0,008	0,691	-0,020	0,135
REGIONAL CHARACTERISTICS					
Small municipalities	Ref.	Ref.	Ref.	Ref.	
Helsinki and metropolitan area	0,112	0,007	0,117	-0,020	0,013
Large university cities	-0,005	0,007	0,441	-0,194	0,008
Other major centers	-0,003	0,008	0,706	-0,020	0,013
Age	-0,001***	0,000	0,000	-0,002	-0,000
Woman	-0,006	0,005	0,248	-0,015	0,004
Married	-0,011**	0,005	0,049	-0,022	-0,000

Statistically significant at 10% (*), 5 % (**) and 1 % (***) confidence level.

Table 2.5 Marginal effects, dependent variable is a dummy for being working poor (0,1) in 2000.

Variable	Marginal effect	*SE*	*p-value*	[95% confidence interval]	
EDUCATION					
High	Ref.	Ref.	Ref.	Ref.	
Middle	0.015*	0.009	0.087	-0.002	,0.032
Low	0.065**	0.019	0.001	0.026	,0.104
SOCIO-ECONOMIC STATUS					
Entrepreneurs	Ref.	Ref.	Ref.	Ref.	
Manual workers	-0.060***	0.006	0.000	-0.073	-0.047
Upper-level employees	-0.068***	0.006	0.000	-0.079	-0.056
Lower-level employees	-0.068***	0.007	0.000	-0.082	-0.056
EMPLOYMENT TYPE					
Full-time	Ref.	Ref.	Ref.	Ref.	
Part-time	0.093***	0.176	0.000	0.583	0.127
HOUSEHOLD TYPE					
Couple without children	Ref.	Ref.	Ref.	Ref.	
Lives alone	0.055***	0.015	0.000	0.026	0.084
Single parent	0.157***	0.037	0.000	0.086	0.229
Couple with children	0.015*	0.008	0.072	-0.001	0.030
Other unclassified	-0.004	0.008	0.660	-0.021	0.013
REGIONAL CHARACTERISTICS					
Small municipalities	Ref.	Ref.	Ref.	Ref.	
Helsinki and metropolitan area	-0.011	0.007	0.115	-0.025	0.003
Large university cities	0.008	0.009	0.370	-0.003	0,025
Other major centers	0.019*	0.118	0.083	-0.003	0.041
Age	-0.002***	0.000	0.000	-0.002	-0.002
Woman	-0.004	0.006	0.539	-0.163	0.009
Married	0.000	0.007	0.955	-0.013	0.016

Statistically significant at 10% (*), 5 % (**) and 1 % (***) confidence level.

2.5 Short-term Poverty Dynamics

Poverty essentially has a dynamic dimension. The dynamics of poverty is not only related to the way an individual experiences poverty, it also helps to reveal the poverty structure of the whole society. Societies with the same poverty rates can involve very different kinds of poverty. In a society A, a large portion of the population experiences short-term poverty, and these periods of poverty are evenly distributed. In a society B, the periods of poverty are long, and short periods of poverty affect the same groups. The society A must be considered more just. (Moisio, 2004, p. 1)

Poverty dynamics is examined using the rotating panel feature of the IDS data. In the rotating panel, households' members are followed for two consecutive years so that half of the respondents are replaced by new households each year. It should be noted that the data does not include a panel sample weight. For this reason, this study uses the geometric average of the panel specific sample weights for the consecutive years.

2.5.1 Poverty flows

Short-term poverty dynamics can be studied by examining poverty in-flows and out-flows. Large in-flows and out-flows indicate a short-term poverty problem. Correspondingly, small entry and exit flows mean that fewer people experience poverty, but poverty is longer-term and deeper. Thus, studying poverty dynamics reveals more about the characteristics of poverty and its distribution than cross-sectional examinations.

Table 2.6 examines poverty flows between the years 2000 and 2010. Based on table 2.6, the in-flows and out-flows have been at 50–60 percent, and the rate of remaining in poverty for the consecutive years has been at 40–50 per cent. The right-hand side column presents the exact figures for the conditional probability of remaining poor. On average, 45.0 percent of the working poor remained in poverty for two consecutive years.

Poverty flows can also be used to study changes in the number of working poor. The annual entry flow into poverty has been very close to the exit flows. These poverty in-flows and out-flows indicate that in-work poverty has not significantly grown during the 2000s. The entry and exit flows correspond to the in-work risk-of-poverty rates in the 2000s, although the rate has been slowly growing (see Figure 2.1). It should be noted that the results depend on the sample weight, the number of employed persons per year and attrition in the panel.

Table 2.6 Poverty flows and the probability of remaining in poverty over consecutive years.

Pairs of years	In-flow	Out-flow	Remaining in poverty
	%	%	%
2000-2001	66.9	61.7	38.1
2001-2002	58.1	31.7	41.2
2002-2003	53.0	53.1	42.1
2003-2004	54.9	50.0	36.8
2004-2005	52.9	58.2	45.5
2005-2006	57.6	54.6	41.8
2006-2007	62.2	63.3	50.0
2007-2008	54.1	57.9	46.9
2008-2009	55.1	58.8	38.3
2009-2010	61.4	61.9	38.3

2.5.2 The Income Mobility of the Poor

The following examines the share of individuals who rose above the poverty threshold because of a significant increase in income, or a significant decrease in income and consequently falling below the poverty line. Examining sufficiently large changes in income is justified because small changes around the poverty line can be meaningless for individuals' well-being and experience of poverty. Here, a significant increase or decrease in income refers to at least a ten-percent change in equivalent income.

Table 2.7 examines income mobility 2002-2010. In the table, a positive change implies at least a ten-percent increment in equivalent income and moving above the poverty line. Similarly, a negative change means at least a ten-percent decrease and moving below the poverty line. It should be noted that absolute changes in Euro are different depending on the positive or negative change. Based on Table 2.7, even eight out of ten individuals rising above the poverty line increased their income by at least 10 percent. However, approximately half of those who entered poverty experienced a decrease in income of at least 10 percent.

Income mobility allows for studying whether low paid jobs act as a 'ladder' toward better-paid jobs. The results support the ladder hypothesis to some extent. On average, the income of seven out of eight individuals increased substantially after a one-year period of poverty. However, income changes can be explained by several factors. For

example, income can increase because of better benefits, increased work intensity or a spouse entering the labour force. Still, the results can be interpreted as a sign of social mobility.

2.6 Conclusions

In-work poverty risk trended upwards between 1990 and 2010, but it remained at a moderate level. A significant reason for the increased poverty risk was the rising number of part-time workers at the beginning of the 1990s. The depth of poverty measured by the risk-of-poverty gap decreased slowly from the recession of the 1990s until the end of the 2000s. Although the poverty risk remained low, the risk of poverty among risk groups increased substantially during the examined time period. This implies growth in inequality in Finland.

The youth aged 18-24 experienced the largest increase in the risk of poverty. In 2010, every sixth young working individual was defined as working poor. In terms of education, the poverty risks among primary educated individuals increased significantly from the beginning of the 1990s. In terms of households, deviations from the dual dual-earner model increased the poverty risk more than before. By the household type, single persons, single parents and households where the other adult was not working or worked part-time had the largest increase in poverty risks. Among risk groups, only individuals who live alone had a minor increase in the risk of poverty.

A growing gap emerged between full-time workers and individuals in weaker labour market positions. A high level of education and full-time work provided the best protection against poverty. Education became a more important factor in protecting from poverty. People with a primary-level education, single parents and young employees were in the weakest position. Based on the type of employment, part-time workers, entrepreneurs and particularly single entrepreneurs were risk groups. Social transfers and social corporatism have had an important role in reducing in-work poverty. The coordinated wage bargaining of the past decades, with one goal of reducing income inequality, was used as a tool for building the welfare state and can still be seen in the structures of the economy (Kiander, Sauramo & Tanninen, 2009). From the perspective of the working poor, the bargaining power of trade unions has compressed the wage distribution (Bradley et al., 2003).

Table 2.7 Income mobility of the working poor.

	%
2009-2010	
Negative change in income	48.9
Positive change in income	75.4
2008-2009	
Negative change in income	47.5
Positive change in income	86.7
2007-2008	
Negative change in income	54.6
Positive change in income	77.1
2006-2007	
Negative change in income	50.8
Positive change in income	87.0
2005-2006	
Negative change in income	57.2
Positive change in income	87.9
2004-2005	
Negative change in income	50.4
Positive change in income	84.5
2003-2004	
Negative change in income	43.1
Positive change in income	86.4
2002-2003	
Negative change in income	67.3
Positive change in income	85.7

Note: Negative income change refers to the proportion of the working poor who experienced at least 10% decrease in their equivalent income out of all working poor with negative income changes. Positive income change refers to the proportion of the working poor who experienced at least 10% increase in their equivalent income out of all working poor with positive income changes.

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3 INCENTIVISING LAST-RESORT SOCIAL ASSISTANCE CLIENTS: EVIDENCE FROM A FINNISH POLICY EXPERIMENT

Abstract

In 2002, the Finnish government introduced an earnings disregard experiment aimed at improving the incentives of low-income individuals who receive last-resort social assistance. The aim of the experiment was to reduce unemployment by providing social assistance clients better incentives to receive at least temporary or part-time work. This paper evaluates the employment effects of the experiment as an event study using coarsened exact matching (CEM) and difference-in-differences. On average, the results show no employment effects, but there is some evidence of positive employment effects on women.[1]

Keywords: Difference-in-differences, making work pay, earnings disregard, welfare
JEL: C93, H53, I38, J68

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3.1 Introduction

Making work pay policies have been introduced to improve financial incentives to accept work and alleviate poverty. These aims are vital within social transfer systems that impose high marginal taxes on low-income individuals. While in-work benefits are often implemented through tax credits, earnings disregards function within a social transfer system. They imply that benefits are withdrawn less than in a one-for-one ratio when a recipient starts to earn income.

In 2002, a three-year experiment – nowadays a permanent policy – was introduced in Finland, allowing for a monthly earned income disregard up to €100 for social assistance recipients. In 2005, the maximum amount was increased to €150. Before the reform, social assistance was reduced one-for-one when a recipient started to earn income. The reform is effectively equivalent to reduced tax rates, consequently leading to an increase in the effective wage rate. Standard economics theory would predict a higher labour supply for low-income individuals as a result of the reform.

The purpose of this paper is to evaluate the Finnish earnings disregard experiment using a quasi-experimental design. This evaluation is based on high-quality individual-level register data that cover the years 1995-2007. While many of the in-work benefit programs are targeted at specific demographic groups such as working families or single mothers, the Finnish experiment was targeted at all social assistance clients without additional eligibility conditions. The earnings disregard is evaluated as an event study. The empirical approach uses difference-in-differences with coarsened exact matching and individual fixed effects. The control group is formed of means-tested labour market subsidy recipients. Labour market subsidy is meant for unemployed persons who enter the labour market for the first time or who have not worked long enough so that they are not entitled to earnings-related unemployment insurance. On average, the results show no employment effects, but there is some evidence of women's positive employment response to the earnings disregard.

This study is motivated by several factors. First, the maximum €150 monthly income increase can be significant for individuals living under the poverty line. Second, last resort-social assistance recipients are a substantial and policy-relevant group for their high rate of unemployment and social exclusion. For example, in 2002, when the policy was introduced, 8.3% of the population received last resort social assistance. Last, quasi-experimental labour supply evidence related to making work pay policies is limited in

Nordic countries[2].

This paper is organised in the following way. The next section introduces related literature and contributions. The third section describes the social security system in Finland and provides details on the experiment. The fourth section describes the empirical strategy and the data. The fifth section provides the results and discusses the sensitivity of the estimations, and the last section concludes.

3.2 Related Literature

Internationally in-work benefits are widely used and researched. More than half of the OECD countries have implemented an in-work benefit (Immervoll & Pearson, 2009). Most of the research has focused on the earned income tax credit (EITC) in the United States and its close counterpart in the United Kingdom. The EITC is a refundable tax credit for low-income families with qualifying children. Several studies have found the EITC increased the labour supply at the extensive margin but not at the intensive margin((Eissa & Liebman, 1996; Eissa & Hoynes, 2004; Hotz & Scholz, 2006). For example, Nichols and Rothstein (2015) review the literature on the EITC. Recently, Kleven (2019) has questioned the consensus related to the effectiveness of the EITC reform. His estimations imply that the earlier results were driven by confounding effects of welfare reform and a booming macroeconomy. The British Working Families' Tax Credit (WFTC) was introduced in 1999. In contrast to the EITC, the British tax credit has a minimum 16 hours of work a week condition and no phase-in region. Francesconi and Van der Klaauw (2007) found a large seven percentage point increase in single mothers' employment rate. Blundell, Brewer and Shephard (2005) found that the WFTC and related reforms increased single parents' employment by around 3.6 percentage points. Since other reforms were introduced at the same time as the WFTC, several other studies use a structural model. For example, Brewer et al. (2007) found that the reform increased the labour supply of single mothers by around 5.1 percentage points.

The EITC and its British counterpart work through the tax system. Some studies have found substantial behavioural effects on the labour supply for welfare recipients.

[2] To our knowledge, the effects of in-work benefits or earnings disregards on social assistance clients have not been studied in a Nordic country before. Edmark et al. (2016) evaluated the Swedish earned income tax credit, but they concluded that the reform could not be evaluated using a quasi-experimental design. Related to the same EITC scheme in Sweden, Laun (2017) utilised a larger EITC for older workers above the age of 65. There are also some studies on supplementary UI benefits. Kyyrä, Parrotta, and Rosholm (2013) studied a supplementary UI benefit in Denmark, and Kyyrä (2010) studied a similar scheme in Finland.

The Canadian Self-Sufficiency Project was designed to provide evidence of the effects of a generous financial incentive on long-term welfare recipients. One-third of the single-parent welfare recipients began to work full-time (at least 30 hours a week), but the temporary program did not have a lasting effect on wages or receiving welfare (Michalopoulos, Robins, & Card, 2005). Lemieux and Milligan (2008) provided labour supply evidence from a substantial incentive change in social assistance. In Quebec, social assistance recipients under the age of 30 without children received benefits 60% lower than the recipients older than 30. Using a regression discontinuity design, the authors found that the employment rate dropped from three to five percentage points after the increase in social assistance payments.

