Working Hours and the Family

Jens Bonke

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– working preferences/economic incentives/ childcare and divorce/retirement and time-use

Arbejdstid og familien

Arbejdstidsønsker/arbejdstid og skat/børn og skilsmisse/pensionering og samvær

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Indhold

Foreword

In 2008/09, the Rockwool Foundation Research Unit conducted a comprehensive survey of the patterns of time use and consumption in Danish families. The survey made it possible to carry out a number of research projects, which were then published either in book form or as articles in international journals. This book presents the findings from a new series of projects which make use of the same data in combination with data from earlier Danish and foreign studies of time use and information from administrative registers maintained by Statistics Denmark.

The projects presented here concern the situation in Denmark with respect to working time and the family – children, adults of working age and pensioners. The projects should be viewed in the context of previous research carried out and published by the Research Unit. They thus represent further contributions to elucidating the way that time is spent in modern families, whether in caring for children, employment or leisure.

Jens Bonke, who is a senior researcher at the Rockwool Foundation Research Unit, is the sole author of three of the articles in the book, and co-author of three other chapters written in collaboration with Marie Louise Schultz-Nielsen and Cecilie Svane Olesen, both also of the Rockwool Foundation Research Unit, and Professor Lori Curtis of the University of Waterloo, Canada.

The projects were financed by the Rockwool Foundation, but were carried out in total academic independence of that organisation. In addition to expressing my gratitude to the Foundation for its financial support, I would like to thank Lars Nørby Johansen, Chairman of the Board of the Foundation, and Elin Schmidt, President of the Foundation, for their interest in the work of the Research Unit with regard to both this publication and other projects.

Copenhagen, January 2016
Jan Rose Skaksen

Forord

Rockwool Fondens Forskningsenhed gennemførte i 2008/09 en omfattende undersøgelse af danske familiers tidsanvendelses- og forbrugsmønster. Denne undersøgelse har muliggjort gennemførelsen af en række forskningsprojekter, som er publiceret i bogform såvel som i internationale tidsskrifter. Med denne bog foreligger resultaterne af en række nye projekter, som har anvendt nævnte data tillige med data fra tidligere danske og udenlandske tidsanvendelsesundersøgelser og oplysninger fra administrative registre i Danmarks Statistik.

Projekterne, som publiceres her, handler om forhold vedrørende arbejdstid og familien – børn, midaldrende og ældre – og skal ses i forlængelse af tidligere publiceringer fra Rockwool Fondens Forskningsenhed. Der er således tale om endnu et bidrag til at belyse, hvordan tiden bruges i moderne familier, hvad enten det gælder børneomsorg, arbejdstid eller fritid.

Seniorforsker Jens Bonke, ph.d. i økonomi, er forfatter til tre af bogens kapitler/artikler, og sammen med seniorforsker Marie Louise Schultz-Nielsen, forskningsassistent Cecilie Svane Olesen, Rockwool Fondens Forskningsenhed, og professor Lori Curtis, University of Waterloo, Canada, medforfatter til tre andre af artiklerne.

Projekterne er gennemført i videnskabelig uafhængighed af Rockwool Fonden, som har finansieret deres gennemførelse. Udover en tak herfor, takkes bestyrelsesformand Lars Nørby Johansen og direktør Elin Schmidt for deres interesse for arbejdet med dette og andre projekter i forskningsenheden.

København, januar 2016
Jan Rose Skaksen

Arbejdstid og familien

Arbejdstidsønsker/arbejdstid og skat/børn og skilsmisse/pensionering og samvær

Jens Bonke

Der er en stigende erkendelse af, at familien spiller en stor rolle for, hvor meget vi ønsker at arbejde, hvor meget vi faktisk arbejder, mængden og karakteren af omsorgen overfor vores børn, hvordan børnene klarer sig, og hvornår man trækker sig tilbage fra arbejdsmarkedet. På baggrund af oplysninger i Rockwool Fondens Forskningsenheds tids- og forbrugsundersøgelse og andre tidsundersøgelser belyses nævnte spørgsmål med familien som omdrejningspunkt.

Det er almindeligt, at begge parter i dag arbejder, og at både arbejdstidsønsker og virkningen af indkomstbeskatningen er et anliggende, der berører både manden og kvinden, og som derfor formodes at blive koordineret partnerne imellem. Det gælder også omsorgen overfor børn, at denne ikke kun er et anliggende for moderen, men at også faderen er involveret, hvorved begge parter også ad denne vej påvirker barnets succes senere i livet. Det samme gælder forskellen i børneomsorg, som kan være mere eller mindre ligelig fordelt børnefamilierne imellem, ligesom der kan være forskel i fordelingen af den tid og de penge, der bruges på børnene. Endelig kan tilbagetrækningen fra arbejdsmarkedet også være begrundet i et ønske om mere samvær med partneren.

I det følgende omtales en række artikler, som de foreligger, og som de i store træk også forventes at blive publiceret i tidsskrifter, nemlig:

I Do preferences impact behavior and wellbeing? A panel study of preferred and actual working hours 2001-2008/09
II Spouses' supply of labor – how dependent are wage rate and income effects to the specification of working hours
III The Impact of Changes in Life Stage on Time Allocations in Denmark: A Cross-Sectional and a Panel Study 2001-2009
IV Childcare and Child Outcomes – and Parental Divorce
V Resources available to children in Denmark, UK and Canada
VI Love and retirement – Older couples' leisure time before and after retirement.

I Omsættes arbejdstidsønsker til virkelighed?

– arbejdstidspræferencer og ændringer i arbejdstid, og velfærd

- Et stort flertal af beskæftigede er tilfreds med deres arbejdstid.
- Flere er tilfredse i dag end tidligere.
- For mange af de utilfredse lykkes det at opnå en tilfredsstillende arbejdstid.

I "Do preferences impact behavior and wellbeing? A panel study of preferred and actual working hours 2001-2008/09" undersøger vi, i hvilket omfang ønsket om kortere eller længere arbejdstid er blevet realiseret i løbet af 2000-tallet, og om det i givet fald har medført større velfærd.

På baggrund af oplysninger i Rockwool Fondens Forskningsenheds tidsanvendelsespanel 2001-2008/09 (DTUP) finder vi, at et overvejende flertal er tilfredse med deres arbejdstid, og at der er flere blandt de utilfredse, som ønsker at arbejde kortere end længere tid på arbejdsmarkedet. Vi ser også, at hvis kvinden har et deltidsarbejde er det mindre sandsynligt, at manden ønsker at arbejde mere, og at kvinder til mænd, som arbejder meget, heller ikke har et ønske om mere arbejde.

For mænd er en mellemlang videregående uddannelse ensbetydende med et ønske om at arbejde mere end for mænd uden nogen uddannelse, mens der både for kvinder med mellemlang og lang videregående uddannelse er et ønske om at arbejde mindre sammenlignet med kvinder uden uddannelse.

Knap halvdelen af de beskæftigede var tilfredse med deres arbejdstid i både 2001 og 2008/09, mens omkring hver ottende forblev utilfredse, og hver tredje gik fra at være tilfredse eller utilfredse til at være utilfredse eller tilfredse. Det viser sig samtidig, at dem, der i 2001 ønskede at arbejde færre timer hhv. flere timer, og som ikke længere havde de ønsker i 2008/09, havde reduceret hhv. forøget deres arbejdstid med 4 ½ time om ugen. For nogle af dem, der ønskede at arbejde færre timer, og som faktisk har fået ønsket indfriet, er der imidlertid fortsat et ønske om – yderligere – nedsat arbejdstid.

Vi finder også, at tilfredsheden med arbejdsforholdene kun påvirkes, hvis man går fra balance til ubalance i arbejdstiden og i så fald negativt. Der er derimod ingen påvirkning af tilfredsheden, hvis ubalance afløses af balance i forholdet mellem ønsket og faktisk arbejdstid. Hvis arbejdstiden derimod forblev utilfredsstillende, blev

mænd alligevel mere tilfredse med arbejdstiden, mens kvinder blev mindre tilfredse, når ønskerne ikke blev indfriet.

Ser vi endelig på forskellen i det antal timer, som den fjerdedel til tredjedel af de beskæftigede, som ikke er i balance, ønsker at arbejde mindre hhv. mere, svarer den til omkring ½ time om ugen i 2008/09 mod 3 kvarter i 2001. Omregnet til fuldtidsbeskæftigede svarer det til et arbejdsudbudsoverskud på ca. 2 1/2 pct. og et tilsvarende underskud på knap 3 ½ pct. i både 2001 og 2008/09, hvilket altså er den samlede ubalance på det danske arbejdsmarked – netto er der altså et arbejdsudbudsunderskud svarende til 1 pct. fuldtidsbeskæftigede.

II Er det kun den normale arbejdstid, der påvirkes af skatten?

– mænd og kvinders normale og faktiske arbejdstider og den marginale skat

- Den normale arbejdstid hænger mere sammen med marginalskatten end den faktiske arbejdstid.
- For kvinder er der ingen sammenhæng mellem den faktiske arbejdstid og ændringer i marginalskatten.
- Længere uddannede, gifte kvinders normale arbejdstid er mere påvirket af marginalskatten end den normale arbejdstid for kortere uddannede, gifte kvinder.
- For gifte mænd er der kun sammenhæng mellem marginalskatten og den normale arbejdstid for dem med kort uddannelse.

I artiklen "Spouses' supply of labor – how dependent are wage rate and income effects to the specification of working hours" sondres der mellem normal og faktisk arbejdstid. Det er således ikke givet, at ægtefællers faktiske arbejdstid påvirkes af skattens størrelse i lige så stort omfang som deres normale arbejdstid, som er den, der sædvanligvis bruges i undersøgelser af dette spørgsmål.

Ved at bruge Rockwool Fondens Forskningsenheds tidsanvendelses-undersøgelse fra 2008/09 og en lignende undersøgelse fra 2001 er det muligt både at inddrage oplysninger om normal og faktisk arbejdstid tillige med at beregne ægtefællers marginalskat og indkomst uden at arbejde – den virtuelle indkomst – for de pågældende år.

Vi finder, at en mindre marginalskat – svarende til 1 pct.-point – for gifte mænd er ensbetydende med 3,6 minutters længere normal ugentlig arbejdstid, mens den faktiske arbejdstid ikke forøges signi-

fikant. For gifte kvinder finder vi heller ingen sammenhæng mellem skatten og den faktiske arbejdstid, hvorimod den normale arbejdstid er 8,8 minutter kortere ved en 1 pct.-point mindre marginalskat. Det viser, at den faktiske arbejdstid ikke hænger lige så meget sammen med skatten som den normale arbejdstid både for gifte mænd og kvinder. Et tilsvarende resultat er fundet for Sverige.

Ved at opdele efter uddannelsesbaggrund ser vi, at sammenhængen mellem skatten og den normale arbejdstid er mere udpræget blandt gifte kvinder med længere uddannelse – videregående ift. ikke-videregående – end blandt gifte kvinder med kortere uddannelse. For gifte mænd er der kun en sammenhæng mellem skatten og den normale arbejdstid for dem med kortere uddannelse, mens det ikke gælder for gifte mænd med længere uddannelse.

Det viser sig således, at sammenhængen mellem skat og normal arbejdstid er mere udpræget for gifte kvinder end for gifte mænd, ligesom den også gælder i større omfang for længere uddannede end for kortere uddannede gifte kvinder og gifte mænd. Når det gælder den faktiske arbejdstid er sammenhængen med skatten derimod ikke særlig udbredt, hvilket der bør tages hensyn til ved udformningen af skattereformer, hvis faktiske virkninger på arbejdsudbuddet formentlig ofte overvurderes.

III Har børn nogen betydning for mænd og kvinders arbejdstid?

– mænd og kvinders tidsanvendelse i forskellige livsfaser

- Når kvinder får børn, undervurderes deres tid brugt på dem, mens mænds overvurderes, når vi sammenligner mænd og kvinder uden hhv. med børn i stedet for at følge de samme mænd og kvinder over tid.
- Der er ingen ændringer i husholdningsarbejdet ekskl. børneomsorg henover livsfaserne, når vi følger de samme mænd og kvinder.
- Det har ingen betydning for forældres arbejde på arbejdsmarkedet, om de har førskole eller skolebørn, når vi følger de samme forældre.

Det diskuteres ofte, hvordan det at have børn påvirker mænd og kvinders arbejdstid, når begge parter er på arbejdsmarkedet, lønforskellene er beskedne og der er en omfattende institutionsdækning. I "The

Impact of Changes in Life Stage on Time Allocations in Denmark: A Cross-Sectional and a Panel Study 2001-2009" har vi belyst dette spørgsmål ved at se på, hvordan mænd og kvinder i løbet af forskellige livsfaser bruger deres tid.

På baggrund af oplysninger i Rockwool Fondens Forskningsenheds tidsanvendelsespanel 2001-2008/09 har vi dels fulgt de samme mænd og kvinder over perioden, dels sammenlignet mænd og kvinder, som er i forskellige livsfaser i 2001 eller i 2008/09. Den sidste fremgangsmåde er den mest udbredte, men tager ikke højde for at der kan være forskelle i forskellige årganges tidsanvendelse – dem, som er født i 60'erne, bruger måske tiden anderledes end dem, der er født i 70'erne.

Når vi følger de samme mænd og kvinder, indebærer det at få børn 2 timers børneomsorg for mænd og 2,4 timer for kvinder, mens børnene er 0-6 år. Det er 0,6 timer mere henholdsvis 0,1 time mindre, end hvis vi i 2001 og 2008/09 sammenligner mænd og kvinder uden børn med mænd og kvinder med børn i den nævnte alder.

Når børnene kommer i skolealderen, er det ensbetydende med en mindre ændring i børneomsorgen, når det er de samme forældre, vi ser på, end når vi sammenligner forældre med førskolebørn og forældre med skolebørn. Der er altså tale om en undervurdering af hvor meget tid til omsorg, det indebærer for kvinder at få børn, mens der er en beskeden overvurdering for mænds vedkommende, når vi sammenligner forskellige mænd hhv. kvinder i stedet for at følge de samme mænd og kvinder over tid.

For husholdningsarbejdet ekskl. børneomsorg er der ingen ændringer henover livsfaserne, når vi følger de samme mænd og kvinder, hvorimod husholdningsarbejdet er mindre i de første faser for derefter at være større og igen mindre, når vi sammenligner mænd og kvinder i forskellige livsfaser. Vi ser også, at arbejdet på arbejdsmarkedet ikke ændrer sig, når ens børn går fra ikke at gå i skole til at blive skolebørn, hvilket er tilfældet, hvis vi bare sammenligner forældre med førskolebørn og forældre med skolebørn. Det betyder derimod ikke noget for sammenligningen af kvinder uden børn med kvinder med førskolebørn, om det er de samme eller forskellige kvinder, vi ser på, da de i begge tilfælde reducerer deres arbejde på arbejdsmarkedet.

Artiklen peger altså på, at mænds børneomsorg faktisk er større, når de får børn, men at tiden brugt på børnene ikke reduceres så meget, når børnene kommer i skole, hvis det er de samme mænd og kvinder, vi ser på, og ikke mænd og kvinder, som blot er i forskellige livsfaser. Tilsvarende har det ingen betydning for forældres arbejde

på arbejdsmarkedet, om de har førskole eller skolebørn, når vi følger de samme forældre. Det ændrer ikke på, at det kun er kvinders og ikke mænds arbejde på arbejdsmarkedet, der er påvirket af at få børn, idet mænds øgede omsorgstid udelukkende tages fra deres fritid.

IV Børneomsorg, voksenliv og skilsmisse

– børneomsorg og forskellige familieformer, og børns succes sidenhen

- Der er ikke forskel i tiden brugt på børneomsorg, hvad enten forældre sidenhen bliver skilt, eller de bliver sammen.
- Mødre bruger mindre tid på det ældste barn, hvis der er halvsøskende i familien.
- Hvis forældre bliver skilt, mens børnene er i en tidlig skolealder, er det mindre sandsynligt, at børnene har fuldført en uddannelse som 27-årige, og at de er gifte i den alder.
- En skilsmisse, mens børnene er i en sen skolealder, øger sandsynligheden for, at børnene indgår i parforhold som 27-årige.

Der er stadig flere familier med sammenbragte børn, hvilket rejser spørgsmålet om, hvorvidt det har betydning for børns omsorg, og hvordan de klarer sig sidenhen. I "Childcare and Child Outcomes – and Parental Divorce" belyses disse spørgsmål ved at anvende oplysninger fra en tidsanvendelsesundersøgelse for året 1987, som gør at vi har oplysninger over forældres tid brugt på børneomsorg dengang, og vha. oplysninger fra Danmarks Statistiks registre om, hvordan det er gået børnene op til i dag.

Vi finder, at der ikke er forskel i den omsorg, børn får, selvom der er udsigt til, at forældrene bliver skilt indenfor de kommende 4 år eller 5 til 11 år ude i fremtiden, sammenlignet med børn, hvis forældre ikke bliver skilt inden de selv bliver 18 år. Vi ser også, at den tid mødre bruger på børneomsorg overfor det ældste barn er mindre, hvis der er en halvsøskende i familien.

Når det gælder børns fremtid, finder vi, at hvis barnet har oplevet, at forældrene blev skilt, da det var i tidlig skolealderen – 7-11 år – er det mindre sandsynligt, at det har fuldført en videregående uddannelse, når det er 27 år. Ligesådan gælder det, at børn, der i den tidlige skolealder har oplevet en forældreskilsmisse, har mindre sandsynlighed for selv at være gift i 27-års-alderen, mens en skilsmisse

oplevet i 12-17-års alderen forøger sandsynligheden for at indgå i et parforhold som 27-årig. Der er derimod ingen sammenhæng mellem forældreskilsmisse i barndommen og det selv at have børn, når man er 27 år.

Hvorvidt disse sammenhænge mellem forældreskilsmisse og børns succes sidenhen blot er udtryk for, at det er "dårlige" forhold, som bliver opløst, eller det er selve skilsmissen, som har betydning, er det ikke muligt at konkludere på baggrund af undersøgelsen.

V Hvor store forskelle er der i forældres børneomsorg?

– en sammenligning mellem Danmark, UK og Canada

- Danske børnefamilier bruger mere tid og flere penge på deres børn end engelske og canadiske børnefamilier.
- Uligheden mellem børnefamilier er mindre i Danmark end i England og Canada.
- Værdien af børneomsorgen er mere ulige fordelt mellem familier end blot tiden i Danmark.
- Den største ulighed er i forældrenes direkte forbrug på børnene, som er større end uligheden i børnefamiliers samlede forbrug.

De fleste undersøgelser af ulighed i børneomsorg og børnefattigdom fokuserer på forældrenes indkomster, mens det er mindre udbredt at se på værdien af den tid, de anvender på børnene, og det konkrete forbrug, der kommer børnene til gode. Det er der rådet bod på i artiklen "Resources available to children in Denmark, UK and Canada", som anvender oplysninger fra danske og canadiske tids- og forbrugsundersøgelser. Disse undersøgelser refererer til omkring 2000, hvilket anses for at være af mindre betydning, når det gælder sammenligninger af forskellige mål for omsorg og mellem forskellige lande.

Vi finder, at både tiden, værdien af tiden og pengene, forældre bruger på deres børn, er større, mens uligheden er mindre i Danmark end i Canada. Det er kun fordelingen af forbruget mellem familier, som er det oftest anvendte mål for ulighed, der er mere lige i Canada end i Danmark.

Ser vi alene på børneomsorgen, er den mere lige fordelt, hvis vi både ser på faderens og moderens omsorg og ikke enten på den ene eller den andens omsorg. Det er altså sådan, at forældrene i et vist omfang arbejdsdeler, ved at det enten er den ene eller den anden,

der giver mest børneomsorg. Vha. oplysninger i Rockwool Fondens Forskningsenheds Tids-og forbrugsundersøgelse og Canadian General Social Survey viser vi også, at værdien af børneomsorgen beregnet som tiden gange forældrenes timeløn er mere ulige fordelt end tiden alene, og det gælder også, selvom det kun er den udviklende omsorg, vi værdisætter på den måde.

Fordelingen af værdien af børneomsorgen er også mere ulige end familiernes samlede forbrug. Ser vi imidlertid udelukkende på den del af forbruget, som direkte er til børnene, hvilket vi kan for Danmarks vedkommende, er det her, den største ulighed viser sig. Det betyder, at uligheden i fordelingen af børneomsorg undervurderes, når vi kun ser på fordelingen af børnefamiliers samlede forbrug, hvilket er det, man gør i de fleste undersøgelser, som lægges til grund for tildeling af offentlige ydelser overfor børnefamilier.

VI Pensionering af kærlighed?

– fritiden før og efter arbejdsmarkedet

- Den sociale fritid er større for pensionerede kvinder end for ikke-pensionerede kvinder, mens der ikke er nogen forskel for mænd.
- Gifte mænd og kvinders fælles fritid er den samme, hvad enten de er pensioneret samtidig eller ikke-samtidig.
- Den fælles fritid inklusive spisning forøges, når kvinden pensioneres, mens mandens pensionering ikke påvirker længden af deres fritid sammen.

I artiklen "Love and Retirement" stilles spørgsmålet, om ægtefællers samtidige tilbagetrækning fra arbejdsmarkedet hænger sammen med ønsket om mere tid sammen. Flere undersøgelser har således peget på, at det ikke kun er arbejdsevne eller de økonomiske muligheder efter pensionering, der er forklaringen på samtidig tilbagetrækning, men at det er udtryk for et ønske om mere fælles fritid.

For at belyse dette spørgsmål har vi set på, om fritiden brugt sammen ændrer sig, når man bliver pensioneret, idet den officielle pensionsalder bruges til at tage højde for, at det ikke kun er pensionering, der bestemmer fritidens anvendelse, men også ønsket om fælles fritid, der bestemmer pensionstidspunktet. En tilsvarende undersøgelse er gennemført for Frankrig, som der foretages sammenligner med.

Undersøgelsen omfatter 55-74-årige gifte/samboende danskere, som har oplyst deres daglige tidsanvendelse i Rockwool Fondens

Forskningsenheds tids- og forbrugsundersøgelse i 2008/09, hvortil der er knyttet registeroplysninger fra Danmarks Statistiks.

Når vi skelner mellem fritiden, hvor begge parter er sociale, fritiden, hvor der også kan ses fjernsyn osv., og fritiden inklusive spisning, har pensionerede kvinder mere af dem alle sammen end ikke-pensionerede kvinder. For mænd er det kun den udvidede fritid med og uden spisning, der er større for pensionerede end for ikke-pensionerede, hvorimod der ikke er nogen forskel i længden af den sociale fritid, hvad enten mænd er pensionerede eller ej.

Vi finder også, at der ikke er forskel i den fælles fritid, hvad enten partnerne har trukket sig tilbage samtidig – op til et års mellemrum – eller på forskellige tidspunkter. Der er heller ikke fundet nogen virkning af den ene partners pensionering på den anden partners individuelle fritid. Den fælles fritid inklusive spisning forøges imidlertid, når kvinden pensioneres, mens mandens pensionering ikke påvirker længden af deres fritid sammen.

I Frankrig indebærer mandens tilbagetrækning fra arbejdsmarkedet, at kvindens individuelle fritid formindskes, mens der bliver mere fælles fritid. Hvorvidt det skyldes, at franske mænd i højere grad serviceres og underholdes af deres partner, når de trækker sig tilbage, mens danske mænds pensionering hverken påvirker den fælles fritid eller kvindens individuelle fritid, er selvsagt en mulig forklaring på forskellene mellem de to lande.

Undersøgelsen peger således på, at for danske kvinder er pensionering mere betinget af et ønske om fælles fritid, end det gælder for mandens pensionering. Samtidig er der ikke noget i undersøgelsen, der tyder på, at en samtidig pensionering i højere grad end en forskudt kan forklares ved et ønske om mere fritid sammen, eftersom det ikke er det, der praktiseres efter pensionering.

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Omsættes arbejdstidsønsker til virkelighed?

– arbejdstidspræferencer og ændringer i arbejdstid, og velfærd

Do preferences impact behavior and wellbeing? A panel study of preferred and actual working hours 2001-2008/09[1]

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SUMMARY: Several European studies show that there are more people in employment who wished that they worked fewer hours than there are people who wished that they worked more hours. The question addressed here is whether imbalanced working hours—working hour tension—influences changes in hours worked: do preferences become reality? On the basis of a Danish longitudinal time-use study, we find that more Danes prefer shorter working hours than longer working hours, which is in contrast to US employees. Moreover, not only do the vast majority of over-employed Danes adjust their working hours, those who are under-employed also do so within a decade. Factors behind these changes are analyzed and means of ensuring an optimization of time- and money-related wellbeing are discussed.

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1. Introduction

The number of hours worked in society is important in order to meet the domestic and foreign demand for goods and services, while the numbers of hours worked by individuals relative to their preferred numbers of working hours—the *working hour tension*—is important for the wellbeing of the population. For the same reasons, the issue of working hours is often on the political agenda, and is a central theme in negotiations between unions and employer organizations, not to mention in everyday conversation. Hence, it is a key question whether Danes are working their preferred number of weekly hours or whether there is an imbalance between their actual hours worked and their preferred working hours, which would mean that the distribution of work and leisure time is not optimal for them. If there is negative working hour tension—preferred working hours lower than actual working hours—a possible result is a loss of productivity due to people being overworked. Conversely, positive working hour tension may result in productivity gains; when people are under-employed and when the workforce is motivated by a desire for advancement and higher incomes, they may become more productive during the hours they work. However, positive working hour tension also indicates a potential production loss, as the available workforce is not being fully used. So irrespective of whether the tension is negative or positive, it is an expression of a societal welfare loss – looking apart from the impact of taxes on optimal working hours – because the actual allocation of time differs from the working hour preferences in the population.

In addition to preferences regarding working hours, labor market constraints may also play a role in determining actual working hours. The supply of working hours is not completely flexible: it is often only available in combinations of full-time and part-time, as governed by labor market regulations and negotiations between unions and employer organizations. Hence, the restrictions on working hours within the job are also important. Moreover, the implementation of preferences for working hours relies on the existence of working time sovereignty, and the determination of preferences and the reliability of the estimates of these depend on the degree to which the statements made by employees in this respect can be trusted.

To investigate the research question, all respondents in the Danish Time-Use Panel (DTUP) who were in employment were asked how many hours they currently worked, whether they were content with this number of working hours and, if not, whether they wanted

to work more or fewer hours. They were also asked how many more or fewer hours they would like to work, given that changes to working hours would increase/decrease their income accordingly. Having asked these questions in both the 2001 and the 2008/09 waves of the survey, we are able to show whether preferences remained stable over time, and whether, if these were not in accordance with actual number of working hours in the first wave, the actual number of working hours later came into line with those earlier preferred. We thus add to existing knowledge by analyzing the relationship between preferred and actual working hours in Denmark; but we also include the dimension of wellbeing in our analysis, and are thus able to investigate whether going from imbalanced to balanced working hours creates satisfaction with working conditions.

2. Literature review

There has been extensive research on labor supply in relation to both the decision to work and the number of hours worked, whereas the underlying preferences for working hours have received less attention, despite working hour tension—the difference between preferred and actual working hours—being widespread and important for individual welfare and for society in general (see Jacobs & Gerson (2004) for the US and Reynolds (2004) for many other countries).

At the micro level, investigations of working hour tensions have often focused on sociological questions, such as the work/family balance issue, with reduced working hours seen as a tool for improving the quality of everyday life for families with children and for resolving the "overwork problem" (Schor, 1991; Townsend, 2001; Clarkberg & Moen, 2001; Jacobs & Gerson, 2004). Hakim's (2000) preference theory of work/lifestyle choices is important in this context, as it distinguishes between adaptive preferences varying over the life-course, which are most commonly found among women, and work-centered preferences with little variation between different life-course stages, most often adopted by men. The implication is that it is more difficult for men with adaptive preferences than it is for women with similar preferences to achieve their desired working hours. Wanrooy's (2005) findings for Australia support this theory, although she notes that external factors, such as the availability of childcare institutions, are not an integrated part of the theory.

Within the literature in the field of economics, working hour tensions are mostly seen as market failures. The question typically

posed is why ordinary labor supply models that assume free choice concerning hours worked, with employees selecting the desired utility-maximizing outcome at a given wage, are not applicable to all employees—see, for example, Steward & Swaffield (1997). In addition, the impact of income taxes on labor supply has been used to explain the existence of working hour tensions on the labor market (Klevmarken, 2005).

In both these perspectives, the question to be answered is what determines people's working hour tensions, and how this might vary between population groups. Mertz (2002) shows how preferences for number of working hours and desired work schedules differ among German freelancers, self-employed individuals and ordinary employees. He also demonstrates that time-use on a household level, together with household size, number of children and household income, all have a key impact on women's work preferences, but not on those of men. However, education and work experience are found to have no impact in this study, which is based on the German Socio-Economic Panel (GSOEP) 1985-1994.

If there is negative working hour tension—preferred working hours are lower than actual working hours—a possible outcome is a feeling of being overworked and a consequent productivity loss, while positive working hour tension may generate productivity gains as the result of possible desires to achieve advancement and higher incomes (Reynolds, 2004). Working hour mismatches may also lead to lower levels of psychological and physical wellbeing and problems within the family, either because of the person with mismatched hours not having sufficient time or because of financial problems. Under all circumstances, negative or positive working hour tensions are key candidates for explaining individuals' low level of wellbeing.

Labor market constraints are also central in determining actual working hours. The supply of working hours is not totally flexible, since employment is often offered as full-time or as various fixed amounts of part time work because of labor market regulations and the outcomes of negotiations between unions and employer organizations. Nevertheless, Steward & Swaffield (1997) found that there was no indication of British unions rationing union workers to working fewer hours than comparable non-union workers in the beginning of the 1990s.

Moreover, job insecurity and the lack of job opportunities enable employers to offer working hours that do not match the desires of employees, because minimum hour constraints are a function of un-

employment rates and risk of unemployment that can more readily be imposed as these levels rise (Steward & Swaffield, 1997). As Böheim & Tayler (2004) find using data from the British Household Panel Survey (BHPS), working hour constraints are significant determinants of British employees leaving the labor market and of within- and between-employer job mobility.

Preferences for working hours are correlated with the business cycle. That is, there are more people who would prefer to work more hours and fewer people who would prefer to work fewer hours—an increasing level of under-employment (Bell & Blanchflower, 2011)—when there is an economic crisis and/or a high unemployment rate, as was the case immediately after the second wave of the DTUP conducted in 2008/09. Conversely, economic growth and/or a low rate of unemployment are correlated with fewer people wanting to work more hours and more people wanting to work fewer hours (Bonke, 2013). A likely explanation is that unemployment creates more disciplined workers who fear redundancy and are accordingly willing to work more hours, earning more income for future consumption. In growth periods, this fear is much smaller; consequently, stating a preference for fewer hours is less risky. The opposite picture emerges for the relationship between GDP per capita and hour constraints, as the preferences for more (fewer) hours are higher (lower) in poor countries than in rich ones.

Lastly, policies on working hours also seem to vary according to the economic growth condition in society. In periods of high unemployment, the focus has often been on lowering the number of weekly working hours for new jobs, as in Germany, France and Denmark in the 1980s. In periods of prosperity and/or demographic change (for example, with an ageing population), incentives aimed at delaying the retirement age and increasing the labor supply in general have been on the political agenda.

This paper aims to further elucidate these issues by investigating changes in working hour tensions between 2001 and 2008/09 and the extent to which these changes can be explained by changes in working hours over the same period. In other words, we seek to determine whether preferences for working hours are revised as a result of changes in actual working hours being made in accordance with those preferences over the survey period of 7-8 years.

3. Data

We use data from the Danish Time-Use Panel Survey 2001-2008/09 (DTUP). These data are based on a random sample of 4,164 18- to 74-year-olds drawn from the Danish administrative registers for 2001 and interviewed in that year. In 2008/09 a total of 2,764 of these respondents were re-interviewed, and they form the panel for the Danish Time-Use Panel Survey 2001-2008/09. A supplementary sample of 1,927 respondents, also drawn from the Danish administrative registers, was added in the 2008/09 wave, giving a total of 6,091 respondents in the Danish Time Use and Consumption Survey (DTUC) 2008/09. A unique identifier for each respondent permitted the merging of the DTUP data with administrative register data at Statistics Denmark, which allowed us to test for sample selection against the whole population. This showed that in the DTUP 2001 and 2008/9 samples.

Hence, we have an imbalanced panel for pooled cross-sectional estimations and a balanced panel for fixed effect estimations, the latter panel being weighted to represent the 2008/09 adult population in Denmark. Because the age distribution of the samples goes from 18 to 74 years, most of the people in employment interviewed in the 2001 wave also participated in the 2008/09 wave. For both waves, respondents first attended an interview, which elicited basic information on, for example, family composition, socioeconomic status, educational level, and average number of working hours. In each survey wave, respondents were then asked to complete two time-use diaries, and if the respondent was aged between 18 and 74 years and had a spouse or cohabiting partner, the spouse/partner was also asked to complete time-use diaries for the same days.

There are certain questions asked as standard in time use surveys. In questions about working hour tension, for example, the International Social Survey Program, the German Socio-Economic Panel (GSOEP), the British Household Panel Survey (BHPS), Household, Income and Labour Dynamics in Australia (HILDA), the Danish Time-Use Surveys from 2001 (DTUS-01) and 2008/09 (DTUC-08), and thus also the Danish Time-Use Panel Study (DTUP) 2001-2008/9, all ask whether the respondent would like to work more hours and earn more money or work fewer hours and earn less than he/she currently does, or whether he/she is satisfied with his/her current number of working hours. The Danish Time-Use surveys also enquired about the *number* of additional or fewer hours desired when a respondent was dissatisfied with his/her current number of working hours.

In our data, we include employees as well as self-employed individuals, although those who are self-employed are assumed to have greater freedom to choose their labor supply. In contrast to Böheim & Taylor (2004), we include people with secondary jobs—around 10 percent of the Danish labor force in 2008 (Bonke, 2012)—because a secondary job might neutralize working hour tensions related to their primary employment, which is what most papers, including this, deal with.

Unlike Merz (2002), we do not include the unemployed because it can be reasonably assumed that they wish to work more hours than they currently do (Smith et *al.*, 1998), and because the issue of unemployment is more a question of incentives to work and mismatch between demand and supply of labor to the labor market.

Information on educational background refers to the longest completed course of education recorded in the administrative registers. We create a binary indicator for whether the respondent completed a course of further education, and if so whether this was a short (under three years), medium-length (3 to 4 years) or long (more than 4 years) course program.