Others have studied income disregard policies implemented through the social transfer system. Knoef and Van Ours (2016) studied an earnings disregard experiment for single mothers in Holland. In the Dutch experiment, single mothers were allowed to earn €4 per hour up to €120 per month without having it deducted from their welfare benefits. Using a triple difference-in-differences approach, they found a positive employment effect for immigrants but a small effect for native single mothers. Matsudaira and Blank (2014) evaluated changes in earnings disregards on U.S. welfare recipients following welfare reform in 1996. Although some states introduced large earnings disregards, they found little evidence of increased labour supply because only a few women used the earnings disregards. These results imply that the labour supply effect may be different depending on whether the in-work benefit is implemented through the tax or social transfer system.

This paper contributes to the earlier literature in two ways. First, since everyone receiving social assistance was eligible, labour supply responses can be compared across many demographic groups. Previous literature has typically focused on narrow demographic groups, such as single mothers or families with dependent children. Second, the literature is mainly focused on the USA and the U.K., with relatively low benefits and high incentives. Finland is representative of a Nordic country with low incentives and high benefits. Nordic countries tend to have a high rate of social spending but a higher rate of unemployment linked to a different institutional setting.

3.3 Background

3.3.1 Social Assistance in Finland

According to the constitution of Finland, everyone is entitled to the basic income and care necessary for a dignified life. Social assistance is meant to provide this last-resort minimum level of income. It is means-tested at the family level and generally granted on a monthly basis. Social assistance is meant to be temporary and secondary in the sense that it comes on top of other primary benefits such as housing allowance and labour market subsidy. However, primary benefits have become increasingly insufficient to cover individuals' and families' living expenses, causing overlap with last-resort social assistance.

A deep recession at the beginning of the 1990s increased the number of social assistance clients. The share of individuals receiving social assistance nearly doubled from 6.3% to 11.9% between 1990 and 1996. Both poverty, at a wide range of measures, and inequality rose after the recession (Riihelä, 2009). After 1996, the share of individuals receiving social assistance started to decline until the financial crisis in 2008. However, long-term dependency on social assistance has increased, and the average length of social assistance reached six months in 2010 (Kauppinen, Moisio & Mukkila, 2013, p. 40). In an effort to reduce the number of people receiving social assistance and long-term unemployment, activation policy emphasising individual responsibility has become the guiding policy - the earnings disregard reform being one example.

3.3.2 Eligibility for Social Assistance

All individuals living in Finland are entitled to receive social assistance. Eligibility and entitlement amounts can be described by a simple formula:

$$SA = max[0;(B+A+H)-Y], \tag{3.1}$$

where B describes the basic part of social assistance. The basic part is meant to cover food, clothing, phone, transportation, internet, basic health and small costs for hobbies and leisure. In 2021, this minimum level of basic income was €504.06 a month for an individual who lives alone. The basic part is a function of household composition. H describes necessary housing expenses and covers, for example, acceptable rent, electricity

and heating. A describes discretionary expenses that can be covered with supplementary and preventive social assistance. They are meant to support social assistance clients' independent living. Supplementary social assistance covers extraordinary expenses, such as sudden housing costs or expenses related to parenting. Preventive social assistance can be granted to ease sudden adverse changes in finances.

Y describes family members' summed earned income and primary benefits. Y includes earned income and assets that are easily liquidated and not necessary for basic living or work. Y also includes primary benefits, such as child benefits, labour market subsidy and housing allowance. The labour market subsidy and housing allowance are means-tested. Because multiple benefits are means-tested and extra benefits can be collected back at a later stage, it is often difficult to know how extra earnings affect disposable income creating income uncertainty. If the family members' summed income in equation 3.1 is smaller than acceptable expenses, an applicant is entitled to social assistance.

3.3.3 Set up of the Experiment

The earnings disregard experiment became effective in April 2002. It started as a three-year experiment but became a permanent policy in 2014. It allowed for social assistance clients to keep at least 20% of their earned income up to €100 (€150 as of 2005) a month without having it deducted from their social assistance payments. The experiment was household-specific so that one household was entitled to only one maximum €150 amount disregarded irrespective of the number of earners in a household. This creates relatively a larger incentive effect for small households. The aim of the experiment was to decrease unemployment by providing social assistance clients incentives to take at least temporary or part-time work. Ideally, the goal of the experiment can be summarized as a three-stage model (Hiilamo, Karjalainen, Kautto, & Parpo, 2004, p.68):

- In the first stage, a social assistance client has no earned income or very little.
- In the second stage, the experiment provides incentives for extra income. The new income stays at a level at which the social assistance client is entitled to the disregarded earnings amount but does not lose his or her social assistance.
- In the third stage, the social assistance recipient is attached to the labour market

due to higher incentives and has no need or little need for social assistance.

Figure 3.1 shows a stylized budget constraint without the earnings disregard and with the disregard excluding other benefits. The budget constraints are calculated for an individual who lives alone using the basic social assistance amount (€ 378.54) in 2005[3]. The social assistance amount depends on household size and individual conditions, and the budget constraints differ accordingly. The vertical axis shows disposable income as a function of earned income. The BC line indicates disposable income before the earnings disregard experiment[4]. For a social assistance client with low earning potential, it is not optimal to accept irregular or temporary work. The BDA and BEFA lines present the budget constraints after the earnings disregard experiment is introduced.

The social assistance law allowed municipalities and social workers to decide the disregard percentage between 20% and 100% they applied to earned income (at most € 150). The lines BDA and BEFA present the budget constraints at these extremes. When 20% of the earned income is disregarded, the maximum monthly benefit from the experiment is € 100, and after earning € 478.54, an individual is no longer eligible for social assistance. This indicates a small incentive effect at a very low income. On the CD line, there may be some individuals who may reduce their labour supply after the experiment, but this case seems quite trivial. Line BEFA shows the budget constraint at the other extreme when 100% of the earned income is disregarded. Here, it is optimal to work until point E - that is, to earn € 150. For more than € 150 in earnings, the marginal tax rate is 100%.

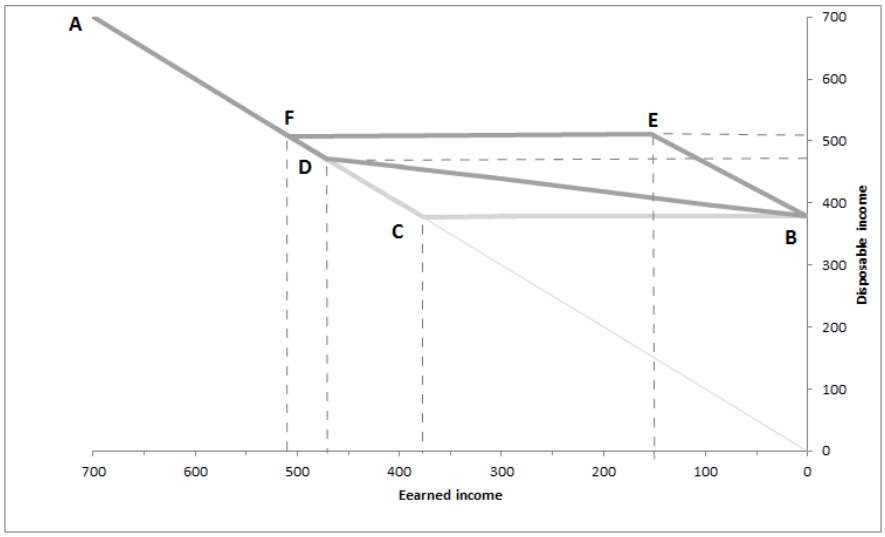
At the time of the experiment, there was no uniform policy on how the earnings disregard policy was implemented across different municipalities. Likely because of the high volume of social assistance applications and due to cost reasons, in most municipalities, the computing systems were set to automatically disregard the minimum 20%. Still, social workers used discretion in applying the disregard percentage[5]. Because it is not known how much was disregarded, this is an intention-to-treat research setting.

[3]The budget constraints do not take into account interactions from other social transfers and benefits. The social assistance is dependent on the household type and housing costs which generally increase the amount of social assistance.

[4]A negligible amount of earnings and gifts was already disregarded before and after the experiment. This amount was generally € 50, but the practice varied across municipalities.

[5]Karjalainen et al. (2013, pp. 193-195) interviewed 142 social workers in nine municipalities and asked how they applied the earnings disregard. Based on the social workers' interviews in 2012, 47% usually disregarded 20% of the earned income, and 43% disregarded the maximum amount € 150. Ten percent of the social workers disregarded between these extremes.

Figure 3.1 Budget constraints for single persons before and after the earnings disregard experiment.



Note: the lines BCA show the old policy. The lines BDA show the budget constraint when 20% is disregarded. The lines BEFA show the budget constraint with €150 disregarded.

3.4 Empirical Strategy

3.4.1 Difference-in-Differences with Coarsened Exact Matching

The aim of this paper is to causally evaluate the employment effects of the earnings disregard experiment. Observable differing characteristics between the treatment and control groups are balanced using coarsened exact matching (Iacus, King & Porro, 2012). CEM coarsens the selected variables into strata and performs exact matching on the coarsened data. The CEM algorithm allows for decreasing imbalance in any variable without increasing imbalance in any other variables. This monotonic imbalance property reduces model dependence accounting for interactions and non-linearities.

The main identifying assumption is the parallel trends assumption, that is the control and treatment groups would have had parallel trends in the absence of treatment. An

individual fixed effects model is estimated with the following specification:

$$Y_{it} = \alpha_i + \gamma_t + \sum_{\substack{s=-7 \\ s\neq -1}}^{5} \beta \times \mathbb{1}[t = s] \times D_i + \epsilon_{it}, \tag{3.2}$$

where α_i and γ are individual and year fixed effects, respectively. The i denotes an individual. The main outcome variable Y_{it} is yearly earnings. This is the most accurate employment measure in the data, and it covers all years between 1995 and 2007. The models are also estimated using work months as an outcome. This variable includes the years 1997-2007 and does not contain entrepreneurs. Yearly earnings also contain entrepreneurial income. The treatment variable D is defined solely on a pretreatment period in 2001 (-1). This is because the earnings disregard increased eligibility for social assistance, and there is likely some inflow to social assistance in the post-treatment period. Period -1 is used as a reference category. The regressions are estimated with CEM-weights, and the standard errors are clustered at the individual level.

All variables are measured at the individual level. Although social assistance is means-tested at the family level, it is granted to the applicant. The earnings disregard was household-specific, so that one household was entitled to a maximum €150 earnings disregard. In the means-testing, the social assistance applicant's earnings and spouse's earnings were disregarded up to €150. Because social assistance is means-tested at the household level and the experiment changed spouses' incentives, the results are also estimated without social assistance clients' spouses who belong to the control group.

The labour market subsidy recipients form a similar group to social assistance recipients. The labour market subsidy is a means-tested benefit provided by the government. It is meant for unemployed persons who enter the labour market for the first time or who have not worked long enough so that they are not entitled to earnings-related unemployment insurance. The labour market subsidy is paid on weekdays only, and the paid amount was €33.78 a day in 2021. There is no duration limit in the labour market subsidy. As a robustness check, the results are also estimated using only home-owning labour market subsidy recipients as a control group. This group does not receive social assistance for predominately exogenous reasons. Homeowners are entitled to social assistance, but their earnings are higher on average, and they have more often a spouse to support their economic well-being.

3.4.2 Data and Sample Selection

This evaluation uses rich individual-based panel data collected by Statistics Finland. The register-based data cover the years from 1995 to 2007, each year containing more than 500 000 observations with a variety of income as well as socio-demographic and regional characteristics. The observations form a representative sample of approximately 10% of the Finnish population. Ages 18-64 are included to reflect primary working age. All variables are measured on a yearly level. Register-based data sets from the experiment time do not contain monthly earnings that could be linked to monthly social assistance. Using yearly measures likely adds some inaccuracy to the results. Since social assistance is granted monthly, monthly data would capture the experiment effect more precisely. Monthly data would capture a treatment effect on those social assistance clients who did not receive it in 2001 but received it for some month(s) before the experiment in 2002. The benefit of yearly measures is that the control group is, to a larger extent, formed of individuals and families that were not eligible or did not apply for social assistance.

Table 3.1 shows how many months social assistance and labour market subsidy were received in 2001. The reported values are for ages 18-64. Social assistance recipients are more often short-term recipients. Table 3.1 shows that 21.2% of social assistance clients received it for only one month, and 13.5% of labour market subsidy recipients received it for one month. The empirical model does not capture positive treatment effects on those social assistance clients who received social assistance in 2001 but not afterwards. Of all social assistance clients who received social assistance in 2001, 64.9% received it in 2002, 55.6% in 2003, 47.1% in 2004 and 33.6% in 2007[6]. Twenty-two percent (21.6%) of social assistance clients did not receive social assistance on any consecutive year between 2002 and 2007.

[6]The frequencies are author's calculations from the data. The frequencies were calculated for social assistance clients aged 18-64 in 2001.

Table 3.1 Social assistance and labour market subsidy dependency in 2001.

Variable	Social assistance	Labour market subsidy
Months received	5.33 (3.95)	6.64 (4.05)
Cumulative month distribution		
1	21.17	13.51
2	35.13	22.02
3	44.99	30.61
4	52.0	37.49
5	58.39	44.23
6	63.73	51.37
7	68.55	56.83
8	73.04	62.13
9	77.51	67.18
10	82.20	71.97
11	88.01	77.16
12	100	100
Observations	17 375	21 238

Notes: 1) The reported values are averages except for the cumulative distribution function. Standard deviations are shown in parentheses. 2) Labour market subsidy is granted for weekdays only. Labour market subsidy months are calculated assuming that there are 21.5 weekdays in a month. Days below 10.75 are rounded upwards to one month.

Table 3.2 shows descriptive statistics on labour market status and employment in 2001 (aged 18-64). Social assistance clients have approximately €1400 higher yearly earnings, and the earnings have considerably more variance. Receiving social assistance can be very temporary, or it can become a long-term dependency. Short-term recipients are more often students, they may be between jobs, or for various reasons, they have experienced a sudden but temporary loss of income. Table 3.2 also shows that hourly wages have more variation for social assistance recipients. The higher share of short-term recipients and higher variance in earnings imply that some of the social assistance clients have a reasonably good labour market position. It is likely that these short-term recipients became employed for reasons unrelated to the earnings disregard.

Table 3.2 Descriptive statistics on labour market status in 2001.

Variable	Social assistance	Labour market subsidy
Earnings (€)	4679.0 (7135.1)	3256.8 (4617.5)
Months employed	3.63 (4.44)	3.12 (3.85)
Hourly wage (€)	9.09 (16.5)	8.30 (3.60)
Main activity, %		
Employee	30.14	27.22
Unemployed	34.72	51.72
Student	13.09	9.77
Retiree	8.89	0.45
Disability retiree	0.30	0.16
Military or civilian servant	0.64	1.22
Outside the labor force	12.22	9.46
N	17 375	21 169

Notes: (1) The reported values are averages for earnings, work months and hourly wages (aged 18-64). Standard deviations are shown in parentheses. (2) Main activity refers to activity in the last week of the year.

Table 3.2 also shows the main activity in the last week of the year. The shares of activity appear quite similar. For example, the share of employees and individuals outside the labour force is similar between the social assistance and labour market subsidy recipients. A distinctive characteristic is a larger share of retirees among the social assistance recipients. Because retirees form a less relevant group for the studied scheme, they are dropped from the sample.

The treatment and control groups are defined so that individuals in the treatment group have received a positive amount of social assistance, and the control group does not receive any social assistance in 2001. Table 3.3 shows summary statistics for the treatment and control groups. In a balanced panel, there are 7137 individuals in the treatment group and 6795 individuals in the control group. Both the treatment and control groups have higher earnings than in table 3.2. The treatment group has higher earnings because retirees were dropped and the control group because individuals who receive social assistance are excluded. In 2001, 33% of labour market subsidy recipients were also social assistance recipients, which is an indicator of a weaker social position as they receive multiple benefits. Table 3.3 also shows that the average time to receive social assistance

was 5.2 months and 6.3 months for labour market subsidy recipients. Social assistance recipients were more often tenants, without a partner, low educated and single parents.

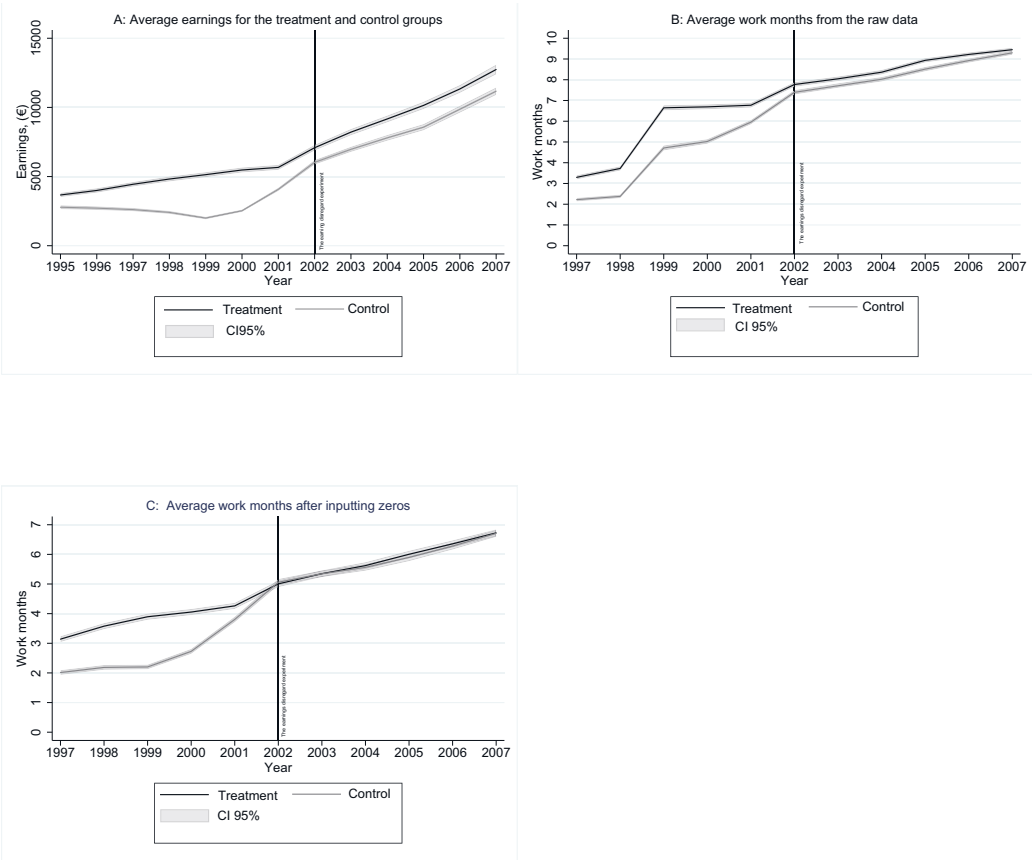
Table 3.3 Descriptive statistics for the selected sample.

	Treatment		Control	
	Mean(Sd.)	Freq.	Mean(Sd.)	Freq.
Earned income (€)	5592.5 (7486.3)	7137	4072.0 (4940.2)	6795
Months employed	4.35 (4.55)	6734	3.91 (4.07)	6385
Months received	5.24 (3.89)	7134	6.30 (3.99)	6790
Age	33.49 (10.43)	7137	35.81 (11.80)	6795
Female	0.46 (0.50)	3308	0.61 (0.49)	4136
Spouse	0.21 (0.41)	1517	0.39 (0.49)	2647
High Education	0.10 (0.30)	689	0.14 (0.35)	962
Middle Education	0.51 (0.50)	3618	0.59 (0.49)	3990
Low education	0.40 (0.49)	2820	0.27 (0.44)	1837
Couple without children	0.09 (0.29)	671	0.18 (0.39)	1255
Couple with children	0.28 (0.45)	2003	0.54 (0.50)	3691
Single parent	0.25 (0.43)	1794	0.12 (0.32)	792
Single person	0.28 (0.45)	2014	0.10 (0.31)	707
Tenant	0.70 (0.46)	5 048	0.37 (0.48)	2512
Observations				
Treatment: 7137				
Control: 6795				

Table 3.2 also shows the main activity in the last week of the year. The shares of activity appear quite similar. For example, the share of employees and individuals outside the labour force is similar between the social assistance and labour market subsidy recipients. A distinctive characteristic is a larger share of retirees among the social assistance recipients. Because retirees form a less relevant group for the studied Figure 3.2 shows the employment trends with earnings and work months as outcomes. The graphs are formed of the panel so that the treatment status is defined on the pre-treatment period, that is, in 2001. Graph 3.2A shows that the treatment and control groups follow similar employ-

ment paths, but the level difference is not constant in the pre-treatment period. This is adjusted by the CEM matching. Graph 3.2B shows average work months from the raw data. Statistics Finland changed its work month classification after 1998. In 1997 and 1998, work months were coded zero for all workdays between 0-15, including individuals who did not have any workdays. After 1998, individuals with no work days received a NULL value. In graph 3.2C, the NULL values are replaced with zeros for all individuals who had zero yearly earnings. This makes the earnings and work month outcomes more comparable.

Figure 3.2 Employment trends for the treatment and control groups.



3.4.3 Matched variables and covariate balance

The following introduces the matched variables. Strictly exogenous variables are chosen. Household types are omitted because these likely affect the treatment. The age of children between 0-2 and 3-8 are included. Young children are less likely to affect the treatment variable, but they may affect the labour supply of their parents. Age is based on quantiles with coarsened bins (24, 34, 44). Earnings are balanced on two pre-treatment periods to avoid endogeneity. The coarsened bins are based on earnings quantiles with coarsened bins in 2000 (0 193 1231 2684 4454 6839 11764). In addition, regional characteristics, education level, sex and students in a pre-treatment period are balanced. Table 3.4 shows the covariate balance before and after matching.

Table 3.4 shows that there is a reasonably good covariate balance. The pre-treatment earnings are not fully balanced, but other variables' covariate balance is zero or very close to it. In CEM matching, there is a trade-off between external and internal validity. The more bins, the more precise the results are, but the results may not be externally valid. After matching, there are 5344 individuals in the control group and 4508 individuals in the treatment group. The unmatched individuals are 1451 and 2620 respectively. Thus, the results are not fully externally valid.

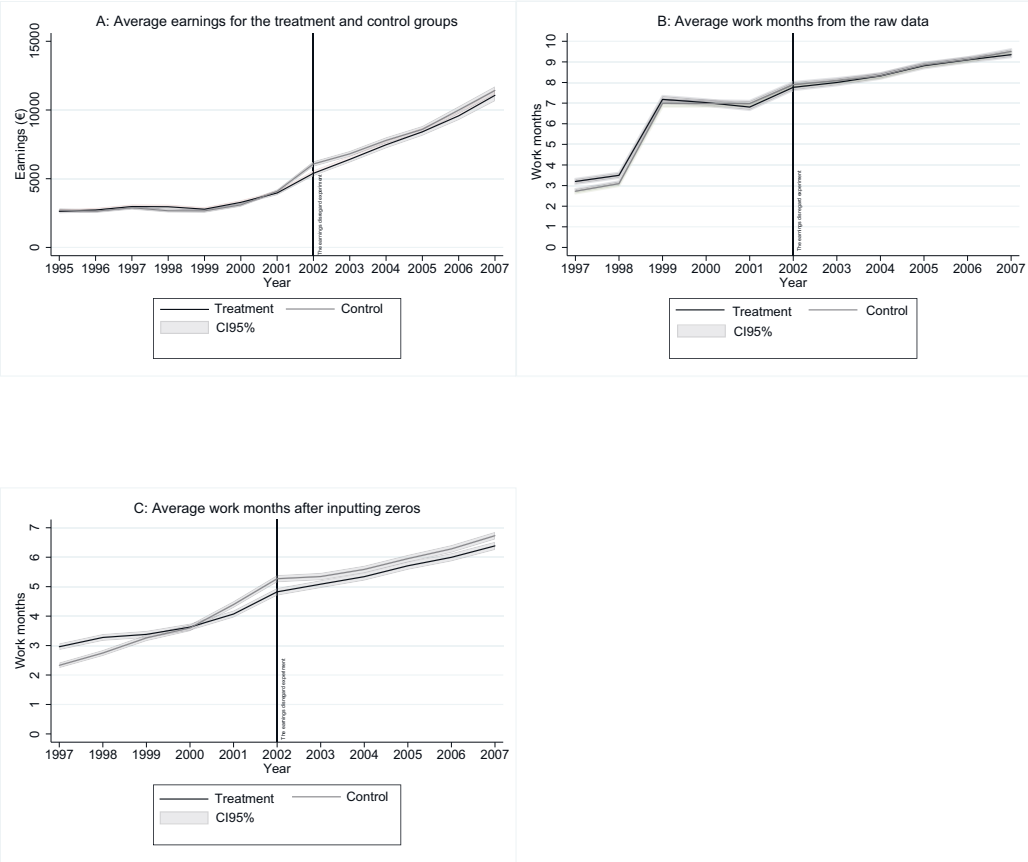
Table 3.4 Covariate balance before and after matching.

	Treatment		Control			
	Un-weighed mean	Weighted mean	Un-weighed mean	Weighted mean	Un-weighed diff.	Weighted diff.
Earnings $_{t=2000}$	5335.65	3280.11	2490.70	3094.19	2845.95	185.92
Earnings $_{t=1999}$	4971.68	2784.52	1963.57	2661.98	3008.11	122.54
Student $_{t=2000}$	0.18	0.14	0.14	0.16	0.04	-0.02
Age	33.40	33.76	35.81	34.02	-2,41	-0.26
Woman	0.46	0.47	0.61	0.47	-0.15	0.00
Low education	0.40	0.40	0.27	0.40	0.13	0.00
Middle education	0.51	0.54	0.59	0.54	-0.08	0.00
High education	0.10	0.06	0.14	0.06	-0.04	0.00
Children 0-2	0.09	0.03	0.03	0.03	0.06	0.00
Children 3-8	0.16	0.09	0.15	0.09	0.01	0.00
Large cities	0.27	0.22	0.16	0.22	0.11	0.00
Towns and rural areas	0.56	0.63	0.68	0.63	-0.12	0.00
N	7137	4508	6795	5344		

Note: Weights refer to CEM-weights and differences are calculated between the treatment and control groups.

Figure 3.3 shows the employment trends after matching. Figures 3.3A and 3.3B show that the pre-trends follow similar paths, and confidence intervals overlap in the pre-treatment period. The employment effects on work months without inputting zeros (Figure 3.3B) are not further studied since only positive workdays were counted after 1998. This intensive margin outcome is not further studied as conditioning on positive earnings causes some bias to the results. 3C shows average work months after inputting zeros if an individual has zero earnings. The pre-trend difference is not constant over time, and these results should be interpreted with caution. It may be more challenging to obtain a good covariate balance with work months as an outcome since the work months is an integer variable with fewer available bins than in earnings.

Figure 3.3 Employment trends for the treatment and control groups after matching.



3.5 Results

This section begins by showing the regression results for four outcomes. In table 3.5, the first column shows the results for earnings and the second column for logged earnings. The third column and fourth columns show the results for work months and logged work months respectively. Work months are estimated for the years 1997-2007 only due to lacking data. Figure 4 plots the treatment effects on yearly earnings and work months.

Figure 3.4A and Table 3.5 show that there are no statistically significant treatment effects on earnings. The drawn confidence intervals show that the treatment effects would not be sizeable even though the effects were at the upper boundary. Figure 3.4B also shows

that the pre-trend differs statistically significantly from zero in the case of work months. As discussed above, it may be more difficult to flatten the pre-trends for work months because work month is an integer variable with fewer available bins than in earnings. Thus, the results should be interpreted with caution. Table 3.5 also reports the results after a logarithmic transformation. This gives less weight to high earning individuals. The results are very close to zero.

Figure 3.4 shows the results for women and men (3.4C and 3.4D). Empirical labour supply literature often finds that women are more responsive to financial incentives than men (e.g. Meghir & Phillips, 2010). There are no statistically significant effects on women or men. As a sensitivity analysis, Figure 3.5 shows the results after adding household types and unemployment in the pre-treatment period -2 to the set of matched variables. That is, the specification is the same as the main specification introduced in section 3.3 but adds household types and pre-treatment unemployment. The household types include single persons, single parents and couples with children and without children. The additional matched variables increase precision to the estimates (bias-variance trade-off), but the household types are potentially endogenous. There are statistically significant effects on women (see Figure 3.5C), but the confidence intervals are wide. Figure 3.5B also shows that the work month pre-trend is flat with the additional matched variables. The treatment effects remain non-significant.

Table 3.5 Estimated treatment effects.