Other control variables we use are age, civil status (single or cohabiting/married), number of children, and net household income. Information on income comes from the administrative register data and is calculated in terms of quintiles.

Table 1 shows means and distributions for the variables used in the analyses. We see that some of the variables are of approximately the same values regardless of whether they relate to the balanced or the imbalanced panel. This is the case for the number of working hours, the proportion of people with flexible working schedules and the proportion of people with secondary jobs; on the other hand, there are a smaller proportion of married/cohabiting respondents, a smaller average number of children and a higher average level of education in the balanced than in the imbalanced panels for the year 2008/09. However, in the analyses we weight both samples using register information from Statistics Denmark to ensure that they represent the Danish population at that time.

Table 1 *Descriptive statistics for balanced and unbalanced panels.*

	Balanced panel 2001-2008/09	Unbalanced panel 2001-2008/09
	Means	Means
Working hours	38.5	38.0
Age	48.4	44.6
	Proportion	Proportion
Flexible working time	48.9	49.0
Secondary job	11.0	9.0
Gender (women)	55.8	50.9
Married/cohabitation	80.2	85.9
No children	*56.0*	*42.2*
1 child	15.7	18.2
2 children	20.2	29.0
3+ children	8.1	10.7
Education:		
No further education/vocational training	45.3	52.3
Short further education	10.3	9.5
Medium-length further education	27.5	24.1
Long further education	16.8	14.1
N:	763	2,942

Source: Danish Time Use Panel

4. Empirical strategy

Many labor supply studies exist—for example, Blundell & MaCurdy (1999) and Klevmarken (2005)—in which wages, virtual incomes and different socioeconomic factors are shown to have important impacts. Here, we investigate *changes* in working hours among those in employment and how these changes can be explained by explicitly mentioned preferences for working hours in light of various socioeconomic characteristics. We also investigate whether working hour tensions—unfulfilled work preferences—are removed through actual working-hour changes, and how preferences and working-hour changes impact satisfaction with working conditions in general.

The empirical models applied are, first, a model for explaining how preferences are revealed in the event of changes in working hours for

respondents over the period 2001-2008/09, controlling for heterogeneity in gender and age.

(1) Δ working hours$^{2008\text{-}2001}$ = f (pref^{2001}, age, age^2, sex).

The next model uses changes in working hours during the period together with preferences in 2001 and structural and individual characteristics to predict the working hour tension/preferences in 2008.

(2) pref^{2008} = g (Δ working hours$^{2008\text{-}2001}$, pref^{2001}, Δ flex work, Δ sec. job, Δ marriage, Δ children, Δ educ., age, age^2, sex)

We also investigate the impact of changes in preferences and specific working conditions, such as flexible working hours and a secondary job, on satisfaction with working conditions in general, controlling for certain socioeconomic characteristics. We know from the literature (e.g. Clark, 1996) that working hour tension contributes to satisfaction with working conditions. Our formalized equation is:

(3) Δ satisfaction with workconditions$^{2008\text{-}2001}$ = h (Δ work tensions$^{2008\text{-}2001}$, Δ flex work, Δ sec. job, Δ marriage, Δ children, Δ educ., age, age^2, sex).

Here, "satisfaction with working conditions" relates to a subjective question about satisfaction with working conditions in general (Bonke et al., 2009).

Model (1) uses OLS estimations of changes in working hours as the dependent variable, with values ranging from -55 to 55, while Model (2) uses multinomial logit-estimations with the same hours as the reference category and under- and over-employment in 2001 among the explanatory variables (Böheim & Taylor (2004) estimate a similar model for the United Kingdom). Model (3) uses OLS estimations with satisfaction as the dependent variable, with values from -6 to 6.

The model used for the preference estimations in (2) is also the one used for estimating the intra-person relationship between the spouses' working schedules and their preferences for working more or fewer hours per week, see Table 3.

5. Descriptives

It is reported in the literature that the preferences for working hours are in accordance with actual current working hours—i.e., that there is no working hour tension—for most people in most countries. Table 2 confirms that this is also the case for Denmark. Three out of four people in employment were satisfied with their actual working hours for the year 2008/09, though this was the case for only two out of three in 2001. Among those who were not satisfied with their working hours, 50 percent more people wanted to reduce the number of hours they worked than wanted to increase their hours. In 2001, 21 percent wanted to work fewer hours, and in 2008/09 the corresponding figure was 16 percent, whereas the percentage of people who wanted to work more hours was only 11 percent in each of the two survey years.

A comparison of 21 countries based on the International Social Survey Program, 1997 and 2005 (Otterbach, 2010) shows that the large majority of workers do not face working hour constraints, with Denmark, Norway and Switzerland at the top of the ranking order of nations, and also that the majority of constrained employees, in particular in the US, would prefer longer working hours (see also Reynolds (2004) with regard to working hour tension in the US). The exceptions to this majority preference for longer hours are found among employees in Denmark, Switzerland and Norway, where the majority of those whose working hours were constrained at the time of the survey wanted to work fewer hours, and to some extent Sweden, where an equal number of such people had preferences for more and for fewer hours. The same picture emerges from an examination of the survey data for 1997 only (Sousa-Poza & Henneberger, 2002; Stier & Lewin-Epstein, 2003).

Table 2 shows that for 2008/09 fewer women than men in Denmark wished to have more working hours, but more women than men wished to have fewer working hours.

Table 2 *Weekly working hours in main occupation and desired working hours, employed individuals, 2001 and 2008/09*

	Preferences for working time[1]				Preferred hour change			N:
	More hours	The same	Fewer hours		More	Fewer	Net hours change[2]	
2008/09	Percent				Hours			
Weekly working hours in main occupation								
<37 hours	11.6	78.0	10.4	100	10.9	7.0	2.5	852
37 hours	11.1	73.6	15.3	100	7.0	7.2	-1.2	1,542
38-44 hours	15.8	67.9	16.2	100	7.0	7.2	-0.2	638
45+ hours	5.2	71.6	23.2	100	10.0	11.9	-7.8	722
All	10.9	73.2	15.9	100	8.2	8.5	-0.46	3,754
2001	*11.7*	*67.0*	*21.3*	*100*	*8.3*	*8.3*	*-0.78*	*1,278*
Men	12.2	73.3	14.6	100	8.0	9.3	-0.4	1,914
Women	9.4	73.1	17.5	100	8.5	7.8	-0.6	1,840
Av. working time in main occupation	Hours							
2008/09	36.86	38.06	40.51					
2001	34.2	37.1	38.9					

1. Q: If possible, would you then wish to work more hours and earn more or work fewer hours and earn less? Q: About how many more/fewer hours would you like to work?
2. More and fewer hours weighted with their proportions and added together, i.e. net hours change.
*Source: Danish Time Use Panel

There were no changes in weekly working hours agreed upon between the unions and employers' organizations in Denmark during the period of the study, except that the principle of granting 3 holiday periods per year was gradually introduced over the period up to 2002, and thereafter paid holidays were increased from five weeks to six.

Not surprisingly, people who currently work many hours a week are also those who more often wish to work fewer hours, and vice versa: more people who currently work fewer hours wish to work more hours than do those working many hours a week; see also Drago et *al.* (2005) for the same finding for Australia. For Danes working more than 44 hours a week, the ratio is 4:1 (23 and 5 percent respectively), while it is 1:1 (16 and 16 percent) for those working between 38 and 44 hours a week. For the majority of employed people, i.e.

those who work 37 hours a week, the ratio is 3:2 (15 and 11 percent). However, of people with part-time work, i.e., those working fewer than 37 hours a week, slightly more want to work more rather than fewer weekly hours. The same is found for the Netherlands, with a greater probability of wanting a shorter working week the more a woman works, and for a greater probability of wanting a longer working week the fewer hours a woman works; men were not included in that analysis (Yerkes, 2004).

Because the same questions about preferred and actual weekly working hours were asked in the Danish Time-Use Survey 2001 (DTUS-01) and the Danish Time-Use and Consumption Survey 2008/9 (DTUC), and the two surveys together constitute a panel, we are able to investigate how preferences and actual working hours changed for the same individuals over the 2001-08/09 period. As the Danish labor market is often considered very flexible, with a high degree of mobility and changes of employment (Andersen, 2012), the expectation is that workers with imbalanced working hours in 2001 would no longer be working-hours constrained in 2008/09.

6. Couples' preferences for working hours

In the following we distinguish between the working hour tensions of men and women in marriages/cohabitating partnerships, because gender roles and career patterns are thought to vary between the two spouses of the household and because labor supply decisions are primarily made in the household context. The spouses' working hour preferences are therefore determined not only by their own actual working hours, but also by those of their partners, due to a desire either to synchronize their time allocations or to specialize in their roles.

Table 3 *Determinants of preferences for working more or fewer weekly hours. Employed husbands and wives—married or cohabiting. 2008/09. Multinomial regression model*

	Husbands' desire to work:		Wives' desire to work:	
	More	Less	More	Less
Own working time				
< 37 hours	0.801* (0.33)	0.0714 (0.33)	0.762** (0.27)	-0.868*** (0.18)
> 37 hours	0.0291 (0.20)	0.408* (0.16)	0.518 (0.34)	0.227 (0.19)
Partner's working time				
< 37hours	-0.627* (0.26)	-0.019 (0.19)	-0.317 (0.48)	0.156 (0.32)
> 37hours	0.254 (0.21)	0.041 (0.19)	-0.582* (0.25)	-0.091 (0.16)
Age	0.0845 (0.08)	0.411*** (0.08)	0.0132 (0.10)	0.0422 (0.07)
Age^2	-0.0018 (0.00)	-0.0043*** (0.00)	-0.0011 (0.00)	-0.0003 (0.00)
1 child (no children)	-0.252 (0.26)	-0.171 (0.22)	-0.610+ (0.33)	0.131 (0.23)
2 children	-0.490+ (0.26)	-0.221 (0.22)	-1.304*** (0.39)	0.598** (0.23)
3+ children	-0.984* (0.41)	-0.639* (0.32)	-0.730+ (0.44)	0.499+ (0.29)
Education (no education)				
Vocational training	0.0125 (0.26)	-0.236 (0.21)	-0.522 (0.33)	0.0241 (0.23)
Short further education	-0.00166 (0.46)	0.168 (0.33)	0.197 (0.35)	-0.223 (0.29)
Medium-length further education	0.944** (0.31)	-0.0146 (0.27)	-0.760* (0.36)	-0.0565 (0.24)
Long further education	-0.106 (0.35)	0.135 (0.26)	-1.278* (0.52)	0.193 (0.27)
Secondary job (no secondary job)	-0.0190 (0.31)	-0.431 (0.27)	0.658 (0.38)	-0.109 (0.32)
Constant	-2.231 (1.46)	-10.85*** (1.71)	-0.379 (1.72)	-2.581 (1.40)
Number	121	244	87	288
Total number	1474		1468	
Log likelihood	-1004.27		-874.78	
Pseudo R^2	0,07		0,08	
LR (chi)32	160.12		144.66	

+ p<0.1, * p<0.05, ** p<0.01, *** p<0.001
Note: Inclusive of a flexible working condition variable.
Source: Danish Time Use Panel

By applying multinomial regression models for married/cohabiting women and married/cohabiting men who wish to work more or fewer hours than they actually do as the dependent variables in each case, and controlling for various socioeconomic factors, we find as shown in Table 3 that only for men is a high number of current working hours associated with the wish to work fewer hours to a greater degree than in the case of men working the standard 37 hours per week. For women, no such relationship is found. However, for husbands and wives working part-time – fewer than 37 hours per week – a larger proportion wish to work more hours and for wives fewer less hours than is the case for husbands and wives who work standard hours.

It is not only husbands' and wives' own working hours that have implications for their working hour tensions; the hours worked by their partners also matter. Hence, if the wife has a part-time job, it is less likely that her husband will wish to work more hours than if she works the standard 37 hours a week. However, if the husband works more than the standard weekly number of hours, the wife is less likely to wish to work more hours each week. This indicates that in the first case, there seems to be some synchronization process in play, while in the second case there is some specialization going on, with a career-oriented man and a home-oriented woman characterizing the household.

Table 3 also shows that men's desire to work fewer hours increases with their age up to a given point, and thereafter declines. For women, there is no such relationship between their age and desire to work more or fewer hours, i.e. Sousa-Poza & Henneberger (2002) find the same for a number of other countries. However, children have a strong impact on women's preferences for working hours (see also Drago et al. (2006) for Australia). Having the first child reduces the mother's desire to work more hours, and this tendency becomes more pronounced when the second child is born. A third child also decreases the desire to work more hours, albeit less than for the second child and little more than that for the first child, which is also a pattern found for German women (Mertz, 2002). This pattern is repeated for the desire to work fewer hours; this is more pronounced for mothers of two and three children than for women without children. For men with three children, the level of desire to work more hours relative to that of men and women without children is almost the same as that of their female counterparts. However, contrary to the case for women, having three children reduces the desire to work fewer hours among men; moreover, having two children impacts on men only half

as much as it does on women with regard to the desire to work more hours.

Finally, the desire to work more hours is more pronounced among men who have completed medium-length programs of further education than among men without any education, although their working hours are nearly the same in number. For women who have completed medium-length or long programs of further education, the opposite appears to be the case: fewer such women want to work more hours than is the case for women without any education. It is interesting that completing a long program of further education has differing impacts on the working preferences of men and women: fewer such women want to work more hours, while such men do not have this preference. Both men and women who have completed long programs of further education work longer hours than do men and women who have completed other programs of further education, or none at all (not shown in Table 3). A possible explanation for highly educated men working longer hours than their female counterparts is that these men have careers and take on less responsibility for family life than highly educated women do.

7. A panel analysis of preferred and actual working hours, the harmonization process, and constraints

The preference theory assumes that peoples' revealed preferences represent their normative preferences, understood as economic agents' true interests, and that preferences are stable over time, which means that a person will only change his/her behavior if it contributes to an optimization of available resources (Beshears et al., 2008). Hence, the desired number of working hours, for instance, determines an individual's actual number of working hours unless his/her living arrangements and environment make such a change impossible because of different kinds of constraints.

Table 4 shows that more than half of those employed in 2001 and 2008/09 were satisfied with their working hours in both years, while 7 percent maintained the desire to work fewer hours and 2 percent to work more hours per week. The remaining 37 percent changed their working hour preferences during the period. Hence, 12 percentage points of those wishing to work fewer hours in 2001 were satisfied with their working hours in 2008/09, and 5 percent wishing to work more hours had become satisfied by 2008/09. Among those who were

satisfied with their working hours in 2001 but not in 2008/09, nearly the same percentages wanted to work fewer hours and more hours, i.e. 11 percent in both categories, in 2008/09.

Table 4 *Working hour tensions in 2001 and 2008/09, and changes in number of working hours between, 2001-2008/09*

N: 763	**2001**			
	Preferences			
2008/09	*More hours*	*Same hours*	*Fewer hours*	All
Preferences	Per cent			
More hours	**(1.7)**	10.7	(0.5)	12.9
Same hours	4.7	**52.1**	11,5	68.3
Fewer hours	(0.1)	11.4	**7.3**	18.8
All	6.5	74.2	19.3	100.0
	Hours			
Change in working hours 2001-2008/09	8.45	3.59	1.97	
Working hours 2001	30.44	35.70	36.15	
Working hours 2008/09	38.88	39.30	38.12	

Source: Danish Time Use Panel

In Germany only every fourth self-employed individual and employee (27 percent) remained satisfied with their working hours from 1985 to 1994 (Merz, 2002), compared to 52 percent in Denmark between 2001 and 2008/09 (Table 4) and 72 percent in the UK in the period 1991-99 (Böheim & Taylor, 2004). In all cases, the great majority of those who were dissatisfied wanted to work fewer hours. For Australia, the number of individuals who remained satisfied in two consecutive years, 2001 and 2002, was nearly 40 percent, whereas 17-18 percent who were not satisfied in the first year became satisfied during the next year (Reynolds & Aletratis, 2006). That only 20 percent of Germans who were not satisfied with their working hours in 1985 had become satisfied by 1994, in comparison with 62 percent of the Danes changing from being dissatisfied in 2001 to being satisfied in 2008/09. Moreover, that the total *mover-index* (proportion of people changing their preferences in the period) was 49 for Germany and 39 for Denmark in the two periods, is also probably due to the more rigid German labor market with lower labor mobility, and to the fact that the year 1994 and also to some degree 1985 were both characterized by high unemployment rates in both countries, unlike the years 2001 and 2008/09, which were growth years in Denmark and in Germany.

An important question here is whether under- and over-employed employees in the Danish survey in 2001 remained dissatisfied with their working hours in 2008/09, either because the number of their working hours had not changed within that period, or because such a change was not sufficiently large to satisfy their working hour preferences. Table 4 shows that those who wanted more hours of work in 2001 were working on average 8.5 hours more per week in 2008/09. However, those who said they wanted to work fewer hours in 2001 were actually working 2.0 hours more per week in 2008/09. Because working hours also increased for "balanced" people by 3.6 hours on average indicating that working hour norms had increased, and that the hours for overworked people had thus fallen slightly relative to the norm over the period under consideration.

Böheim & Taylor (2004) showed results similar to those reported in this paper but for Britain during the period 1991-99, when nearly 40 percent of both men and women working full-time and having positive working hour tension (were under-employed) increased their working hours. The same was found for men and women with negative working hour tension (over-employed), who decreased their working hours (again in nearly 40 percent of cases) between two consecutive years during the period 1991-99. That said, however, more than 25 percent of the under-employed reduced their working hours, and the same share of the over-employed increased their working hours, during the same period, indicating either that the working hours preferences were not stable over time or that working hour constraints are widespread on the British labor market.

We also see that in Denmark, those able to fulfill their preferences of working fewer hours in 2001 and, hence, to become satisfied with their working hours by 2008/09 actually reduced their working time by 4¼ hours per week in that period (Table 5). Similarly, those wanting to work more hours and who had become satisfied with their working hours in 2008/09 had increased their working time by 4½ hours per week in 2001-2008/09. Dutch employees (not including the self-employed) were also able to decrease their working hours, if that was their preference, even within two-year periods, i.e., 1986-88, 1988-90 and 1996-98 (Baaijens & Schippers, 2008).

Table 5 *Working hour preferrences in 2001 and 2008/09 and changes in weekly working hours over the period 2001-2008/09.*

N: 763	**Pct.**	**Δ working hours 2001-2008/09**		**Pct.**	**Δ working hours 2001-2008/09**
2001		Coeff. (st.err.)	2008/09		Coeff. (st.err.)
Balanced	68.5	..(..)[1]	Balanced Under-employed Over-employed	52.2 4.7 11.6	..(..)[1] -4.166+ (2.231) 1.453 (1.491)
Under-employed	12.9	4.627** (1.439)	Balanced Under-employed Over-employed	10.8 (..) (..)	4.441** (1.580) -- --
Over-employed	18.6	-2.191+ (1.206)	Balanced Over-employed Under-employed	11.2 7.3 (..)	-4.228** (1.511) 0.899 (1.820) --
Age (2001)		0.572+ (0.335)			0.441 (0.336)
Age^2		-0.008+ (0.004)			-0.006 (0.004)
Sex		-3.479*** (0.924)			-3.419*** (0.924)
Constant		-0.669 (6.575)			1.761 (6.612)
Adj. R^2		0.044			0.050

+ p<0.1, * p<0.05, ** p<0.01, *** p<0.001
1. Δ working hours balanced–balanced 3.602 (0.620) () --<20 obs.
Source: Danish Time Use Panel

An important question is how working hour mismatches are created and resolved through changes in both actual and preferred hours of work (see Reynolds & Aletraris (2006) regarding this issue for Australia). Table 6 shows that there is no relationship between being under-employed in 2001 and being under-employed in 2008/09 when changes in working hours, for example, are taken into account, while being under-employed in 2001 has a negative impact on the desire to work fewer hours—being over-employed—in 2008/09. For those who were over-employed in 2001, there was a positive impact on the desire to work fewer hours and a negative impact on the desire to work more hours in 2008/09. This indicates that for under-employed people, controlling for working hour changes reveals a higher working hour tension balance, while this is only partially the case for those who are over-employed, of whom some contribute to accentuating the wish to work fewer hours and others decrease the wish to work more hours a week.

Table 6 *Preference shifts and working constraints.Multinomial logistic regression estimations.*

N: 762	**More work/same work 2008/09**	**Less work/same work 2008/09**
	Preferences 2001:	
More work	.428 (.414)	-1.604** (0.555)
Less work	-2.233* (1.075)	1.134*** (0.220)
	Actual working hours:	
Increased	.235 (.447)	-0.580* (0.295)
Decreased	-0.493 (0.367)	-0.038 (0.214)
	Working conditions:	
Flexible working time:		
2001 not 2008	0.136 (0.548)	-0.301 (0.353)
2008 not 2001	0.826* (0.359)	-0.273 (0.269)
Secondary job:		
2001 not 2008	-1.109 (0.794)	-0.149 (0.320)
2008 not 2001	-1.553 (1.1349)	-0.305 (0.526)
	Socioeconomic factors	
Δ Marriage	0.697+ (0.372)	-0.486+ (0.267)
Δ Children	-1.953*** (0.530)	0.385+ (0.224)
Δ Further education	-0.463 (0.620)	-0.951 (0.611)
Age (2001)	0.011 (0.128)	0.166+ (0.087)
Age^2	-0.001 (0.002)	-0.003* (0.001)
Gender	0.153 (0.324)	0.129 (0.199)
Constant	-1.041 (2.258)	-3.826+ (1.688)
Adj. R^2	0.134	0.134

+ p<0.1, * p<0.05, ** p<0.01, *** p<0.001
Note: The inclusion of job change in the period does not produce significant results, and nor does it change the other coefficients in the model; only the number of jobs is reduced.
Source: Danish Time Use Panel

The impact in isolation of working hour changes on preferences for working hours is very limited, as neither working more hours nor working fewer hours in the second wave of the survey are correlated with the desire to work more hours expressed in the first wave, and the same holds for the relationship between an actual decrease in working hours and the wish to work fewer hours. Further, a working hour increase results in fewer people wanting to work fewer hours when working hour preferences in 2001 are controlled for, possibly because of adaptive preferences integrating actual working hours into an individual's preference function.

An interesting result is that having been granted a flexible working hour schedule (the right to alter the starting and ending times of

the work day) at some point during the period 2001-08/09 is positively associated with the desire to work more hours, i.e., with being under-employed, while there is no significant association with the desire to work fewer hours, although the coefficient for this is negative (Table 6). This shows that changing the actual work schedule does not reduce working hour tension; instead, it increases the demand for more hours. This is in contrast to findings for the US, where having flexible working hours—though not any change in this arrangement—increases the desire to work fewer hours (Golden & Gebreselassie, 2007).

Taking on or giving up a secondary job during the period 2001-2008/09 has no impact whatsoever on working hour tensions in 2008/09. This also holds for changes of job, which, in contrast to findings by Böheim & Tayler (2004), is not found to have any impact on working hour tension, neither does it impact on any of the other coefficients (results not shown in the table).

Lastly, the models in Table 6 include some socio-demographic characteristics. These show that being married increases the desire to work more hours and decreases the desire to work fewer hours on the labor market. This is to be considered a net impact, as we control for gender. Furthermore, having a child has the opposite impact to being married: it decreases the likelihood of wanting to work more hours and increases the likelihood of wanting to work fewer hours. The impact of having a child, however, is not found to be greater for men than for women, i.e. the coefficient for an interaction term is not significant (not shown). Having completed further education is not correlated with the desire to work either more or fewer hours per week, neither does gender impact working hour tension, even if we include an interaction with being married or having children (not shown).

8. Working hour tension and wellbeing

An important element in satisfaction with one's working conditions is the number of hours worked, and especially whether this number is in accordance with one's preferences for the amount of working time per week. British data show that working hours have a significant impact on job satisfaction, motivation and retention of employees (Clark, 1996). This relationship is confirmed in Table 7, where satisfaction with working conditions—as indicated by responses to the question "are you satisfied with your working conditions/financial situation/

amount of leisure?" on a six-point scale (1 not satisfied … 6 very satisfied)—is higher for people who are satisfied with their working hours—no working hour tension—than for people wanting to work more hours and, even more, for those wanting to work fewer hours. The relationship holds for both 2001 and 2008/09.

Table 7 *Satisfaction within different domains, people in employment, 2001 and 2008/09*

2008/09				
Satisfaction with:	Want more hours	Want same hours	Want fewer hours	N
Working conditions	4.75	4.88	4.69	3759
Financial situation	3.82	4.47	4.75	3762
Amount of leisure	4.44	4.39	3.61	3763
Percent	*9.02*	*74.17*	*16.81*	*100.00*
2001				
Satisfaction with:	Want more hours	Want same hours	Want fewer hours	N
Working conditions	4.59	4.9	4.75	1375
Financial situation	3.67	4.58	4.81	1375
Amount of leisure	4.73	4.57	3.58	1375
Percent	*12.07*	*67.42*	*20.51*	*100.00*

Satisfaction scale 1-6 for all domains, with 0 as the least and 6 as the most satisfying.
Source: Danish Time Use Panel

In regressions for both 2001 and 2008/09 we also find that over-employed individuals, particularly women, are less satisfied with their working conditions, and that under-employed individuals are more satisfied (though not significantly so), than are people who are satisfied with the number of hours they work. Moreover, having a fixed working schedule is also associated with greater satisfaction with working conditions (not shown in the tables).

Table 7 shows that the desire to work more or fewer hours may be due to economic reasons, inasmuch as people with a desire to work more hours are less satisfied with their financial situation than are people in working hour balance. More obviously, there is a correlation between working hour tension and satisfaction with the amount of leisure time, as the leisure time and working time are obvious substitutes (Bonke et al., 2009). Hence, the desire to work fewer hours is related to a much smaller degree of satisfaction with leisure time – they probably wish more leisure time – than is the desire to work the same or more hours a week.

An interesting question is whether changes in working hour tension have an impact on satisfaction with working conditions in 2001 and 2008/09, i.e., whether going from imbalanced working hours—preferred and actual working hours not in accordance with each other—to balanced working hours leads to greater satisfaction with working conditions. This then leads on to the question of whether the opposite movement, from balanced to imbalanced working hours, means decreased satisfaction with working conditions.

Table 8 *Working conditions and working hour tensions. OLS estimations*

	Δ Satisfaction with working conditions[1] 2001-2008		
	All	Men	Women
	Work hour tension:		
Balance/imbalance	-0.231+ (0.143)	-0.278 (0.182)	-0.186 (0.224)
Imbalance/balance	0.074 (0.129)	0.102 (0.166)	0.019 (0.201)
Imbalance/Imbalance	-0.030 (0.174)	0.526* (0.231)	-0.575* (0.268)
Flexible working time:			
2001 not 2008	-0.240 (0.166)	-0.250 (0.233)	-0.178 (0.242)
2008 not 2001	0.148 (0.131)	0.241 (0.167)	0.114 (0.209)
	Secondary job:		
2001 not 2008	0.375* (0.167)	0.306 (0.202)	0.456 (0.288)
2008 not 2001	-0.061 (0.243)	0.0283 (0.167)	-0.240 (0.467)
N	755	410	345
Adj. R^2	0.022	0.029	0.015

+ p<0.1, * p<0.05
1. Numerical variable -4 to 4, mean value 0.027 (0.051)
Controls: age, age*age, marriage, children, education; see the variables in Table 6.
Source: Danish Time Use Panel

Table 8 shows that only the second change has the expected impact on satisfaction: satisfaction with working conditions is reduced when the working hours balance becomes an imbalance, but this is only at the 10 percent significance level. When the sample is divided into men and women, this relationship retains its magnitude (the coefficients are of the same size), but the statistical significance disappears, probably because of the smaller sample sizes. For movement from imbalanced to balanced working hours the coefficients are positive, but far from being significant. However, if the number of working hours in the period remains unsatisfactory, men become more satisfied and women less satisfied with their working conditions. This difference between men and women is possibly because being over-employed

is more disappointing than being under-employed (Reynolds & Aletraris, 2006), and more women wanted to work fewer hours in 2008 than in 2001 (86 vs. 80 percent), whereas this number was virtually unchanged for men (76 vs. 74 percent).

Surprisingly, there is no correlation between being granted or losing a flexible working schedule and satisfaction with working conditions; this holds for both men and women. Giving up a secondary job increases satisfaction with working conditions, although this increase is netted out when calculations are made for women and men separately (Table 8). Conversely, having a secondary job does not impact on satisfaction with working conditions, and this also holds true when men and women are considered separately.

9. Preferred and actual working hours – a macro perspective

The working hour tension balance is not only of importance for the welfare of individuals; the implications for society are also very relevant. A shortage of labor supply at a societal level due to demographic changes in the population, or a surplus of labor in periods of recession with substantial unemployment, are both economic policy issues that are often referred to in the political debate.

A comparison of the numbers of hours that people wanted to work more or fewer reveals that the figures were approximately the same in both 2001 and 2008/09. In both survey waves, the working hour tensions found amounted to a wish for 8 hours more work or less work per week. Because the two samples are of different sizes, the working hour tension can be calculated as equivalent to 7 percent of the total labor supply in 2001 and 6 percent in 2008/09. This implies that the net imbalances are fairly small, with a net deficit of labor supply in both years, equivalent to nearly 30 minutes in 2008/09 and 45 minutes in 2001 for the quarter of the labor force who were either over-employed or under-employed in the two years.

Grözinger et al. (2008) show that the working hour tension in Germany results in job satisfaction, life satisfaction and health satisfaction all being considerably smaller than they would be if no tension were present; the same is found for Australia using the Household, Income and Labour Dynamics (HILDA) (Wooden et al., 2009), because over-employment and under-employment have negative impacts on quality of life. High unemployment rates result in people working more unpaid hours than they do in growth peri-

ods, because this increases their chances of better jobs and higher earnings in the future.

10. Summary

The number of hours that individuals works relative to their preferred numbers of working hours—the *working hour tension*—is important for the wellbeing of the population. Negative working hour tension—when the preferred number of working hours is lower than the actual working hours—may result in individuals feeling that they are overworked and have an unsatisfactory life situation, with productivity losses as a possible consequence, while positive working hour tension—when the preferred number of working hours is higher than the actual working hours—may also be unsatisfactory, although this situation may also generate productivity gains when individuals are motivated by a desire for advancement and higher incomes.

On the basis of responses about preferences for working hours and current actual working hours obtained from the Danish Time-Use Panel Survey 2001-2008/09 (DTUP), where the samples for the 2001 and the 2008/09 waves were drawn randomly from administrative registers by Statistics Denmark, we find that most Danish people's preferences regarding working hours are in accordance with their actual working hours. Three out of four employed people were satisfied with their actual working hours for the year 2008/09, while only 2 out of 3 had that privilege in 2001. Among those not satisfied with their working hours, 50 percent more wanted to reduce the number of working hours relative to those wanting to increase these hours. In 2001, 21 per cent wanted to work more hours; in 2008/09 this was 16 percent, whereas the percentage of people wanting to work more hours was only 11 for the two years survey waves.

We also found that working hour tension was correlated with the number of working hours, not only those of individuals but also with those of their partners. If the wife has a part-time job, it is less likely that her husband will want to work more hours than if she works the standard 37 hours a week; but if the husband works more than the standard number of hours, the wife is less likely to wish to work more hours per week. This indicates that in the first case there seems to be some synchronization process in play, while in the second case some degree of specialization, with a career-centered man and a home-oriented woman, characterizes the household.

Preferences regarding working time were satisfied throughout the

period 2001-2008/09 for nearly half of those in employment, while 7 percent maintained a desire to work fewer hours throughout the period and 2 percent to work more hours per week. The remaining 37 percent changed their working hour preferences during the period.

An important question addressed in this paper is whether any working hour tension was eliminated due to changes in working hours over the period 2001-2008/09. Those people who were able to fulfill their preferences for working fewer hours in 2001 and, hence, were satisfied with their working hours in 2008/09, actually reduced the number of hours they worked by 4¼ per week during the period. Those who wanted to work more hours in 2001 and who became satisfied with their working hours by 2008/09 increased their working hours by 4½ hours per week. However, when we take changes in working hours into consideration, we find that being under-employed in 2001 has a negative impact on the desire to work fewer hours—being over-employed—in 2008/09. In the case of those who were over-employed in 2001, controlling for working hour changes had a positive impact on the number of people wanting to work fewer hours and a negative impact on those wanting to work more hours in 2008/09. Thus, for under-employed individuals, controlling for working hour changes results in an increased number of individuals for whom work tension is in balance, while this is only partially the case for over-employed individuals, some of whom contribute to accentuating the desire to work fewer hours and others contribute to decreasing the desire to work more hours per week.

An interesting question is whether changes in working hour tension from 2001 to 2008/09 have an impact on changes in reported satisfaction with working conditions; i.e., does going from imbalanced working hours to balanced working hours, with preferences and actual working hours in accordance with each other, produce greater satisfaction with working conditions? Does the opposite movement, from balanced to imbalanced working hours, mean less satisfaction with working conditions? In fact, only the second change has the expected impact on working conditions: satisfaction is reduced when balance turns to imbalance. For a change from imbalanced to balanced working hours, the coefficients are positive but not significant. However, if the number of working hours remained unsatisfactory throughout the period, there was a positive correlation with change in satisfaction with the working conditions as men became more satisfied and women less satisfied.

A comparison of the number of additional hours desired by people

who wanted to work more with the number of hours fewer desired by those who wanted to work less reveals that there was virtually no difference in the totals in either 2001 or 2008/09. The net imbalances are fairly small, with a net deficit in the labor supply in both years of nearly 30 min in 2008/09 and 45 min in 2001 for the quarter of the people in the labor force who were either over-employed or under-employed in the two survey years.

If we calculate the number of weekly working hours that are imbalance in terms of full-time equivalents, the result shows that there was a labor supply surplus equivalent to 2.8 percent of the individuals who were under-employed in 2001 and 2.4 percent in 2008/09, while the equivalent shares of over-employed individuals were 3.5 percent and 3.3 percent in 2001 and 2008/09, respectively. From a political viewpoint, this shows that a considerable number of Danish employees do not work hours that are in accordance with their preferences, suggesting in turn a welfare loss to society.

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II

Er det kun den normale arbejdstid, der påvirkes af skatten?

– mænd og kvinders normale og faktiske arbejdstider og den marginale skat

Spouses' supply of labor: How dependent are wage rate and income effects to the specification of working hours?

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SUMMARY: Although labor supply studies continue to produce different results only a few studies have focused on the impact of using different working hour measures. In this paper, we estimate a simple labor supply function using normal and actual working hours in order to investigate whether wage rates and income effects depend on the specification of working hours between spouses. The data stem from the Danish Time-Use Surveys in 2001 and 2008/09 which include information from stylized survey questions and time-use diaries. The results suggest that the wage-rate effects are larger when using normal working hours compared to actual working hours, and that income effects are less sensitive to working hour measures.

Keywords: Labour supply; Time allocation; Panel data

1. Background

The economic literature studying how labor supply responds to economic incentives continues to produce very different results. Even the latest wave of studies applying very sophisticated estimation techniques repeats this tradition of not being very conclusive (see e.g. Saez et al., 2012). This is unfortunate in general and in particular for active policy makers and governments, because labor supply is a very important political issue in (almost) all modern welfare states. And any government would like to know how the supply of labor can be influenced.

One reason for the inconclusiveness of the literature could be that the vast majority of studies implicitly or explicitly assume that people are either singles, live as if they were singles, or that the life with a spouse and children does not influence a person's labor supply decision in a systematic way. However, the majority of adults do not live as singles. Whether couples live 'as if' they were singles or whether family life does not have a systematic influence on labor supply is an empirical question. If family circumstances have a systematic influence on individuals labor supply that could be a contributing factor behind the fact that different labor-supply studies often arrive at quite different results.

If (some of) these family circumstances influence the families labor supply decision, then the economic incentives and labor supply have to be considered in a much broader context than simply income taxation – and it is not enough just to also include the welfare transfers in the discussion. One has to look at all family related welfare payments (to child care, child benefits, etc.), see e.g. Smith et al. (2003).

Furthermore, estimations of wage rate and income effects are assumed to be data dependent, see e.g. Klevmarken (2005). Hence, information on normal working hours stemming from labor force surveys and tax authorities do not take every day deviations in working time into account. Applying time-use data improves the analysis of labor supply by explicitly including competing leisure time activities and home production, which is found of particular importance for women's labor supply. From a productivity point of view actual working hours are also more appropriate to use than contracted and normal working hours (Bonke, 2014).

The aim of this project is first of all to study the relationship between family circumstances and normal versus actual family labor supply in order to understand how the income tax and the entire welfare system frame the economic incentives for spouses' supply of

working hours given different working time measures. Hence, the focus is not strictly on taxable income responses (see e.g. Kleven & Schultz, 2014), but more of a paper showing correlations between relevant variables controlling for various observable characteristic. However, we will also look at the way labor supply elasticity varies with different family circumstances and working hour concepts.

The data used here stem from two Danish Time-Use Surveys, where the first one was conducted in 2001 (DTUS-01) and the next one in 2008/09 (DTUC). Both surveys were based on random samples for the entire adult population and included stylized information on normal working hours as well as diary information on actual working hours for both spouses in a family. Besides socio-economic information from the surveys information on personal income and household income, educational background, etc. are from administrative registries at Statistics Denmark.

Some of the questions addressed are these:

a. *An overview of taxation, subsidy schemes, and other legislations that influences the families' labor supply.*
b. *What significance do family circumstances have for the amount of time spent by spouses in paid employment?*
c. *How is labor supply dependent on working hour information, normal versus actual working time?*

In the next paragraph the overall hypothesis referring to the dependence of the working hour information on spouses' labor supply is raised, while chapter 3 presents the different measures of working time together with some descriptive of working hour distributions in 2001 and 2008/09. Then follows in chapter 4 an introduction to the Danish tax-system in the two years under consideration, and chapter 5 presents the data used in the analyses. Some descriptive statistics are to be found in chapter 6, and in chapter 7 is a presentation of the economic model used in the empirical analyses. The results are shown in chapter 8, and the conclusion given in chapter 9.

2. Labor supply and different measures of working hours – a hypothesis

The primary purpose of this paper is to analyze labor supply using different measures of working hours while relying on the assumption that the choice of specification is important for what determines labor supply. Hence, because of progressive income taxes, see chapter 4,

higher income is expected to imply that the actual working time is significantly smaller than the normal (scheduled or agreed) working time, compared to what applies to lower marginal tax rates where the difference is expected to be smaller. In order to illustrate whether this could be the case, Table 2.1 shows the difference between normal and actual working hours for employees with high gross incomes – 3rd and 4th quartile – and employees with low gross incomes – 1st and 2nd quartile. The table shows that employees with high incomes have a significantly greater difference between their actual and normal working hours than employees with low incomes. The relative difference however, is not significantly different for the two income groups.

The significant difference between actual and normal working hours for people with high and low incomes justifies the hypothesis that labor supply will be determined by different factors, depending on the specification of working hours and the business cycle (Bonke, 2014). In addition, actual working hours are considered to be a better measure of the actual production input. It also provides a better illustration of labor productivity in different sectors, and how it has evolved over time.

Table 2.1 *The relationship between normal and actual working hours for different income groups, 2008/09*

	Difference between normal and actual working time (Hours per week)	Relative difference between normal and actual working time (Percent)
Gross income		
1st and 2nd quartile	6.416	0.9134
3rd and 4th quartile	8.554*	0.8436

Source: The Rockwool Foundation Research Unit

3. Different measures of working hours

In most countries, including Denmark, different measures of working hours exist since the necessary information can be based on either national registries or surveys. This entails that the definition of working hours varies as well as the period of time and time of registration.

Statistics Denmark's working time account (WTA) integrates the existing statistics – wage statistics, the registry based labor force statistics (RAS) and the employment in businesses statistic, see Statistics Denmark (2012) – on an aggregated level as well as employers' yearly wage reports to the Danish tax authorities in order to supply infor-

mation about working hours. This statistic reports, on a yearly basis, the duration of the individual periods of employment – using entire years or the employment's starting and ending dates. In addition, the statistic also contains information about the employee's own working hours as well as assisting spouse's working hours. The information originates from the central government, regions, municipalities and private enterprises since employers with fewer than 10 employees weren't obligated to report information about working hours until 2001.

With the introduction of the e-income registry the Danish tax authorities obtained information about all employees (over the age of 14), including employees in smaller enterprises, on a monthly basis whereby the information was reported more frequently and became more reliable.

The working time account refers people's employment status until November, as you are employed if you received wages or payment for at least one hour of work or were temporarily absent from employment in a given (reference) week. Undeclared work and unpaid overtime are not included. Based on this information the WTA reports the total number of working hours for each employee's main and secondary job, since the purpose of WTA is to assess the aggregated reported working hours in Denmark.

The labor force surveys (LFS), which are conducted in a wide range of countries, are based on telephone interviews and aim to illustrate the populations' attachment to the labor market. The interviews are conducted regularly in all weeks of the year and include, on a quarterly basis, 22,000 people between the ages of 15-74 residing in Denmark. Working hours in the LFS are reported per week in the week before the interview – the reference week – as employment is defined as being an employee, self-employed or an assisting family member, who has worked at least one paid hour during the week in question in their main employment (if the employment is secondary, the one with the largest amount of hours will be included as well). People who are temporarily absent from their current employment, for example due to vacation, illness or maternity leave, will also be considered as employed. The LFS provides information about the amount of working hours agreed upon by the employer and the employee (formally or informally) with or without paid breaks, while the normal working hours (also with or without paid breaks) indicate a normal week of work in the current employment. Actual working hours are also disclosed in the LFS and consist of the number of hours actually worked

excluding absence, but including overtime, whether paid, unpaid or undeclared etc.

The LFS is based in the employee's own reports, while the WTA is based on the employer's reports.

In order to compare information about working hours in the WTA and the LFS, Statistics Denmark recommend an enumeration of the latter, which is reported on a weekly basis, to years by multiplying by 52, since the purpose of the former is to calculate the total annual hours worked in Denmark. This entails that the number of annual hours is a few percent greater in LFS compared to the WTA, due to that fact that the LFS involves undeclared work, unpaid overtime and unregistered absence. This is partly offset by the fact that the WTA contains information about all employments, while the LFS only includes the primary and secondary employment (Statistics Denmark, 2012).

Like the LFS, the Danish Time-Use Surveys in 2001 (DTUS-01) and 2008/09 (DTUC) contain information about the normal and actual working hours.

In general, the calculation of normal working hours is the same in the LFS and the time-use surveys. In contrast, the actual working hours in the LFS refer to the reported actual number of hours during the reference week, while actual working hours in time-use surveys are compiled on two selected days – a weekday and a weekend day – which are then weighted by respectively 5/7 and 2/7 and then multiplied by 7 in order to obtain an entire week of work. Unlike the LFS which uses questionnaires, the time-use surveys base its information about actual working hours on diaries in which respondents have reported their specific activities from 4 a.m. to 4 a.m. the following day. The LFS and the time-use surveys therefore both include the actual working hours – including overtime in the main employment, secondary employment and undeclared work – and the normal working hours, including various forms of absence.

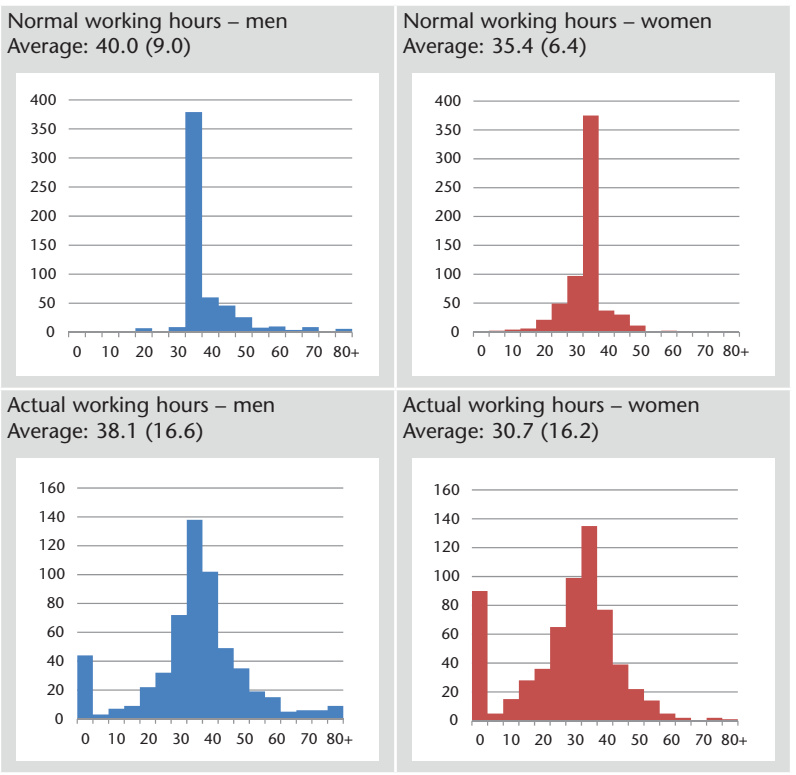
3.1. Distribution of working hours

When it comes to information about normal working hours, the distribution for men is expected to have a peak around full time employment – 37 hours – while women, with a relatively larger share of part-time employees, are expected to have two peaks: full time and part time. Such a "neat" normal distribution – for men – is not expected to found for the actual working hours which take into account non-working episodes, actual meet-and-go-home times, errands during working

hours and irregular overtime. Thus, if one works at irregular times, it is obviously more difficult to report normal working hours and these will be subject to greater uncertainty. Simultaneously information about actual working hours using diaries entail that meals and other non-work activities are not included in working hours while overtime, secondary working hours and undeclared work will be included.

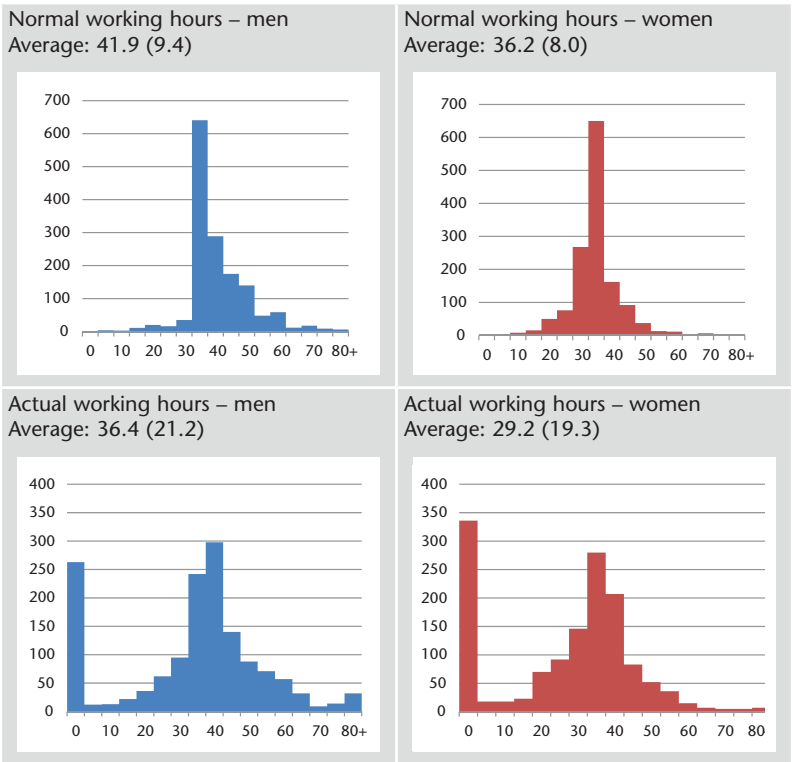
Figures 3.1 and 3.2 illustrate that the distributions of normal and actual working hours are different for both sexes in both 2001 and 2008/09, when we only use information from the DTUS-01 and DTUC-08/09. Normal working hours peak, as expected, around 37 hours a week for both men and women however the distribution for women has an additional peak around 30 hours (part-time). Furthermore the distribution of working hours is skewed to the left for women and skewed to the right for men in both years (2001 and 2008/09) which indicates that the number of average normal working hours is higher among men than women.

Figure 3.1 *Distribution of working hours by sex and measure of working hours, 2001*



Source: The Rockwool Foundation Research Unit

Figure 3.2 *Distribution of working hours by sex and measure of working hours. 2008/09*



Source: The Rockwool Foundation Research Unit

As expected, the spread is significantly smaller for the normal working hours than the actual working hours, partly because some observations have zero actual working hours – corrected for in the analyses – which implies that the respondents have not worked any hours during the two reference days. This picture emerges in both 2001 and 2008/09, although the relative spread (standard deviation/average) has increased significantly for both women and men over time.

A similar pattern has been found in Sweden with a smaller spread of normal working hours, compared to actual working hours, and a growing spread of women's and men's actual working hours during the period of 1984-93 (Klevmarken, 2005).

It's expected that there are systematic differences between normal and actual working hours since breaks, non-work activities and absence are assumed to be included in the former while irregular overtime and undeclared work are included in the latter. Table 3.1 also shows, like figures 3.1 and 3.2, that the average number of normal

working hours is smaller than the average number of normal working hours for both sexes in both 2001 and 2008/09. Juster & Stafford (1991) have also shown that the usual assessments of working hours overestimates the actual labor supply, see Bonke (2014).

It may also be mentioned that Deding & Filges (2009) have shown that the actual working hours including lunch breaks compiled by the Labor Force Survey (LFS) is 0.5 hours shorter per. week (38.3 compared. 37.8) than the normal working hours among men between the ages of 15-66 and 0.8 hours less per. week (32.2 compared. 31.4) for women in the same age group in 2006.

Table 3.1 *Different measures of working hours, age 20-64, 2001 and 2008/09*

	2001				2008/09			
	Men		Women		Men		Women	
	Average weekly hours							
Normal working hours incl. secondary employment[1]								
LFS	38.8		34.3		37.0		34.1	
DTUS/DTUC	40.0		35.5		41.8		36.2	
Actual working hours incl. secondary employment [1]								
LFS	34.3		28.8		33.5		28.2	
DTUS/DTUC[2]	38.2		30.6		36.4		29.2	

1. During the reference week
2. Time-use survey
Source: The Rockwool Foundation Research Unit

If we compare the different measures of working hours as reported by the LFS and the time-use surveys and illustrated in Table 3.1, there is a systematic compliance. Thus, the difference in normal working hours between men and women was 3.8 hours and 2.1 hours per week in 2008/09, while the corresponding difference in actual working hours was 2.9 and 1.0 hours per week. In 2001, the differences were of roughly the same magnitude.

3.2. Working hours and the business cycle

We would expect that the difference between normal and actual working hours varies with the business cycle since there is a stronger incentive to work in accordance with the agreed number of working hours when the unemployment rate is high. In this scenario the risk of unemployment is assumed to "discipline" employee behavior. This assumption is confirmed by the fact that the amount of sick leave

is lower during a recession than during periods of high economic growth and low unemployment (Statistic Denmark, 2015).

Bonke (2014) has similarly shown that the difference between the employee's normal and actual working hours is smaller during periods of high unemployment, while the difference is greater during periods of low unemployment. Such a "counter-cyclical" relationship can also be found for the last few years where the average number of weekly working hours in primary employment, both actual and normal, was declining up until 2009. From 2009 to 2011 the number of normal working hours stagnated, while the actual number of working hours rose. This suggests that the economic crisis, which began in 2008/09, has been able to help increase the actual working time, while the normal working time remained unchanged.

4. The Danish tax system

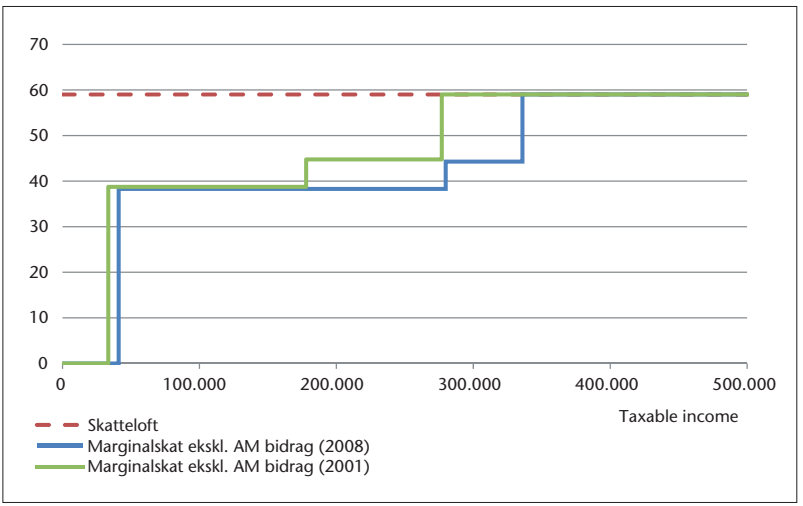
Denmark has a substantial income tax along with a widespread system of public benefits, which together contribute to a substantial redistribution between different income and age groups. With many benefits decreasing with the size of taxable income, some people have a very high marginal tax rate despite having a relatively low income. However, the Danish tax system is also progressive, which means that the marginal tax rate is greater for high-income earners.

During the last ten years a number of reforms have aimed at reducing marginal tax rates. In particular, between the two survey years 2001 and 2008, two major tax reforms have been carried out: "The spring package" in 2004 and "Lower tax on income" in 2007. Both reforms have been aimed at reducing marginal tax rates on earned income through an increase in deductions (incl. the earned income tax deduction) and income limits for the middle and top tax brackets. The structural reform from 2007 also changed the geographic division of Denmark by dissolving the counties and transforming the different county tax rates to a uniform health contribution of 8 percent while at the same time reducing the "bottom" tax rate. As a result, the personal income taxes calculated as the sum of municipal and state tax excluding the labor market contribution and the earned income tax deduction for 2001 and 2008 can be illustrated by the stippled lines in Figure 4.1.

Denmark has three income tax brackets. The income limit for the lowest tax bracket was 33,400 DKK in 2001 and 41,000 DKK 2008. Income above this limit was subject to a tax rate (municipality tax,

county tax in 2001, the health contribution in 2008 and state tax) of 38.8 and 38.3 percent. The next tax bracket contained income above 177,900 DKK and 279,800 DKK and were subject to tax rates of 44.8 and 44.3 percent in 2001 and 2008 respectively. The last and highest tax brackets contained incomes above 276,900 DKK and 335,800 DKK and were subject to a maximal tax rate of 59.0 percent (the tax ceiling). Adding the labor market contribution of 8 percent, the maximal tax rate was 63.4 and 63.0 percent in 2001 and 2008 respectively.

Figure 4.1. *Marginal income tax rate, 2001 and 2008*



Source: The Rockwool Foundation Research Unit on the basis of information from the Ministry of Taxation

The marginal tax rate is also affected by the size and design of a number of transfers, such as unemployment benefits, social assistance, housing assistance and daycare subsidies. You could also include commodity taxes, VAT and other taxes outside the income tax system when calculating the effective tax rate, see Jacobsen Kleven & Thustrup Kreiner (2006). This is however not the case in this paper since these taxes are not considered to be crucial for the actual and normal labor supply.

A detailed description of the calculation of the marginal tax can be found in appendix A.

5. Data

As mentioned earlier, we use data from Statistics Denmark's registries as well as the Danish time-use surveys in 2001 and 2008/09. The former was discussed in detail in Chapter 2 while the structure of the latter is described below. The Danish time-use surveys in 2001 (DTUS-01) and 2008/09 (DTUC) both contain a questionnaire addressed to households, randomly drawn from Statistics Denmark's population registry.

The sample thus contains 18-74-year-old individuals who are asked about their household composition, educational background, personal income and household income, etc. In addition the respondent is also asked about their own and their partner's (if relevant) normal working hours in primary as well as secondary employment, including whether they have a fixed amount of working hours. The latter question is similar to that of the LFS, making it possible to compare this information, including how the context of this kind of interviews influence the answers.

Furthermore, DTUS and DTUC contain diaries which are filled out by the respondent and his or her partner on the same weekday and weekend day. These two days were chosen randomly and placed as close to the interview as possible. The form contains a range of activities – post-coded for the DTUS-01 and pre-coded for the DTUC where the respondents chose between 37 different activities. The time required for a given activity, such as work or transportation to and from work, in the course of a day then becomes the sum of 10 minute sequences, where these activities occur. The weekly time consumption becomes the sum of 5 times the weekday time and 2 times the weekend time. The calculated working hours are hereafter referred to as the actual working time.

The interviews used for DTUS-01 were carried out during three months in the spring and three months in the autumn, while the interviews used for DTUC covered a full year, i.e. the 2nd, 3rd and 4th quarter of 2008 and the first quarter of 2009. 2,739 and 6,091 interviews were conducted in 2001 and 2008/09 respectively. A detailed description of the DTUS-01 and DTUC can be found in Bonke (2002) and Bonke & Fallesen (2011) where the response rates among others are specified.

Information from Statistics Denmark's registries on personal characteristics, educational background and income has been added to both of the time-use surveys. The respondents' hourly wages, which are included in the calculation of the labor supply, also originate from these registries by dividing the annual gross income by the "normal"

number of weekly hours from DTUS and DTUC or from Statistics Denmark's wage registry. In other words the wages reflect an average hourly wage – assuming the employees have a fixed amount of weekly or monthly working hours. If the wage or the number of weekly/monthly working hours vary – the remuneration of the last working hour does not match the average hourly wage, which may be the case for overtime or secondary jobs – it will lead to uncertainty when estimating the impact of wages on labor supply, since labor supply is assumed to be influence by the marginal hourly wage and not the average hourly wage.

It is however not the marginal *gross* hourly wage which is assumed to affect labor supply, but the marginal *net* hourly wage, which takes taxes into account. In order to obtain the net wage we need the marginal tax rate, which is calculated on the basis of the Danish tax system including deductions, capital income and income from shares for the individual respondents. The effective marginal tax rate is then found by adding the phase-out of public benefits in the form of housing assistance and daycare/preschool subsidies.

The estimations also contain the so-called virtual income, see Blundell & MaCurdy (1999) and Klevmarken (2005), which is defined as the respondents' non-labor income. The virtual income is thus calculated as the sum of capital income, income from shares, unemployment benefits and other public benefits after taxes. The virtual income for respondents who are married also includes the spouse's net income. We therefore draw a distinction between virtual income A, which is calculated for all the respondents, and virtual income B, which is only calculated for respondents who are married.

6. Descriptive statistics

Tables 6.1 and 6.2 show the descriptive statistics for the two data sets (2001 and 2008/09). Overall, there is, as mentioned earlier, a negative difference between the actual and normal working hours, as the number of normal working hours seems to be overestimated. It is also clear from looking at the tables that the difference is greater 2008/09 than in 2001 for both sexes, due to the fact that the number of normal working hours has increased while the number of actual working hours has decreased. In addition, the difference between the actual and normal working hours is greater for women than for men. Women thus worked 4.9 and 7.0 hours less than their normal working time in 2001 and 2008/09 respectively.

Looking at the average income level for the respondents, men earned significantly more than women in both 2001 and 2008. The average gross wage for men was 338,000 DKK in 2001, while being 264,000 DKK for women. The corresponding net income was 236,000 DKK for men and 181,000 DKK for women. The same pattern exists in 2008, where men had an average gross income of 430,000 DKK, and women had an average gross income of 333,500 DKK. While net income amounted to 302,000 and 242,000 DKK The gross income for both sexes and men's net income increased by 27-28 percent from 2001 to 2008, while women's net income increased by 34 percent during 2001-2008.

Table 6.1. *Descriptive statistics for 25-64 year olds in 2001*

	Men		Women	
	Avg.	Std. dev.	Avg.	Std. dev.
Weekly normal working hours	40,11	8,88	35,40	6,32
Weekly actual working hours	38,52	16,33	30,52	16,03
Gross income (DKK per year)	338.029	194.589	263.590	91.004
Net income (DKK per year)	236.195	157.456	180.661	104.159
Virtual income A (DKK per year)	223.278	178.031	275.452	318.462
Virtual income B (DKK per year)	281.956	184.734	369.248	364.181
Marginal tax rate	0,508	0,101	0,472	0,087
Effective marginal tax rate	0,509	0,099	0,474	0,087
Children (share)	0.40	0.49	0.45	0.50
Children: Ages 0 to 2 (daycare)	0.11	0.31	0.11	0.32
Children: Ages 3 to 6 (preschool)	0.15	0.35	0.17	0.38
Children: Ages 7 to 17	0.30	0.46	0.35	0.48
Observations	522		585	

Source: The Rockwool Foundation Research Unit

Table 6.2. *Descriptive statistics for 25-64 year olds in 2008/09*

	Men		Women	
	Avg.	Std. dev.	Avg.	Std. dev.
Weekly normal working hours	42.20	9.25	36.30	7.89
Weekly actual working hours	36.82	21.13	29.28	19.31
Gross income (DKK per year)	429.856	253.270	333.495	153.584
Net income (DKK per year)	302.201	165.525	242.090	166.149
Virtual income A (DKK per year)	189.515	150.895	268.795	453.308
Virtual income B (DKK per year)	269.915	119.454	367.345	517.416
Marginal tax rate	0.495	0.128	0.454	0.110
Effective marginal tax rate	0.496	0.126	0.456	0.110
Children (share)	0.46	0.50	0.50	0.50
Children: Ages 0 to 2 (daycare)	0.11	0.31	0.11	0.31
Children: Ages 3 to 6 (preschool)	0.15	0.36	0.15	0.36
Children: Ages 7 to 17	0.34	0.47	0.39	0.49
Observations	1368		1352	

Source: The Rockwool Foundation Research Unit

The tables above also show that the virtual income B is higher than the virtual income A, which obviously is because B only includes married respondents and therefore also their spouse's net income, even if they do not work. The virtual income B also is higher for women than for men, due to the fact that men have a higher average net income than women. Furthermore, women's average virtual income (both A and B) is higher than their own average net income.

Figure 6.1. *Taxable income and the effective marginal tax rate for men, ages 25-64, 2001*

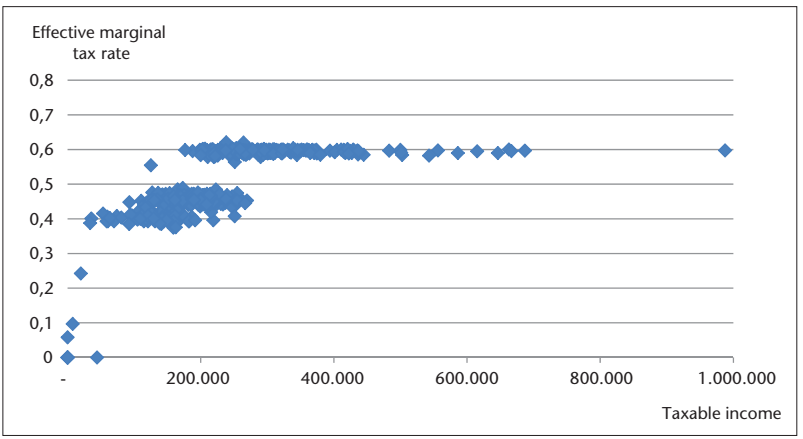


Figure 6.2. *Taxable income and the effective marginal tax rate for women, ages 25-64, 2001*

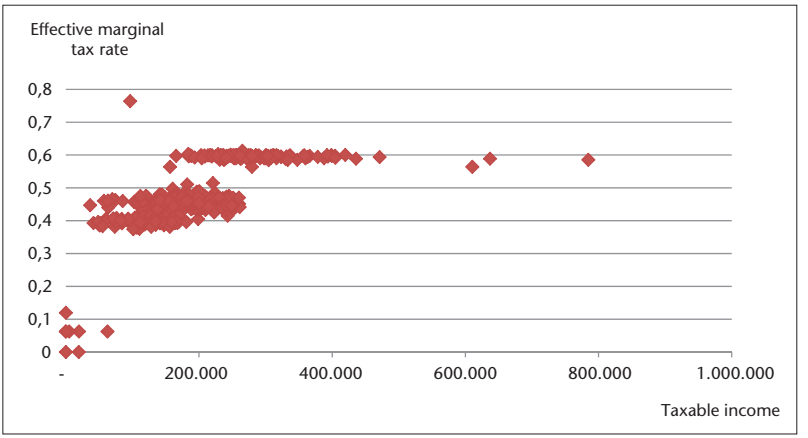


Figure 6.3. *Taxable income and the effective marginal tax rate for men, ages 25-64, 2008/09*

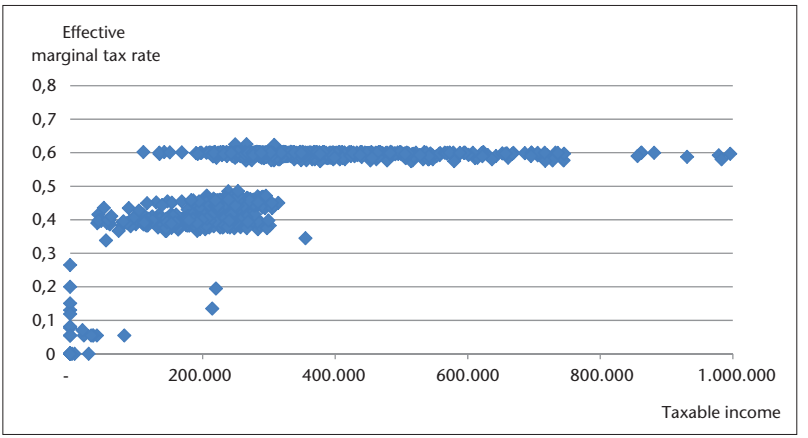
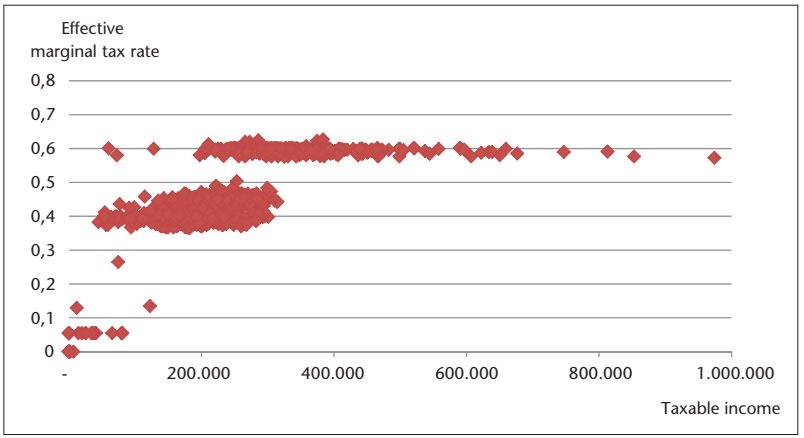


Figure 6.4. *Taxable income and the effective marginal tax rate for women, ages 25-64, 2008/09*



Source: The Rockwool Foundation Research Unit

A partial reason for the small difference between the marginal and the effective marginal tax rate is the low share of respondents who have children in the daycare or preschool age groups (14 and 15 percent of the observations in 2001 and 2008/09). Thus there are relatively few people who are potential beneficiaries of subsidies and housing assistance, which are phased out for higher-income taxpayers and create the difference between the marginal and the effective marginal tax rate. The share of respondents who had children aged 0 to 17 years was slightly higher in 2008/09 than in 2001.

The number of observations is smaller than the total dataset because the sample is limited in terms of age and only includes respondents, who reported their actual and normal working hours.

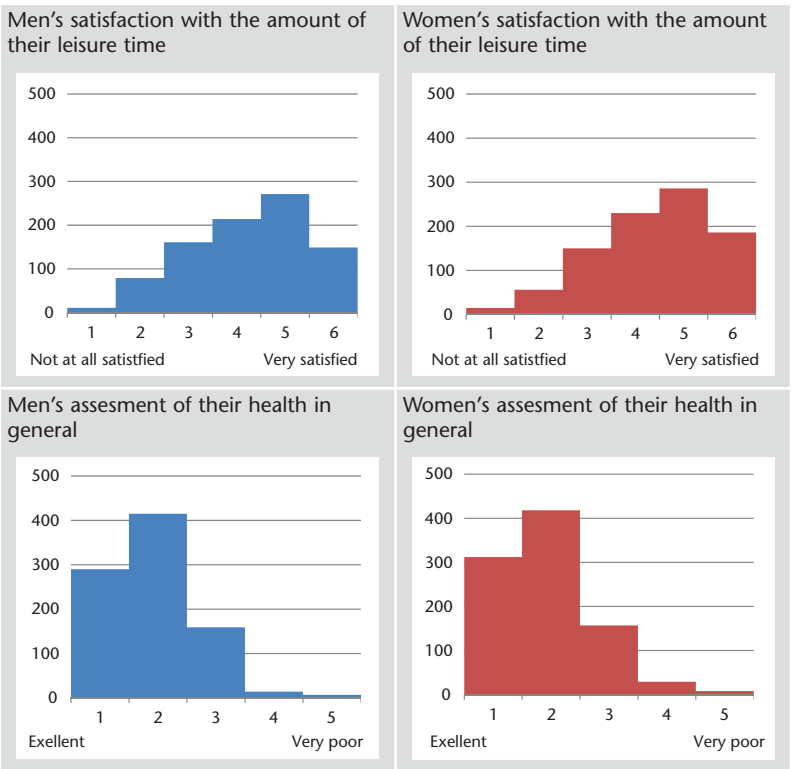
The following four graphs show the distribution of the effective marginal tax rate for men and women according to taxable income in 2001 and 2008. The reason for choosing taxable income rather than gross income is that the taxable income takes into account deductions, pension contributions and capital income. The effective marginal tax rate includes income taxes (municipal tax, health contribution and state taxes) as well as the phase-out of benefits. The distributions are similar to the progressive Danish tax system with a large part of the observations concentrated around the two highest tax brackets. Since the effective marginal tax rate includes the phase-out of benefits, some respondents have a higher marginal tax rate than the tax ceiling of 59 percent.