	(1)		(2)		(3)		(4)	
	Earnings		Logged earnings		Work months		Logged work months	
	β^{DiD}	S.E.	β^{DiD}	S.E.	β^{DiD}	S.E.	β^{DiD}	S.E.
t=0	-557.4***	180.4	-0.07	0.13	-0.12	0.09	0.01	0.02
t=1	-278.8	233.1	0.02	0.12	0.06	0.12	0.02	0.02
t=2	-196.9	279.8	0.09	0.12	0.08	0.13	0.03	0.02
t=3	-56.3	298.5	-0.07	0.13	0.08	0.13	0.03	0.02
t=4	-294.5	321.7	-0.09	0.15	0.04	0.13	0.03	0.02
t=5	-233.7	367.9	0.00	0.16	-0.02	0.14	0.00	0.02
N	128076		128076		91143		91143	

Notes: (1) Work months are estimated for the years 1997-2007. Full sample is used for the other outcomes. (2) Standard errors are clustered at the individual level. (3) *Significant at 10%; ** significant at 5%; *** significant at 1%.

Figure 3.4 Estimated treatment effects for the whole sample and women and men.

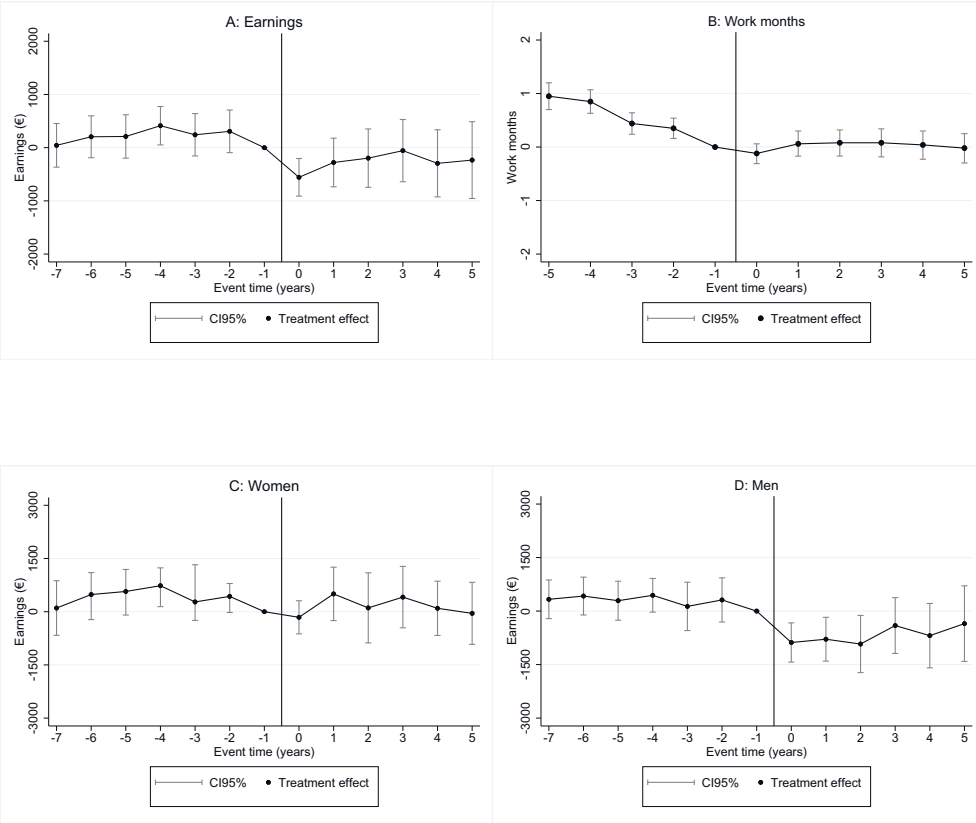
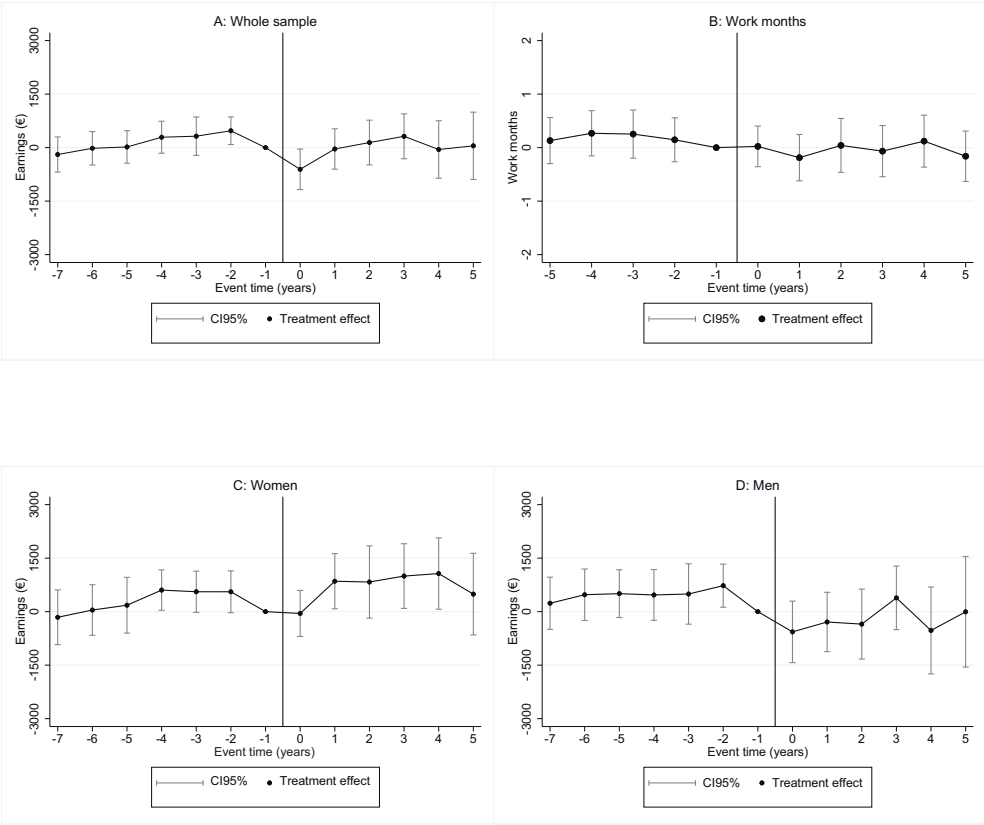


Table 3.6 shows three types of robustness checks. The first result column (1) excludes social assistance clients' spouses who belong to the control group. This is because social assistance is means-tested at the family level, and the earnings disregard was household-specific. This creates a potential downward bias. Table 3.6 shows that the results are very similar without the spouses. This is partly explained by the yearly data. Because the control group did not receive social assistance for one year, it is to a large extent formed of families and individuals who were not eligible for social assistance or did not apply for it. Approximately eight percent (8.2%) of the control group members had a spouse who received social assistance in 2001. Even if there was a treatment effect, the effect would be likely smaller for spouses in the control group. This is because the social assistance was paid to the applicant's bank account. Although families may share earnings, the fact that the spouse did not receive the social assistance could have diminished the perceived incentive effect for the spouses.

Figure 3.5 Estimated treatment effects after adding household types and pre-treatment unemployment in period -2



Note: Household types and pre-treatment unemployment are added to the main specification introduced in section 3.3. Household types refer to single persons, single parents, couples without children and with children. Pre-treatment unemployment in period -2 refers to unemployment in 2000.

The second model (2) in table 3.6 controls for differing pre-existing trends between the treatment and control groups. At first, the earnings growth is predicted for post-treatment years from pre-treatment data separately for the treatment and control groups. Then the trends are subtracted from post-treatment data, and these values are used as outcomes. The results remain very similar. The third result column (3) excludes tenants from the control group. Homeowners are less likely to be eligible for social assistance. One way to measure exogeneity and inflow to social assistance is the share of social assistance clients' spouses in the control group. Only 4.2 % of homeowners had a spouse who received social assistance in 2001. The results do not significantly change, but the treatment effects are more negative, which may be caused by imprecise matching. Fig-

ure 3.6 plots the treatment effects with the main specification (3.6A) and after adding household types and pre-treatment unemployment in period -2 (3.6B). Figure 3.6 shows no positive effects after excluding tenants from the control group.

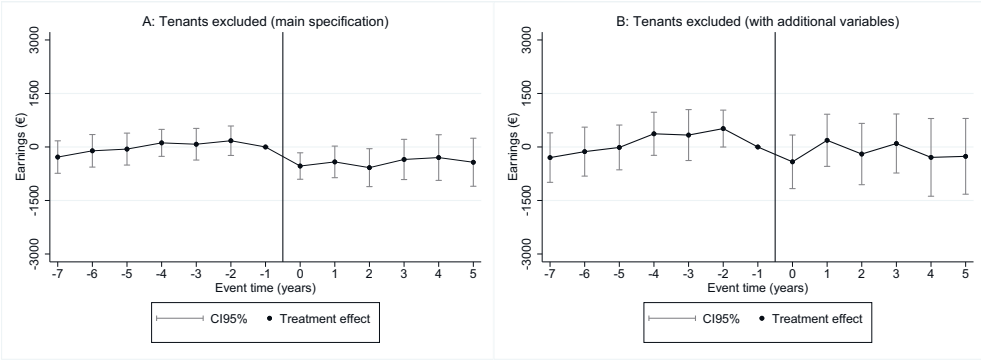
The results show no statistically significant employment effects on average. There is some evidence of women's employment response to the earnings disregard, but the estimations are potentially endogenous, and the sample size limits the examinations. The results appear robust to the potential inflow from the control group as shown by the estimations using exogenous homeowners as a control group and to the changed incentives of social assistance recipients' spouses.

Table 3.6 Robustness checks.

	(1)		(2)		(3)	
	Spouses excluded		Pre-trend controlled		Tenants excluded	
	β^{DiD}	S.E.	β^{DiD}	S.E.	β^{DiD}	S.E.
t=0	-618.2***	183.4	-561.1***	180.4	-543.0***	189.0
t=1	-345.4	237.6	-286.3	233.1	-418.2*	226.0
t=2	-250.2	284.5	-208.2	279.8	-579.8**	271.2
t=3	-85.7	303.0	-71.3	298.5	-349.8	287.6
t=4	-290.8	325.8	-313.2	321.7	-296.9	326.4
t=5	-206.6	373.0	-256.2	367.9	-428.2	343.5
N	122499		128076		91143	

Notes: (1) Earnings are used as a dependent variable. (2) Standard errors are clustered at the individual level. (3) *Significant at 10%; ** significant at 5%; *** significant at 1%.

Figure 3.6 Estimated treatment effects after excluding tenants from the control group. The right hand side figure adds household types and unemployment in period -2 to the main specification.



Note: The left hand side figure plots the treatment effects with the main specification introduced in section 3.3. Household types refer to single persons, single parents, couples without children and with children. Pre-treatment unemployment in period -2 refers to unemployment in 2000.

3.6 Conclusions

This paper examined the employment effects of the Finnish earnings disregard experiment between 2002-and 2007. The results show no significant employment effects on average, but the results suggest a treatment effect on women. The empirical approach does not allow for studying the short-term recipients, and monthly data would provide more subtle results. Although the results suggest no clear positive effects, the new policy had positive aspects. The earnings disregard unambiguously improved social assistance clients' situation with limited fiscal implications. Before the experiment social assistance was effectively reduced in one-to-one ratio after a recipient started to earn income. However, from a policy perspective, there are factors that weakened the effectiveness of the experiment. Applying the earnings disregard at the individual level instead of the household level would have likely given a higher incentive effect. Also, the rules for applying the earnings disregard varied across municipalities. Simple rules should be applied to earnings disregards so that it is easy to perceive how taking up work affects disposable income. Interaction effects from other means-tested benefits add complexity to the social security system making it more difficult to perceive how temporary work affects disposable income.

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4 CHANGING NORDIC MODEL? A POLICY ANALYSIS

Abstract

Based on simulated counterfactual analyses, this paper studies the long-term evolution of key policy outcomes associated with the Nordic model. The simulated risk-of-poverty rates are supplemented with multidimensional Alkire-Foster (AF) poverty indices. Sweden has aimed at efficiency at the cost of equality in the labour market. The Swedish work-line policy increased the risk of poverty by 1.0 percentage point and the Gini coefficient by 0.4. poverty risk of the unemployed increased substantially, by 1.6 percentage points. The Danish flexicurity model involves high benefit levels, and the participation tax rates were the highest. In comparison to Sweden, the Danish model has fulfilled better the egalitarian goals of the Nordic model and performs relatively well in terms of employment. Finland had the most redistributive policy changes, but it fared least well in multidimensional poverty. In Sweden, a significant increase in the poverty risk implies that there are other factors, such as the integration of immigrants, that can pose challenges to the Nordic model.

1

[1]I want to thank Jukka Pirttilä, Jari Vainiomäki, Markus Jäntti and Alari Paulus for their valuable comments. The results presented here are based on EUROMOD version H1.0+. EUROMOD is maintained, developed and managed by the Institute for Social and Economic Research (ISER) at the University of Essex, in collaboration with national teams from the EU member states. I am indebted to the many people who have contributed to the development of EUROMOD. The process of extending and updating EUROMOD is financially supported by the European Union Programme for Employment and Social Innovation 'Easi' (2014-2020). The results and their interpretation are the author's responsibility. I make use of microdata from the EU Statistics on Incomes and Living Conditions (EU-SILC) made available by Eurostat (59/2013-EU-SILC-LFS). Funding from the Strategic Research Council (SRC) at the Academy of Finland (project no. 293120,'Work, Inequality and Public Policy') is gratefully acknowledged.

Keywords: Welfare states, Nordic countries, social protection, poverty, microsimulation
JEL: H23, I32, I38

4.1 Introduction

Although Nordic countries share institutional similarities, Nordic countries have implemented very different labour market and social policies as a response to high unemployment and globalisation in recent decades. Based on simulated counterfactuals, this paper studies the long-term evolution of key policy outcomes associated with the Nordic model. In the Nordic model, social protection is based on extensive social transfers and services that require high employment rates. The aim of this paper is study how policy changes in tax-benefit systems affected poverty, inequality and employment using EUROMOD in Denmark, Finland and Sweden. The Static EUROMOD model is extended to take into account the behavioural effects on employment. The simulated risk-of-poverty rates are supplemented with multidimensional Alkire-Foster (AF) poverty indices.