Figure 6.1 and 6.2 show the distribution of the effective marginal tax rate in 2001 by sex. As expected from the descriptive statistics a greater number of men than women are concentrated around the highest tax bracket. Common to both sexes is that very few people have an effective marginal tax rate below 37 percent.

Figure 6.3 and 6.4 show the distribution of the effective marginal tax rate in 2008/09 by sex. Compared to 2001, a higher share of the observations is concentrated around the middle tax bracket, which now contains taxable incomes greater than 300,000 DKK. As mentioned earlier, this is due to the two major tax reforms between 2001 and 2008 which reduced the marginal tax rate considerably by increasing the income limits of the middle and highest tax brackets. Otherwise we see the same trend for men and women as in 2001, where a larger part of the male observations are concentrated around a taxable income of 400,000-1,000,000 DKK than is the case for women.

In addition to the variables mentioned earlier, the time-use survey of 2008/09 also included the respondents' satisfaction with the amount of their leisure time and an assessment of their health. Satisfaction with leisure time was evaluated on a scale from 1 to 6 – from not at all satisfied to very satisfied – and the respondents' health in general was evaluated on a scale from 1 to 5 – from excellent to very poor. Figure 6.5 contains the distribution of the two variables by sex.

Figure 6.5. *Descriptive statistics for leisure and health, ages 25-64, 2008/09*



Source: The Rockwool Foundation Research Unit

Overall the similarities between the male and female responds are worth noticing. Thus both men and women are mostly satisfied with the amount of their leisure time (a majority of the answers are on the scale 4 to 6) and also asses their health as quite good (a large majority of the answers are on the scale 1 to 3).

7. Econometric model

In order to estimate the correlation between the effective marginal tax rate and the number of working hours we use a standard OLS, taking into account the virtual income A, marital status, children and whether the respondent is an employee or self-employed. In accordance with several other papers, for example Klevmarken (2005), the basic model is the following:

$$7.1 \quad h_i = \beta_0 + \beta_1 mtax_i + virtuelindkomstA_i + \boldsymbol{\beta x} + \varepsilon_i$$

Where h is the number of weekly working hours (normal or actual), $mtax$ is the effective marginal tax rate and $\boldsymbol{x}$ contains the personal characteristics mentioned above. The first set of regressions is split by sex, while the second set of regressions is also split by level of education. The results are shown in Table 8.1 and 8.4.

Since both the effective marginal tax and the virtual income are influenced by the number of working hours, the regressions have also been carried out using the natural logarithm of these two variables. The coefficients however do not significantly change. An interpretation of the labor supply function above, as a result of a behavioral model which assumes utility maximization can be found in Blundell and MaCurdy (1999).

In order to analyze the coordination and influence between spouses, the previous model 7.1 is expanded in order to include the spouse's effective marginal tax rate $mtax_{sp,i}$ and other individual and family related characteristics. The regression is then carried out for respondent's who are married.

$$7.2 \quad h_i = \beta_0 + \beta_1 mtax_i + \beta_2 mtax_{sp,i} + virtuelindkomstB_i + \boldsymbol{\beta x} + \boldsymbol{\alpha z} + \varepsilon_i$$

The individual characteristics x include self-assessment of health in general, satisfaction with the amount of leisure time and whether the respondent is self-employed. Family related characteristics z include the age of the youngest child (using age intervals of 0 to 2, 3 to 5 or 7-17). The estimation results are shown in Table 8.5 and 8.6.

8. Results

The results of the labor supply estimation for men and women respectively in 2001 are shown in Table 8.1. The coefficient of the effective marginal tax rate is significant in all regressions. For men the coefficient is negative for both measures of working hours, which indicates that a reduction of the effective marginal tax rate by 1 percentage point corresponds to an increase in the normal weekly working time by 8.4 minutes and an increase in the actual weekly working time by 7.4 minutes. In contrast, the effect is positive for women, as a decrease in the effective marginal tax rate of 1 percentage point corresponds to a decrease in the normal and actual weekly working time of 8.1 and 10.3 minutes respectively. That the effect is found positive for women might be because some of them reach the roof of the tax bracket, where many men already are to be found.

For men, the coefficient of the marginal tax rate is numerically greater when included for the normal working time than for the actual working time, whereas the reverse is true for women. The difference in the coefficients however is not significant in 2001 for either men or women. The regressions still indicate that a lower marginal tax rate corresponds to longer working hours for men and shorter working hours for women. In other words, the income effect is greater than the substitution effect when it comes to women, while the substitution effect is greater than the income effect when it comes to men.

Table 8.1. *Multivariate OLS-estimates of labor supply, 2001*

Normal working time (hours per week)		
	Men	Women
Effective marginal tax rate[1]	-14.11*** (3.69)	13.50*** (2.97)
Virtual income A per week (1,000 DKK)	0.60*** (0.12)	-0.10** (0.05)
Constant	42.09*** (2.41)	29.71*** (1.63)
R^2	0.13	0.06
Actual working time (hours per week)		
	Men	Women
Effective marginal tax rate[1]	-12.25** (5.56)	17.19*** (4.95)
Virtual income A per week (1,000 DKK)	0.48** (0.18)	-0.02 (0.08)
Constant	2.90 (3.64)	-6.54** (2.72)
R^2	0.42	0.59
Observations	522	585

Standard error in parenthesis, * p<0.1, ** p<0.05, *** p<0.001
1. coefficients/100 express an hourly change per week from a 1-percent change in the tax rate.
Note: The regression controls for marital status, children, self-employed and the positive number of actual working hours.
Source: The Rockwool Foundation Research Unit

Similar to 2001, Table 8.2 shows a significant correlation between the effective marginal tax rate and the number of normal working hours for both sexes in 2008/09. The correlation between the effective marginal tax rate and the number of actual working hours is only significant for men in 2008/09. Thus for men a reduction of the effective marginal tax rate by 1 percentage point corresponds to a 2.9-minute change in the normal weekly working time and a 3.8-minute change in the actual weekly working time. The difference between the effective

marginal tax rate and the normal and actual working time for men is not significant. For women, a reduction of the effective marginal tax rate of 1 percentage point is associated with a 8.4-minute reduction in the normal weekly working time.

Table 8.2. *Multivariate OLS-estimates of labor supply, 2008/09*

Normal working time (hours per week)		
	Men	Women
Effective marginal tax rate[1]	-4.91** (1.99)	14.00*** (1.91)
Virtual income A per week (1,000 DKK)	-0.01 (0.13)	-0.08** (0.03)
Constant	42.35*** (1.22)	28.91*** (1.04)
R^2	0.03	0.08
Actual working time (hours per week)		
	Men	Women
Effective marginal tax rate[1]	-6.27** (2.98)	2.24 (2.85)
Virtual income A per week (1,000 DKK)	-0.24 (0.19)	-0.02 (0.04)
Constant	3.23* (1.84)	-0.11 (1.55)
R^2	0.58	0.66
Observations	1368	1352

Standard error in parenthesis, * p<0.1, ** p<0.05, *** p<0.001
1. coefficients/100 express an hourly change per week from a 1-percent change in the tax rate.
Note: The regression controls for marital status, children, self-employed and the positive number of actual working hours.
Source: The Rockwool Foundation Research Unit

The coefficient of the virtual income A was positive for men in 2001, both in terms of normal and actual working hours, and negative for women with regard to normal working hours. The coefficient was insignificant for women's actual working hours. This suggests that men work more if their non-labor income increases, ie an increase in the virtual income A by 1,000 DKK per week is associated with a 3-minute increase in the actual weekly working time, while such an increase does not play a role in women's actual working time. In 2008/09 only women had a significant correlation between the virtual income A and the number of normal working hours. For both sexes the correlation between the marginal tax rate and the actual weekly working time is insignificant in 2008/09. This surprising pattern could partly be caused by the fact that the regression does not take the

spouse's income into account, as is done when we include the virtual income B in Table 8.6 to 8.7.

Since some observations have an actual working time of 0 hours per week, we too, like Klevmarken (2005), included a dummy for whether the actual working time is strictly positive. In 2001, 34 men and 81 women had an actual working week of 0 hours, while this was the case for 219 men and 300 women in 2008/09 see Figure 3.1 and 3.2. As expected, the coefficient for this dummy is positive and significant, as well as numerically large compared to the coefficients of the other variables. Also, the coefficient is greater for men than for women (not shown in the tables).

A key aspect of both years is that the actual working time regressions have a significantly higher explanatory power as measured by R-squared. Thus the normal working time regressions have an average R-squared of about 0.1, while R-squared is about 0.5 for the actual working time regressions. However, if we only include observations with a positive number of working hours, the difference in R-squared almost disappears as shown by Table B.1 and B.2. The omission of observations with an actual working time of zero hours per week, however, has virtually no impact on the relationship between the marginal tax rate and the number of normal and actual working hours either year.

8.1 Taxes, working hours and education

Table 8.3 shows the regression results for 2001 by gender and highest educational level divided into tertiary (academy professional degree, Bachelor and Master) and non-tertiary (primary, secondary and vocational training).

When dividing the observations with regard to educational level the effective marginal tax rate becomes insignificant in 2001 for men with a higher education. In turn, the coefficients for men without a higher education become greater than for all the male observations. A reduction of the effective marginal tax rate by 1 percentage-point is associated with a change in the normal and actual working time for men with a non-tertiary education of 14.7 and 10.6 minutes per week. For women, the effective marginal tax rate is positive and significant for all educational groups. With regard to normal working hours, the effect is greatest among women with a higher education, for whom a reduction of the effective marginal tax rate of 1 percentage-point corresponds to an 8.9-minute reduction of the working week. With regard to actual working hours, there is no significant difference between women

with and without a higher education. For both groups a reduction of the effective marginal tax rate of 1 percentage-point corresponds to a 10-minut reduction of both the normal and actual working week.

The virtual income A correlates positively with men's working hours, while the opposite is true for women without a higher education. An increase in the virtual income A by 1,000 DKK corresponds to a change in the normal and actual working hours for women without a higher education by -0.32 and -0.36 hours per week respectively. For men, we find the largest coefficient among observations without a higher education where an increase in the virtual income A by 1,000 DKK increases the normal and actual working week by 1.33 and 0.76 hours respectively.

Table 8.3. *Multivariate OLS-estimates of labor supply by gender and educational level, 2001*

	Men, non-tertiary	Men, tertiary	Women, non-tertiary	Women, tertiary
Normal working time (hours per week)				
Effective marginal tax rate[1]	-24.54*** (5.11)	-2.28 (5.40)	11.66** (4.70)	14.83*** (3.83)
Virtual income A per week (1,000 DKK)	1.33*** (0.27)	0.46*** (0.13)	-0.32** (0.11)	-0.02 (0.05)
Constant	44.33*** (3.12)	38.37*** (3.91)	31.06*** (2.58)	29.00*** (2.09)
R^2	0.17	0.17	0.08	0.08
Actual working time (hours per week)				
	Men, non-tertiary	Men, tertiary	Women, non-tertiary	Women, tertiary
Effective marginal tax rate[1]	-17.68** (7.02)	0.40 (9.86)	17.71** (6.62)	15.98** (7.70)
Virtual income A per week (1,000 DKK)	0.76** (0.37)	0.62** (0.23)	-0.36** (0.15)	0.08 (0.09)
Constant	3.97 (4.28)	-2.38 (7.13)	-5.30 (3.63)	-6.69 (4.20)
R^2	0.48	0.34	0.61	0.59
Observations	319	203	278	307

Standard error in parenthesis, * p<0.1, ** p<0.05, *** p<0.001
1. coefficients/100 express an hourly change per week from a 1-percent change in the tax rate.
Note: The regression controls for marital status, children, self-employed and the positive number of actual working hours.
Source: The Rockwool Foundation Research Unit

Table 8.4 shows the regression results for 2008/09, broken down by gender and educational level. The regression coefficients vary according to both sex and measure of working hours. Likewise, the coefficient of the effective marginal tax rate remains negative for men and positive for women when significant. Reducing the effective marginal tax rate by 1 percentage-point is thus equivalent to a 3.6-minute change in the normal working time for men without a higher education. The same tax change corresponds to a 10.4- and 4.8.minute reduction of the normal working week for women with and without a higher education or a 4.8-minute reduction of the actual working week for women without a higher education or a 4.8-minute reduction of the actual working week for women without a higher education.

Table 8.4. *Multivariate OLS-estimates of labor supply by gender and educational level, 2008/09*

Normal working time (hours per week)				
	Men, non-tertiary	Men, tertiary	Women, non-tertiary	Women, tertiary
Effective marginal tax rate[1]	-6.12** (2.56)	-2.91 (3.52)	7.89** (3.68)	16.99*** (2.29)
Virtual income A per week (1,000 DKK)	-0.26 (0.23)	0.11 (0.15)	-0.27** (0.12)	-0.06** (0.02)
Constant	42.95*** (1.57)	41.48*** (2.13)	31.72*** (1.84)	27.40*** (1.30)
R^2	0.04	0.03	0.03	0.14
Actual working time (hours per week)				
	Men, non-tertiary	Men, tertiary	Women, non-tertiary	Women, tertiary
Effective marginal tax rate[1]	-4.86 (3.90)	-5.21 (5.13)	-5.03 (5.07)	7.98** (3.62)
Virtual income A per week (1,000 DKK)	-0.52 (0.35)	-0.04 (0.22)	-0.21 (0.17)	-0.00 (0.04)
Constant	2.50 (2.40)	2.81 (3.11)	3.16 (2.53)	-2.93 (2.05)
R^2	0.56	0.62	0.66	0.66
Observations	822	546	554	798

*Standard error in parenthesis, * p<0.1, ** p<0.05, *** p<0.001*
1. coefficients/100 express an hourly change per week from a 1-percent change in the tax rate.
Note: The regression controls for marital status, children, self-employed and the positive number of actual working hours.
Source: The Rockwool Foundation Research Unit

Similar to 2001, the coefficient of the effective marginal tax rate is highest for men without a higher education and for women with

higher education, while insignificant for men with a higher education. The virtual income A is insignificant for men and only significant for women with regard to normal working hours, where an increase of 1,000 DKK entails a reduction in the working week of 0.06 and 0.27 hours for women with and without a higher education. The coefficient is significantly smaller than in 2001.

8.2 Taxes and working hours of spouses

As a first step towards looking at the relationship between taxes and working hours of spouses, Table 8.2 is reproduced solely for the respondents who are married as of January 1st 2009 and shown in Table 8.5.

Table 8.5. *Multivariate OLS-estimates of labor supply by gender in 2008/09, married respondents*

Normal working time (hours per week)		
	Men	Women
Effective marginal tax rate[1]	-6.05** (2.43)	14.61*** (2.19)
Virtual income A per week (1,000 DKK)	-0.10 (0.14)	-0.08** (0.03)
Constant	44.17*** (1.57)	27.93*** (1.17)
R^2	0.06	0.12
Actual working time (hours per week)		
	Men	Women
Effective marginal tax rate[1]	-4.25 (3.53)	1.96 (3.33)
Virtual income A per week (1,000 DKK)	-0.37* (0.20)	-0.02 (0.04)
Constant	3.37 (2,28)	0.17 (1,79)
R^2	0,60	0,64
Observations	885	924

Standard error in parenthesis, * p<0.1, ** p<0.05, *** p<0.001
1. coefficients/100 express an hourly change per week from a 1-percent change in the tax rate.
Note: The regression controls for marital status, children, self-employed and the positive number of actual working hours.
Source: The Rockwool Foundation Research Unit

Comparing the regression for spouses to that for all respondents, there are two significant differences with regard to normal working hours. Firstly, the coefficient of the effective marginal tax rate for men is numerically larger, which means that a tax reduction of 1

percentage-point is associated with an increase in the working week of 3.6 minutes. Secondly, the exclusion of single people has made the effective marginal tax rate insignificant for men's actual weekly working hours, which was not the case when all observations were included in the sample. For women there is no difference with regard to the effect of a tax change on the normal and actual working week.

The virtual income A becomes significant and negative for men. Thus, an increase of the virtual income of 1,000 DKK leads to a reduction in the actual working week of 0.37 hours.

The virtual income B, where the spouse's income is included, however, is more interesting when the sample only includes married respondents.

8.3 Taxes, working hours and preferences for leisure among spouses

In order to expand the analysis of spouses' labor supply the model 7.2 is estimated for married respondents in 2008/09. Furthermore, in order to better identify the effects on working time we distinguish between weekdays, weekend and total actual weekly working time, see Klevmarken (2005) for a similar breakdown. The normal working week is the same as before. The regression also includes two new individual variables, namely satisfaction with leisure time and assessment of health in general, derived from the time-use survey DTUC.

Table 8.6 shows the estimation results for married male respondents. The effective marginal tax rate is negative and significant with regard to normal working hours and actual weekend working hours. Lowering the effective marginal tax rate with 1 percentage-point is thus associated with an increase in the normal working week of 3.0 to 4.6 minutes and an increase in the actual weekend working hours of 1.6 minutes. The effective marginal tax rate is not significant for actual working time during weekdays or the total weekly actual working time. In other words the coefficient varies across measures of working hours, although it is surprising that the actual working week is not affected by the marginal tax rate. In Sweden, Klevmarken (2005) finds that a reduction of the marginal tax rate is associated with an increase in men's and women's weekday working time and a reduction in the weekend working time in 1993.

The spouse's marginal effective tax rate is insignificant for both the normal and actual working week, while the weekly virtual income B is significant and negative for the actual working time, indicating that an increase in the non-labor income or the spouse's income of

Table 8.6. *Multivariate OLS estimation for married men, 2008/09*

	Normal weekly working time			Actual working time, weekdays			Actual working time, weekends			Actual weekly working time		
	Hours per week											
Effective marginal tax rate[1]	-5.14**	-7.38**	-7.73**	-0.36	0.20	0.16	-2.75***	-2.65***	-2.66***	-7.31	-4.28	-4.54
	(2.52)	(2.41)	(2.41)	(1.06)	(0.65)	(0.65)	(0.78)	(0.77)	(0.77)	(5.78)	(3.69)	(3.71)
Spouse's effective marginal tax rate[1]	0.12	-0.84	-0.87	-0.29	-0.16	-0.17	0.08	0.07	0.07	-1.27	-0.67	-0.72
	(1.46)	(1.39)	(1.39)	(0.61)	(0.37)	(0.37)	(0.45)	(0.44)	(0.44)	(3.34)	(2.13)	(2.13)
Virtual income B (1,000 DKK, per week)	0.05	-0.09	-0.06	-0.08	-0.06	-0.06	-0.05	-0.04	-0.04	-0.49	-0.39*	-0.38*
	(0.15)	(0.14)	(0.14)	(0.06)	(0.04)	(0.04)	(0.05)	(0.05)	(0.05)	(0.34)	(0.22)	(0.22)
Self-employed		5.49***	5.45***		1.02**	1.01**		-0.26	-0.26		4.60**	4.55**
		(1.16)	(1.16)		(0.31)	(0.31)		(0.37)	(0.37)		(1.78)	(1.78)
Satisfaction with leisure time		-1.83***	-1.90***		-0.12*	-0.12*		-0.11	-0.12		-0.83**	-0.85**
		(0.24)	(0.25)		(0.07)	(0.07)		(0.08)	(0.08)		(0.37)	(0.38)
Health		-2.03***	-2.05***		-0.18*	-0.18*		-0.07	-0.06		-1.04*	-1.04*
		(0.38)	(0.38)		(0.10)	(0.10)		(0.12)	(0.12)		(0.58)	(0.59)
Positive actual working time		0.31	0.35		8.16***	8.16***		1.33***	1.33***		43.44***	43.46***
		(0.80)	(0.80)		(0.22)	(0.22)		(0.26)	(0.26)		(1.23)	(1.23)
Youngest child: Age 0-2			-1.75*			-0.00			-0.04			-0.07
			(1.02)			(0.28)			(0.33)			(1.58)
Youngest child: Age 3-5			-0.75			-0.20			-0.01			-1.03
			(1.10)			(0.30)			(0.35)			(1.69)
Youngest child: Age 6-17			0.66			0.07			0.05			0.46
			(0.70)			(0.19)			(0.23)			(1.08)
Constant	44.86***	57.89***	58.31***	7.45***	1.08*	1.10*	2.75***	2.21**	2.21**	42.78***	9.82**	9.91**
	(1.39)	(2.11)	(2.19)	(0.58)	(0.57)	(0.59)	(0.43)	(0.68)	(0.70)	(3.18)	(3.24)	(3.36)
R^2	0.01	0.11	0.12	0.00	0.63	0.63	0.02	0.05	0.05	0.01	0.60	0.60
Observations	864			864			864			864		

Standard error in parenthesis, * p<0.1, ** p<0.05, *** p<0.001
1. coefficients/100 express an hourly change per week from a 1-percent change in the tax rate.
Source: The Rockwool Foundation Research Unit

1,000 DKK leads to a decrease in the actual working time of 0.38 to 0.39 hours per week.

Satisfaction with leisure time correlates negatively with both the normal and actual working time, of which the correlation with the actual working time originates from the weekdays. A higher working time is thus associated with less satisfaction with leisure time and vice versa. The coefficient is significantly larger for the normal working time than for the actual working time.

One unit's increase in leisure time satisfaction indicates a reduction of the normal and actual working time of 1.8-1.9 and 0.8-0.9 hours per week. Respondents' subjective assessment of their health in general correlates negatively with both the normal and actual working time. Thus, one unit's worsening of the subjective health assessment is associated with a 2-hour reduction of the normal working week and a 1-hour reduction of the actual working week.

The dummy-variable indicating that the observations have a positive weekly working time is still significant and positive for the actual working hours on both weekends and weekdays. On average men whose youngest child is 0-2 year's old work 1.8 hours less per week. The other family related variables are insignificant for men.

Table 8.7 shows the estimation results for married women. In general, a larger part of the family and spouse related variables are significant for women than for men. Contrary to men, the effective marginal tax rate is only significant for the normal working week, where a tax change of 1 percentage-point corresponds to an increase in working time of 6.6 to 9.2 minutes. The tax rate is also significant for the actual working hours, except on weekends, but only when individual characteristics are excluded. The effective marginal tax rate thus varies significantly across measures of working hours, except when the individual and family characteristics are included. In this case it is not possible to reject the hypothesis that the coefficients are the same.

The spouse's marginal effective tax rate correlates negatively with the normal weekly working hours. This is surprising since a higher marginal tax rate for the spouse is expected to increase the working hours of the respondent whose tax rate is now relatively lower. However, the virtual income B is also affected by the spouse's marginal effective tax rate as it includes his/her income after tax, i.e. an increase of 1000 DKK is associated with a decrease in the normal and actual weekly working time of 4.2-4.8 and 7.8 minutes, which might outweight the direct negative impact of the spouse's marginal effective tax rate on the working hours.

Table 8.7. *Multivariate OLS estimation for married women, 2008/09*

	Normal weekly working time			Actual working time, week-days			Actual working time, week-ends			Actual weekly working time		
	Hours per week											
Effective marginal tax rate[1]	15.44*** (2.23)	11.77*** (2.14)	11.41*** (2.13)	1.73* (1.03)	0.18 (0.63)	0.02 (0.63)	0.23 (0.68)	0.07 (0.68)	0.03 (0.68)	9.12* (5.46)	1.04 (3.37)	0.16 (3.35)
Spouse's effective marginal tax rate[1]	-1.88** (0.94)	-1.84** (0.90)	-1.75* (0.89)	-0.84* (0.44)	-0.27 (0.27)	-0.21 (0.26)	-0.35 (0.29)	-0.26 (0.28)	-0.24 (0.28)	-4.87** (2.32)	-1.85 (1.41)	-1.54 (1.40)
Virtual income B (1,000 DKK, per week)	-0.08** (0.03)	-0.07** (0.02)	-0.07** (0.02)	-0.02* (0.01)	-0.00 (0.01)	-0.00 (0.01)	-0.01 (0.01)	-0.00 (0.01)	-0.00 (0.01)	-0.13** (0.06)	-0.01 (0.04)	-0.01 (0.04)
Self-employed		4.65** (1.86)	4.46** (1.86)		1.69** (0.55)	1.63** (0.55)		-0.11 (0.59)	-0.09 (0.59)		8.25** (2.94)	7.96** (2.92)
Satisfaction with leisure time		-1.61*** (0.20)	-1.72*** (0.20)		-0.03 (0.06)	-0.08 (0.06)		-0.06 (0.06)	-0.06 (0.06)		-0.27 (0.32)	-0.51 (0.32)
Health		-1.42*** (0.29)	-1.52*** (0.29)		-0.24** (0.09)	-0.28** (0.09)		0.12 (0.09)	0.12 (0.09)		-0.96** (0.46)	-1.17** (0.46)
Positive actual working time		1.95** (0.60)	1.80** (0.60)		6.94*** (0.18)	6.89*** (0.18)		1.10*** (0.19)	1.11*** (0.19)		36.88*** (0.95)	36.67*** (0.95)
Youngest child: Age 0-2			-2.28** (0.87)			-0.77** (0.26)			0.05 (0.28)			-3.76** (1.37)
Youngest child: Age 3-5			-1.80* (0.94)			-1.00*** (0.28)			-0.32 (0.30)			-5.61*** (1.49)
Youngest child: Age 6-17			0.56 (0.54)			-0.19 (0.16)			-0.03 (0.17)			-1.02 (0.85)
Constant	30.20*** (1.11)	39.96*** (1.67)	41.07*** (1.74)	5.17*** (0.51)	0.62 (0.50)	1.21** (0.52)	0.94** (0.34)	0.10 (0.53)	0.16 (0.55)	27.74*** (2.73)	3.32 (2.64)	6.39** (2.74)
R^2	0.07	0.17	0.19	0.01	0.64	0.65	0.00	0.04	0.04	0.02	0.64	0.65
Observations	903			903			903			903		

Standard error in parenthesis, * p<0.1, ** p<0.05, *** p<0.001
1. coefficients/100 express an hourly change per week from a 1-percent change in the tax rate.
Source: The Rockwool Foundation Research Unit

Satisfaction with leisure time correlates negatively with the normal working hours, where one unit increase in satisfaction represents a decrease in the weekly working time of 1.6-1.7 hours. Satisfaction with leisure time is not significant for the actual working time. The respondents' own assessment of their health correlates, like for the men, negatively with the normal and the actual working time. Thus, one unit's worsening of health leads to a reduction of the normal and actual working week of 1.4-1.5 and 1.0-1.2 hours per week.

Women's working time is negatively affected by having children aged 0-2 and 3-5 (daycare and preschool age groups), and the coefficient is significantly higher for women than for men. Women with their youngest child aged 0-2 thus have a normal and actual working week of 2.3 and 3.8 fewer hours. For the normal working time, the effect is greatest for 0-2 year-olds, while the effect is largest for 3-5 year-olds with regard to the actual working time.

Men's normal working time is also negatively affected, whereas their normal working time is unaffected by having children aged 0-2. Carling & Flood (1997) also found that Swedish fathers to minor children reduced their actual working time while their normal working hours were the same as for men who didn't have younger children.

As in previous regressions, the inclusion of the variable for positive actual working time increases the explanatory power significantly for the actual working hours.

8.4 Taxes, working hours and satisfaction with leisure time for spouses

Table 8.9 divides the regression by satisfaction with leisure time based on the assumption that a greater level of satisfaction is associated with a smaller labor supply effect from the marginal tax rate. Satisfaction with leisure time is assessed on a scale from 1 to 6 – from not at all satisfied to very satisfied. The respondents are defined as "unhappy" if they answered 1-3, and "happy" if they answered 4-6.

As shown earlier in Figure 6.5 a majority of the respondents, both men and women, are satisfied with their current level of leisure time. Thus ¾ of the sample is defined as "happy" and ¼ as "unhppy".

As shown in Table 8.6, the effective marginal tax rate is significant and negative with regard the the normal working time of men, however, the coefficient numerically higher among men who are not satisfied with their current level of leisure time (Table 8.9). Conversely, the effective marginal tax rate is positive and significant with regard to the normal working time of women, and the coefficient is greater

for the unhappy observations. As expected the effect of the marginal tax rate is smaller among respondents who are satisfied with their current level of leisure time.

In contrast to earlier, the effective marginal tax rate is significant and negative for the actual working time among men, who are unhappy with their current level of leisure time. At the same time, this coefficient is significantly greater than that for the normal working hours, which shows that the actual adjustment of working hours is greater than the adjustment of the "normal" working hours, when the tax rate changes. The spouse's effective marginal tax rate is significant for the normal weekly working time of women who are satisfied with their current level of leisure. Thus, an increase in the spouse's tax rate is associated with a decrease in the actual working time of 0.1 hours per week.

Likewise, the virtual income B is significant and negative for the normal working hours among women who are satisfied with their current level of leisure, as well as for the actual working time among men and women who are dissatisfied with their current level of leisure. The effect is greatest for the actual working time among men who are unhappy with their current level of leisure, where an increase in the virtual income B of 1,000 DKK per week is equivalent to a reduction of the actual working time of 1.3 hours.

8.5 Taxes, working hours and education for spouses

Table 10.8 shows the regression results for spouses by sex and educational level with the same categories as in section 8.1. A majority of the male respondents do not have a higher education, while the opposite is the case for women.

The effective marginal tax rate is significant for both educational groups among women, although the effect is greatest for women with a higher education, where a reduction of the tax rate of 1 percentage-point corresponds to an increased working time of 8.2 minutes per week. Among the male respondents, the effective marginal tax rate is only positive for men without a higher education, where a reduction of the tax rate of 1 percentage-point corresponds to an increased working time of 5.4 minutes. The effective marginal tax rate is insignificant for the actual working week.

The spouse's effective marginal tax rate is only significant for women with a higher education, where a reduction of the spouse's tax rate of 1 percentage-point corresponds to an increased working time 1.3 minutes.

Table 8.9. *Multivariate OLS estimation for married respondents by leisure satisfaction, 2008/09*

	Normal weekly working time (hours per week)				Actual weekly working time (hours per week)			
	Men, unhappy (1-3)	Men, happy (4-6)	Women, unhappy (1-3)	Women, happy (4-6)	Men, unhappy (1-3)	Men, happy (4-6)	Women, unhappy (1-3)	Women, happy (4-6)
Effective marginal tax rate[1]	-10.75**	-5.53**	15.18**	11.30***	-16.30**	-0.05	-1.76	1.74
	(5.07)	(2.77)	(5.24)	(2.39)	(7.65)	(4.24)	(6.88)	(3.88)
Spouse's effective marginal tax rate[1]	0.97	-1.19	-0.71	-2.08**	3.93	-1.74	-1.81	-1.32
	(2.79)	(1.63)	(2.13)	(1.01)	(4.21)	(2.50)	(2.80)	(1.63)
Virtual income B (1,000 DKK, per week)	-0.42	-0.00	0.09	-0.09***	-1.29**	-0.21	-0.45**	0.00
	(0.39)	(0.16)	(0.15)	(0.02)	(0.58)	(0.24)	(0.20)	(0.04)
Self-employed	7.27**	4.44**	6.73**	2.56	11.02**	2.23	11.70**	4.25
	(2.31)	(1.37)	(2.95)	(2.58)	(3.49)	(2.10)	(3.87)	(4.20)
Satisfaction with leisure time	-1.10	-2.39***	-1.92**	-1.35***	-0.25	-1.17*	-1.49*	-0.98*
	(0.77)	(0.45)	(0.66)	(0.33)	(1.15)	(0.69)	(0.87)	(0.54)
Health	0.81	0.20	1.90	2.09**	43.45***	43.10***	36.80***	36.71***
	(1.55)	(0.95)	(1.39)	(0.68)	(2.34)	(1.45)	(1.83)	(1.11)
Positive actual working time	-3.51*	0.40	-4.65**	-0.52	3.13	0.13	-3.79*	-3.65**
	(1.82)	(1.27)	(1.72)	(1.04)	(2.75)	(1.95)	(2.26)	(1.70)
Youngest child: Age 0-2	-1.05	0.19	-1.68	-1.56	0.61	-0.58	-6.50**	-5.09**
	(2.01)	(1.33)	(1.88)	(1.13)	(3.03)	(2.04)	(2.46)	(1.84)
Youngest child: Age 3-5	0.11	1.11	-1.41	1.41**	3.94*	-0.37	-3.00*	-0.38
	(1.44)	(0.81)	(1.30)	(0.61)	(2.17)	(1.25)	(1.71)	(0.98)
Youngest child: Age 6-17	54.64***	48.00***	34.70***	31.93***	13.10**	3.90	10.25**	2.46
	(3.75)	(2.01)	(3.53)	(1.51)	(5.65)	(3.08)	(4.64)	(2.45)
Constant	0.10	0.07	0.17	0.12	0.63	0.60	0.71	0.63
	244	620	211	693	244	620	211	693

Standard error in parenthesis, * p<0.1, ** p<0.05, *** p<0.001
1. coefficients/100 express an hourly change per week from a 1-percent change in the tax rate.
Source: The Rockwool Foundation Research Unit

The virtual income correlates negatively with the normal working time of women, whether they have a higher education or not. The correlation is significantly higher for women without a higher education. The actual working time, however, does not correlate with the virtual income for either educational group.

It also appears that satisfaction with leisure correlates negatively with the normal working time of both sexes and educational groups. For women, the effect is greatest among the higher educated, where one unit improvement in satisfaction with the level of leisure is associated with a decrease in the weekly normal working time of 2.1 hours. For men the effect is greatest among respondents without a higher education, where one unit improvement in satisfaction with the leisure level is associated with a decrease in the weekly normal working time of 2.1 hours.

The respondents' assessment of their health correlates negative with the normal working week for both sexes, though the coefficient is greatest among those without a higher education. Thus one unit improvement in the respondents' own assessment of their health corresponds to an increase in the normal weekly working time of 2.4 and 1.6 hours, respectively, for men and women.

Having children in the two youngest age groups (0-2 and 3-5) correlates negatively with the normal and actual working hours for women with a higher education. The coefficient is highest for children aged 3-5 years, which is associated with a decrease in the normal and actual working time of 3.1 and 7.0 hours per week for women with a higher education.

Table 8.10. *Multivariate OLS estimation for married respondents by educational level, 2008/09*

	Normal weekly working time (hours per week)				Actual weekly working time (hours per week)			
	Men, tertiary	Men, non-tertiary	Women, tertiary	Women, non-tertiary	Men, tertiary	Men, non-tertiary	Women, tertiary	Women, non-tertiary
Effective marginal tax rate[1]	-5.75 (4.21)	-9.03** (3.14)	13.61*** (2.53)	7.19* (4.06)	0.54 (6.40)	-5.01 (4.87)	3.63 (4.40)	-3.09 (5.77)
Spouse's effective marginal tax rate[1]	-3.07 (2.03)	0.67 (1.97)	-2.10* (1.10)	-0.28 (1.54)	-0.74 (3.09)	0.28 (3.06)	-2.01 (1.91)	-0.55 (2.19)
Virtual income B (1,000 DKK, per week)	-0.06 (0.18)	-0.15 (0.25)	-0.05** (0.02)	-0.34** (0.13)	-0.21 (0.27)	-0.58 (0.39)	0.01 (0.04)	-0.22 (0.18)
Self-employed	5.27*** (1.55)	5.69** (1.73)	4.98** (1.84)	-1.90 (5.65)	3.70 (2.35)	5.78** (2.68)	8.98** (3.20)	1.88 (8.04)
Satisfaction with leisure time	-1.56*** (0.38)	-2.13*** (0.34)	-2.06*** (0.24)	-1.23*** (0.34)	-0.82 (0.57)	-0.97* (0.52)	-0.62 (0.43)	-0.27 (0.49)
Health	-1.50** (0.63)	-2.40*** (0.50)	-1.50*** (0.37)	-1.61*** (0.47)	-1.11 (0.95)	-1.16 (0.77)	-1.15* (0.64)	-1.31* (0.67)
Positive actual working time	-0.14 (1.18)	0.65 (1.10)	2.52*** (0.71)	0.97 (1.05)	42.13*** (1.79)	44.31*** (1.71)	35.96*** (1.24)	37.81*** (1.50)
Youngest child: Age 0-2	-1.59 (1.44)	-1.78 (1.48)	-2.25** (0.95)	-2.38 (1.83)	-0.56 (2.20)	0.66 (2.30)	-3.95** (1.65)	-2.51 (2.61)
Youngest child: Age 3-5	-0.99 (1.68)	-0.57 (1.46)	-3.08** (1.08)	1.13 (1.76)	-0.88 (2.55)	-1.32 (2.26)	-6.95*** (1.88)	-2.27 (2.50)
Youngest child: Age 6-17	-0.13 (1.08)	1.28 (0.94)	-0.41 (0.67)	2.02** (0.90)	-0.17 (1.64)	0.88 (1.47)	-2.11* (1.17)	0.65 (1.27)
Constant	56.01*** (3.48)	60.30*** (2.95)	41.19*** (2.13)	42.14*** (3.00)	6.67 (5.30)	11.28** (4.58)	5.76 (3.71)	6.88 (4.26)
R^2	0.11	0.14	0.29	0.10	0.63	0.58	0.65	0.65
Observations	350	514	519	384	350	514	519	384

Standard error in parenthesis, * p<0.1, ** p<0.05, *** p<0.001
1. coefficients/100 express an hourly change per week from a 1-percent change in the tax rate.
Source: The Rockwool Foundation Research Unit

In contrast to earlier, children aged 6-17 are significant for women without a higher education in terms of normal working hours and for women with a higher education in terms of actual working hours.

For women without a higher education, children aged 6-17 are associated with an increased weekly working time of 2.0 hours. For women with a higher education, children aged 6-17 are associated with a reduced weekly working time of 2.1 hours.

8.6 Tax change and working hours, 2001-2008/09

As mentioned in chapter 3, two major tax reforms were carried out during the period of 2001-2008/09. Besides a reduction of the marginal tax rate for the middle tax bracket, the income limits for the middle and highest tax bracket were increased significantly, cf. Figure 3.1 and Table 8.11. The middle tax bracket was subsequently removed in 2009 and thus after the period we are looking at.

In order to analyze whether there is a link between tax cuts and labor supply, i.e. whether the substitution effect is greater than the income effect, we use information from respondents who participated in both DTUS-01 and DTUC-08/09 and thus were a part of the Danish Time Use Panel (DTUC). We then divided the respondents into two groups based in their taxable income in 2001. The first group – the treatment group – had an income, which would be affected by the tax changes. The second group – the control group – had an income, which would not be affected by the tax changes.

Table 8.11. *Marginal tax rates for different taxable income levels, 2001 and 2008/09.*

2001		2008/09	
Taxable income (DKK)	Marginal tax rate excluding the labor market contribution (percent)	Taxable income (DKK)	Marginal tax rate excluding the labor market contribution (percent)
0-33,399	0	0-40,999	0
33,400-177,899	38.28	41,000-279,800	38.75
177,900-276,900	44.28	279,800-335,799	44.75
276,900-	59	335,800-	59

Source: The Rockwool Foundation Research Unit

Table 8.12 shows that the treatment group worked fewer weekly hours than the control group, however, there is no significant difference between the two groups with regard to the actual working time. This pattern remains when we take the differences in marital status and

number of children into account. During the time period, the average number of normal working hours increased by over an hour for both groups, while the average actual working week remained unchanged. The difference between the normal and actual working time has thus increased during the 2000s. However, the evolvement of normal and actual working hours respectively does not differ between the treatment group and the control group. This would suggest that the tax reform have not significantly changed the labor supply of the respondents. Since the number of respondents is limited, this finding should however be used with caution.

Table 8.12. *Normal and actual working hours for the treatment and control group, 2001-2008/09*

	T-group [1]	C-group[2]	Difference between T- and C-group	Difference between T- and C-group incl. control variables[3]
		Hours (std. dev.)		
Normal working hours, 2001	37.71	38.62	**	**
Actual working hours, 2001	34.33	34.32	n.s.	n.s
Difference: 2001-2009				
Normal working hours	1.527 (0.452)	1.320 (0.332)	n.s.	n.s.
Actual working hours	-0.222 (1.344)	0.298 (0.895)	n.s.	n.s.
Difference: normal and actual working hours	1.749 (1.378)	1.021 (0.947)	n.s.	n.s.
Observations		475		

1. Taxable income in 2001: 177,900-335,800 DKK
2. Taxable income in 2001: 33,400-177,889 and +335,800
3. Marital status and number of children in the household. The inclusion of these variables does not change the finding about the tax reform and the labor supply, cf. column 3.

Since the tax reductions in 2001-2009 were only relevant to incomes from 177,900 to 335,800 DKK, Table 8.13 is divided into two groups: the first contains respondents with an annual taxable income of 177,900-279,800 DKK while the second contains respondents with

an annual taxable income of 279,800-335,800 DKK. The former was affected by the change in income levels for the top and middle tax bracket and the latter was affected by both the change in income levels and the reduction of the top tax rate. We then compare the first group to a control group containing respondents who had a taxable income of less than 177,900 DKK. The second group is compared to a control group containing respondents who had a taxable income of more than 335,800 DKK.

As shown in Table 8.13, respondents with taxable income of less than 279,800 DKK in 2001 (first group) increased their normal labor supply by more than one hour per week, while the actual labor supply increased by 0.5 hour per week. Furthermore, the increase in the normal labor supply was greater for the treated group than for the control group, while the increase in the actual labor supply was smaller for the treated group. In total this suggests, that the difference between the normal and actual labor supply was greater for the treatment group than for the control group. A similar pattern is found for respondents with taxable income above 335,800 DKK, where the difference between the normal and actual labor supply was also greatest for the treatment group.

Since none of these differences are significant, it is, however, not possible to conclude that the tax reforms have affected the supply of labor for the respondents. This conclusion should be used with caution due to the limited number of observations.

It is expected that men and women respond differently to tax cuts. Table 8.13 also shows that both the normal and actual working hours have increased more for men than for women while the increase in the normal working time has been greater than the increase in the actual working time for both sexes. None of these changes are significant probably due to the relatively few respondents in the survey.

Table 8.13 *Normal and actual working hours for the treatment and control group (income groups), 2001-2008/09*

	Low income groups		High income groups	
	T-group[1]	C-group[2]	T-group[3]	C-group[4]
	Hours (std. dev.)			
Normal working hours, 2001	37.74	36.33	37.57	39.23
Actual working hours, 2001	33.03	32.78	40.52	34.75
Difference: 2001-2009				
Normal working hours	1.491 (0.495)	1.182 (0.775)	1.694 (1.119)	1.359 (0.365)
Actual working hours	0.508 (1.472)	0.872 (1.974)	-3.677 (3.281)	0.136 (1.003)
Difference: normal and actual working hours	0.983 (1.524)	0.311 (2.134)	5.371 (3.200)	1.223 (1.055)
Observations	190		285	

Note: Taxable income in 2001:
1. 177,900-279,800 DKK
2. 33,400-177,889 DKK
3. 279,800-335,800 DKK
4. >335,800 DKK

Table 8.14 *Normal and actual working hours for the treatment and control group (men and women), 2001-2008/09*

	Men		Women	
	T-group [1]	C-group[2]	T-group [1]	C-group[2]
	Hours (std. dev.)			
Normal working hours, 2001	39.63	42.04	36.17	35.72
Actual working hours, 2001	38.71	39.75	30.82	29.71
Difference: 2001-2009				
Normal working hours	2.256 (.771) (.744-3.768)	2.469 (.577) (1.336-3.602)	0.942 (.529) (-.097-1.981)	0.345 (.361) (-.364-1.055)
Actual working hours	0.565 (2.075) (-3.507-4.638)	0.562 (1.267) (-1.924-3.049)	-0.853 (1.764) (-4.314-2.609)	0.075 (1.258) (-2.394-2.543)
Difference: normal and actual working hours	1.691 (2.172)	1.907 (1.410)	1.795 (1.775)	0.271 (1.279)
Observations	216		259	

1. Taxable income in 2001: 177,900-335,800 DKK
2. Taxable income in 2001: 33,400-177,889 and +335,800

Comparing the change in normal and actually working time for respondents whose tax rate was reduced and respondents whose tax rate was constant there is no significant difference for either men or women. It is therefore not possible in this study to conclude that there is a correlation between a change in the marginal tax rate and the normal and actual working time of men and women.

9. Conclusion

The purpose of this project was to study the relationship between family circumstances and normal versus actual family labor supply in order to understand how the income tax and welfare system frame the economic incentives for spouses' supply of working hours given different measures of working hours.

The data stemmed from two Danish Time-Use Surveys conducted in 2001 and 2008/09, which included stylized information on normal working hours as well as diary information on actual working hours for both spouses in a family. The surveys were merged with information about income, educational attainment etc. from administrative

registers at Statistics Denmark making it possible to calculate spouses' marginal tax rates and their virtual incomes in the two years under consideration.

The results suggest that the effective marginal tax rate is significant and negative for married men's normal working hours and actual weekend working hours. A tax reduction of 1 percentage points is therefore associated with an increase in normal working hours and actual weekend working hours by 3.0-4.6 and 1.6 minutes per week. The effective marginal tax rate is insignificant for the actual weekday working hours and for the overall actual weekly working hours. For married women we do not find a significant relationship between the effective marginal tax rate and the actual working hours, neither during weekdays or weekends, while the normal working hours are positively correlated with the effective marginal tax rate. As a result, a tax reduction of 1 percentage points implies an increase in the normal working hours of 6.9-9.3 minutes per week. This indicates, that the coefficient of the effective marginal tax rate varies across measures of working hours, even though it is a surprising finding, that the overall actual weekly working hours is unaffected by the effective marginal tax rate.

If we compare these Danish results to those from Sweden obtained in 1993, there are large similarities. Both papers find that the correlation between the effective marginal tax rate/net wage rate and working hours is larger for the normal weekly working hours than for the actual weekly working hours for both sexes.

When the estimations are divided by educational attainment – tertiary and non-tertiary – the effective marginal tax rate remains significant for women's normal working hours, albeit the coefficient is larger for women with a tertiary education, where a tax reduction of 1 percentage points is associated with an increase in the normal working hours of 8.2 minutes per week. For men's normal working hours the effective marginal tax rate is significant for non-tertiary educations, where a tax reduction of 1 percentage points is associated with an increase in the normal working hours of 5.4 minutes per week, which could indicate that a larger fraction of this particular educational group have incomes around the tax brackets.

The results suggest, that high marginal tax rates, which indeed affect individuals with a tertiary education to a larger extent than individuals with a lower educational background, contributes to the fact, that the actual labor supply is significantly less affected than the normal labor supply.

Such a difference between the actual and normal labor supply among individuals with a high or low income and educational attainment justifies the conclusion, that labor supply is associated with normal and actual working hours differently, which may have impor

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Appendix

A The tax model

One of the key elements behind the estimation results is the underlying tax model used to calculate the marginal effective tax rate for the respondents and their spouses, the net income and the virtual income. All benefits are calculated based on the relevant legal framework.

The taxes included in the calculations are income taxes (health contribution, municipal tax, county tax, church tax, bottom tax, middle tax and top tax) and income from shares. In 2008/09, the county tax (which differed across counties) was replaced by the uniform health contribution.

The county, municipal and church taxes were calculated on the basis of the taxable income incl. the earned income tax deduction. The municipal tax rate is determined by the respondent's residence municipality as of September 5th the previous year.

If the personal tax exemption is not fully utilized, the remaining amount is transferred to the spouse. The health contribution is calculated on the same basis as the municipal tax.

During the two survey years Denmark had three tax brackets with three associated tax rates (bottom, middle and top tax). The bottom tax is calculated on the basis of the personal income plus any positive net capital income. For married tax payers the spouse's negative net capital income is deducted before the tax is calculated. The middle tax is calculated on the basis of the personal income plus any positive net capital income which together exceed the income level of the bottom tax bracket. If the bottom tax bracket is not fully utilized by a married tax payer it can be transferred to the spouse, whose tax base is then reduced.

The top tax is calculated on the basis of the personal income plus any positive net capital income and contributions to a capital pension scheme which together exceed the middle tax bracket. If the middle tax bracket is not fully utilized by a married tax payer it cannot be transferred to the spouse, unlike the middle and bottom taxes. The total tax rate excluding church tax cannot exceed the tax ceiling of 59 percent. The respondents' total tax rates are calculated as sums of the different tax rates, the highest possible rate being 59 percent. The

gross income minus the total amount paid in taxes is then used to calculate the total net income.

In addition to income taxes we also calculate the tax of income from shares. Income from shares includes dividends from domestic and foreign shares as well as gains from the sale of these shares. The tax rate is progressive and thus depends on the share income level. For spouses who are cohabitating at the end of the tax year the tax on income from shares is calculated collectively. Thus the spouses' incomes (both positive and negative) are aggregated and the progressive tax rate income limits are doubled. The after-tax income from shares is then used to calculate the total net income.

The Danish child benefits are also included in the total net income. The size of the child benefit depends negatively on the child's age, thus being highest for children aged 0-2, but is independent of the household income level (this was changed in 2013). For this reason the child benefit does not affect the marginal tax rate. The total annual benefit is divided by the number of parents in the household.

The housing benefit and the daycare/preschool subsidy are graduated according to income and therefore impact the net income and the effective marginal tax rate. The subsidy aims to pay a share of the price of public daycare and preschool in order to reduce the cost. All Danish municipalities are obligated to pay 75 percent of the total cost of daycare and preschool. Thus the price of daycare and preschool reflects the remaining 25 percent, which must also be paid by the municipality if the household income is low enough, i.e. the daycare/preschool subsidy. It has been taken into account that the prices of daycare and preschool and therefore the value of the subsidy varies across municipalities. The calculation only includes subsidies for daycare and preschool even though other types of child care are also subsidized, for example with regard to children with special needs. The subsidy is reduced according to household income, defined as the sum of personal income, positive net capital income and incomes from shares. The income limit is also increased for each additional child below the age of 18 years. The subsidy for each parent is calculated on the basis of the local price of daycare or preschool and the subsidy rate. The marginal phase out rate, used for the effective marginal tax rate, is then calculated as the rate by which the subsidy is reduced when the household income increases.

The housing benefit is significantly more complicated to calculate compared to the child benefit. The size of the benefit for each respondent is therefore collected directly from the income registry after

which The marginal phase out rate, used for the effective marginal tax rate, is calculated by estimating a regression with a wide range of explaining variables (number of children, living space and whether the respondent is retired) including the household income (defined as above).

Having calculated taxes and benefits, the total net income is then calculated as taxable income minus income taxes plus benefits and income from shares after tax. The effective marginal tax rate is calculated as the total tax rate (max 59 percent) plus the marginal phase-out rates of the child subsidy and the housing benefit.

The virtual income is the respondent's non-labor income, i.e. their potential unemployment benefit or social assistance after tax plus their spouse's net income. Unemployment benefit is available for respondents who have unemployment insurance. How many of the respondents have unemployment insurance is estimated by examining whether they received a tax deduction for their quotas in the year in question. The potential unemployment benefit depends on the respondent's labor income and whether they work part- or full-time. Calculating the potential benefit we ignore the fact that there exists a separate benefit rate for graduates. Full-time employment is legally defined as working more than 26 hours per week. If the respondents are not entitled to unemployment benefits it is possible to receive social assistance.

In order to receive social assistance the respondent cannot be under the age of 18 or eligible for other benefits. The respondent cannot hold wealth nor have a spouse with an income sufficient to support the entire household. The rate of assistance also depends on whether the respondent is over the age of 25 or has children (we ignore the "introduction benefit" for immigrants). Unemployment benefit and social assistance are both calculated after tax using the model described above.

B Tax rates and working time of respondents with a strictly positive amount of working hours

The estimation results from chapter 8 are shown for respondents with a strictly positive amount of working hours in the following three tables.

Table B.1 *Multivariate OLS estimates of labor supply for respondents with a strictly positive amount of working hours*

2001	**Normal working hours per week**	
	Men	Women
Effective marginal tax rate[1]	-15.43*** (3.81)	14.30*** (3.01)
Virtual income A per week (1,000 DKK)	0.57*** (0.12)	-0.11** (0.05)
Constant	45.46*** (2.08)	29.95*** (1.52)
R^2	0.13	0.05
	Actual working hours per week	
	Men	Women
Effective marginal tax rate[1]	-12.37**	18.63***
	(5.86)	(5.54)
Virtual income A per week (1,000 DKK)	0.49**	-0.02
	(0.19)	(0.08)
Constant	43.88*** (3.19)	28.14*** (2.80)
R^2	0.07	0.03
Observations	488	504
2009	**Normal working hours per week**	
	Men	Women
Effective marginal tax rate[1]	-7.38*** (2.14)	12.69*** (2.12)
Virtual income A per week (1,000 DKK)	-0.00 (0.14)	-0.15** (0.07)
Constant	44.67*** (1.13)	31.27*** (1.10)
R2	0.04	0.01
	Actual working hours per week	
	Men	Women
Effective marginal tax rate[1]	-6.92** (3.48)	3.55 (3.64)
Virtual income A per week (1,000 DKK)	-0.28 (0.23)	-0.21* (0.12)
Constant	47.26*** (1.83)	37.18*** (1.88)
R^2	0.06	0.02
Observations	**1149**	**1052**

Standard error in parenthesis, * p<0.1, ** p<0.05, *** p<0.001
1. coefficient/100 expresses an hourly change per week from a 1-percent change in the tax rate.
Note: The regression controls for marital status, children, self-employed and the positive number of actual working hours.
Source: The Rockwool Foundation Research Unit

Table B.2 *Multivariate OLS estimates of labor supply for respondents with a strictly positive amount of working hours, 2008/09*

	Normal working hours per week, men			Normal working hours per week, women			Actual working hours per week, men			Actual working hours per week, women		
Effective marginal tax rate[1]	-8.46**	-10.73***	-10.87***	13.56***	10.40***	10.14***	-2.95	-4.44	-4.75	4.06	1.67	0.83
	(2.74)	(2.60)	(2.61)	(2.43)	(2.33)	(2.33)	(4.42)	(4.41)	(4.43)	(4.22)	(4.25)	(4.21)
Spouse's effective marginal tax rate[1]	0.95	-0.36	-0.30	-2.32**	-2.47**	-2.33**	-0.30	-1.11	-1.13	-2.16	-2.25	-1.79
	(1.61)	(1.53)	(1.53)	(1.04)	(0.99)	(0.99)	(2.60)	(2.59)	(2.60)	(1.81)	(1.80)	(1.79)
Virtual income B per week (1,000 DKK)	0.06	-0.04	-0.00	-0.12	-0.15**	-0.14**	-0.38	-0.46*	-0.44	-0.12	-0.14	-0.10
	(0.17)	(0.16)	(0.16)	(0.07)	(0.07)	(0.07)	(0.27)	(0.27)	(0.27)	(0.13)	(0.13)	(0.13)
Self-employed		5.27***	5.23***		5.08**	4.87**		5.30**	5.26**		8.52**	8.26**
		(1.26)	(1.26)		(1.88)	(1.88)		(2.14)	(2.15)		(3.42)	(3.39)
Satisfaction with leisure		-1.93***	-2.02***		-1.66***	-1.75***		-0.96**	-0.98**		-0.36	-0.63
		(0.27)	(0.27)		(0.22)	(0.22)		(0.45)	(0.46)		(0.39)	(0.40)
Health		-1.94***	-1.97***		-1.30***	-1.38***		-1.24*	-1.23*		-1.31**	-1.49**
		(0.42)	(0.42)		(0.33)	(0.33)		(0.71)	(0.72)		(0.59)	(0.59)
Youngest child: age 0-2			-2.15*			-2.53**			0.01			-4.86**
			(1.11)			(1.01)			(1.89)			(1.83)
Youngest child: age 3-5			-0.80			-1.65			-1.14			-6.81***
			(1.19)			(1.03)			(2.02)			(1.86)
Youngest child: age 6-17			0.26			-0.05			0.50			-1.24
			(0.77)			(0.60)			(1.31)			(1.08)
Constant	46.34***	59.77***	60.33***	31.89***	43.24***	44.17***	47.26***	54.66***	54.70***	36.83***	41.98***	44.83***
	(1.47)	(2.10)	(2.19)	(1.25)	(1.78)	(1.83)	(2.37)	(3.56)	(3.72)	(2.17)	(3.24)	(3.31)
R^2	0.01	0.12	0.13	0.05	0.16	0.17	0.00	0.02	0.02	0.01	0.02	0.05
Observations	716			715			716			715		

Standard error in parenthesis, * p<0.1, ** p<0.05, *** p<0.001
1. coefficients/100 expresses an hourly change per week from a 1-percent change in the tax rate.
Source: The Rockwool Foundation Research Unit

III

Har børn nogen betydning for mænd og kvinders arbejdstid?

– mænd og kvinders tidsanvendelse i forskellige livsfaser

How Time Use Varies With Life Stage In Denmark: A Cross-sectional and a Panel Study 2001-2009

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SUMMARY: We investigate the relationship between women and men's life stages and their time spent on paid work, household work, childcare and leisure time. We also examine how this time use differs over the course of the respondent's life-cycle within a Scandinavian welfare state regime. Using a Danish panel dataset from the DTUS-01 and DTUS-09 for the period 2001-2009 merged with administrative register data, we find that paid work of fathers of preschool children does not differ from that of young men without children, while mothers of preschool children spent less time in paid work than young women without children. Comparing fathers and mothers of school children with those of preschool children, we find more paid work for the parent with school children. However, fixed effects estimations using the balanced panel do not result in a reduction in women's paid work when having preschool children, while the increase in paid work remains for the father and mother when their children reach school age.

Keywords: Life stage; Time allocation; Panel data

1. Introduction

We investigate how Danish men and women's time allocation varies over different life stages during the period 2001-2008/09. We compare the time spent on paid work, household work, leisure, sleep and childcare by men and women, respectively. We compare the following groups: 1) singles without children with couples without children and wives under the age of 45 years, 2) couples without children and wives under the age of 45 years with parents of children under 7 years of age, 3) parents of children under 7 years of age with parents with the youngest child aged between 7 and 17 years, 4) parents with the youngest child aged between 7 and 17 years with couples without children and wives over the age of 44 years, and 5) couples without children and wives over the age of 44 years with singles without children and over 44 years of age. The information relies on cross-sectional data, as in Apps & Rees (2005) and Anxo et *al.* (2011), for which reason the men and women in the different life stages are not the same, implying some cohort effects. To account for this, we also calculated the shift in time allocation for the same individuals moving from one life stage to another—the dynamic aspect—using panel-data information for 2001-2008/09. Hence, we remove the difficulties of disentangling age, cohort and period effects, that is, the selection processes involved when comparing different life-stage groups.

The results indicate that having children affects only women's time spent on the labor market, not that of men, and that the time women spend on children is taken from paid work as well as from leisure time, while for men, time spent on children is primarily taken from their leisure time.

2. Literature review

There are various investigations about the relationship between work and leisure time and how children influence this relationship, see e.g. Lundberg & Rose (1999), Apps & Rees (2005), Bonke (2009a) and Anxo et *al.* (2011). The implication of having children, apart from time spent on childcare, means more household work and investments in durables such as labor-saving devices, cars and bigger houses. Although large subsidies are given to child families directly as child allowances and indirectly as public subsidies to childcare facilities, see Bonke (2009b) for Denmark, and financial markets allow for "income smoothing", i.e. savings before having children and lending and spending down afterwards (Browning & Crossley, 2001;

Bonke & Browning, 2011), fathers are generally found to work more and mothers less than men and women without children (Deding & Larsen, 2008). However, in some countries, this redistribution of time within the family allows household income to be kept intact while the child(ren) grows up (Bonke, 2009a).

Additionally, forming a couple without having children initially impacts men and women's time allocation, although to a much lesser extent than having children. This is primarily due to a gendered distribution of household work with the wife contributing more than the husband, which might be explained by different preferences for and productivity in the doing of household work. Later, in most Scandinavian countries, in the empty-nest life stage, the gendered contribution to household work in previous life stages prevails, probably because the division of labor in the child-life stage continues due to established gender roles and experiences obtained during that life stage.

Following Robinson and Goodbey (1997), several factors contribute to determining how people spend their time. Biological factors (age, sex, race), role factors (marriage, parenthood), status factors (education, occupation and income), environmental factors (urbanity, region, housing type) and temporal factors (day of the week, season and year) all play a role in how an individual allocates his or her time. Together with these life-style characteristics, individual preferences and choices explain the actual time allocation within a zero-sum property to time with 24 hours as the ultimate constraint on human activity (Joyce and Steward, 1999) and finite resource (Robinson, 1997). Moreover, public policy, including the tax system—individual or joint taxation of spouses—the affordability of childcare and the size of child allowances affect men and women's transitions between life stages and allocation of time within the different life stages (Apps & Rees, 2005; Smith et al., 2003).

In Denmark, representing the Scandinavian welfare state regime (Esping-Andersen (1999), women's labor market attachment is similar to that of men, and the number of working hours for employed women is 85 percent of similar men's, which is possible because of a substantial supply of primarily public childcare institutions with coverage rates for 1-6-year-olds of about 95 percent. The parents pay a maximum of 25 percent of the running costs of these institutions and receive an additional child allowance around 400 Euro net per child (up to three children) every third month. Furthermore, a divorce now requires the consent of only one partner, and child custody is shared equally between the mother and father as the starting point.

Because of the work-life family-life balance characterizing the Danish welfare state, time allocation and consumption patterns are probably more a matter of preference than in many other countries; accordingly, they are a revealing way of showing who people are and to which group in society they belong. Moreover, life-course transitions are important indicators of social and behavioral changes in women and men's lives (Fast & Frederick, 2004) and are also determinants of quality of life outcomes. Being married, having children, etc. all represent life-course events, which are judged by societal expectations about role content across the lifespan, not to mention the way people spend their time.

The usual chronological order of life-course transitions implies that an individual goes from youth to adulthood, which generally occurs between the ages of 15 to 29 years, and implies economic and social independence of parents and the schooling system, and the entering of the labor market. The next transition is from singlehood to marriage/cohabitation with coordination of time use and sharing of income as one of the most prominent changes for both partners. For the great majority, this is followed by parenthood, which even more than partnering has crucial consequences for women and men's behaviour, allocation of household and paid work and individual wellbeing (Coltraine and Ishi-Kuntz, 1992). The empty-nest stage, when children have left home, affects the way leisure time is spent more than the amount of labor supplied to the labor market, and retirement from the labor market is obviously a very radical change in people's time allocation, with many unanswered questions due to increasing life expectancies, population aging and the feminization of the older population.

In between these life stages occurs singlehood, with and without children, due to more divorces and remarriages. The life course formerly considered as a sequence of discrete events that happened to people in a relatively linear fashion at more or less fixed and prescribed times is no longer the general rule. Life-course patterns are now more diverse, the timing of transitions less precise and universal, and the life course is considered as an extended and complex process for modern people.

Despite this complexity in life-course movements and the very diversified life stages in contemporary societies, here we focus on the more traditional aspects: singlehood, young couples, parents of preschool children, parents of school children, older couples, and elderly singles—the activities we address are paid work, household

work, childcare, leisure and sleep. Men and women in other life stages are omitted from the estimations; nevertheless, this does not imply any sample selection bias not being controlled for.

Anxo et al. (2011) apply very similar life stages, while Apps & Rees (2005) include only couple stages in their analyses. Both studies include paid work and domestic work inclusive of childcare, and Anxo et al. (2011) include leisure time exclusive of personal care and sleep.

In the following we distinguish between domestic work and childcare because they are requiring different abilities and that preferences for the doing of these activities may vary between mothers and fathers, see e.g. Bianchi et *al.*, 2006.

3. Data

The data used stem from the Danish Time Use Panel Survey 2001-2008/09 (DTUP), which is a merged dataset of The Danish Time Use Survey 2001 and The Danish Time and Consumption Survey 2008/09 (Bonke & Fallesen, 2010), both drawn randomly among 18-74-year-olds from administrative registers held by Statistics Denmark. Respondents in 2001 were asked to also participate in 2008/2009—up to the age of 74 years—by giving diary information on the same weekday and weekend day. In the unbalanced panel, all individuals with diary information on a weekday and a weekend day were included: 4,828 men and 5,153 women. In the balanced panel used for the fixed effect estimations, the sample consisted of 1,247 men and 1,517 women.

The basic information in both waves of the panel about family relations, socioeconomic status, educational level, and average number of working hours was gathered through telephone or internet interviews followed up by the completion of two time-use diaries, one for a weekday and one for a weekend day, with the weights 5/7 and 2/7 to find an average weekday, in both 2001 and 2008/09.

In the diaries the respondent reported the primary activity in which s/he was engaged during the day. In 2008/09 there were 34 pre-coded activities to choose from, unlike 2001 where the respondents were asked to report the undertaken activities in their own words, i.e. post-coding. Table A1 includes a list of the activities used in this paper. Owing to the inclusion of a unique identifier in DTUP, we were able to merge with administrative register data in Statistics Denmark, which considerably increased the information available.

The combination of survey and administrative register data also made it possible to test for sample selection, for example, those unemployed and those who are immigrants are underrepresented, and through a weighing procedure make the DTUP representative of the population as a whole, see Statistics Denmark (2010) for the weighting procedure used.

Information on employment status and educational background stems from administrative registers, where employment is included as a binary variable: employed versus un- or non-employed, i.e. 2001 and 2008/09 were periods with economic favorable climate. Education refers to the longest completed course of education and we distinguish between individuals having completed a further education—short-course further education (less than 3 years), medium-course further education (3-4 years), and long-course further education (more than 4 years)—and individuals with vocational or no education. Additionally, age and year as a dummy for 2001 vs. 2008/09 were added as control variables in the multivariate least square regression.

4. Descriptive statistics

Table 1 shows descriptive statistics for the sample of single and married/cohabitating men and women, respectively, for the pooled sample and for each of the years 2001 and 2008/2009. We find that time spent on childcare among fathers increased between 2001 and 2008/2009: average time spent was 0.28 hours a day in 2001 and 0.34 hours in 2008/09, see the same trend for the US (Bianchi et *al.*, 2006; Sandberg & Hofferth, 2005a,b). For household work, we found an increase in men's time and a decrease in women's time devoted to the activity, following a general trend towards more gender equality in household production (Gershuny, 2000; Sevilla & Gimenes-Nadal, 2012; Bonke & Jensen, 2012). Time spent on paid work decreased for both men and women during the period 2001-2008/09, while awake leisure time increased for both sexes, but more for women than for men. Lastly, we found that men and women slept nearly 0.2 hours a night more in 2008/09 than in 2001.

These changes in time spent on the different activities are distributed differently over the life stages (Figure 1-5). The decrease in paid work is caused by considerably fewer hours worked by late life-stage women and men, which more than out-weighted an increase in early life-stage women and men's hours worked, with the most marked change pertaining to men's life stages between 2001 and 2008/09.

The changes in household work were nearly parallel for all life stages in men and women, with the exception of fathers of preschool children, who spent considerably less time on this activity in 2008/09 than in 2001. Conversely, childcare increased for fathers of preschool children, whereas it decreased for counterpart mothers. For mothers and fathers of schoolchildren, almost no changes in childcare occurred during the study period.

Women at all life stages experienced more awake leisure, whereas this was the case only for men with children and older married men without children. For older, single men, awake leisure time remained virtually the same, and for early life stage single or partnered men, awake leisure was reduced during the last 10 years.

The greater amount of sleep obtained during the period was initially to the benefit of women, who all slept longer in 2008/09 than in 2001. For men the same occurred, except for fathers of preschool children, who slept less in 2008/09.