This paper is motivated by several factors. First, the economics and social policy literature often present welfare regimes as typologies. For example, in his seminal study, Gøsta Esping-Andersen (1990) divides regimes into liberal, conservative and social democratic. Others simply refer to the Nordic welfare model as opposed to the Anglo-Saxon or Central European models. Although Nordic countries share institutional similarities, the benefit levels and labour market policies differ strikingly between the Nordic countries. For example, in Sweden, the central-right government (2006–2014) introduced an 'arbetslinjen' (*the work-line*) policy aimed at increasing labour supply and reducing unemployment. The Danish flexicurity (flexibility + security) model combines a flexible labour market and a generous social security system that has a strong emphasis on active labour market policies. Comparative policy evaluation forms the second motivational factor. From a policy perspective, Nordic countries form natural comparison groups for each other. They share similar institutions, cultural values and population sizes.

EU-wide data (EU-SILC) and the EUROMOD model allow for meaningful country comparisons. The EUROMOD microsimulation model addresses what is known as the 'dependent variable problem'. That is, how to conceptualise, operationalise and measure changes across welfare states (Clasen & Siegel, 2007, p. 4). Macro-level country comparisons suffer from a selection bias caused by varying historical, institutional and po-

litical contexts. Thus, many authors have argued for a policy-level approach to studying changes in welfare states (Kasza, 2002). Because the EUROMOD model is harmonised across countries, it ideally fits for studying policy-level changes in welfare states. Because EUROMOD is an EU-wide model, Denmark, Finland and Sweden are included in the analyses. The Alkire Foster-method (Alkire & Foster, 2011) is used to calculate a multidimensional poverty measure to get a broader picture of poverty and its policy implications. The longest studied time period covers the years 2006–2017.

The results show that Finland had the most redistributive policy changes in the studied time periods. In Finland, policy changes decreased the risk of poverty by 1.4 percentage points and the Gini coefficient by 0.9, but multidimensional poverty values were the highest. The Danish flexicurity model involves high benefit levels, and the participation tax rates were the highest. In Denmark, policy changes decreased the risk of poverty by 0.4 percentage point and increased the Gini coefficient by 0.8 point between 2007 and 2017. The Swedish work-line policy forms an interesting case because it was based to a large extent on monetary incentives, allowing for its extensive evaluation using the EUROMOD model. The centre-right government's work-line policy aimed at increasing labour with policies such as introducing earned income tax credits, reducing benefits and limiting access to early retirement (Gottries, 2018). The policies increased the income gap between labour market insiders and outsiders. According to Dal Bó et al. (2019), the gap between labour market insiders and outsiders increased the popularity of right-wing populism in Sweden. The results show that the work-line policy increased poverty risk by 1.0 percentage point and Gini coefficient by 0.4 point. The poverty risk of the unemployed increased substantially, by 1.6 percentage points. The static EUROMOD model is extended by taking into account behavioural employment effects. Recent quasi-experimental participation literature and the results suggest modest employment effects in Sweden. Sweden is expectational among Nordic countries as both inequality and poverty have increased substantially, and the poverty risk reached the EU level in 2019. According to Eurostat, poverty risk increased by 5.1 percentage points and the Gini coefficient by 3.5 points during the work-line policy 2007-2014. Thus, the Swedish case implies that factors other than tax-benefit changes have more substantially challenged the egalitarian goals of the Nordic model. Multidimensional poverty measures draw somewhat a different picture. Finland had the highest and Sweden lowest multidimensional poverty values. In Finland, multidimensional poverty was related to health and financial burden, and in Sweden, it was related to the monetary risk of poverty.

This paper is organised in the following way. The next section introduces related literature and contributions. The third section explores the institutional settings in Nordic countries. The fourth section presents the data and methodology. The fifth section presents the static and dynamic simulation results, and the last section concludes the paper.

4.2 Related Literature

This study is linked to two strands of literature. The first strand involves studies that simulate the effects of tax-benefit systems on income distribution, and the second involves Nordic labour supply literature. Several studies have used decomposition methods to identify the policy effects on income distribution using the EUROMOD model. Bussolo et al. (2019) studied vertical and horizontal inequality in 28 EU countries between 2007 and 2014. Several papers have studied the distributive effect of changes in European tax-benefit systems after the 2008 financial crisis (Bargain, Callan, Doorley, & Keane, 2017; De Agostini, Paulus, & Tasseva, 2016). De Agostini et al. (2016) included Nordic countries and compared several time periods between 2008 and 2015 after the financial crisis. Paulus and Tasseva (2018) decomposed changes in income distribution into policy changes and changes in the market and population characteristics in 27 EU countries between 2007 and 2011. They found that Sweden had one of the largest poverty increasing policies during this period. Other papers have focused on a specific policy domain, such as the role of automatic stabilisers (Callan, Doorley, & Savage, 2018; Dolls, Fuest, & Peichl, 2012) or fiscal consolidation (Paulus, Figari, & Sutherland, 2017), and some papers have focused on a specific geographic area (Navicke, 2017). In comparison to this study, the above-mentioned studies do not take into account the behavioural labour supply effects of the changes in the tax-benefit systems.

A substantial body of literature has studied the labour supply effects of in-work benefits and various active labour market policies (ALMPs). Evaluation strategies typically follow a quasi-experimental design or structural discrete choice models. The latter strategy involves more stringent assumptions but allows for *ex-ante* reform evaluations. Related to this study, the Swedish earned income tax credit (EITC) has drawn a considerable amount of research attention. The Swedish EITC was implemented in five stages between 2007 and 2014, and it substantially reduced income taxes for low-income individuals. Given the difficulties of evaluating the EITC using a quasi-experimental design

(Edmark, Liang, Mörk & Selin, 2016), structural models have been used. Using the SWE-taxben model, Ryner (2014) found that the EITC increased employment by 90 000 persons and hours worked by 2.4 percent. Flood (2010) estimated that the first four stages improved employment by 72 000 persons. Instead of using a structural discrete choice model, Lundberg's (2017) simulation model uses exogenous elasticities and taxable income rather than hours worked. He estimated that the employment effect was 128 000 individuals or 2.3 percent larger than without the EITC. The estimated degree of self-financing was 21 percent.

The Danish flexicurity model provides high-income security for the unemployed, with high marginal tax rates for low-income individuals. The high tax rates are compensated with ALMPs and investments in job search services for the unemployed. The EUROMOD model allows for studying only the tax-benefit levels (the security part) and the associated monetary incentives of the Danish model. The EUROMOD model excludes activation policies. The Danish government initiated randomised experiments to evaluate the employment effects of activation policies. The first experiment, called Quick Back to Work (QBW), was conducted in two counties in 2005 and 2006. The participants were members of unemployment insurance funds, implying that they had a rather strong attachment to the labour market. The experiment consisted of job search programs, intensive counselling and a mandatory training programme. Graversen and van Ours (2008) found a substantial 30% increase in the re-employment rate. Graversen and van Ours also found that the threat effect and job-search assistance were the most important factors in explaining the success of the experiment. There is further evidence that it was not the activation *per se* that was effective, but rather the threat of activation (Rosholm, 2008; Vikström, Rosholm & Svarer, 2013). A follow-up experiment (QBW2) confirmed that meetings with caseworkers and early activation were particularly efficient (Maibom, Rosholm & Svarer, 2017). A general conclusion from these experiments is that ALMPs – a key part of the Danish flexicurity model – can reduce unemployment duration significantly.

This study contributes to the existing literature as follows. The EUROMOD model has not been used with a specific focus on Nordic countries and their distinctive policies. Unlike most of the earlier studies, the paper also examines the behavioural labour supply responses of the reforms. From the perspective of comparative welfare state literature, the EUROMOD model is a proper tool to compare policy-level changes between welfare states.

4.3 Institutional Setting

Nordic countries can be characterised by relatively strong trade unions and collective bargaining, the use of active labour market policies in facilitating labour mobility, high-quality education, extensive social protection, high employment and openness to globalisation. Although inequality has trended upwards in the Nordics, these countries have been able to combine relatively well equality and equality of opportunity to dynamic economies (Pareliussen et al., 2018). Nordic countries have been able to combine low wage differences and extensive social protection systems to high employment and openness to globalisation. The key to the model's success has been its ability to create shared prosperity (Barth, Moene and Willumsen, 2014; Acemoglu, 2019). This has been achieved through interactions of key institutions such as collective bargaining, active labour market policies, extensive social protection and widely accessible high-quality education. These institutions have reinforced each other, and it would not be possible to reach the same outcomes by simply redistributing income from the rich to the poor.

Although Nordic countries share institutional similarities, there are important divergences between them. Nordic countries have responded differently to grown unemployment since the early 1990s, and inequality and poverty rates differ remarkably between Nordic countries. These developments highlight the need to study and compare individual policies between Nordic countries. Much like in other developed Western countries, Nordics have had a tendency to strip social protection, lower taxes, emphasise individual responsibility, and move from the government towards markets. This tendency has been stronger in Sweden in comparison to other Nordic countries.

Last-resort social assistance provides a good starting point for studying benefit levels in Nordic countries. Last-resort social assistance indicates the minimum level of income that society finds acceptable. Table 4.1 shows the last-resort social assistance levels for different household types in 2017. The amounts are not fully comparable because the eligibility conditions vary, and the amounts depend on the ages of the household's children. Nevertheless, there are significant differences in the social assistance levels. The Swedish social assistance is only 51% of the Danish amount for single persons (PPP corrected). Sweden has the lowest and Denmark has the largest social assistance amounts, and Finland is in the middle. The differences in social assistance amounts are smaller for single parents and couples with children.

Figure 4.1 shows the risk-of-poverty rates and Gini index between 2005 and 2020.

Table 4.1 Last-resort social assistance monthly amounts for different household types (2017).

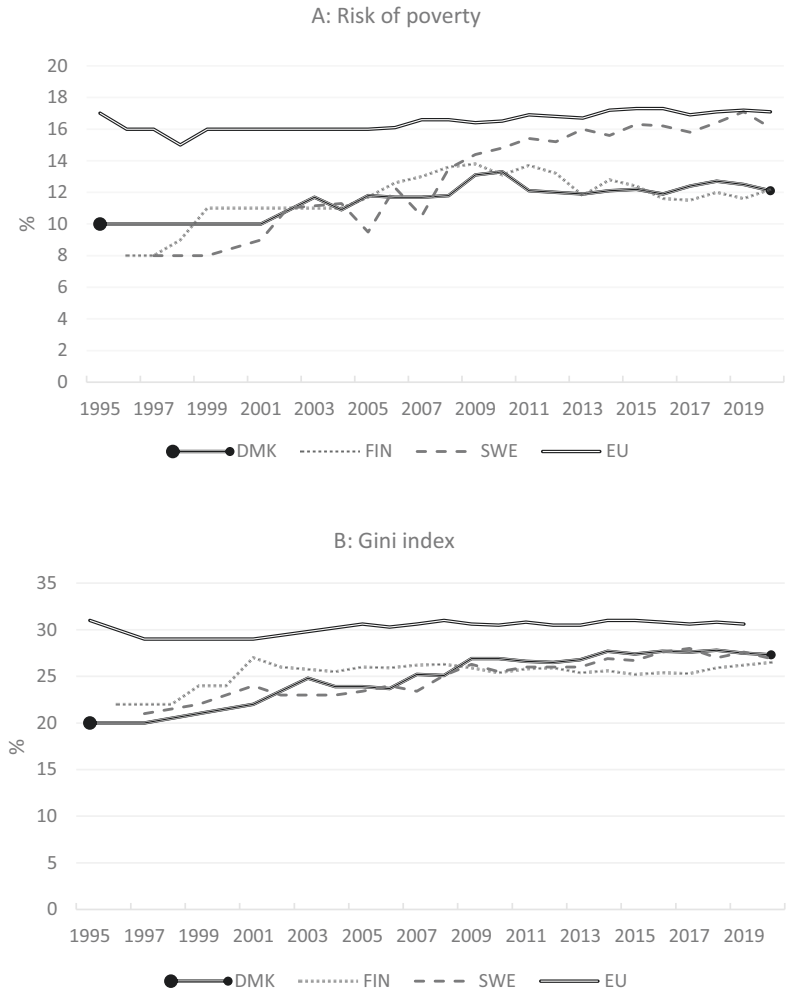
	Single person	Single parent	Couple with children
Spot exchange rates 31.12.2017 (€)			
Denmark	820	1988	1329
Finland	488	1161	1039
Sweden	400	1988	1251
PPP corrected (€), (EU15=1)			
Denmark	635	1540	1030
Finland	425	1012	906
Sweden	326	805	1019

Notes: 1) Purchasing power parities (PPP) are based on actual individual consumption (EU15=1). 2) The calculations are based on two-children households. In Finland, the calculations are based on children aged 0–9 and 10–17. In Sweden, the amounts are based on children aged between 4–6 and 15–18.
Sources: Social assistance amounts are calculated from EUROMOD country reports 2017, and the PPPs are based on Eurostat's database.

Figure 4.1 shows that the Gini coefficient has trended upwards in the Nordics. There is a significant increase in the risk-of-poverty rate in Sweden, and the poverty risk reached the EU level in 2019. Most of this increase has happened when the Swedish work-line policy was implemented between 2007 and 2014. During this time period, the risk-of-poverty rate increased by 5.1 percentage points. One of the questions this paper aims to answer is whether this increase was caused by active policy changes. The Gini coefficient has been increasing in a very similar way in Denmark and Sweden over the last decades. In Finland, the Gini coefficient increased significantly after the mid-1990s, but after that it has been quite stable.

Denmark, Finland and Sweden experienced a hike in unemployment rates at the beginning of the 1990s. From there, the three countries took different routes. Reforms towards the Danish flexicurity model were initiated in the mid-1990s as a response to high unemployment. The Danish model combines flexible hiring and firing rules with a generous social safety net and active labour market policies. The central-right government in Sweden (2006–2014) introduced an 'arbetslinjen' (*the work–line*) policy aimed at increasing labour supply and reducing unemployment. Several supply-side reforms were introduced starting in 2007. These included sizeable in-work tax credits (EITC), tightening of sickness insurance, household service deductions, a lower amount of unemployment insurance benefits and new active labour market programmes. Several social

Figure 4.1 Risk-of-poverty rate and Gini index developments in Denmark, Finland and Sweden between 2005 and 2020.



Note: 60% of the median income is used as a threshold. There are data breaks in the early years. Data breaks have been connected with previous and and following data points.
Source: Eurostat, Income and living conditions.

insurance benefits were indexed to nominal prices while real wages were rising or kept constant. For example, the unemployment benefit remained constant in nominal terms, which effectively eroded its level. Finland has not had a clearly stated model, but during the deep recession in the 1990s, fiscal pressures and persistently high unemployment rates were the factors behind retrenchment policies. After the recession, making work pay and

activation policies emphasising individual responsibility became the guiding policies.