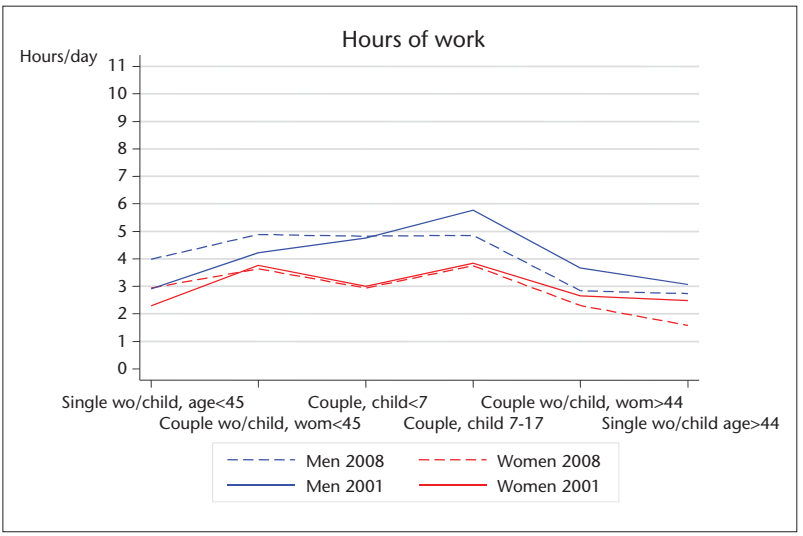
Table 1 *Descriptive statistics. Mean and standard deviation in parentheses. Men and women. 2001 and 2008/9 samples.*

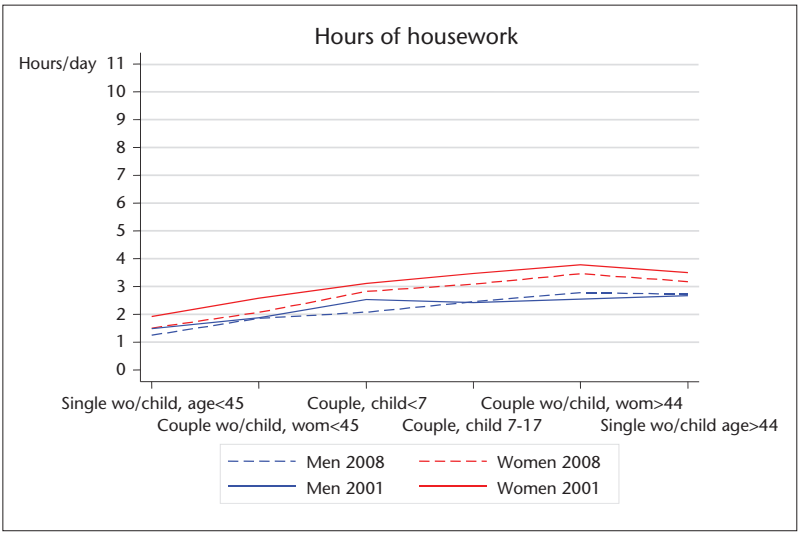
	Pooled	2001	2008	Pooled	2001	2008
		Men			Women	
	Means (St. dev.)					
Childcare[1] (Hours/day)	0.32 (0.87)	0.28 (0.67)	0.34 (0.94)	0.57 (1.24)	0.58 (1.18)	0.57 (1.26)
Household work[1] (Hours/day)	2.31 (1.98)	2.26 (1.73)	2.33 (2.07)	3.03 (1.91)	3.10 (1.76)	2.99 (1.97)
Paid work[1] (Hours/day)	3.84 (3.27)	3.99 (3.13)	3.77 (3.32)	2.83 (2.84)	2.97 (2.72)	2.76 (2.90)
Leisure[1] (Hours/day)	8.94 (3.01)	8.82 (2.81)	8.99 (3.09)	8.76 (2.81)	8.42 (2.56)	8.93 (2.91)
Sleep[1] (Hours/day)	7.86 (1.53)	7.72 (1.34)	7.92 (1.60)	8.09 (1.45)	7.95 (1.32)	8.16 (1.51)
	Percent					
Single wo/ child, <45 years	0.16 (0.37)	0.19 (0.39)	0.15 (0.36)	0.12 (0.33)	0.18 (0.39)	0.09 (0.29)
Couple wo/ child, woman <45 years	0.09 (0.29)	0.14 (0.35)	0.07 (0.25)	0.09 (0.29)	0.14 (0.35)	0.07 (0.26)
Couple, child <7 years	0.14 (0.35)	0.14 (0.35)	0.14 (0.35)	0.14 (0.35)	0.14 (0.35)	0.14 (0.35)
Couple, child 7-17 years	0.16 (0.37)	0.13 (0.34)	0.17 (0.38)	0.17 (0.37)	0.15 (0.35)	0.18 (0.38)
Couple wo/ child, woman >44 years	0.35 (0.48)	0.32 (0.47)	0.36 (0.48)	0.35 (0.48)	0.28 (0.45)	0.38 (0.49)
Single wo/ child, >44 years	0.10 (0.30)	0.07 (0.26)	0.11 (0.31)	0.13 (0.33)	0.10 (0.30)	0.14 (0.34)
	100.0	100.0	100.0	100.0	100.0	100.0
Further education[2] (1/0)	0.33 (0.47)	0.30 (0.46)	0.34 (0.47)	0.44 (0.50)	0.38 (0.48)	0.47 (0.50)
Age (years)	46.43 (16.06)	43.28 (15.23)	47.78 (14.78)	46.04 (14.62)	41.86 (14.67)	48.00 (14.18)
Employed/ un-, non-employed	0.71 (0.45)	0.70 (0.46)	0.72 (0.45)	0.64 (0.48)	0.64 (0.48)	0.64 (0.48)
N:	2983-2935	897-982	2086-2043	3235-3068	1030-984	2205-2084

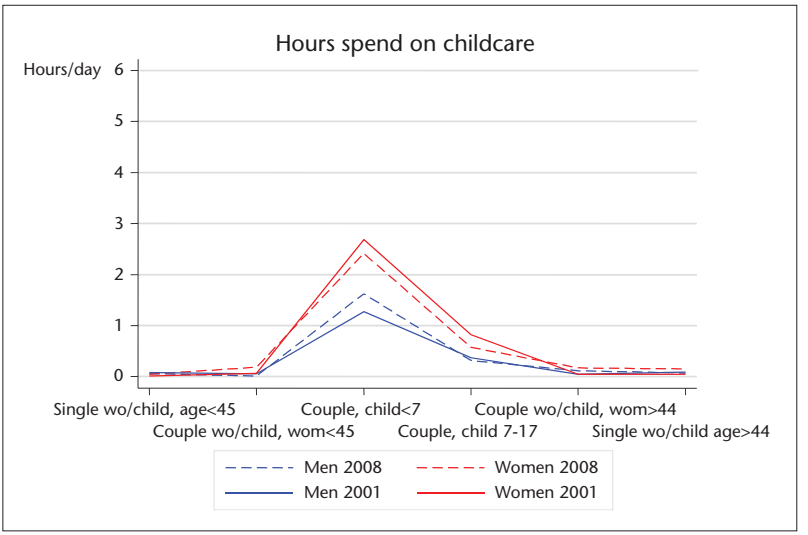
1. See Table A1
2. Short-course further education (less than 3 years), medium-course further education (3 to 4 years), and long-course further education (more than 4 years) versus vocational or no education.
Note: Sample consists of respondents in the DTUS 2001 and 2008/2009.
Time use variables are weighted averages of one weekday and one weekend day.

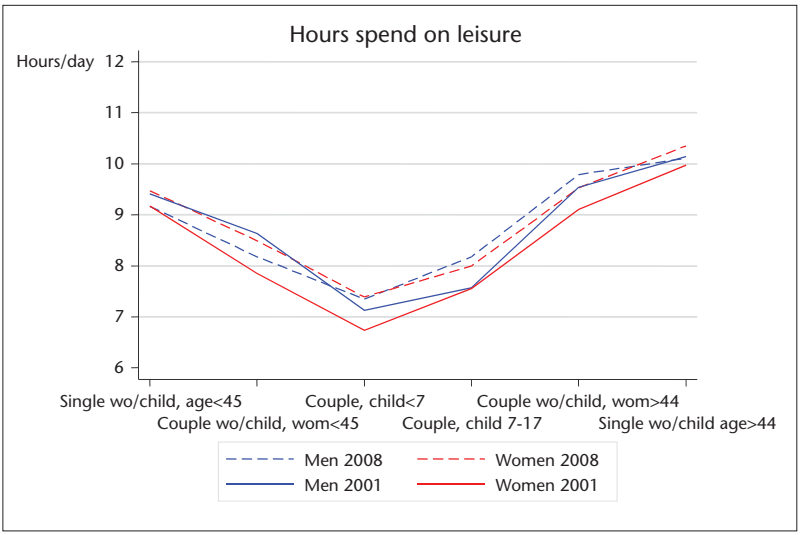
In particular for men and women's paid work, the standard variations across households are large, which emphasizes the importance of using panel data to control for heterogeneity and selection processes involved when moving from one to another life stage. Because Anxo et al. (2011) and Apps & Rees (2005) have cross-sectional data only, they do not solve these problems, although Apps & Rees (ibid) apply two life-cycle profiles, one for households with wives supplying no or few hours to the labor market and another one with wives having at least a full-time attachment to the labor market, where the husband is employed in both cases.

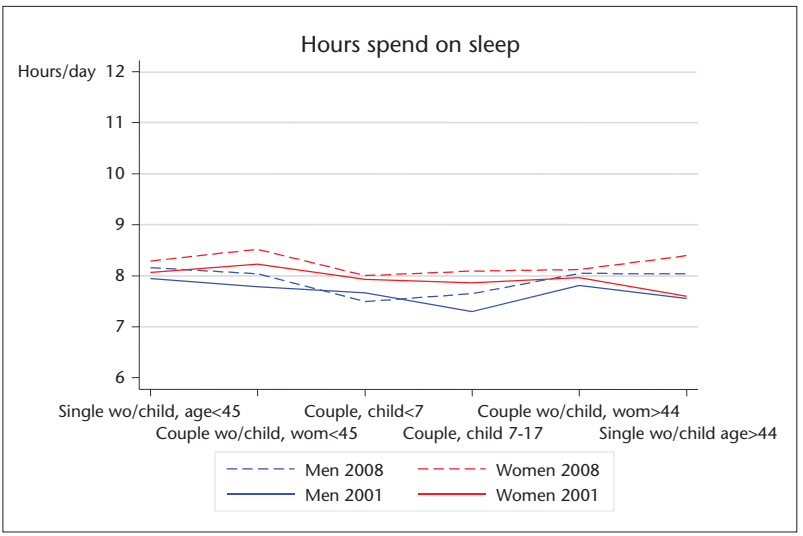
Fig. 1-5. *The distribution of activities over life stages. 2001 and 2008/09.*




Hours of housework
Hours/day
11
10
9
8
7
6
5
4
3
2
1
0
Single wo/child, age<45
Couple, child<7
Couple wo/child, wom>44
Couple wo/child, wom<45
Couple, child 7-17
Single wo/child age>44
Men 2008
Women 2008
Men 2001
Women 2001


Hours spend on childcare
Hours/day
6
5
4
3
2
1
0
Single wo/child, age<45
Couple, child<7
Couple wo/child, wom>44
Couple wo/child, wom<45
Couple, child 7-17
Single wo/child age>44
Men 2008
Women 2008
Men 2001
Women 2001





5. Empirical strategy

We analyze the effect of life-stage changes on time allocation, such as time spent on paid work, household work, leisure, sleep and childcare. We apply a model for each activity and for men and women separately.

The form of the equation is the following:

$$(1) \quad T_{jit} = X_{it}\beta_1 + \beta_2 LS_{it} + u_{it}$$

Where T_{jit} is time spent on the activity j at time t done by individual i, X is a vector of different correlates, LS indicates life stages, and u is the error term. The error term has two components: an individual effect, ε_i, which represents unobserved fixed characteristics of the individual and a random error, γ_{it}, which is assumed to be normally distributed. Hence, the error term has the form:

$$(2) \quad u_{it} = \varepsilon_i + \gamma_{it}$$

The problem is that a correlation between life stage and the error term u will bias the β_2-estimates in an OLS regression because it does not take the impact of unobserved characteristics into consideration. That is, the individual's time allocation—the 24 hour constraint, which is only implicitly modelled—is affected by having children, inasmuch as it affects earning an income and thus doing paid work, and the other activities are decided simultaneously. Furthermore, unobserved time invariant characteristics correlated with life stage might also correlate with time spent on different activities. For instance, individuals who discount the future will be less likely to have children and perhaps more likely to work many hours on the labor market, which implies that the unobserved time invariant component in the error term, ε and life stage will be negatively correlated, and the coefficient β_2 will be biased downwards.

In the following, we begin by using the unbalanced, pooled sample for the years 2001 and 2008/09 and control for clustering because some respondents participated in both waves/surveys. Life stages are included as a categorical variable, where the reference group changes to function as "departure" life stages positioned immediately before the "arriving" life stage. The implication is that all the observations are included in the estimations independently of the life-stage transition under consideration. We then use the balanced panel doing fixed effects estimations to deal with the bias that may arise due to the correlation between unobserved characteristics and life stage. For all estimations, the 24 hour constraint was not explicitly taken into consideration.

6. Results

6.1 Multivariate ordinary least squares results

Table 2 shows the multivariate ordinary least square (OLS) results of equation (1) applied on pair-wise groups of consecutive life stages (the full estimations are available on request). Panel A shows the results for men and Panel B, the results for women. Columns 1-5 show the results from equation (1) for the outcomes time spent on childcare, household work, paid work, leisure and sleep. In addition to the life-stage variable, we include educational background, employment, age and a dummy variable for year in the OLS specification. Although life stages are defined, for example, by age, we include this variable to delimit the age effect on time allocations when we compare two close life-stage groups: being single individuals with younger couples without children, each with broad age spans. Further, employment—employed vs. non-employed—and educational background—further education vs. shorter or no education—vary with life stages, but again, by including these binary variables, we end up by getting a "purer" effect or correlation between life-stage changes and changes in time allocation.

The results show a significant association for women between moving from singlehood to cohabitation/marriage and time spent on childcare, although there are no home-living children in either of the two life stages. The most likely explanation is that some people have children from previous relationships or children from the present relationship who have left home on whom they spent some time: less time if single men are compared with partnered men, and more time when comparing single women with partnered women.

Table 2 *Multivariate ordinary least squares estimation of time spent on childcare, household work, paid work, leisure and sleep. Adjusted for education, employment, age and year. Men and women. Pooled sample. 2001-2008/09*

	Child-care	House-hold work	Paid work	Leisure	Sleep
	Coeff. (Std error)				
	Men				
Couple wo/child, woman <45 years vs. single wo/ child, aged <45	-0.0242 (0.06)	0.434** (0.15)	0.237 (0.20)	-0.556** (0.21)	-0.0405 (0.12)
Couple, child <7 years vs. couple wo/child, woman <45	1.467*** (0.06)	0.303* (0.15)	-0.315 (0.2)	-0.881*** (0.21)	-0.333** (0.12)
Couple, child 7-17 years vs. couple, child < 7 years	-1.193*** (0.05)	-0.115 (0.14)	0.456* (0.18)	0.461* (0.19)	-0.0187 (0.11)
Couple wo/child, woman >44 years vs. couple, child 7-17 years	-0.263*** (0.05)	-0.456*** (0.13)	-0.0909 (0.17)	0.346+ (0.18)	0.147 (0.10)
Single wo/ child, aged >44 vs. couple wo/child, woman >44 years	-0.0114 (0.05)	0.0686 (0.12)	-0.0588 (0.17)	0.313+ (0.17)	-0.076 (0.10)
N	2949				
R-sq	0.3191	0.0998	0.3976	0.2279	0.0526
	Woman				
Couple wo/child, woman <45 years vs. single wo/ child, aged <45	0.220** (0.07)	0.539*** (0.14)	0.346+ (0.18)	-0.913*** (0.20)	0.284* (0.12)
Couple, child <7 years vs. couple wo/child, woman <45	2.468*** (0.07)	0.492*** (0.14)	-0.939*** (0.17)	-1.088*** (0.19)	-0.401*** (0.11)
Couple, child 7-17 years vs. couple, child < 7 years	-1.697*** (0.06)	-0.124 (0.12)	0.632*** (0.16)	0.574** (0.18)	0.0675 (0.10)
Couple wo/child, woman >44 years vs. couple, child 7-17 years	-0.373*** (0.06)	-0.617*** (0.12)	0.213 (0.15)	0.382* (0.17)	-0.0973 (0.10)
Single wo/ child, aged >44 vs. couple wo/child, woman >44 years	0.00765 (0.05)	-0.406*** (0.10)	-0.0173 (0.13)	0.404** (0.14)	0.048 (0.08)
N			3115		
R-sq	0.4566	0.1702	0.3768	0.2234	0.0257

Note: clustered for same individual observations in 2001 and 2008/09
+ p<0.10, * p<0.05, ** p<0.01, *** p<0.001

Household work increases when men and women are forming a partnership. However, only women's paid work is affected by this life-stage change, possibly to be seen as the woman's economic contribution to establishing and investing in a new home—the same pattern is found in Sweden and France, whereas women's paid work is unaffected by marriage in the US and Italy (Anxo et al., 2011). Together with the increase in household work, and also in sleep, women have to pay in terms of an hour's reduction in time spent on leisure time. Younger, married/cohabiting men without children have 0.6 hours less daily leisure time than do younger, single men without children, and for women the difference is 1.0 hour in favor of the singles.

The time devoted to childcare in families with children below 7 years of age is primarily taken from leisure and sleep. Two-thirds of the 1.5 hours fathers of preschool children spend on their children—there might also be older children in such families—is taken from leisure, while only 40 percent of women's 2.5 hours childcare comes from that source. Moreover, 0.3-0.4 hours of sleep are forfeited by men and women when having a child, partly due to more housework for both partners, 0.3 vs. 0.5 hours. Apart from the price to be paid in terms of leisure, women with a child/children also reduce their paid work. For men no such pay is actualized as they work the same number of hours irrespective of whether they have young children or no children.

In France, Australia, the UK and Germany, married men's paid work is also unaffected by having young children, whereas it increases in Italy and the US and decreases in Sweden. For women, young children mean fewer working hours in all the countries (Apps & Rees, 2005; Anxo et *al.*, 2011) even in Denmark.

For fathers of school-age children, paid work is 0.5 hours longer than for fathers of preschool children, and for mothers the difference is 0.6 hours, implying that as children age, some of the reduction in mothers' paid work related to having a child is regained when the child reaches school age. Moreover, substantial leisure time is regained for both fathers and mothers when their children age and less caring time is required: that is, fathers of school children spend 1.2 hour less per day taking care of their children, relatively to the 1.5 hours increase when going from no children to having preschool children. For mothers of school children, the same figures were 1.7 hours relatively to 2.5 for the first transition. For leisure time, fathers and mothers regained about 50 percent of what they had to give up when having their first and youngest child.

Obviously, the great majority of time spent on childcare disappears when children leave home and empty nests appear, which happens earlier in Denmark than in the Southern European countries (Esping-Andersen, 1999; Anxo et *al.*, 2011). For both women and men, time devoted to household work also decreases significantly and to nearly the same extent, which allows for 20 minutes more leisure time per day for both sexes when the last child leaves home.

Lastly, we find that time spent on household work differs for women in a partnership compared with women living alone. Household work declines by 0.4 hours a day, while no such difference is found for men in the two life stages. However, for both sexes, 0.3-0.4 hours of leisure is gained by living alone relative to having a partner in old age. These changes are not because of older single women's older age relatively to older women's age in a partnership—women survive men—as we control for age-differentials between the two groups.

For all the comparisons made here, we have talked about transitions, although the different life-style groups are populated to some extent by different people rather than the same ones, as is the case for the following fixed effects analyses.

6.2 Fixed effects results

The problems occurring when life stages are endogenous were described in the empirical strategy section focusing on the simultaneous determination and the presence of a third unobserved factor correlating with both time allocated to the specific activities and to life stage: a simultaneous preference for being married and spending time together with a partner. This problem cannot be solved when doing OLS regressions, whereas fixed effects estimations take care of the presence of unobserved characteristics, i.e. the time invariant component in the error term ε_i being correlated with life stage, producing consistent estimates of the effect of life stage on time spent on specific activities.

Further, fixed effects estimates cause problems because they are sensitive to measurement errors and might bias fixed effects estimates downwards. Although we do not believe that the measure of age, civil status and children implies measurement error, the time-use variables might include errors depending on the activities. For example, unobserved variables might influence both having children and time spent on childcare. These unobserved variables may vary over time—quantities have been converted into qualities with fewer children and more time spent per child (Bonke, 2009a; Bianchi, 2000;

Table 3 *Life stages and time allocation in Denmark. Panel data 2001-2008/09. Fixed effects estimations adjusted for educ. and employment.*

	Single wo/child, aged <45 → couple wo/child, woman <45 years			**Couple wo/child, woman <45 → Couple, child <7 years**			**Couple, child < 7 years → couple, child 7-17 years**			**Couple, child 7-17 years → couple wo/child, woman >44 years**			**couple wo/child, woman >44 years → single wo/ child, aged >44**		
	2001 Means	2008 Means	Coeff	2001 Means	2008 Means	Coeff	2001 Means	2008 Means	Coeff	2001 Means	2008 Means	Coeff	2001 Means	2008 Means	Coeff
	Hours:minutes/day (t-statistics)														
	Men														
Childcare	0:01	0:00	-0.018 (0.02)	00:00	02:02	2.029*** (7.69)	01:15	00:25	-0.811*** (-6.96)	00:19	00:02	-0.285** (-3.16)	..	..	..
Household work	1:41	1:38	0.348 (0.49)	01:42	01:56	0.214 (0.78)	02:17	02:23	0.0345 (0.16)	02:13	02:32	0.165 (0.52)	..	..	..
Paid work	3:26	6:26	1.417 (1.45)	04:50	05:12	-0.205 (-0.40)	05:23	05:32	0.183 (0.44)	06:02	05:28	-0.209 (-0.04)	..	..	..
Leisure time	9:04	6:57	-2.359 (-2.53)	08:35	06:40	-1.784*** (-3.65)	07:04	07:36	0.497 (1.36)	07:35	07:53	0.081 (0.23)	..	..	..
Sleep	8:11	8:33	0.917 (1.68)	07:27	07:19	-0.083 (-0.30)	07:25	07:32	0.163 (1.03)	07:14	07:31	0.322+ (1.91)	..	..	..
N	32			108			144			128			12		
	Women														
Childcare	00:00	00:22	0.346 (0.91)	00:07	02:39	2.405*** (8.11)	02:10	00:41	-1.311*** (-7.80)	00:31	00:06	-0.402*** (-4.17)	0:02	0:00	-0.033 (-1.60)
Household work	01:50	02:03	-0.054 (-0.09)	02:10	02:44	0.423 (1.3)	02:58	03:10	0.269 (1.15)	03:28	03:03	-0.426 (-1.58)	3:50	3:43	-0.344 (-0.51)
Paid work	01:53	03:40	1.323 (1.36)	03:49	03:09	-1.180+ (-1.95)	03:42	04:02	0.0196 (0.05)	03:40	04:20	0.742* (2.00)	2:07	1:16	0.288 (1.09)
Leisure time	08:14	08:05	0.016 (0.01)	08:09	07:01	-0.908+ (-1.98)	06:48	07:40	0.823* (2.34)	07:54	07:59	-0.003 (-0.01)	9:22	9:16	-1.104 (-0.93)
Sleep	08:19	08:38	0.998+ (1.95)	08:03	07:52	-0.222 (-0.87)	07:49	07:58	0.218 (1.28)	07:56	07:49	-0.125 (-0.69)	8:15	9:37	1.531 (1.37)
N	48			120			144			148			34		

+ p<0.1, *p<0.05. **p<0.01, *** p<0.001
Note: 2008-weights, Statistics Denmark. <20 obs.

Bianchi et *al., 2006)*. Furthermore, relatively few of those with time diary information in both 2001 and 2008/2009 changed life-stage status from 2001 to 2008/9, giving a relatively small balanced sample.

Nonetheless, we did fixed effects estimations together with OLS estimations because of an expected relationship between life stage and unobserved fixed characteristics causing a potential problem when applying equation (1). That is, there might be a selection into marriage and the same for having children, although nearly 90 percent of Danish women have at least one child within their fertile period.

Table 3 shows the fixed effects estimates with the results for men shown in Panel A and the results for women in Panel B. The control variable age drops out of the estimation because it is fixed over time. Column 3 shows the fixed effects estimates on the effect of life-stage transitions on paid work, household work, childcare, leisure and sleep. Compared with the earlier OLS results, there are some fixed effects estimations that cannot be done due to attrition. Hence, there are too few observations to follow men's transitions from marriage to the older singlehood stage. Moreover, the fixed effects results show fewer significant parameter estimates, and among those that are significant, the parameter estimates are sometimes higher than when doing OLS regressions.

The fixed effects estimates in Table 3, Column 6, show that among married/cohabiting men, having a child means a 2.0 hour increase in time spent on childcare and for women it is 2.4 hours, which is 0.5 more and 0.1 hours less, respectively, than that found in the OLS regressions. When the child ages and becomes a school child, the fixed effects for women and men are smaller than those obtained by OLS estimates. Lastly, when children leave the parents' home, the fixed effects for both the mother and the father are equal to the OLS estimates. The higher fixed effects estimates for the first transition point to fixed unobserved factors positively correlating with life stages with children biasing downwards the OLS estimates in Table 2, whereas this is not the case for the other transitions when looking at time spent on childcare.

For men and women there are no effects of life-stage transitions on time spent on household work, which is in contrast with the OLS estimates, where positive correlations between early life-stage changes and negative correlations between late life-stage changes were found. The positive OLS estimates for paid work disappear in the fixed effect estimates when comparing women and men with preschool children with women and men with school children. However, the significant

and negative OLS estimates for women with preschool children relative to women without children, become larger when following the same women's transition from the second to the first stage. Additionally, the OLS estimate for older couples without children compared with women with school children is smaller, and not significant, compared with the fixed effects estimate for the same transition. The suggestion is that some fixed unobserved factors positively correlating with life stages bias the OLS estimates downwards when the focus is on time spent on the labor market.

Moreover, the OLS estimates for leisure time are nearly double the size relative to the fixed effects estimates for younger men without children compared with fathers of young children, while there is no such difference between the two estimates for women with children and living without children becoming older.

Finally, when children leave home, men increase their sleep significantly, which was not the case when looking at the OLS estimates. We also found that young single women increase their sleep considerably—1 hour per day—when married/cohabiting, while the OLS estimate showed an increase of only 0.3 hours.

7. Conclusion

This paper offers new insight into life-stage differences in time allocation, i.e. time spent on paid work, household work, childcare, leisure and sleep in Denmark, which belongs to the Scandinavian welfare state regime characterized by a high incidence of dual-earner households, egalitarian wage structures and generous family policies. The results indicate that having children affects only women's time spent on the labor market and not that of men, and that the time spent on children for women is taken from paid work and from leisure time, while for men time spent on children primarily goes from their leisure time.

A Danish time-use panel dataset for the period 2001-2008/2009 gives the opportunity to compare OLS estimates with fixed effects of life-stage changes on men and women's time spent on different activities: paid work, household work, childcare, leisure and sleep.

The fixed effects estimates show that among men, having a child means 2.0 hours of childcare and for women 2.4 hours, which is 0.6 more and 0.1 hours less, respectively, than that found in the OLS regressions. When the child ages and becomes a school child, the fixed effect for women is smaller than that obtained by OLS estimates, and

when children leave home, the fixed effects for both the mother and the father are equal to the OLS estimates. The higher fixed effects estimates for the first transition point to fixed unobserved factors positively correlating with life stages with children biasing the OLS estimates downwards, whereas this is not the case for the other transitions when considering time spent on childcare.

For both men and women, there are no effects of life-stage transitions on time spent on household work, which is in contrast with the OLS estimates, where positive correlations between early life-stage changes and negative correlations between late life-stage changes were found. The positive OLS estimates for paid work disappear in the fixed effects estimates when comparing women and men with preschool children with women and men with school children. However, the significant and negative OLS estimates for women with preschool children relative to women without children, are of nearly the same size when following the same women's transition from the first to the second stage. Further, the OLS estimate for older couples without children compared with women with school children is smaller than the fixed effects estimate for the same transition. Again, the suggestion is that some fixed unobserved factors positively correlating with life stages bias the OLS estimates downwards when the focus is on time spent on the labor market.

Compared with the OLS results, there are too few observations, due to attrition, to follow younger men into marriage/cohabitation, and the same holds for men and women's transitions from marriage to the older singlehood stage. Moreover, the fixed effects results show fewer significant parameter estimates, and among those that are significant, the parameter estimates are generally higher than when doing OLS regressions.

Accordingly, the conclusion is that both OLS estimations and fixed effects estimations have their drawbacks, but if one wishes to eliminate some unobserved characteristics affecting the transitions between different life stages, fixed effects estimations are the most appropriate estimation method to use. This calls for further analyses using longitudinal data applied on welfare states different from the Scandinavian regimes.

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Table A1 *Activity definitions*

	Sub-activities	Eurostat numbers
Childcare	Unspecified childcare, physical care and supervision, teaching the child, accompanying child, other specified childcare tasks, transporting a child	380, 381, 382, 383, 384, 389, 938
Household work	Food management, household upkeep, making and caring for textiles, gardening and pet care, construction and repairs, shopping and services	31, 32, 33, 34, 35, 36
Paid work	Working time in main job, working time in second job, commuting time	111, 112, 913
Leisure	Volunteer work and meetings, social life and entertainment, sports and outdoor activities, hobbies and games, mass media, other travels	4, 5, 6, 7, 8, 936, 951, 952, 961, 971, 982
Sleep	Sleep	01

Eurostat (2000)

IV

Børneomsorg, voksenliv og skilsmisse

– børneomsorg og forskellige familieformer, og børns succes sidenhen

Childcare and child outcomes – and parental divorce

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SUMMARY: In this study we wish to investigate whether divorce is associated with childcare along with children's future outcome such as educational and family attainments. Hence, the question is the amount of care and attention stepchildren receive in comparison with children who do not have a step-parent, and what significance these different situations have for these children's educational choices, success on the labour market, and their own family formation? We use data from the 1987 time use survey combined with administrative register data from 1980-2014 collected by Statistics Denmark. The focus is on families with children living at home aged 0-17 at the time the survey was conducted.

Keywords: Labour supply; Time allocation; Panel data

1. Background

A big fraction of the families nowadays are not of the traditional new-clear type. Many children have half sisters and/or brothers and many live together with step children. And yet others share a family frame which contains both own children and adopted children. The questions asked are 1) How much care and attention do stepchildren receive in comparison with children who do not have a step-parent, both those who grow up in the care of their mother alone and those who grow up in a family with both their parents, and 2) what significance do these different situations have for these children's educational choices, success on the labour market, and their own family formation?

Bonke and Browning (2011) have demonstrated that, after correction is made for a number of factors, the money spent on children is less if there is a child from the female partner's previous relationship in the family compared with the amount spent if there is a child from the male partner's previous relationship in the family. This indicates that the presence of step-children in a family, depending on which partner's children they are, affects the mutual power relationships of the partners and in consequence probably also the amount of care – measured in terms of time and money – that such children receive in comparison with children who do not have a step-parent. There are thus differences in the investments of the parents in such children, which are expected to affect the children's later educational choices and success in the labour market.

2. Theory

Already Becker (1991) argued that family structure's have an impact on child outcomes, because households are time- and money restricted. The fewer adults in the child family mean less time and money to invest in children, because of less specialization and economies of scale in household production including child care. In the case of remarriage, however, this theory doesn't yield any explanation for why such families with stepparents might offer fewer investments into the stepchild(ren). Theories about asymmetric information – the stepparent may know less about the needs of the stepchild – might expect to gain less from investments in such a child relatively to from a biological child, and the bargaining power of the biological parent might be smaller than that of the stepparent, because single-parents and in particular single-mothers might have a smaller value on the marriage market (Lundberg & Pollak, 2003).

Within the years, however, the question of children and family structure has become more prominent, where still more marriage dissolutions are found. The interest is based on the assumption that divorces have negative impacts on children's welfare. Following Browning et al. (2014) the reasoning is that separation implies an inefficient level of time and expenditures on children, because

1. *if parents remarry, a new spouse is introduced to the child's life who cares less about a step child reducing the incentives to spend time and money on such a child from a previous marriage,*
2. *if the parents remain single the child will experience not only fewer gains from joint consumption but the custodial parent may also determine child expenditures without regard to the interest of the ex-spouse, and*
3. *parents that live apart from their children may spend less time and money and receive less satisfaction from them.*

These problems are enlarged if the partners have different incomes and they cannot share custody to overcome the indivisibility of children. Hence, if the custodial parent is the mother, which is still often the case, she might have some comparative advantages in caring for at least small children, but lower income making it harder to achieve an acceptable level of living. And if the father has limited access to the child for legal reasons or by tradition he has a lower incentive to provide for the child. The implication is that fewer resources in case of time and money are spend on children with divorced parents relatively to what would be spend in intact families, which reduces child welfare and possibly also the welfare of the parents.

Although some child support payments are mandatory, the non custodial father may still transfer money to his child if he wishes to influence the expenditures of the custodial mother to the children. However, the amount of money to be transferred, depend on whether the mother is single or remarried or expect to be given her changes on the marriage market. In the latter case on talks about the "Cinderella effect" (Case et al., 2003), which has empirically been verified by US data showing that child support payments and alimony combined are more rare and lower when the custodial mother is married. Nonetheless, Piketty (2003) shows that for France an increase in the divorce rate has reduced the gap in school performance between children of divorced parents and children from intact families. At the same time, the higher the expected remarriage rate the more willing are the father to commit on child support payment, although this commitment to

their custodial ex-spouse may make the non-custodial parent be less attractive as a potential mate for remarriage.

From the perspective of the child this leads to the assumption that growing up with both parents yields more gains from higher household incomes – better housing standard, higher food quality and more leisure goods and services – economies of scale in household production and more caring time – separate or jointly – than if the child grew up with a lone mother or father or a stepfather or –mother. Moreover, because children are gendered in the sense that fathers spend more time on boys than on girls (Bonke, 2009) and that children brought into a new family by its mother – the husband has a stepchild – reduces her private consumption, while a husband's child in a new family – the wife's has a stepchild – has no impact on his private consumption (Bonke & Browning, 2011), this raises the following hypotheses:

4. *Children experiencing family breaks are less successful in school than other children, and the earlier in life the break is, the more problematic it is for the success in school*
5. *Stepfathers are better for boys than for girls, while stepmothers are better for girls than for boys*
6. *Biological children fare better in life than half-siblings due to more care etc.*

There is some evidence for the hypotheses to be empirically confirmed. For example Würtz (2009b) finds that the number of family breaks for a 1985-cohort of Danish children is negatively and the age of the child, when the break happens, positively correlated with educational, behavioral and health outcomes later in life, and that these relationships are of more importance than the years the child has spent with his/her single-parent. By doing a differences-in-differences analysis of health outcomes, Würtz argues that there is not only a selection effect but also a causal effect of shocks in the family structure on children, see also Francesconi et al. (2005) for Germany. However, this is in contrast to studies for Sweden and US, which find only selection effects of family breaks, see Björklund & Sundström (2006) and Björklund et al. (2007), who argues that children from divorced and separated group of parents have worse outcomes not only after but also before splitting up than do non-splitting up households. The problem is, that the counterfactual to separation and divorce is to remain together and that may also become problematic for the child(ren), if the parents for some reasons are forced to live together maybe because they cannot

sell their house due to an economic crises. On the other hand, Ermisch & Francessconi (2001) propose the argument that there is a casual effect of separation and divorce, although this effect can be visible even before the break up materialized by a high conflict level in the family. Clark et al. (2015) confirm that family conflicts can be damaging to children's success in life, and that a separation in such families is found to have a positive impact on child outcome.