4.4 Data and Methodology

4.4.1 Data and the EUROMOD Microsimulation Model

EUROMOD is an EU-wide microsimulation model. It applies coded tax and benefit policy rules to micro-level data on individuals and households. The detailed tax-benefit simulations allow for an examination of how social contributions, taxes and benefits affect disposable income. The EUROMOD model is unique in the sense that it is harmonised across countries, allowing for meaningful policy comparisons. The simulations are based on EUROMOD version H1.0+. The input data are based on the European Union Statistics on Income and Living Conditions (EU-SILC). They are collected from individual countries and combine surveys and registers in Nordic countries. For more details on the EUROMOD model, see Sutherland and Figari (2013). EUROMOD is static, but behavioural effects are taken into account by employing various labour supply elasticities to predict employment changes and then reweighting the sample weights. Osei, Pirttilä and Rattenhuber (2019) used a similar approach to study behavioural effects using a microsimulation model based on EUROMOD.

The EUROMOD simulation model allows for creating counterfactual scenarios. It is crucial to isolate changes in a tax-benefit system from changes in the underlying economy and population structure. For example, over time, a tax-benefit system may appear more equal in terms of income distribution even though the real driver is an increase in the number of pensioners. To isolate other time-varying effects from policy changes, the following counterfactual exercise is simulated:

$$\Delta_{policy} = \underbrace{D(y_t^{market}, S_t, X_t)}_{Base} - \underbrace{D^*(y_t^{market}, \rho S_{t-j}, X_t)}_{Counterfactual}, \tag{4.1}$$

where the baseline disposable income D is presented as a function of the market income y_t, tax-benefit system S_t and demographic characteristics X_t. The counterfactual disposable income D^* is a function of the tax-benefit system at time $t-j$, holding constant the market income and population characteristics. The monetary values (benefits and tax thresholds) of the counterfactual tax-benefit system are uprated with a factor ρ to bring

them to the baseline level. Depending on the country, the uprated counterfactual years are 2006 or 2007 and the baseline years 2014 or 2017. The uprating is based on consumer price indices (CPI). Thus, the counterfactual is based on an alternative state of the world in which governments would not have made any reforms.

In Nordic countries, social protection is based on extensive social transfers and services that require high employment rates. Thus, participation in the labour market is a key policy question in Nordic countries. The focus is on the extensive margin. The participation tax rate (PTR) is defined as follows:

$$\tau = 1 - \frac{D(z) - D(u)}{z}, \tag{4.2}$$

where D denotes disposable income and z gross earnings. $D(u)$ denotes disposable income when unemployed. PTR measures the financial gain from working versus not working. It is assumed that the transition happens from unemployment to employment. Thus, the participation wage needs to be defined. That is the wage that an unemployed person receives when he or she becomes employed. Because the focus is on the evolution of long-term employment and because the earnings likely approach averages over a long period of time, the participation wage is calculated as an average wage. The PTRs are calculated at an individual level, and the unemployment benefits are set to zero when an individual becomes employed. Because part-time work is common in countries such as Sweden, the PTRs are also calculated for part-time workers. The PTRs can be transferred into relative employment changes as follows:

$$E = \mathscr{E} \frac{\overline{\tau}^{Base} - \overline{\tau}^{Counterfactual}}{1 - \overline{\tau}^{Base}}, \tag{4.3}$$

where $\mathscr{E}$ is the labour supply elasticity on the extensive margin, and $\overline{\tau}$ is the average participation tax rate. The sample weights sum up the entire population from which the sample is drawn. Thus, on the basis of formula 4.3, the change in the number of employees can be calculated by altering the sample weights of the employed and unemployed[2]. A decrease in unemployment goes fully into an increase in employment so that only weights are shifted between the two groups.

The simulated tax/benefit systems begin in the year 2006 for Sweden and 2007 for

[2]The same reweighting can be used for calculating the dynamic effects on income distribution by using expected income. The changed probabilities of being employed and unemployed are derived from formula 4.3. If p is the probability of being employed, y is the expected disposable income when a person is employed, and b when unemployed, then the expected income is py+(1-p)b.

Denmark and Finland. The first examined time period covers the years 2006–2014 (*the work-line policy)* for Sweden and 2007–2014 for Denmark and Finland. To exploit full coverage of the EUROMOD policy years, the additional years 2006-2017 for Sweden and 2007–2017 for Denmark and Finland are examined. Tables in Appendix A list the main simulated reforms in the examined time periods. The input data are based on EU-SILC 2015. This means that the income reference year is 2014. All the risk-of-poverty thresholds are calculated as 60% of the median equivalised disposable income. The equivalence scale is based on the modified OECD scale.

4.4.2 Labour Supply Elasticity Literature

Several authors have argued that high employment rates are a key policy question facing Nordic countries, in particular with ageing populations (Andersen et al., 2007; Andersen, 2008). Financing extensive social transfers and public services requires that a large proportion of the population is employed. Participation elasticity tells how responsive labour force participation is to changes in taxes and benefits. Conventionally, empirical labour supply literature has found that the extensive margin response is much more elastic than the intensive margin response. The consensus that earned income tax credits have sizeable extensive margin effects is to a large extent based on studies on the U.S. EITC and its expansions (Eissa & Liebman, 1996; Meyer & Rosenbaum, 2001; Hotz et al., 2006; Meyer, 2010). Recently Kleven (2021) has seriously questioned this consensus. He finds null results. The EITC was introduced in 1975 at federal level and expanded in 1986, 1990 and 2009 along with state supplements between 1984-2018. Using both federal and state variation Kleven does not find any significant employment effects expect for the 1993 reform. According to Kleven, the 1993 reform is associated with large positive employment effects, associated with large positive employment effects, but these effects are confounded with changes from welfare reform and the macroeconomy.

The extensive margin elasticity literature on Nordic countries is growing, but it is still quite limited. Sigurdsson (2019) and Stefánsson (2019) estimated labour supply responses to the Icelandic tax holiday. In Iceland, the tax system was changed so that Icelanders did not pay any income taxes in 1987. Sigurdsson built a life-cycle diffierence-in-differences model using adjacent cohorts as control groups and estimates 0.1 participation elasticity for the whole population. Stefánsson shows that the participation rate had no trend deviation in 1987, implying a zero participation elasticity (Lundberg & Norell, 2021, p. 71).

Kosonen (2014) exploited municipal variation in the Finnish child-care benefits and estimated a participation elasticity of 0.83 for mothers. The high elasticity may be explained by a lower labour force participation of Finnish mothers. Similar child-care schemes from other Nordic countries have not resulted in positive labour supply effects (Lundin, Mörk & Öckert, 2008; Havnes & Mogstad, 2011). Jäntti et al. (2015) estimated participation elasticities using Luxemburg Income Survey (LIS) data and group IV. They found participation elasticities of 0.21 and 0.17 for Denmark and Finland respectively, and a non-significant estimate for Sweden. Bartels and Schupe (2022) used EUROMOD to calculate participation tax rates and group IV to estimate participation elasticities for breadwinners and secondary earners across European countries, including Denmark and Sweden. Their point estimates do not exceed 0.2 for Denmark and Sweden, although the elasticities are bigger for secondary earners. Selin (2014) utilised the 1971 change in taxation of Swedish married couples. Before 1971, married couples were taxed jointly and after the reform separately, which increased work incentives for secondary earners. Using women married to low-income earners as a control group, Selin found a unitary participation elasticity for women married to high-income earners. Bastani et al. (2021) estimated a participation elasticity for low-income married women using a housing benefit reform introduced in 1997 and found a 0.13 participation elasticity. Laun (2017) utilised the larger Swedish EITC for older workers – above the age of 65 – and found a 0.22 participation elasticity.

Recently Lundberg and Norell (2021) did a meta-analysis on extensive margin elasticity literature updating Chetty's et al. (2013) earlier analysis. Lundberg's and Norell's preferred extensive margin elasticity is between 0.1 and 0.2. Based on their meta-analysis, Chetty et al. (2013) suggested using a 0.25 extensive margin elasticity. Chetty et al. focused mainly on U.S. and U.K studies, and their review included only 15 papers, while Lundberg and Norell used 35 papers in their analysis. According to Lundberg and Norell, participation elasticities have decreased over time, and women are responsive to changed incentives. Some groups exhibit higher elasticities, such as single mothers. The likely reason for this is that they have a lower labour force participation and more room to increase their labour supply. Similarly, elasticities tend to be lower in Europe than in the United States, likely because of a higher female labour supply. As female labour supply is among the highest in OECD countries, it is possible that population-wide participation elasticities are even lower in Nordic countries than in the rest of Europe.

Extensive margin literature points towards modest elasticities, particularly in Nordic

countries. Still, wide population elasticities are not well known. Although some papers estimate wide population elasticities, it is in most cases not possible to find and construct a credible control group as policies affect all individuals. Furthermore, external validity is an issue in experimental studies. For example, the Iceland tax holiday studies estimate intertemporal Frisch elasticity, but long-term participation elasticities are still not well known in this literature. There can be optimisation frictions because it is difficult to participate in the labour market for a short period of time, as in the case of tax holidays, or inattention because of small changes in benefits or taxes. Because the exact population participation elasticities are not known, the employment effects are calculated using the elasticities of 0.1 and 0.25 to examine how sensitive behavioural employment effects are to participation elasticity.

4.4.3 The Alkire-Foster method

Poverty is a multidimensional phenomenon. To get a broader picture from poverty and its causes, the two-stage AF method (Alkire & Foster, 2011) is used to calculate the multidimensional poverty index. In EU-SILC, the variables related to poverty measurement are mainly ordinal, and hence the analyses are restricted to the basic form of AF-measures, the adjusted headcount ratio M_0. The identification of the poor involves two steps or cut-offs – within dimensions (1) and across dimensions (2).

The first cut-off defines deprivation within dimensions. A vector of deprivation cut-offs z is applied to each indicator. A deprivation matrix has entries of one if a person is deprived in that indicator and zero otherwise. A deprivation score c_i indicates the depth of deprivation across dimensions j. Using relative weights w_j attached to each dimension, the deprivation score is defined as the sum of weighted deprivations. The second cut-off (*poverty cut-off*), denoted by k, is applied across dimensions. The identification of the multidimensionally poor requires that their deprivation score is above the poverty cut-off ($c_i \geq k$). Finally, the censored deprivation score, $c_i(k)$, is used to obtain the adjusted headcount ratio M_0. Censoring implies that all deprivations that are less than k have been replaced with zero values. M_0 is defined as the sum of the poor individuals' weighted deprivations divided by the total number of individuals:

$$M_0 = \frac{1}{n} \sum_{i=1}^{n} c_i(k). \tag{4.4}$$

Alternatively, and more intuitively, M_0 can be decomposed into the product of two partial indices, incidence and intensity: $M_0 = HA$. Incidence or the headcount ratio H is defined by q/n where is the number of poor and n is the total number of individuals. The intensity A is the average deprivation score across the poor. Thus, the decomposition provides more information on the structure of poverty than the value of M_0 itself.

The multidimensional poverty index is based on four equally weighted dimensions: (1) risk of poverty, (2) health, (3) education and (4) financial burden. In the first and second dimensions, the deprivation cut-offs are defined as follows: (1) equivalised disposable income is below 60% of the median, (2) the self-reported health status is bad or very bad, activities are limited or strongly limited because of health issues, and at least one time the respondent needed treatment or examination without receiving it. In the third and fourth dimensions, the deprivation cut-offs are defined as follows: (3) an individual has only received a basic education, (4) the household has no capacity to face unexpected expenses, and the total housing cost is a slight or heavy financial burden to the household.

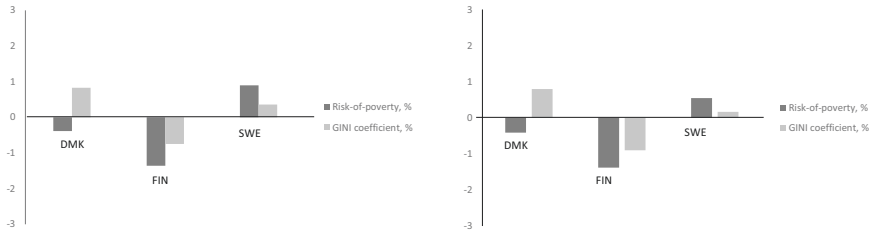
4.5 Results

4.5.1 Static Simulation Results

The following section presents static or immediate policy effects on income distribution. Figure 4.2 shows the policy effects on the risk of poverty and the Gini coefficient for various time periods. The graph on the left covers the years 2007–2014, while the graph on the right covers the years 2007–2017. For Sweden, the year 2006 is used as a comparison year for evaluating the Swedish *arbetslinjen* that was implemented between 2007 and 2014. The simulations cover all the policy changes in this time period (simulated policies are listed in appendix A). Although all the policy changes were not directly linked to the work-line policy, the simulations reflect the policy of the centre-right government and involve its flagship policy, the EITC and policy changes in several benefits aimed at increasing labour supply.

The risk of poverty increased by 1.0 percentage point and the Gini coefficient by 0.4 during the Swedish work-line policy. These increases are less than what can be seen in Figure 4.1. Thus, the results imply that the poverty risk increased more because of changes in the distribution of market income or demographic structure. It is unlikely that wage differentials are the main driver behind the increased inequality and increased risk of

Figure 4.2 Static policy effects on the risk of poverty and the Gini coefficient between 2007–2014 (left) and 2007–2017 (right). For Sweden, the static effects are shown for 2006-2014 and 2006-2017.



Source: Author's calculations based on Euromod version H1.0+.

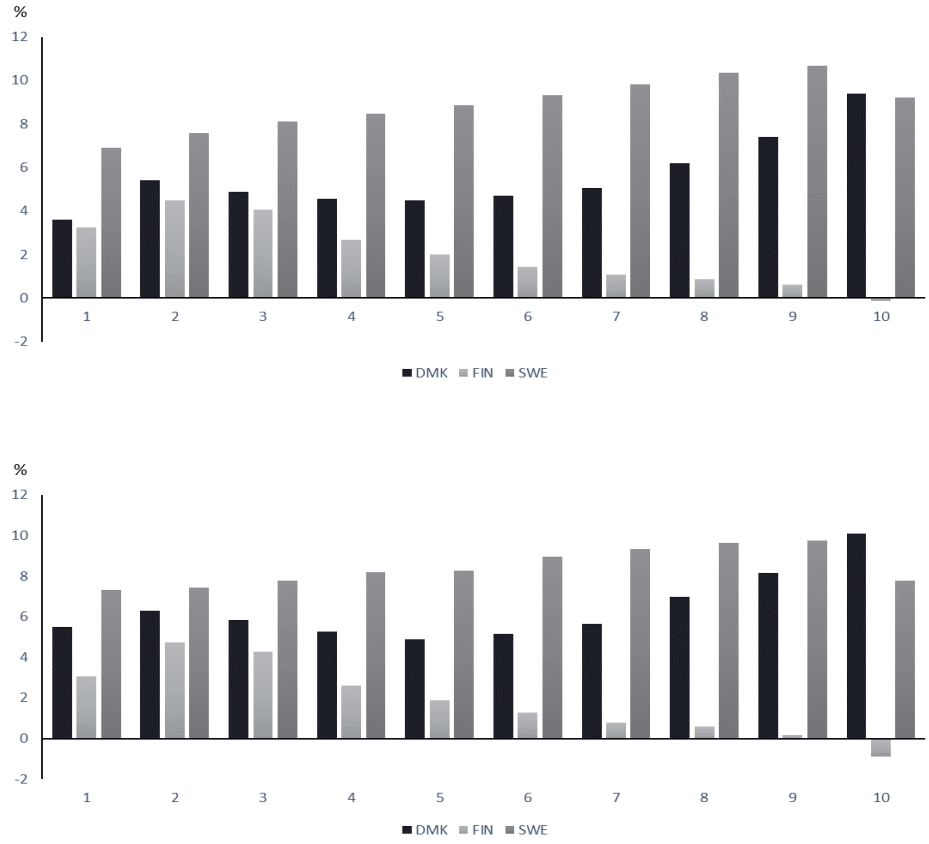
poverty in Sweden. Sweden has the most equal wage distribution in the EU, and it has been very stable since 2001 (Gottfries, 2018). Market incomes have risen partly due to increased capital incomes, but market income changes are not exceptionally high in comparison to other Nordic countries (Pareliussen et al., 2018, pp. 26-27). It is possible that immigration is behind the grown risk of poverty in Sweden. Sweden is exceptional among Nordic countries as it has received by far the largest number of refugees and asylum seekers, and 26.3% of its population is of foreign background (Statistics Sweden, 2022). Immigrants from conflict areas tend to have a higher risk of poverty and social exclusion that is in many cases intra-generational. According to Eurostat (2020), the risk of poverty or social exclusion among foreign citizens was the second-highest in the EU (56%) together with Spain in 2018. In 2015, 36% of foreign-born men and 44% of foreign-born women were unemployed or not in the labour force, although the share of immigrants who are not in the labour force has decreased over time (Gottfries, 2018). It is possible that increased immigration is behind the grown poverty risk in Sweden, but isolating the effects of immigration on the risk of poverty and inequality is beyond the scope of this paper.

If the whole time period (2006–2017) is examined, there is a small decrease in the risk of poverty (0.5 percentage point) and the Gini coefficient (0.2 Gini point) In Sweden. The two time periods (2006–2014 and 2006–2017) are not fully comparable because the earlier period is presented in 2014 euros and the latter in 2017 euros. However, it can be concluded that the policy changes were more redistributive after the work-line policy in Sweden. Finland has had the most redistributive policy changes among the examined countries. In Finland, the policy changes decreased the risk of poverty by 1.4 percentage points and the Gini coefficient by 0.9 between 2007 and 2017. In Denmark, the policy

changes decreased the risk of poverty, but they increased the Gini coefficient by 0.8 Gini point between 2007 and 2017. In the same time period, the Gini coefficient increased by 2.4 Gini points (see Figure 4.1). Thus, the policy changes reinforced the observed increase in the Gini coefficient in Denmark.

Figure 4.3 shows the static policy effects on household equivalent disposable income. In every examined time period, Sweden has had the largest increase in equivalent disposable income in all the deciles, except for the highest. In the tenth decile, Denmark has the largest relative increase in equivalent disposable income. In Sweden, even in the lowest income decile, disposable equivalent income increased by 6.9 percentage points between 2006 and 2014. However, the risk of poverty among labour market outsiders increased substantially during the work-line policy. The risk of poverty for the unemployed increased by 1.6 percentage points. It should be noted that the EUROMOD simulation model does not fully simulate the tax-benefit systems, and the results depend on how the counterfactual is constructed.

Figure 4.3 Static policy effects on household equivalent disposable income by income decile groups. The upper graph covers 2007-2014, and the lower graph covers 2007-2017. For Sweden, the upper graph covers 2006–2014 and the lower 2006–2017.



Note: The results are shown as a percentage change of the counterfactual household income.
Source: Author's calculations based on Euromod version H1.0+.

4.5.2 Dynamic Simulation Results

This section presents the behavioural effects of the changes in tax-benefit systems. Table 4.2 shows the participation tax rates and dynamic effects on the number of employees. The results are calculated for all workers and separately for part-time workers. The sample that is used to calculate the dynamic effects of all workers includes the individuals whose employment status is either unemployed, employee or entrepreneur without restrictions on the intensity of work. The sub-sample that is used to study part-time work includes

all individuals whose employment status is either unemployed or employed with at least six months of part-time work history. Studying the dynamic effects of part-time work is particularly relevant in the Swedish case because working part-time is more common in Sweden.

Sweden has the lowest participation tax rates, and Denmark has the highest tax rates. In Denmark, the participation tax rates exceed 90 percent for part-time workers. The high participation tax rates are compensated with extensive active labour market policies and investments in work search services for the unemployed. As shown in 4.2, Denmark has also aimed increasing labour labour supply incentives, and participation tax rates have decreased over time. In Finland, the government increased basic security for the unemployed by €100 and last-resort social assistance by a smaller amount in 2011. Among other policy reforms, these increments increased the participation tax rates in Finland, and there is a small negative effect on employment. Because of the work-line policy, the number of employed individuals increased the most in Sweden.

Assuming a 0.25 labour supply elasticity parameter, the employment increase would be 159 000 persons and 41 000 part-time workers during the Swedish work-line policy. Using the same participation elasticity as Lundberg (2017), the estimated employment increase is 96 000 persons. These employment effects are not significant, especially seen from the perspective of the weakened social protection system. To give a comparison point, employment increased by approximately 140 000 persons during the prime minister Juha Sipilä's centre-right government in Finland between 2011-2015, even though the population of Sweden is about twice bigger (Myrskylä, 2020, p. 143). After the Swedish centre-right government, some increases were made to benefits. These increases raised the participation tax rates in particular for the part-time workers, and the employment effect drops from 41 000 to 32 000 individuals if the whole time period (2006–2017) is examined and the elasticity of 0.25 is assumed.

Table 4.3 shows the dynamic effects of all workers on the risk of poverty, the risk-of-poverty gap and the Gini coefficient. The risk-of-poverty gap is calculated using a 60% threshold of the median equivalised disposable income. The static percentage point differences between the base and counterfactual are shown in parentheses.

The results show that the dynamic effects of the Swedish work-line model do not fully offset its static negative effects on the risk of poverty and the Gini coefficients. Assuming a 0.25 labour supply elasticity parameter, the dynamic effect on the risk of poverty is only -0.1 percentage point for the whole population and -0.5 for the working-age population.

Table 4.2 Average participation tax rates and dynamic effects on the number of employees.

	Denmark		Finland		Sweden	
	2007-2014	2007-2017	2007-2014	2007-2017	2006-2014	2006-2017
Participation tax rates						
Unemployed transitioned to employment						
Base	67.0	67.1	60.8	61.2	52.8	53.5
Counterfactual	69.8	70.2	58.8	59.0	58.5	58.8
	Δ -2.8	Δ -3.1	Δ 2.0	Δ 2.2	Δ -5.7	Δ -5.3
Unemployed transitioned to part-time employment						
Base	92.7	93.0	73.5	73.2	68.0	68.8
Counterfactual	91.8	91.7	71.9	72.1	72.8	72.6
	Δ 0.9	Δ 1.3	Δ 1.6	Δ 1.1	Δ -4.8	Δ -3.8
Change in employment						
All workers						
$\mathscr{E} = 0.1$	22000	25000	-11000	-11000	64000	61000
$\mathscr{E} = 0.25$	55000	63000	-26000	-28000	159000	153000
Part-time workers						
$\mathscr{E} = 0.1$	-3 000	-5 000	-1 000	-1 000	16 000	13 000
$\mathscr{E} = 0.25$	-8 000	-12 000	-3 000	-2 000	41 000	32 000

Source: Author's calculations based on Euromod version H1.0+.

Taking into account the static differences, the total policy effect is 0.9 percent and 0.4 percent for the whole population and working age, respectively. For the working age, the dynamic effects would fully offset the static negative effects on the risk of poverty if the participation elasticity were 0.4. This high participation elasticity would be unrealistic. The dynamic effect on the risk-of-poverty gap is -0.1, and the total policy effect is 0.1. If the whole time period (2006–2017) is examined, the static effect on the risk of poverty is smaller, but the dynamic effects are very similar to the years 2006–2014.

In Denmark, the static effect on the risk of poverty is negative for the whole population but positive for the working age. For the working age, the dynamic effects offset the negative static effects on the risk of poverty and the risk-of-poverty gap in both examined time periods if a 0.25 participation elasticity parameter is assumed. However, the

total policy effect is smaller if the period between 2007 and 2017 is examined. In Finland, there is a small increase in the risk of poverty because of dynamic effects on both examined time periods. The static and dynamic effects on the Gini coefficients tend to be small in all three countries.

Table 4.4 shows the dynamic effects of part-time workers on the risk of poverty and the Gini coefficient. As shown in Table 4.2, there is very little change in the Finnish employment and hence no behavioural effects for part-time workers. In the Danish case, there is a very small increase in the risk of poverty because of behavioural effects. In Sweden, the dynamic effect on the risk of poverty is -0.1 percentage point for the whole population and for the working-age during the work-line policy if a 0.25 participation elasticity parameter is used. The behavioural effect disappears for the whole population if the whole time period (2006-2017) is examined.

Table 4.2 showed that The participation tax rates were 13.6 percentage points, and for part-time workers, 24.2 points higher in Denmark than in Sweden in 2017. The Danish model shows that it is possible to combine high-income taxes to high benefit levels and relatively good employment. According to OECD (2022), the employment rate was 74.7% in 2020 in Denmark and 75.5% in Sweden. In comparison to Sweden, the Danish flexicurity model has fulfilled better the egalitarian goals of the Nordic model and performs relatively well in terms of employment. Swedish labour market policies have aimed at more efficiency at the cost of equity, but it is not evident that these policies increased employment substantially. Although population steady-state long-term population extensive margin elasticities are not well known, recent empirical literature implies modest employment effects on the extensive margin in Sweden. Despite significant increases in the risk of poverty and inequality, the tax-benefit changes have not been redistributive in the examined time periods. In Finland, the policies were the most redistributive, but employment rates are behind Denmark and Sweden. According to OECD, the employment rate was 74.7% in 2020 in Finland.

Table 4.3 The dynamic effects of all workers on the risk of poverty, risk-of-poverty gap and Gini coefficient.

	Denmark		Finland		Sweden	
	2007-2014	2007-2017	2007-2014	2007-2017	2006-2014	2006-2017
Elasticity: $\mathscr{E} = 0.1$						
All workers						
Risk of poverty						
Whole population	0.0 (-0.4)	-0.1 (-0.4)	0.0 (-1.4)	0.0 (-1.4)	-0.1 (1.0)	0.0 (0.6)
Working age	-0.1 (0.3)	-0.2 (0.6)	0.1 (-1.0)	0.1 (-0.9)	-0.2 (0.9)	-0.1 (0.8)
Risk-of-poverty gap						
Whole population	0.0 (0.1)	0.0 (0.0)	0.0 (-0.2)	0.0 (-0.1)	0.0 (0.2)	0.0 (0.2)
Working age	-0.1 (0.1)	-0.1 (0.1)	0.0 (-0.2)	0.0 (-0.2)	0.0 (0.2)	0.0 (0.2)
Gini	0.0 (0.8)	0.0 (0.8)	0.0 (-0.7)	0.0 (-0.9)	0.0 (0.4)	0.0 (0.2)
Elasticity: $\mathscr{E} = 0.25$						
All workers						
Risk of poverty						
Whole population	-0.2 (-0.4)	-0.2 (-0.4)	0.1 (-1.4)	0.0 (-1.4)	-0.1 (1.0)	-0.1 (0.6)
Working age	-0.4 (0.3)	-0.5 (0.6)	0.2 (-1.0)	0.1 (-0.9)	-0.5 (0.9)	-0.5 (0.8)
Risk-of-poverty gap						
Whole population	-0.1 (0.1)	-0.1 (0.0)	0.0 (-0.2)	0.0 (-0.1)	0.0 (0.2)	0.0 (0.2)
Working age	-0.2 (0.1)	-0.2 (0.1)	0.0 (-0.2)	0.0 (-0.2)	-0.1 (0.2)	-0.1 (0.2)
Gini	-0.1 (0.8)	-0.1 (0.8)	0.0 (-0.7)	0.0 (-0.9)	-0.1 (0.4)	-0.1 (0.2)

Note: The table shows the percentage point differences in the base and counterfactual. Static differences are in parentheses.

Source: Author's calculations based on Euromod version H1.0+.

Table 4.4 The dynamic effects of part-time workers on the risk of poverty, risk-of-poverty gap and Gini coefficient.

	Denmark		Finland		Sweden	
	2007-2014	2007-2017	2007-2014	2007-2017	2006-2014	2006-2017
Elasticity: $\mathscr{E} = 0.1$						
Part-time workers						
Risk of poverty						
Whole population	0.0 (-0.4)	0.0 (-0.4)	0.0 (-1.4)	0.0 (-1.4)	0.0 (1.0)	0.0 (0.6)
Working age	0.0 (0.3)	0.0 (0.6)	0.0 (-1.0)	0.0 (-0.9)	-0.1 (0.9)	0.0 (0.8)
Risk-of-poverty gap						
Whole population	0.0 (0.1)	0.0 (0.0)	0.0 (-0.2)	0.0 (-0.1)	0.0 (0.2)	0.0 (0.2)
Working age	0.0 (0.1)	0.0 (0.1)	0.0 (-0.2)	0.0 (-0.2)	0.0 (0.2)	0.0 (0.2)
Gini	0.0 (0.8)	0.0 (0.8)	0.0 (-0.7)	0.0 (-0.9)	0.0 (0.4)	0.0 (0.2)
Elasticity: $\mathscr{E} = 0.25$						
Part-time workers						
Risk of poverty						
Whole population	0.0 (-0.4)	0.0 (-0.4)	0.0 (-1.4)	0.0 (-1.4)	-0.1 (1.0)	0.0 (0.6)
Working age	0.1 (0.3)	0.1 (0.6)	0.0 (-1.0)	0.0 (-0.9)	-0.1 (0.9)	-0.1 (0.8)
Risk-of-poverty gap						
Whole population	0.0 (0.1)	0.0 (0.0)	0.0 (-0.2)	0.0 (-0.1)	0.0 (0.2)	0.0 (0.2)
Working age	0.0 (0.1)	0.0 (0.1)	0.0 (-0.2)	0.0 (-0.2)	0.0 (0.2)	0.0 (0.2)
Gini	0.0 (0.8)	0.0 (0.8)	0.0 (-0.7)	0.0 (-0.9)	0.0 (0.4)	0.0 (0.2)

Note: The table shows the percentage point differences in the base and counterfactual. Static differences are in parentheses.