Sundström (2013) estimating a sibling-difference model approach found that although children living in a single parent family or a stepfamily fare worth educationally – years of schooling and gymnasium complesion – than children growing up in intact families, children living a greater proportion of their childhood in families with resident or non-resident half-siblings have significant more schooling than their sibling(s) who lived in other family structures. However, joint children in blended families do better than stepchildren in the same families and in particular if the father was a stepfather. Also Hanson et al. (1996) confirm the existence of this so-called "stepfather paradox", although a stepfather is more appropriate than growing up with no father at all (Cobb-Clark and Tekin, 2011), and thereby stick to the suggestion that father's dedicate more time and efforts to own children than to stepchildren.

Hence, the problem of separating selection and casual relationships doesn't change the fact that several studies have found that less direct care, monetary support, financial aid for continued education and homework help are supplied in stepfamilies and especially those with stepfathers than is the case in intact families, see e.g. Anderson, Kaplan & Lancaster (1999); Anderson, Kaplan, Lam & Lancaster (1999); Zvoch (1999); Flinn, Leone & Quinlan (1999); Ginther & Pollak (2004). Christoffersen (2002) have also found that there are specific risk factors for family dissolution including family violence, self-destructive behaviour, unemployment and the spousal income ratio as well as teenage-motherhood, cohabitation or having four or more children.

Hamilton, Cheng & Powell (2007) show that not only biological ties explanes parental investment in children, also the joint decision of having children matters. Hence, two-adoptive-parents invest to the same extend into these kids than do two-biological-parents, but more relative to step-parents and the like. However, controlling for socio-economics the differentials between the two groups nearly disappear, see also Hofferth & Anderson (2003) for the same finding.

That early investment in children are more beneficial than later

investments are among others demonstrated by Cunha & Heckman (2008), who introduced the concept of sensitive and critical periods of children's upbringing, and Conti & Heckman (2012) focusing on the importance of childhood programs that prevent problems before they occur. These periods of skill formation seeing children "as a work in progress" was found of the greatest importance for later outcome being in school or on the labour market, and therefore also the periods, where shocks were the most damaging for children's later lives amplified by a high degree of emotional sensitivity among smaller children (Ginther & Pollak, 2004).

In the following we first investigate the amount of childcare in different kind of families – chapter 3 – and then, secondly, in chapter 4, if children's later success in life depends on the family background with family breakdown/-divorce as the turning point.

3. Data

We use data from the 1987 time use survey combined with administrative register data from 1980-2014 collected by Statistics Denmark. Out of the random sample of about 3600 Danish people who filled out the time use survey, we identified 820 families with children. In order to be characterized as a family with children, the respondent has to be above 18 years old, and the children have to live permanently in the household. The families can be of the type; single parents, parents with biological children only, couples where only one is the biological parent and the other is a step-parent.

The time use survey from 1987 is constructed such that the respondents only filled out a time diary for a weekend day or week day, and only one person from the household did so. The register data include information on parental income, educational background, housing and civil status for the period 1980-2013.

The two datasets combined form one unique dataset that makes it possible to follow the same individuals from childhood to adulthood. From the 820 identified families with children, we end up with a sample of 1384 children aged 0-17. In the first analysis where we focus on childcare, children younger than one year in 1987 are excluded, because reported childcare for these children most likely are a higher than for the other the children in the sample. The analyses that focus on long-term outcomes are based on the whole sample, where children younger than one in 1987 are included.

Table 1 shows that the majority of the children in the sample live

with their biological parents, but a relatively high number also live with their biological mother and a stepfather in 1987.

Table 2. *The distribution of children among family types. 1987.*

Number of children staying with:	
Both biological parents	1,172
Single biological father	14
Single biological mother	81
Biological father and stepmother	12
Biological mother and stepfather	105
Total	1,384

Source: The Rockwool Foundation Research Unit

We start out by analyzing whether a future divorce is associated with parental childcare time, the latter calculated from daily reported in the survey. Here the sample only includes children living with their biological parents in 1987, as we are interested in the presence of future divorce versus no future divorce. By definition, children living with their biological parents have not yet experienced a divorce, but they are of risk of doing so in the future. The observation of the same individuals over time makes it possible to track any divorce the children in the sample might have experienced while still living at home, both back and forth in time.

The children in the sample can either be an only child, have siblings or half siblings. The children are being split into the categories; the youngest and the second youngest child.

We run OLS regressions for the two different categories where the dependent variable is mothers and fathers time spent on childcare, respectively. Different characteristics of the child are included such as age and gender. Children younger than one year in 1987 are excluded because reported childcare for these children most likely are a lot higher than for the rest of the children in the sample. Further we include characteristics of the parents such as occupation (employment/ unemployment), level of education (completion of a further education[1]), working hours (including work related transportation) and household monthly net income.

Next we focus on long term outcomes for the children in the

1. We use the term 'further education' throughout the paper, which refers to any level of education attained in addition to high school

sample. More specifically we look at educational and family outcomes and most importantly whether these are associated with a divorce during childhood. For this part we use the whole sample and not just children living with both their biological parents. The analyses also includes children aged 0 in 1987.

We start out by using attainment of a further education as the dependent variable (taking the value 1 if the person has obtained a further education). Again this indicates whether the persons in the sample have completed any level of education in addition to high school. We also investigate whether divorce has an impact on being married, living with a partner and having children at the age of 27.

4. Descriptive

Table 2 shows the sample statistics for the whole sample consisting of children aged 0-17 excluding the fourth youngest child. Further it shows the share of children in the subsample experiencing a divorce in the future and the share of children that does not.

Table 2 *Sample statistics*

	(Mean)	(std.dev)
The whole sample Completed further education at age 27 (0/1)	0.38	0.49
Married 27 (0/1)	0.12	0.32
Partner 27 (0/1)	0.42	0.49
Children 27 (0/1)	0.20	0.40
M's completed further education (0/1)	0.27	0.44
F's completed further education (0/1)	0.27	0.26
M's employment	0.97	0.16
F's employment	0.88	0.32
Gender of the child (girl 0/1)	0.49	0.50
Child's age (1987)	8.34	5.13
Divorce (0/1)	0.28	0.45
Household monthly net income	2.96	4.35
The sub-sample	*(fraction)*	
No divorce	857/997	
Divorce within 0-4 years	84/997	
Divorce within 4-14 years	56/997	
Number	1371	

Source: The Rockwool Foundation Research Unit

The subsample only consists of children aged 1-17 living with their biological parents. Further both the 3.youngest and the 4.youngest children are excluded in the sub-sample, which consists of 997 children.

Table 3 *Sample statistics – weekday and weekend day*

	Weekday		Weekendday	
	(mean)	*(std.dev.)*	*(mean)*	*(std.dev.)*
F's hours of childcare, youngest	2.83	2.27	6.13	4.08
F's hours of childcare, 2.youngest	2.79	2.33	5.89	4.61
M's hours of childcare, youngest	5.04	3.34	7.93	4.47
M's hours of childcare, 2.youngest	4.68	2.24	7.20	3.74
F's share of care	0.43		0.45	
M's share of care	0.57		0.55	
Number	879		492	

Source: The Rockwool Foundation Research Unit

5. Parental time investment

An increasing number of studies have shown that parental time investment has an impact on children's schooling and educational success and labour market careers, see e.g. Hsin, 2008; Würtz, 2008. In particular the time parents spend with their kids in early childhood facilitates the intergenerational transmission of knowledge and abilities. Hence, talking to the children and verbal stimulation in general are found to improve children's educational attainments for which reason the presence of the parents are crucial, and, in reverse, the absence of parents in daily life is seen as an obstacle to how successful children become in adulthood.

In this part of the analysis we focus on divorce and whether that has any influence on time spent on childcare. One way of investigating whether divorce has any influence on time spent on childcare, is by simply including a dummy for whether there has been a divorce. Another and more detailed strategy is to specifically look at the time horizon in which the divorce took place. The assumption is that the closer the divorce is to the time the childcare was reported, the bigger influence it should have on the reported childcare. If, for example, the divorce took place in 1988, the childcare being reported in 1987 might already have been influenced by the divorce taking place in the near future.

The future divorces are distributed on a time horizon from 0 to 14 years, where zero indicates that the divorce took place by the end of 1987. We split the time horizon into two; divorces happening 0-4 and 5-14 years from 1987, respectively.

Table 4. *Mothers time spent with the youngest and the second youngest child, respectively (aged 1-17). OLS estimation results: Care1*

Mothers time spent on childcare (care1)	Youngest	2.Youngest
T_1 (0-4 years horizon) (no divorce)	– 0.600 (0.602)	0.765 (0.901)
T_2(5-14 years horizon) (no divorce)	0.457 (0.836)	0.329 (0.909)
Weekday (weekend)	– 1.342** (0.507)	– 1.498** (0.5239
Working hours (incl. related transportation)	– 0.326** (0.053)	– 0.201** (0.056)
M's education level (0/1) (Completed further education)	0.192 (0.401)	0.031 (0.111)
M Employed (0/1)	– 0.296 (0.676)	– 1.633** (0.743)
Child's age 4-6 (1-3)	– 0.014 (0.555)	0.297 (0.927)
Child's age 7-10 (1-3)	– 1.201** (0.513)	– 0.415 (0.909)
Child's age 11-17 (1-3)	– 2.754** (0.469)	– 2.294** (0.896)
Gender of the child (girl)	– 0.028 (0.359)	– 1.316** (0.397)
Siblings (no siblings)	0.113 (0.423)	–
Half-siblings (no half-siblings)	0.749 (0.875)	– 2.622** (0.836)
Household monthly net income(log)	-0.087 (0.098)	0.029 (0.111)
constant	10.108** (1.375)	10.169** (1.765)
R-squared	0.30	0.37
Number	327	218

–: omitted (zero observations)
**: significant at a 5% level *: significant at a 10% level

Table 5. *Fathers time spend with the youngest and the second youngest child, respectively (aged 1-17). OLS estimation results: Care1*

Fathers time spent on childcare (care1):	Youngest	2.Youngest
T_1 (0-4 years horizon) (no divorce)	– 0.238 (0.437)	0.595 (0.854)
T_2 (5-14 years horizon) (no divorce)	– 0.161 (0.728)	0.265 (0.899)
Weekday (weekend)	– 2.157** (0.531)	– 2.123** (0.758)
Working hours (incl. related transportation)	– 0.272** (0.463)	– 0.234** (0.067)
F's education level[2] (0/1) (further education)	– 0.217 (0.364)	– 0.106 (0.533)
F Employed	0.904 (1.619)	1.765** (0.536)
Child's age 4-6 (1-3)	0.355 (0.474)	– 0.907 (0.877)
Child's age 7-10 (1-3)	– 1.021 (0.504)	– 0.365 (0.872)
Child's age 11-17 (1-3)	– 0.961* (0.499)	– 1.541* (0.826)
Gender of the child (girl)	0.169 (0.346)	– 0.599 (0.482)
Siblings (no siblings)	0.281 (0.384)	–
Half-siblings (no half-siblings)	0.699 (0.949)	– 0.660 (0.966)
Household monthly net income(log)	0.109 (0.117)	0.159 (0.169)
constant	5.531** (1.903)	4.663** (1.765)
R-squared	0.40	0.30
Number	280	172

**: significant at a 5% level
*: significant at a 10% level

The sample used in the analysis consists of children who, at the time of the survey, lived with both their biological parents.

Table 4 and 5 summarize the OLS estimation results, when the dependent variable is mothers and fathers time spent on childcare, respectively. Mother and fathers time spent on childcare is defined as time spent with the youngest and the second youngest child. Hence childcare is divided in accordance to the specific child receiving the

2. Mother and fathers education level includes persons that have completed a further education.

care, i.e. the analysis excludes families with more than two children[3]. That leads us with two dependent variables in total; childcare spent on the youngest and the second youngest child.

Because the category 2.youngest child per definition has siblings we only control for the presence of siblings in the category youngest child (Table 4 and 5).

In order to keep as many observations as possible, the analysis is not separately split between weekday and weekend days. Instead weekday is included as an independent variable to control for the fact that childcare provided on weekdays differs from childcare provided on a weekend day.

We then control for a number of different family background factors that are believed to affect the amount of time parents spend on their children. As mentioned in the beginning of the paper, only one person has filled out the time use survey at a time. Thus adding the observations for the youngest and the second youngest child in table IV (mothers time spent on childcare) with those in table V (fathers time spent on childcare) makes up to the total number of observations in the sub-sample[4].

The OLS analysis for parents time spent on childcare generally shows an insignificant association with future divorce on reported childcare time in 1987. Given the few observations in this group, this is not a very robust or general result though. The main conclusion drawn from this analysis is that the prospect of future divorce does not seem to have a significant effect on time parents spent on childcare. This is in opposition to what could be expected. What seems to be more important for the time spent on childcare is working hours and the child's age. We see that both mothers and fathers childcare is negatively related to the time spent at work (plus work related transportation). In most of the cases the oldest age group of children (11-17) is affecting childcare in a negative way. The result is in accordance to what is expected, since older children require less attention than toddlers.

In the first group, the youngest children, we control for the presence of siblings seen in relation to not having siblings. This have an insignificant effect on childcare both in the case of fathers and mothers time spent on childcare. We investigate whether the presence of half-siblings (seen in relation to no half-siblings in the family) have

3. This is done due to the few observations of families with more than three children.
4. Observations in table IV: 327 + 218 observations in table V: 280 + 172 observations

an effect on childcare for both the youngest and the second youngest, and find that is does have a significant negative effect in the case of mothers time spent on childcare for the second youngest children.

6. Child outcomes

This part of the analysis focuses on long term outcomes for the children in the sample. More specifically we look at educational and family outcomes and most importantly whether these are associated with the presence of a divorce during childhood. We use the whole sample and not just children living with both their biological parents. Regarding divorce what is most interesting to look at, and further most crucial for long-term outcomes, is the child's age at the time of divorce. Previous studies have shown that children of divorced families have significantly poorer educational outcomes than children from intact families (Zeratsion et al.2014). It is reasonable to think that a divorce happening during the child's school years (from the child being 7 years old and onwards) has a greater impact on educational attainment than a divorce happening at other points in the child's life. It is especially during the time of schooling that the child develops a foundation and skills for further educational attainment. If an event like a divorce takes place during the time of schooling, this could be disturbing and setting back the child in some way. One can imagine that this would have a negative impact on further educational outcomes. In the following regressions we control for this by including three different age groups for which the divorce took place.

We start out by using attainment of further education as the dependent variable (taking the value 1 if the person has obtained a further education). Because the outcome variable is a binary variable the following regressions are estimated by probit.

Table 6. *Completed further education at the age 27. Probit estimations marginal effects*

	Model 1	Model 2
Childs age_divorce (0-6)	– 0.027 (0.044)	– 0.033 (0.044)
Childs age_divorce (7-13)	– 0.102** (0.046)	– 0.108** (0.045)
Childs age_divorce (14-17)	– 0.061 (0.572)	– 0.001 (0.057)
Weekday (weekend)	0.022 (0.025)	0.029 (0.029)
Gender of the child (girl)	– 0.144** (0.024)	– 0.144** (0.024)
M's hours of childcare	..	0.009** (0.004)
F's hours of childcare	..	– 0.005 (0.005)
M's education level (further education)	0.194** (0.029)	0.198** (0.029)
F's education level (further education)	0.184** (0.029)	0.182** (0.029)
M Employed	0.144** (0.051)	0.141** (0.052)
F Employed	0.190** (0.052)	0.257** (0.061)
Household monthly net income	0.012* (0.007)	0.012 (0.007)
Constant	– 1.241**	– 1.387**
R-squared	0.11	0.11
Numbers	1312	1312

**: significant at a 5% level
*: significant at a 10% level

Table 7. *Marriage, partner and child at the age of 27. Probit estimations marginal effects*

	Married at the age of 27	Living together with a partner at the age of 27	Having children at the age of 27
Childs age_divorce (0-6)	– 0.019 (0.029)	0.011 (0.045)	0.037 (0.034)
Childs age_divorce (7-13)	– 0.081** (0.036)	0.115** (0.046)	0.013 (0.037)
Childs age_divorce (14-17)	– 0.073 (0.048)	0.156** (0.063)	0.074 (0.049)
Weekday (weekend)	– 0.002 (0.019)	– 0.064** (0.031)	– 0.017 (0.025)
Gender of the child (boy)	– 0.071** (0.018)	– 0.010 (0.027)	0.104** (0.004)
M's hours of childcare	– 0.002 (0.003)	– 0.008** (0.004)	0.002 (0.003)
F's hours of childcare	0.003 (0.033)	– 0.010* (0.005)	0.004 (0.004)
M's education level (further education)	– 0.029 (0.023)	0.021 (0.005)	– 0.065** (0.029)
F's education level (further education)	– 0.031 (0.023)	– 0.028 (0.034)	– 0.069** (0.029)
Constant	– 0.898**	– 0.013	– 0.569**
R-squared	0.04	0.01	0.04
Numbers	1312	1312	1312

**: significant at a 5% level
*: significant at a 10% level

The youngest children in the sample from 1987 turn 27 in year 2013 (same year where educational information collected by Statistics Denmark is available). Hence in order to get as many individuals in the sample with chance of having completed a further education, the outcome variable is defined as *completion of higher education at the age of 27,* also including persons who are enrolled in a study program.

We also investigate whether divorce has an impact on being married, living with a partner and having children at the age of 27.

In the estimation, mother and fathers hours of childcare is included in the second specification but not in the first. When included, the effect of mother's childcare time is significant at a 5% level, but the father's time spent on childcare doesn't have a significant effect. Also divorce happening in the school-age (7-13) has a negative significant effect on the probability of getting a higher education in both specifications.

Further, and not surprisingly, parental education affects the child's

education, as seen by the fact that both mother and father's level of education are significant at a 5% level. The gender of the child also seems to matter, since boys significantly lower the probability of obtaining a higher education. These results are also in accordance to results obtained in another study by Rasmussen (2009).

The results from the estimation also show that the event of divorce happening in the school age, have a significant negative effect on the probability of getting married but a positive effect on the probability of living together with a partner. Boys have significantly lower outcomes than girls when it comes to getting married and having children at the age of 27. Both mother and fathers hours of childcare have a significant negative effect on the probability of living together with a partner at the age of 27. Both mother and fathers level of education affect the probability of having children negatively. Overall the results from these probit-estimations are mixed, but the fact that divorce has a negative effect on the probability of getting married is in accordance to what could be expected. An assumption could be that people prefer to stay unmarried leading to divorce having a positive effect on the probability of cohabitation.

7. Conclusion

Nowadays, there exists a broad variation of different family types of which Statistics Denmark has registered 37 different types with children in Denmark. What drives the focus of this study is the observed variety in family structures. We focus on children growing up in different families, where still more marriage dissolutions are found. The interest is based on the assumption that divorces have negative impacts on children's welfare.

In the empirical analyses we use data from the 1987 time use survey combined with administrative register data from 1980-2014 collected by Statistics Denmark. We start out by investigating whether divorce is associated with parental childcare time in 1987. For this part of the analysis the sample consists of children (aged 1-17) initially living with two biological parents in 1987. These children may or may not experience a divorce in the future.

We analyze whether divorce has an effect on mothers and fathers childcare time on the youngest and second youngest child, respectively. We split the time horizon in which the future divorce can place into two; divorces happening 0-4 and 5-14 years from 1987. We find that the prospect of a future divorce doesn't seem to have a

significantly effect on father and mothers time spent on childcare.

We also control for a number of other factors and find that the time the parents spend at work is negatively associated with the time they spent on childcare. Also being an older child (aged 11-17) means less childcare received. When we control for the presence of sibling and half-siblings, we find that mothers time spend on childcare on the second youngest child is negatively affected when half-siblings are present.

The second part of the empirical analysis focus on long-term outcomes of the children, where we use the whole sample of children living in different types of families. Other research has shown that children experiencing family breaks are less successful in school than other children. Controlling for divorce in a probit analysis, we investigate whether this has any effect on the probability of completing a further education at the age 27. We find that divorce taking place in the child's school age (7-11) has a negative impact on the outcome variable. Furthermore parent's educational background has an influence on the children's success in completing a further education; that is the outcome variable is positively influenced by the parent's completion of a further education.

Finally we look at the children in the sample's own family formation at the age of 27, and whether divorce experienced during ones childhood has any positive or negative influence on getting married, getting children or living with a partner later on in life. We find that divorce taking place in the child's school age (7-11) is negatively associated with the outcome variable *getting married*, whereas it is positively associated with has a positive effect along with divorce happening later in life (12-17) on the outcome variable *living with a partner*. We find no significant effect of divorce on the probability of getting children.

The different results indicate that experiencing a divorce at some point in childhood is associated with children's educational choices and their own family formation. However, if it is the divorce per se or a high conflict level in the family, which matter remain a question to be investigated more intensively in future research.

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V

Hvor store forskelle er der i forældres børneomsorg?

– en sammenligning mellem Danmark, UK og Canada

Resources available to children: A comparison between Denmark, UK and Canada

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SUMMARY: Much of the child poverty and inequality literature focuses on measuring one resource, typically income or expenditure. We include alternative measures of resources available to children by exploiting time-use data alongside of expenditure data. By doing so, we are able to show a more complete picture of parental resources available to children in Canada. Moreover, we examine data available from Canada, Denmark and the UK to offer two comparisons. First, we provide an international comparison of inequality when including measures of joint parental time and intrahousehold allocations to children. Secondly, we demonstrate how data limitations constrain those interested in examining such issues in Canada. Moving from time a parent spends with children to joint parental time decreases inequality if moving from maternal time but even more so when moving from paternal time to joint time. Including measures of resources available in households with children to measures of resources directed at children within households increases inequality substantially. Hence, better (Canadian) data is needed to move from measuring inequality across households with children to measuring inequality of resources available to children (in Canada).

JEL Classification: I3; I32

1. Introduction

The resources available to children, and the inputs into children's wellbeing and development, are of broad and deep policy concern in Canada and elsewhere. Evidence on the distribution of resources and inputs across children is therefore an important research priority. International evidence on the material deprivation of children indicates that, in many developed countries, little advancement in the 'war on child poverty or inequality' has occurred (see for example, Fortin et al., 2012; Curtis, 2011; Brewer and Gregg, 2008; Angeriz and Chakravarty, 2007; Crossley and Curtis, 2006; Dickens and Ellwood, 2003; Bradbury, Jenkins, & Micklewright, 2001). On the other hand, recent research in the area of parental time investments have reported that, contrary to popular belief, parental time devoted to children appears to be increasing, on average, despite higher labour force participation rates of mothers and mean hours worked by parents (see for example, Guryan et al., 2008; Yeung & Glauber, 2007; Gauthier, Smeeding, & Furstenberg, 2004; Sayer, Bianchi, & Robinson, 2004; Bianchi, S., 2000). Results also suggest that, although mothers continue to devote substantially more time to 'child friendly activities', the gender gap is decreasing. The findings have been observed in Canada, the US, the UK and several other countries and authors have suggested a global trend towards an increase in parental time investment in children.

However, research in this area is hampered by data limitations. First, in terms of material standard of living, researchers typically have data on household income or expenditure. Identifying what proportion of those resources flow to children is difficult or impossible with typical income and expenditure surveys (see Crossley and Curtis, 2006, for an example and further discussion). For this reason, in practice research attempts to document, for example, the number of children living in poverty – meaning, the number of children living in households below some *household* poverty line.

The literature that employs time-use survey data to document the time that parents spend with their children (Bonke & Esping-Andersen, 2009; Guryan et al., 2008; Mullan, 2010; Price 2008; Yeung & Glauber, 2007; Kalenkoski, Ribar, and Stratton, 2005; Folbre et al., 2005; Gauthier, Smeeding & Furstenberg, 2004) also faces important data limitations. For example, many time-use surveys collect data from only one parent. This allows researchers to construct the marginal distribution of mothers' time with children, and the marginal distribution of fathers' time with children, but not the distribution of total parents' time with children. If, across households, mothers' and

fathers' time with children is negatively correlated (as would be the case if there was a primary 'carer' in each household), then inequality in total parents' time with children will be overstated by the inequality in mothers' time and in fathers' time.Note, that in most cases, there are restrictive assumptions under which limited data give a true picture of the extent of inequality or deprivation. For example, if the male and female parents' time spent with children is uncorrelated, then the joint distribution, and the distribution of total time spent with children, can be constructed from the marginal distributions of fathers' time with children and mothers' time with children.

This paper seeks to document how much these data limitations matter. To do this, we exploit time-use data from Canada, Denmark and the UK and expenditure data from Denmark and the UK. Time-use data from Canada provides information on one parent while the UK and Danish data provide information from both parents. The Danish data can also be linked to very detailed 'register' (administrative) data. This is extremely helpful in valuing the time that parents spend with children, and therefore comparing it to material goods and services. Turning to income and expenditure data, again the Danish data provide superior information. Uniquely, the Danish expenditure data record *for whom* various expenditures were made. This allows us to directly measure goods and services flowing to children.

We use these data to address the following questions:

1. Do inequality measures differ when we are able to measure joint parental caring time rather than individual parental time (mothers or fathers)?
2. To what extent does moving from quantity of time to value of time affect inequality measures? Is inequality in the value of time sensitive to whether time is valued at opportunity cost or replacement cost?
3. How does inequality in the value of time spent in childcare compare to inequality in income and consumption (or expenditure) measures?
4. Does an indication of intra-household allocation of good and services change measured inequality in consumption?

We begin our analysis by documenting inequality in standard measures of the time available to children in the three countries: Denmark, the U.K and Canada. We then focus on the joint distribution of parental caring time. These data are not available in Canada and thus Canada cannot be included in this section of the analysis. Finally, we

examine whether including material resources available within the household and then to children themselves adds to the inequality picture. The cross-country comparison serves two purposes. First, the cross national comparisons are of interest in themselves. Second, international differences provide a natural metric for assessing the magnitudes of changes in measured inequality that arise when we exploit the full possibilities of the UK and Danish data.

To preview our results, we find that the distribution of resources available to children is substantially more equitable in Denmark than in the other countries, and the levels are higher, no matter the measure. Canada and the UK have similar levels of inequality in the distribution of mother's or father's time but levels of resources are higher in Canada. The ability to examine multiple resources available to households with children matters. Moving from measures of resources available in households with children to measures of resources directed at children within households increases inequality quite substantially.

The rest of the paper proceeds as follows section 2 provides a description of our data and methods, our results are discussed in section 3 and we discuss our conclusions in the final section.

2. Inputs to children

2.1 Data and Measures

In order to answer our basic questions we first examine the time parents spend with their children, often referred to as childcare time. Childcare time is usually understood as the time parents devote to their home-living children under the age of 18. Caring for children includes a continuum of activities (see for example, Folbre and Yoon 2007; Folbre et al., 2005). Activities can include time *directly* dedicated to caring for one's child either as the parent's self-reported main activity (the activity the parent is directly engaged in) or as time *indirectly* provided to the child as the parent's self-reported secondary activity (an activity the parent is engaged in while reporting another, non-child caring main activity (e.g. a parent may report making meals as the primary activity and helping the child with home work as the secondary activity). Finally, and more difficult to ascertain, childcare may include the time a parent feels primarily responsible for the well-being of the child (referred to as 'string attached' or 'on-call' time (Folbre and Yoon, 2007; Folbre et al., 2005; Budig and Folbre, 2004). As with most of the measures in this paper, we focus on the measure

that is most commonly available in the time use data across the three countries chosen for the comparison – direct child care – child care that is the self-reported main activity of the parent. Relative to stylized questions on child care, diary information has been found to be more reliable, (for example see Bonke, 2004).

We distinguish between developmental and non-developmental care, where the first category of caring includes parental involvement in children's intellectual, physical and social development (teaching, reading and playing), and the second category includes more routine activities such as feeding and dressing. This categorization is consistent with other studies in the literature (see for example: Bonke and Esping-Andersen, 2009; Kimmel and Connelly, 2008 and 2006; Bianchi et al., 2006, Stafford and Yeung, 2005; Zick et al., 2001 and Blair et al., 1994). See, section 2.2 for a more complete description.

Across the countries of interest, the data measure the amount of time parents spend caring for all of their children without taking account of the number of children within the family, thus we divide the reported child caring time within the household by the square root of the number of children (Folbre et al, 2005; Folbre and Yoon, 2005). The implication of this non-linear transformation of the density of care is that we assume that there are some economies of scale in the production of child care, so that within a two-child family every child benefits somehow from the presence of the other child concerning how much caring s/he receives. We also implicitly assume that every child in multiple child-families gets the same amount of caring. This follows the "equity heuristic" decision rule developed by Hertwig et al (2002) saying that parents split the resources available at a point in time equally among their children. Several studies find evidence for the rule including Price (2008), who shows that based on the American Time Use Study (ATUS) fathers' quality care (similar to our developmental care) devoted to the first versus the second-born child only varies by about 6 percent and mothers by about 9 percent. Price concludes that parents appear to allocate time equally across their children at any point in time. Whether this holds for non-developmental care is an open question but for now we assume time is equally distributed among the children in a household, see chapter IV in this book. Baker and Milligan (2013) provide evidence that the time spent in different activities differs by the sex for young children. Parents from US, Canada and the UK tended to spend more time in cognitive activities with their young daughters but fathers spent more 'sport or play' time with their sons when they were old enough.

Unfortunately, the data does not specify the sex or age of the children parents are spending time.[1]

The surveys[2] from which we draw our time use information include the 2001 Danish Time Use Survey, the 2000/01 UK Time Use Survey (UKTUS) and the 1998 Canadian General Social Survey (GSS). The time use data are comparable. Canadian and Danish time use data are available for 2005 and 2010 and 2008/09, respectively but the UK survey has not been updated. As we are attempting to provide a comparison of results given characteristics of the data, we use Canadian survey which matches closest in time to the Danish and UK surveys.

The 2001 Danish Time Use Survey (DTUS, 2001) includes data for 2,739 randomly chosen individuals. Information on household characteristics including family composition and individual characteristics such as education, employment, earnings and demographic information is collected. The survey includes a time-diary component. The respondent and the partner (for cohabiting and married people) complete a weekday and weekend time-diary, identifying the primary and secondary activities for each 10-minute interval over the two days, as well as identifying who they were with during the activities, i.e. his/her partner, children, other people or alone. The result is a total of 1,826 diaries, 82 from single parents and 1,744 from cohabiting and married spouses with children under the age of 18 years living at home. Caring time/day is the sum of 10 minute intervals reported as caring time on the week day or the weekend day. The caring time is then weighted (weekday caring time multiplied by 5 and weekend caring time multiplied by 2), summed and divided by 7 to find an average daily caring time which is the unit of analysis. Survey weights are also provided and utilized.

1. Our data do not identify with which children the parents are spending time. The UK data does allow cursory examination of households with only very young children (0 to 4) and households with only older children (5 to 9) although sample sizes are very small. Parents in households with only young children spend, on average, 2 to 3 times as many hours in child care than do parents with only older children however, the inequality measures are similar across household types.

2. Websites for the UK Time Use data http://www.statistics.gov.uk/timeuse/default.asp; UK Income and Expenditure data http://www.statistics.gov.uk/StatBase/Source.asp?vlnk=1385&More=Y, Canada Time Use data http://www.statcan.ca/english/Dli/Data/Ftp/gss/gssc1298.htm; Danish Time Use Survey see Bonke (2002) and for DK Income and Expenditure data (Bonke & Browning, 2009).

The UK time-use survey (UKTUS) is a representative sample of the population of private households and individuals within those households in the UK. A cluster design was used within the post-code and government sectors to account for population density and socio-economic grouping of the head of the household. Selected household heads or their partners completed a household questionnaire. All individuals aged 8 or over were asked to complete individual questionnaires, two one-day diaries and a one week work and education time sheet. The respondent and the partner (for co-habiting and married people) complete two one-day time-diaries, identifying the primary and secondary activities for each 10-minute interval, where the activity took place and whom they were with. Caring time/day is the sum of 10 minute intervals reported as caring time on the week day or the weekend day. The caring time is then weighted (weekday caring time multiplied by 5 and weekend caring time multiplied by 2), summed and divided by 7 to find an average daily caring time which is the unit of analysis. Questionnaires were used to gather background information and socio-demographics. The household questionnaire response rate was 61% and 73% of eligible people within those households completed a diary giving a net diary response rate of 45%. The result is 19,898 completed diaries. For the purposes of this study, there were approximately 3,500 individuals from coupled households with children who completed both diaries. Approximately 1,520 individuals were coupled parents (760 households) with only children under 16 years of age. Survey weights are provided and used to adjust for complex sampling and non-response.

The Canadian General Social Survey cycle 12 (GSS) collected time use information. The target population for the GSS is all persons living in Canada who are 15 years of age or over. The exceptions are residents living in the Yukon or North West Territories and full-time residents of institutions. The surveys are divided equally across all months to adjust for seasonality. The sample is stratified within provinces; telephone numbers are randomly selected without replacement and are distributed across the days of the week to provide a sample representative of the days of the week. A random person aged 15 years or over within the household is selected for the interview. Response rates are approximately 75%. There were 10,749 individuals who completed surveys. Approximately 2,700 of those were married with children in the household and just over 1,900 with children under the age of 15 years. Personal and household characteristics are collected along

with that persons time use. Survey weights are provided and used to adjust for complex sampling and non-response.

The British Household Panel Survey (BHPS) is used to give wage and occupation information and, thereby, to determine the mean wage mothers, fathers and of a housekeeper. The BHPS began in 1991 and is a multi-purpose study following the same representative sample of individuals over several years. The survey interviews every adult member of the household. The first wave consists of 5,500 households and 10,300 individuals from 250 areas of Great Britain. Samples from Scotland and Wales were added in 1999 and from Northern Ireland in 2001 making the panel representative of the UK population. Survey weights were provided and utilized.