Source: Author's calculations based on Euromod version H1.0+.

4.5.3 Multidimensional poverty results

To get a broader picture of poverty and its policy implications, the Alkire- Foster method is used to calculate a multidimensional poverty index. The AF method is used to calculate the adjusted headcount ratio M_0 and its components H and A between 2005 and 2015. The results are based on EU-SILC data for 2005, 2010 and 2015. The main results are calculated using two cut-off values, 0.26% and 0.50%. If the cut-off value is set at 26%, an individual is multidimensionally poor. That is, the individual is deprived in more than one dimension. If the cut-off value is 50%, poverty is more intense. In this case, deprivation occurs at least in two dimensions.

Multidimensional poverty indices draw different picture than the income-based risk-of-poverty rates. According to table 4.5, Finland has the largest M_0 value and Sweden the lowest in every examined year. For example, in Finland and Sweden, the respective M_0 values were 0.206 and 0.112 in 2015. In the Finnish case, this means that poor individuals experience one-fifth of the maximum number of deprivations that would be experienced if everyone was deprived in every indicator. The intensity of poverty A is similar across the countries, but the headcount ratio H is higher in Finland. This explains the higher M_0 values in Finland. The results are robust to different cut-off values. Figure 4.5 shows the M_0 values using different cut-offs for the year 2015. Sweden has the lowest values consistently. Thus, multidimensional poverty draws a different picture than the income-based risk of poverty indicator.

To explain this, Table 4.6 shows the percentage contribution of each dimension to M_0. In Sweden, the contribution from the risk of poverty dimension significantly increased between 2005 and 2015. In 2015, this percentage contribution to M_0 was the highest in Sweden. Thus, from a policy perspective, decreasing the risk of poverty would be the most efficient policy to reduce the Swedish multidimensional poverty. In Sweden, the contributions from other dimensions than the risk of poverty are smaller than in Denmark or Finland in 2015. This explains the high risk-of-poverty rate but low multidimensional poverty in Sweden.

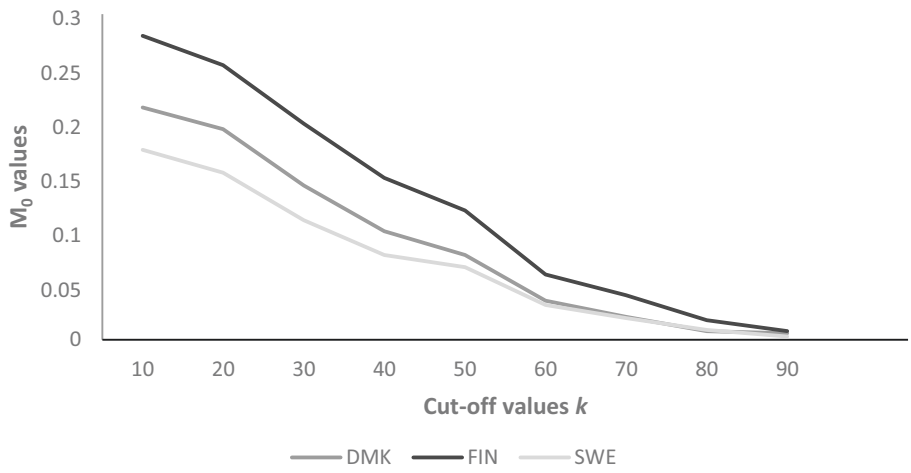
The financial burden has the highest contribution to the level of M_0 in Finland. Interestingly, the contribution of health has increased in Denmark and Finland but decreased in Sweden over time. In each country, the contribution of education has decreased over time. Poverty is more intense if the cut-off value 50% is used. The intensity of poverty was highest in Finland in every examined year. In 2015, the M_0 values were similar in Den-

Table 4.5 Changes in M_0, H and A over time.

	2005			2010			2015		
	DMK	FIN	SWE	DMK	FIN	SWE	DMK	FIN	SWE
k=26%									
M_0	0.132	0.225	0.121	0.153	0.202	0.117	0.147	0.206	0.112
H	0.282	0.451	0.274	0.321	0.408	0.249	0.315	0.423	0.231
A	0.469	0.499	0.443	0.475	0.494	0.469	0.467	0.487	0.485
k=50%									
M_0	0.074	0.139	0.052	0.087	0.124	0.066	0.066	0.119	0.067
H	0.126	0.223	0.087	0.145	0.201	0.112	0.130	0.190	0.110
A	0.587	0.623	0.595	0.601	0.616	0.590	0.604	0.626	0.604
Observations	5886	10772	5686	5805	10563	6817	6954	5986	5483

Source: EU-SILC, author's own calculations.

Figure 4.4 Changes in M_0 with different cut-off values k in 2015.



Source: EU-SILC, author's own calculations.

mark and Sweden ($k = 50\%$). Table 4.5 shows that the intensity of poverty has increased in Sweden, but it has decreased in Denmark and Finland.

Table 4.6 Contribution of dimensions to M_0.

	2005			2010			2015		
	DMK	FIN	SWE	DMK	FIN	SWE	DMK	FIN	SWE
k=26%									
Contribution, %									
Risk of poverty	23.4	17.0	19.5	22.9	20.6	28.2	22.4	18.0	31.8
Health	10.4	15.9	18.6	14.0	14.3	13.6	17.3	17.8	11.8
Education	37.0	32.3	31.7	35.7	30.9	26.8	28.4	28.5	26.9
Financial burden	29.2	34.8	30.2	27.4	34.2	31.4	31.9	35.8	29.5
k=50%									
Contribution, %									
Risk of poverty	28.8	23.2	24.5	28.2	26.9	32.6	28.5	23.9	34.6
Health	7.8	13.5	15.7	12.3	11.8	10.0	13.6	14.6	9.1
Education	33.3	30.2	31.4	32.9	28.5	26.5	26.3	28.8	28.0
Financial burden	30.2	33.2	28.4	26.5	32.7	30.9	31.7	32.7	28.3

Source: EU-SILC, author's own calculations.

4.6 Discussion

Using the EUROMOD model and counterfactual analyses, this paper examined the long-term evolution of key policy outcomes associated with the Nordic model. The aim of the paper was to isolate the policy component and to study how policy changes affected the risk of poverty, inequality and employment. The trade-off between labour market efficiency and equality was studied using reweighting sample weights. To get a broader picture of poverty and its policy implications, the AF method was used to calculate multidimensional poverty indices.

Sweden is expectational among Nordic countries as both income inequality, and relative poverty have increased significantly. According to Eurostat, the poverty risk is no longer at the Nordic level, and it reached the EU level in 2019. Swedish labour market policies have aimed at efficiency at the cost of equity. The Swedish work-line policy (2007-2014) aimed at increasing labour supply through policies such as EITCs, lowering benefit levels and active labour market policies. The work-line policy increased the risk-of-poverty rate by 1.0 percentage point and the Gini coefficient by 0.4. The policies widened the gap between labour market insiders and outsiders. The poverty risk of the unemployed increased substantially, by 1.6 percentage points. Recent quasi-experimental literature implies modest employment effects on the extensive margin, and the employment effects did not offset the increased poverty risk and Gini coefficient in Sweden. Still, disposable incomes increased also in the lowest deciles, and Sweden fared well in multidimensional poverty. The results showed that inequality and relative poverty increased mainly for reasons other than tax-benefit changes. Based on earlier literature, tendencies towards widening market income and wage dispersions have been relatively weak in the Nordics. Nordic institutions have likely weakened the effects of globalisation and technological change on inequality and poverty, and these institutions are not very different in Sweden compared to other Nordic countries. It is possible that immigration is behind the grown risk of poverty, but the effects of immigration were not isolated. It is also possible that stripping social protection intensified the social exclusion and contributed more to grown poverty risk and inequality than the microsimulation results show.

Compared to Sweden, the Danish flexicurity model has fulfilled better the goals of the Nordic model. The Danish model shows that it is possible to combine high-income security with high taxes and well-performing economy. Last-resort social assistance amounts

were substantially higher in Denmark than in Sweden. The last-resort social assistance amounts were 51% lower for single-person households in Sweden than in Denmark in 2017. In addition, Denmark performs relatively well in terms of employment despite high participation tax rates. The participation tax rates were 13.6 percentage points, and for part-time workers, 24.2 points higher in Denmark than in Sweden in 2017. Finland had the most redistributive policy changes, but it fared least well in multidimensional poverty, and employment is lower than in other Nordic countries. In Finland, health and financial burden dimensions contributed the most to multidimensional poverty

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Appendix A

Table A1 Simulated (S), partly simulated (PS) and included (I) benefits and policy changes for the examined time periods.

Benefits		
Denmark (2007-2017)	Finland (2007-2017)	Sweden (2006-2017)
Unemployment benefit (PS) Sickness benefits (I) Social assistance (S) Benefit ceiling (S in 2017) *-Benefit ceiling was introduced in 2016, and it was applied to social assistance, integration benefit, educational allowance and specific means tested benefits, like housing benefit, housing grant, support for payment of day-care.*	Basic unemployment allowance (PS) Earnings-related unemployment allowance (PS) *-Since 2014, all unemployment benefits have exempt earnings of 300 euros without benefits being cut.* Labour market subsidy (PS) Other unemployment benefits (I) Sickness leave benefit(I) Disability allowances (I)	Unemployment benefit (PS) *-In 2016, the unemployment benefits payments were increased. There were no benefit increments between 2006 and 2015.* Parents' allowances (I) Sickness benefit (I) Education related allowance (I) Disability benefits (I) Old age pensions (I)
Education grant (I)	Sickness leave benefit (I)	Disability benefits (I)
Child Family Grant (S)	Disability allowances (I)	Old age pensions (I)
Ordinary Child Benefit and supplement (S) Child benefit for student parents (S) Child benefits for twins etc. and adoptions (I) Housing benefit (S) Housing grant (S) Old-age pension (S) Old-age pension supplement (S) Survivors' benefits (I) Green check (S) *-Introduced in 2010 as a tax-free lump sum benefit to compensate for the increase in in environmental and energy taxes*	Rehabilitation subsidy (I) Pensioner's care allowance (I) Home care allowance (I) Parental benefits (I) Child benefit(S) General housing allowance (S since 2015) Pensioner's housing allowance (S) Study grant (S) *-Since March 2011, study grant and student housing supplement were the only benefits which were not indexed by legislation* Other education benefits (I) Local authority income support (S) Other social assistance benefits (I) Guarantee pension (S since 2011)	Survivors pensions (I) Child benefit(S) Housing allowance (S) Housing allowance for pensioners (S) Social assistance (S) *-In 2013, if the household have had social assistance for 6 months or more when calculating net income, the employment income was reduced by 12,5 %. Since 2014 the reduction was 25 %.* *-Since July 2014, families with children in the age 10 to 15 years who assistance for more the 6 months can receive up to 3000 SEK to pay for activities which the children take part in. This support was removed 2016.*

Source: Euromod country reports for Denmark, Finland and Sweden. Notes: (1) Simulated (S) refers to a simulated policy although some minor or very specific rules may not be simulated. Partly simulated (PS) means that a policy is partially simulated as some as some of its relevant rules are not simulated. For example, the unemployment benefit payments depend on employment history that has no data available. Included (I) means that benefit is in the microdata, but it is not simulated. 2) Listed policy changes are not fully exhaustive. Detailed smaller changes in benefit eligibility conditions and thresholds can be found from the EUROMOD country reports.

Table A2 Simulated (S), partly simulated (PS) and included (I) social contributions, direct taxes and policy changes for the examined time periods.

	Social contributions and direct taxes	
Denmark (2007-2017)	Finland (2007-2017)	Sweden (2006-2017)
Labour market contribution(S)	Employee social contributions (S)	Employee social contributions (S)
Supplementary labour market contribution (PS)	Employer social contributions (S)	Employer social contributions (S)
Contributions to unemployment insurance scheme and early retirement pension scheme (PS)	Self-employed social contributions (S)	Self-employed social contributions (S)
Health contribution (S)	Medical care contribution (S)	Tax on capital income
Earned Income Tax Credit (S)	Capital income tax (S)	Personal income tax (S)
Municipality tax (S)	*-Dividends received from non-listed companies and treated as capital income are non-taxable up to 90,000 euro if the net wealth of a company is large. In 2012 this limit was reduced to 60,000 euro.*	Government tax
Church tax (PS)		*-In 2015 the limit of allowances for voluntary private pension contributions was significantly reduced from 12,000 SEK to 1,800 SEK. In 2016, the allowance was abolished.*
Health contribution (S)		
Earned Income Tax Credit (S)	National state income tax (S)	Personal income tax (S)
Municipality tax (S)	Municipality tax (S)	Municipality tax (S)
Church tax (PS)	Church income tax (PS)	Funeral tax (S)
Bottom-bracket tax (S)	Broadcasting tax (S since 2013)	Earned income tax credit (S)
Top-bracket tax (S)	*-Designed to finance Finland's national public service broadcasting company*	*Introduced in 2007 and enhanced in 2008, 2009, 2010 and 2014*
Property value tax (PS)	Tax on real estate (I)	Tax on real estate (I)
Land value tax (I)		
Property value tax (PS)		

Source: EUROMOD country reports for Denmark, Finland and Sweden

Notes: (1) Simulated (S) refers to a simulated policy although some minor or very specific rules may not be simulated. Partly simulated (PS) means that a policy is partially simulated as some as some of its relevant rules are not simulated. Included (I) means that benefit is in the microdata, but it is not simulated. 2) Listed policy changes are not fully exhaustive. Detailed smaller changes in social contributions, direct taxes and their thresholds can be found from the EUROMOD country reports.