Income and expenditure data are taken from the Danish Expenditure, the UK Family Expenditure Survey and the Canadian Survey of Household Spending. The Danish Expenditure Survey (DHES) is an ongoing survey of household buying habits covering approximately 1,000 households per year. The survey consists of a self-administered accounting book ('diary') and a questionnaire ('interview'). The interview gives information about the household's expenditures on certain public goods (rent, heating, etc.) and on purchases and possession of durables (television, vehicles, etc.), whereas the diary data record all purchases of each household member during a two-week period. Moreover, in the Danish Expenditure Survey for 1999-2005, respondents record for each good (except food stuffs), for whom it was bought. Specifically they can respond one of: 'mainly for her', 'mainly for him', 'mainly for the household', 'mainly for any children' or 'mainly for someone outside the household'. This allows a complete picture of the distribution of all assignable goods within the household. For further details on the data set, see Bonke & Browning (2009). The income data (*register or administrative data*) come from several registers (e.g. income register, the child data base) and cover information about age, income, wages, education, and labor market status of all household members. The data set also contains information about children and possible former partners (age, income levels, etc.).

Statistics Canada's Survey of Household Spending (SHS) 2001 public use files are used to estimate income and expenditure in Canada. The SHS[3] surveys private households across in the ten provinces annually. The survey covers about 98% of the population in the

3. See for example http://www.statcan.gc.ca/cgibin/imdb/p2SV.pl?Function=getSurvey&SDDS=3508&lang=en&db=imdb&adm=8&dis=2

10 provinces. The main purpose of the survey is to obtain detailed information on household spending during the previous calendar year. Information is also collected on income, dwelling characteristics, household equipment and demographics including age, sex and marital status. Over 21,000 households are surveyed, the sample is a stratified, multi-stage sample selected from the Labour Force Survey (LFS) sampling frame. The response rates are typically between 70 and 75%. Survey weights which adjust for complex survey methodologies are provided and used. Age categories in the public use data allow identification of families with children under the age of 18 years (not 16 years as in Denmark and UK). The data have been used extensively to study poverty and inequality in Canada[4]

The *UK Family Expenditure Survey* (FES)[5] closely matches data available in the Canadian SHS and the Danish DHES. The FES is a stratified, multi-stage sample of private households in the UK. Each household member 16 years of age or over is asked keep diary records of daily expenditure for two weeks. In addition information about regular or infrequent expenditures, such as mortgage payments or automobile purchases, is obtained from a household interview. Demographic information such as age, sex and marital status is available on each household member and detailed income information is gathered on each adult. The survey is continuous with interviews spread evenly throughout the year to adjust for seasonality. The response rate for the survey is around 60 to 65% with approximately 6,500 households participating. The Expenditure and Food Survey (EFS) enveloped the FES in 2001. The surveys are all based on, and compatible with, the original FES. Survey weights which adjust for complex survey methodologies are provided and used.

In all cases, we restrict the samples to households where there are coupled (married or common-law) parents reporting either time spent with household children or household expenditures. The Danish and UK data allow tracking of households with children under the age of 16. The Canadian data asks parents about the time they spend with children under the age of 15 (household members 15 and over are considered adults) thus we must limit the Canadian sample

4. Brzozowski & Crossley, 2011 present an excellent discussion on the data used to study child poverty in Canada.

5. Office for National Statistics, *Family Expenditure Survey, 2000-2001* [computer file]. Colchester, Essex: UK Data
Archive [distributor], May 2002. SN: 4490.

to households with children under the age of 15 years for time use and under 18 for income and expenditure as explained previously. In an attempt to exclude parents who are retired persons or multi-generational or multi-family households (parental time use decisions may be very different from the 'norm'), we include parents between the ages of 18 years and 59 years and limit the sample to couple family households.

In Canada, one member 15 years of age or older was randomly selected in each household to answer the time-use survey providing information only on mothers' *or* fathers' child care activities. In Denmark and the UK, both parents were surveyed providing information on mothers' or fathers' or total parental child care time. Thus, we present results for the mean self-reported caring time by mothers and fathers in all three countries and total parental caring time in Denmark and the UK. The final sample sizes are presented in Appendix 1, Table 1.

We are particularly interested in the equality of the distribution of resources available to children across measures and countries. We begin by reporting the mean of each measure and the Gini Coefficient (gini), which is commonly used in the literature to measure inequality within and across countries in such diverse measures as income, education, wealth and health (see for example, Fortin et al., 2012; Qian and Smyth, 2008; Bhattacharya, Debopam, 2007; Contoyannis and Wildman, 2007; Wagstaff and van Doorslaer, 2004; Wolfe, 1994); its values range from zero to one with lower values indicating less inequality. Besides the Gini Coefficient, which focuses on the middle of the distribution, we include p90/10 (90^{th} percentile/10^{th} percentile), p90/50 (90^{th} percentile/50^{th} percentile) and p50/10 (50^{th} percentile/10^{th} percentile) to provide an indication of the distribution of the data when we move to measuring joint time. The mean and p90/10 are included in the expenditure tables

Table 1 *Summary Table. Definitions of Resources Available to Children*

Child Input	Definition
Time	
Caring time	Developmental + Non-developmental caring time/√no of children
Developmental caring time	(teaching the child (help with homework, guiding in activities); reading; playing; and/or talking with child) /√no of children
Non-developmental caring time	(unspecified childcare; physical care and supervision (feeding, dressing, washing and preparing for bed, supervision indoors and outdoors); accompanying child (e.g., to a doctor, for sports, music lesson etc.); other childcare; and transporting child) /√no of children
Value of caring time (opportunity cost or parental wage rates)	(caring time * parent's wage)/√no of children parent's wages are actual wages in Denmark, estimated wages in Canada and mean parental wages in UK
Value of caring time (parental and housekeeper wages)	((developmental care * parent's wage) + (non-developmental care*housekeeper's wage)) /√no of children
Income and Consumption/Expenditure	
Gross household income	Household Income before taxes / √no of family members
Net household income	After tax Household Income / √no of family members
Aggregated household consumption	Expenditure on household goods and services/√no of family members
Assignable goods	Expenditure on household goods and services purchased for child/√no of children
Assignable goods + Non-assignable goods	Expenditure on household goods and services purchased for child/√no of children + expenditure on other household goods and services/√no of family members

2.2 Measures of time available to children

We include direct, primary care only (the time parents report spending directly with the child). We report on developmental, non-developmental and total caring time, where: ***Developmental care*** includes, from each time-use survey, the equivalent of i) teaching the child (help with homework, guiding in doing things (code 382 in Eurostat Guidelines)) and ii) reading, playing and talking with child (entertaining, playing games, reading (code 383 in Eurostat Guidelines)); ***Non-developmental*** care includes i) unspecified childcare (helped the children (code 380 in Eurostat Guidelines)), ii) physical care and supervision (feeding, dressing, washing and preparing for bed, supervision indoors and outdoors (code 381 in Eurostat Guidelines)), iii) accompanying child (accompanying child to a doctor, waiting at

a sports centre, music lesson etc. (code 384 in Eurostat Guidelines)), iv) other specified childcare (code 389 in Eurostat Guidelines), and v) transporting a child (code 938 in Eurostat Guidelines); and ***Total caring time*** is the sum of developmental and non-developmental time. The measures are consistent across the countries studied and, in fact, were among the original countries utilized in the Multinational Time Use Study for cross-country comparisons[6] (see Table 1 for a summary of the measures).

2.3 Valuation of time

Economists have long recognized that non-market work (including child care) has an economic value. However, valuation of non-market production and particularly unpaid childcare has been difficult. With the recent availability of good quality time-use data in many countries the topic is receiving more attention in the literature (see for example, Mullan, 2010; Kimmel and Connelly, 2007; Folbre and Yoon, 2005; Bradbury, 2008; Bonke, 1992) but no consensus has been arrived at.

There are two common approaches to valuing time in the literature; the replacement cost and the opportunity cost methods. Replacement costs necessitate answering the question – how much would a parent have to pay for alternate provision of child care (e.g. a child-care worker to provide care)? The opportunity cost approach requires parental wages as a measure of the foregone opportunity of spending time with children. Folbre and Yoon (2005) present an excellent discussion on the pros and cons of the two alternatives. Given empirical and theoretical considerations, we utilize the opportunity cost method in this study. A common objection to this is that "just because a person is a good lawyer/investment banker/etc. doesn't mean they are good parent". That is of course true, but it is only relevant if the return to time spent with children is constant. If, instead, time spent with children exhibits diminishing marginal returns (as seems likely) then optimizing parents should invest time in their children up to the point where they can do more for the children by working for money. Thus on the margin, the value of time spent with children will be equal to the wage.

Parental wages are available in the Danish data and the labour force participation of parents is very high, providing a true measure of the opportunity cost for fathers' and mothers' time. The value of

6. See http://www.timeuse.org/mtus/

time is calculated as the product of the wages and the time each parent spends caring for the children independently of whether both parents are giving child care at the same time. This implies that we assume a double "treatment" of child caring when produced simultaneously. As most parents in Denmark are employed we only face the problem of not having information on wages among people unemployed the full year around. In most cases, this is solved by inflating previous wages by the wage experienced by the employed in the specific period.

The data are more limited in UK and we resort to calculating mean parental wages by sex for those who are working in the British Household Panel for the UK. The variation in wages in UK is minimal (two mean wages: 1) married fathers and 2) married mothers leading to differences in the means but no differences in the gini coefficients between quantity and value of time). Table 2, Appendix 1 presents the descriptive statistics for wages used to calculate the 'opportunity cost' value of time.

We document, by sex, the mean of the observed wages for Denmark, and the mean of wages for married individuals in the UK.

2.4 Income and Expenditure measures

We explore typical measures found in the poverty literature: gross household income (before taxes); net household income (after taxes); and expenditures on household goods and services, where ***Gross Household Income*** and ***Net Household Income*** include income reported by all household members before and after taxes/transfers, respectively. ***Expenditure*** is the total household expenditure or consumption found in the countries expenditure survey, i.e. housing, fuel, food, alcoholic drink, tobacco, clothing, footwear, miscellaneous, second dwelling, household goods, household services, personal goods & services, private and public transportation expenditures, leisure goods and services, excluding personal taxes, personal insurance payments, and gifts and contributions.

The Danish Household Expenditure Survey (DHES) contains information on for whom the expenditures were made, i.e. a measure of goods and services purchased for children – assignable goods. The measure includes expenditures for children on clothing (clothes and footwear), leisure (electronic equipment, sports, books, travel etc.) and on services (restaurants, personal care etc.). As children's welfare also depends on non-assignable goods such as the amount and quality of food, the housing situation, and other joint goods within the family, we also add the expenditures on such goods to the goods

assigned to the child(ren). We therefore end up with two measures of child goods and services from the Danish data, namely the child assignable goods and services and these goods added to the joint goods of the family; assignable + non-assignable goods and services. See table 1, Appendix 1 for more information on sample sizes.

Although the households in our income/expenditure sample are fairly homogenous (households containing two-parents between the ages of 18 and 59 years and single children under the age of 16), the number of children, and thus need, varies across households. We adjust for the differences in need across households with the use of an equivalence scale (as is common in the poverty literature). We divide household income and expenditure by the square root of household size (a common mid-range equivalence scale) and expenditures assignable to children by the square root of the number of children in the household. The final measure, assignable + non-assignable expenditure, is adjusted by dividing assigned child expenditures by the square root of the number of household children while using the square root of the total household size – parents and children – for the non-assignable expenditures. We implicitly assume, as is routinely done in the literature, that there are economies of scale present and that each family member (or child for assignable goods) shares equally in the distribution of income and/or expenditure.

Finally, we attempt to examine resources (time and income/expenditure) available to children not the resources available to households with children. The combination of restricting the sample to households with children and weighting the calculations by the product of the population weight and the number of children in the household provides us with results representative of the population of children not households with children (Crossley and Curtis, 2006). Refer to table 1 for a summary of all measures.

3. Results

Table 2 presents our first pass at the time-use data. To review briefly, we report mean hours per month spent caring for children under the age of 16 years (15 years in Canada) by mothers or fathers in Denmark, Canada, and the UK. The standard deviation and the gini coefficients are reported. The top panel presents fathers' caring time and the second panel mothers' caring. Total caring time (TCT), is further divided into developmental caring (DC) in the second row of each panel and non-developmental caring time (NDC) in the third

row. We explore the added information gleaned by having a measure of parental caring time (sum of mother's and father's caring time) in the third panel in the Danish and UK results.

Fathers' TCT is about half that of mothers' TCT in the three countries (0.41 in Denmark, 0.42 in the UK, and 0.55 in Canada). The fact that fathers' to mothers' TCT is among the lowest in Denmark is surprising as Danish women have the highest labour force participation rates. Fathers spend about 1/3 of their time in DC (reading, teaching, helping with homework) and 2/3 in NDC (feeding, dressing, bathing, etc.) in the three countries. Canadian fathers spend, on average, the most time in caring for their children at approximately 26 hours per month, followed closely by Danish fathers at 24 hours per month. UK fathers spend about 18 hours per month in child care activities. Inequality in fathers' caring time is the highest in Canada for all measures (TCT gini of 0.62, DCT gini of 0.77 and NDCT gini of 0.70), the UK has similar but slightly lower levels of inequality (ginis of 0.6, 0.72 and 0.68 for TCT, DCT and NDCT, respectively). Danish fathers spend nearly the same time with children as Canadian fathers, on average, while inequality is the lowest in Denmark by 10 to 15 points depending on the measure (ginis of 0.49, 0.63 and 0.55 for TCT, DCT and NDCT, respectively).

Moving to the examination of maternal time with children increases average time and decreases inequality substantially within each country. The patterns are similar with smaller differences in levels and inequality across countries. Like fathers, mothers spend about 2/3 of their time in NDC in the three countries. Danish mothers spend, on average, the most time in caring for their children at approximately 60 hours per month. Canadian mothers spend about 48 hours in TCT per month (80% of Danish moms) and UK mothers spend about 42 hours per month in child care activities. Inequality in mothers' caring time remains highest in Canada for all measures (TCT gini of 0.48, DCT gini of 0.68 and NDCT gini of 0.53). The UK has similar but slightly lower levels of inequality than Canada (ginis of 0.48, 0.65 and 0.51 for TCT, DCT and NDCT, respectively). Although inequality is the lowest in Denmark (ginis of 0.40, 0.49 and 0.47 for TCT, DCT and NDCT, respectively), the ginis are closer in the three countries particularly for NDCT. Thus, it definitely matters whether we measure fathers' caring time or mothers' caring time if examining inequality of parental caring time.

Moving from measuring a parent's time to measuring total parental time (bottom panel table 2) indicates there is some substitution across

mothers' and fathers' caring time and this decreases the inequality but does not lead to substantially different conclusions for Denmark or the UK. Canada cannot be included in this analysis as time-use information is available for only one parent in the household. Mean NDCT is 1.7 times (2.3 times) higher in Denmark (the UK) than mean DCT. Using the cross-country comparisons as a metric for the within country differences, we find that Danish parents spend about 1.3 times more in non-developmental time and 1.7 times in developmental time with their children than do UK parents. Within country differences in caring time (developmental vs nondevelopmental) are larger than cross-country differences in the caring times. Inequality falls when moving from maternal caring time to parental caring time but the decrease in levels is about the same in the two countries so the relative differences remain across countries; the levels of inequality change by about 5% when we utilize a measure of joint parental caring time rather than maternal caring time (most often reported in the literature). The picture is quite different if we compare paternal caring time to joint parental caring time. Thus, the answer to our first substantive question – Does inequality change when we are able to measure joint parental caring time rather than individual parental time (mother's or father's time)? – is yes when moving from maternal time to joint parental time and even more when moving from paternal caring time (typically only explored when examining gender differences in time allocation) to joint parental caring time.

Table 2 *Equivalent Mean Monthly Caring Time – Denmark, UK & Canada*

Coupled households with children under the age of 16 years and parents 18-59 years old[1] Hours/Month						
	Denmark 2001		UK 2000/01		Canada 1998	
	Mean	Gini	Mean	Gini	Mean	Gini
	Fathers' Caring time					
Total Caring st. dev	24.2 26.6	.466 (.438-.496)	17.5 21.9	0.60	26.3 34.2	0.62
Developmental Caring st. dev	9.3 13.9	.474 (.443-.513)	6.9 11.2	0.72	10.9 19.4	0.77
Nondevelopmental Caring st. dev	14.9 19.5	.480 (.452-.516)	10.7 16.1	0.68	15.4 25.0	0.70
	Mothers' Caring Time					
Total Caring st. dev	59.6 46.8	.433 (.403-.454)	41.6 40.1	0.48	47.9 45.3	0.48
Developmental Caring st. dev	21.5 19.6	.420 (.399-.446)	11.1 15.9	0.65	16.6 24.1	0.68
Nondevelopmental Caring st. dev	38.1 36.6	.488 (.459-.515)	30.5 32.2	0.51	31.2 34.7	0.53
	Parental Caring Time					
Total Caring st. dev	83.8 59.0	.410 (.387-.448)	59.1 51.1	0.45	--	--
Developmental Caring st. dev	30.8 25.5	.421 (.401-.449)	18.0 22.4	0.59	--	--
Nondevelopmental Caring st. dev	53.0 45.2	.464 (.439-.506)	41.2 38.8	0.47	--	--

1. Children <15 in Canada.

Results for the value of time available to children are presented in Table 3. For ease of comparison, we include joint parental caring time (from table 2) in the top panel of table 3 and the value of that caring time in the bottom panel. As previously noted, we have an estimate of opportunity costs for each parent in Denmark but an average measure of wages for each parent (mothers and fathers) in the UK hence, the gini coefficients are almost identical for quantity and value of time in

the UK (any difference is due to the small differential in wages across sex and marital status (see Table 1 and Appendix 1 Table 2 footnote)). We also include more descriptors (p90/p10, p90/p50, p50/p10) of the distribution for these results to offer an idea of skewness in the distribution of parental time with children.

As the ginis indicate the inequality in DCT is higher than NDCT however, the percentiles show the inequality even more strongly. In both Denmark and the UK there are values of zero for DCT at the 10th percentile thus p90/p10 and p50/p10 cannot be reported. Monthly hours spent in DCT are, on average 2.4 times higher at the 90th percentile than at the 50th in Denmark and 3.9 higher in the UK. The mean time is 31 (median 27 (not in tables)) hours per month in Denmark and 18 (median 11(not in tables)) hours in the UK indicating the DCT data are skewed to the right.

The relative percentiles show a similarly skewed pattern in distribution of NDCT with p90 at 13 (18) times p10 in Denmark (the UK). Median hours of NDCT are 6 times the hours at the 10th percentile while the hours reported at the 90th percentile are less than 3 times the median for both countries. Moving to parental TCT almost halves the p90/p10 and p50/p10 in Denmark but changes the figures little for the UK. The relative percentiles indicate, even more so than the ginis, a much more unequal picture in the UK than Denmark.

Inequality increases slightly when we move from hours of caring time to value of caring time, valued at opportunity cost in Denmark. The change in resource measure (quantity to value of time) leads to a 5 to 10% increase in inequality in Denmark. The relative percentiles indicate the increase in inequality is caused by higher gains at the top end of the distribution (p90/p10 – doubles when moving to values rather than time). Thus, the change from measuring quantity to value of time within countries leads to smaller within country differences in inequality than across country measures in inequality. In the last row of Table 3, we move to a measure which values developmental time at mean parental wages and non-developmental time at replacement cost (mean housekeepers' wage). The mean value and inequality of this measure is substantially lower than the opportunity cost value of time, but not the ginis (39 to 38). Thus, the answer to our second question – does moving from quantity of time to value of time affect inequality measures (if so to what extent) – is yes to some extent.

Penultimately, we explore inequality by some common measures of material goods available to children, namely household income and consumption, in table 4. We examine mean adjusted gross

household income (first row in table 4) and its gini coefficient and the 90/10 ratio for Denmark, the UK and Canada can once again be included. Danish two-parent households with children earn more than their UK and Canadian counterparts (at PPP). Danish couples, on average, have adjusted gross incomes which are almost 20% higher than similar UK or Canadian households. The higher mean is not accompanied by higher inequality in Denmark. The Danish Gini coefficient is less than half of the UK's and 2/3 of Canada's Gini coefficient. Net household income (second row of results), gives us

Table 3. *Parental Caring Time – Denmark & UK*

Coupled households with children under the age of 16 years										
	Denmark					UK				
	Mean	Gini (CI-95)	90/10	90/50	50/10	Mean	Gini (CI-95)	90/10	90/50	50/10
	Hours/Month of Caring Time									
Total Caring st. dev	83.8 59.0	.410 (.387-.448)	6.7	2.1	3.2	59.1 51.1	0.45	14.9	2.8	5.6
Developmental Caring[1] st. dev	30.8 25.5	.421 (.401-.449)	--	2.4	--	18.0 22.4	0.59	--	3.9	--
Nondevelopmental Caring st. dev	53.0 45.2	.464 (.439-.506)	13.0	2.3	5.6	41.2 38.8	0.47	18.0	2.9	6.1
	Value[1] of Caring Time converted to Can$2001/month at PPP									
Total Caring st. dev	1905 1497	.505 (.464-.554)	13.1	2.4	5.5	1110 962	0.45	15.4	2.7	5.7
Developmental Caring st. dev	710 642	.509 (.446-.560	--	2.9	--	350 439	0.59	--	3.9	--
Nondevelopmental Caring st. dev	1196 1108	.553 (.506-.593)	24.5	2.9	8.5	760 713	0.47	19.1	2.8	6.7
Opportunity cost developmental time + replacement cost* non-developmental time*[2] *st. dev*	1456 1011	.450 (.413-.494)	8.1	2.1	3.8	976 848	0.46	16.3	2.8	5.8

1. Developmental Care is 0 hours at the 10th percentile.
2. Opportunity cost approach using parental wages; see Table 2 for descriptive statistics and explanation of wage derivation.

an indication of how much the county's social policies (taxes and transfers) matter when examining the material resources available to households with children. In the Danish and Canadian case, mean adjusted net household income is substantially below the mean adjusted gross household income however, the UK gross and net household incomes are almost identical[7]. Danish households now lag behind Canada by about 10% and the UK by about 22%. Inequality drops slightly in Denmark, moderately in Canada and substantially in the UK. The distribution of adjusted net household income is more equal than that of adjusted gross household income in the three countries; the UK shows the most improvement even as it is still the most unequal.

The mean values fall further when moving from household income to a measure of resources consumed in each household (adjusted household expenditure – third row of results) and the patterns present a slightly different picture. Danish households spend almost 25% less than do similar UK households and just over 10% more than Canadian households. While inequality remains lower in Denmark than the UK the gap is almost closed and Canada now has the lowest inequality. The UK and Canada see the gini fall by 0.04-0.06 when measuring adjusted household expenditures rather than adjusted net income while Denmark experiences a slight increase (0.18 to 0.22); expenditure inequality is more similar across the three countries than income inequality.

Finally, we obtain a measure of intra-household allocation of consumption (measured in the Danish data only). We compare adjusted household expenditure to adjusted household expenditure on goods and services reportedly purchased directly for the child(ren) and a middle-ground measure that includes both assignable and non-assignable goods and services (last two rows of table 4). Inequality in unallocated household consumption is less than half that of goods and services purchased for children (0.48 vs. 0.22) but more similar to the inequality in total assignable and non-assignable goods (0.27 vs. 0.22). Assignable goods to children only make up about 20% of assignable + non-assignable goods. Interestingly, inequality in adjusted child assignable consumption is higher than inequality in adjusted maternal caring time (0.48 to 0.40). We cannot offer cross-country

7. The equivalence of mean gross and net income in the UK has been shown previously, see for example http://www.statistics.gov.uk/cci/nugget.asp?id=334
http://www.statistics.gov.uk/articles/nojournal/Taxes_Benefits_0910_Methodology.pdf

Table 4. *Equivalent Mean Monthly 2001 Household Income, Consumption and Assignable Goods Denmark, UK & Canada*

Coupled households with children under the age of 16 years[1] $2001/month at PPP									
	Denmark			UK			Canada		
	Mean	Gini (CI-95)	P90/10	Mean	Gini (CI-95)	P90/10[2]	Mean	Gini (CI-95)	P90/10
Gross Household Income st. dev.	4133.52 1747.35	0.208 (0.196-0.219)	2.41	2842 2195	0.42	--	2892 1595	0.31	5.02
Net Household Income st. dev.	2410 1044	0.203 (0.189-0.216)	2.37	2902 1544	0.28	3.95	2494 1057	0.24	3.15
Household Expenditure st. dev.	1947 831	0.220 (0.209-0.231)	2.63	2447 1106	0.24	3.21	1637 528	0.18	2.34
Child Assigned Expenditure st. dev.	198 188	0.443 (0.426-0.461)	10.35						
Child Assignable + Non-assigned expenditure st. dev.	1796.30 782	0.224 (0.213-0.235)	2.70						

1. Children are under 18 years of age in Canada
2. Adjusted gross household income is zero at the 10th percentile in the UK.

comparisons in the metric as no other countries have comparable data. Moreover, whether we examine intra-household allocation of resources directed towards children as mothers' time caring for children, the value of parents' caring time or the value of consumption goods and service purchased for children, the inequality is about twice that of the resource measures typically used in the literature, net household income or consumption. Inequality across resource measures (those directed at children vs. unallocated resources) within a country vary substantially more than the cross-country differences in the inequality in available measures. The answer to our final ques-

tion – does an indication of intra-household allocation change the results substantially – is definitely yes.

5. Conclusion and discussion

To summarize, we address four substantial questions using several different data sources across three countries (Denmark, Canada, the UK) and parental type (mothers, fathers or both parents). The cross-country comparisons in measures of resources available to children (parental time spent with children, the value of parental time spent with children, and household income and/or consumption) by parental type are interesting in themselves and they provide a metric when examining alternative measures of resources available to children within countries: parental time spent with children, the value of parental time, household income/consumption and consumption assignable to children within the household.

The main questions addressed are: do inequality measures differ when we are able to measure joint parental caring time rather than individual parental time (mothers or fathers)?; to what extent does moving from quantity of time to value of time affect inequality measures? is inequality in the value of time sensitive to whether time is valued at opportunity cost or replacement cost?; how does inequality in the value of time spent in child-care activities compare to inequality in income and consumption (or expenditure) measures?; does an indication of intra-household allocation of goods and services change measured inequality in consumption/expenditure?

Our cross-country comparisons indicate that the distribution of resources available to children is most equal in Denmark except when using household expenditures/consumption as the measurement. Means are also higher in Denmark than in the other countries for all measures except adjusted net household income and consumption where the UK outranks Denmark. Canadian parents spend more time with their children, on average, than do UK parents but the distribution across parents is more equal in the UK.

Our within and across country comparisons indicate that: 1) the ability to measure joint parental caring time rather than mothers' caring time adds to the overall picture of inequality within or across countries. Moving from fathers' time with children to joint parental time decreases inequality substantially but does not change the patterns; 2) having a measure of opportunity cost of parental time inequality increases slightly leading to a smaller within country dif-

ference in inequality than across country measures in inequality however, patterns remain stable when moving from opportunity cost to replacement cost; 3) measuring the value of child-caring time rather than income and/or expenditure increases inequality substantially within Denmark and the UK and this is relatively more important than moving across countries within the measures; and 4) having measures of resources directed at children increases inequality substantially over measures of resources available within households with children (observed when moving from measures of household consumption/expenditure to measures of consumption/expenditure on goods and services directed at children (in the Danish data) but also can be observed when moving from general measures of income and/or expenditure, frequently measured in the child poverty and inequality literature, to measures of time spent with household children.

The full extent of deprivation depends on the joint distribution of material and time inputs. Simply put, if the children who receive the fewest material inputs also receive the lowest quantities of parental time input, then those children are even more disadvantaged than either of the marginal distributions would suggest. On the other hand, if time and money inputs are negatively correlated, and at least in part substitutes in the developmental process, then the marginal distributions of time and money available to children may overstate actual inequality. Ideally, one would like to have detailed data on both expenditures and time use for the same households; no such data is generally available to researchers at this time.

Examining which children (e.g., which sexes or ages) has recently been shown to be important (see for example, Baker and Milligan, 2013) younger and older children or girls and boys may require different amounts or types of time from parents in order to develop successfully. Another major data limitation is the inability to measure the amount or quality of purchased childcare. It may be the case that some parents substitute substantial amounts of purchased care for their own time with children. The amount and quality of such care may be important aspects in measuring resources available to children. Unfortunately, we are unable to account for it in these data.

Child poverty and inequality in resources and outcomes is on the forefront of policy agendas in most developed countries including Canada. In most cases we are only able to measure poverty or inequality of households with children. Questions regularly arise regarding whether or not income support such as social assistance or

child benefits for families with children are assisting children in ways policy makers intended. Better time use measures (estimating time parents are spending with children) or expenditure measures (estimating resources flowing to children) would assist in providing the answers. Recent concerns over the educational attainments of boys are becoming forefront in the policy world. Time use data could provide information on the types of activities parents are undertaking with girls and boys. If Baker and Milligan's (2013) preliminary results hold, providing information to parents on the unequal cognitive treatment of young girls and boys may assist in overcoming the gender bias now appearing in test scores and graduation rates.

In sum, our paper indicates that more specific data matters in most instances and obtaining measures of resources directed at children (e.g., parental caring time or assignable consumption) leads to substantially more inequality within and across countries than do measures of resources available in households with children; intra-household allocation matters. So, the answer to the original question is – yes, Canada could do better on the equality front (compared to Denmark) and Canada could do much better on the data front (when compared to Denmark and the UK).

Appendix 1 *Table 1. Data Samples – Denmark, Canada & UK*

	Coupled Households with children <16 years of age[1]		
	Observations	Data from both parents	Assignable Goods Allocated
Danish Time Use Survey	786	Yes	--
UK Time Use Survey	760	Yes	--
Canadian Time Use Survey	1,964	No	--
Danish Expenditure Survey	1,098	--	Yes
UK Family Expenditure Survey	1,272	--	No
Canadian Expenditure Survey	3,811	--	No

1. Canadian households contain children <15 years of age for time use and <18 years for expenditure survey.

Appendix 1 *Table 2. Wage-Rates – Denmark & UK. Can$2001/month at PPP*[1]

	Denmark[2] Actual Wages		UK[3] Mean Group	
	Mean	St. Dev	Mean	St. Dev[4]
	Married and Employed			
Father	31.05	13.65	24.51	13.08
Mother	22.43	7.25	16.33	10.50
Housekeeper[5]	*14.19*		*15.18*	*10.63*

1. Wages adjusted using the OECD Purchasing Power Parity. 2. Actual Wages; 3. Mean parental wages by sex from the 2001 British Household Panel Survey; 4. Standard deviation is of the group (there are 2 mean wages: married males and married females). 5. The housekeepers' wage is the mean for that occupational class in the given countries data. For DK only a few numbers are available not stemming from Statistics Denmark, which is why no St.Dev. is calculated.

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VI

Pensionering af kærlighed?

– fritiden før og efter arbejdsmarkedet

Love and retirement: Older couples' leisure time before and after retirement[1]

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SUMMARY: The paper investigates older spouses' individual and joint leisure time before and after retirement. To identify the impact of retirement on individual and joint leisure time, we use a regression discontinuity approach with the official retirement age as the instrument. The sample consists of 55-74-year-old married or cohabiting men and women and data stem from the Danish Time-Use and Consumption Survey and administrative registers at Statistics Denmark.

We find that spouses' simultaneous retirement has the same impact on joint leisure time as does non-simultaneous retirement. Further, there is no impact of a partner's retirement on men and women's own leisure time. Joint and individual leisure time, however, increases when she retires, while his retirement has no impact on the couple's joint leisure time.

Keywords: Regression discontinuity, retirement, leisure, time-allocation.
JEL-Classification: C26. C31. J26. J22.

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1. Introduction

There are several studies showing that joint retirement of spouses is not only explained by their economic opportunities after retirement, but also by their preferences for spending time together, i.e. complementarity in leisure (see e.g. Banks et *al.* (2010) and Stancanelli & Van Soest (2011, 2012a, 2014)). That said, few studies have compared the actual time use of older men and women still active on the labor market with that of their retired counterparts. Gauthier & Smeeding (2003) find in nine European and North American countries that a substantial share of paid work is converted into passive leisure time when men and women retire and, concurrently, that the number of activities, including those partaken alone, increases with older people's age (Herzog et *al.* 1989; McKenna et *al.* 2007). Further, Stancanelli & Van Soest (2012a, 2014) find that French pensioners spend only a small amount of leisure time together with their partner, which, however, also holds for couples still active on the labor market with or without children, see e.g. Bonke (2012), Hamermesh (2002) and Hallberg (2003) for Denmark, USA and Sweden, respectively.

That people with a preference for leisure time are supposed to retire early indicates that it is not only retirement that determines leisure time, but also the preference for leisure time that explains retirement (Smith & Moen, 2004). Hence, the official retirement age is used to identify the causal relationship between retirement and leisure time. In comparison, Hospido & Zamarro (2014) apply the official early retirement and normal retirement ages in various European countries to investigate the impact of the partner's retirement on own retirement from the labor market.

In accordance with Stancanelli & Van Soest (2012a, 2014), who investigated the correlation between retirement and the use of leisure time in France, we analyses the impact of both spouses' retirement on joint and individual leisure time applying the official retirement age to explain the time of retirement. However, we also use an earlier retirement age as an instrument because of the early retirement option in Denmark. The information covers 55-74-year-old Danish spouses' time use in 2008/09 (DTUC).

A summary of the Danish pension system is given in Chapter 2, and Chapter 3 explains the data sources and includes descriptive statistics. Chapter 4 shows time allocation before and after retirement, while the analyses are presented in Chapter 5. Chapter 6 concludes.

2. The Danish Pension System

The Danish pension system includes three pillars: the public pensions (early retirement, official retirement, and disability pension), labor market pensions, and private pension arrangements.

The official retirement age has been 65 years since 1999, where it decreased from 67 years for those born on or after 1939. Hence, in 2008 – the year of the survey (DTUC) used in this paper – 69+-year-olds' (born before 1939) retirement age was 67 years, while it was 65 years for people younger than 69 years (born in or after 1940). From 2004 a premium was given to people postponing their retirement beyond the age of 65 years but not later than 70 years, and from 2009 until the age of 75 years. In January 2012 the official pension age increased for people born during January 1, 1954-June 30, 1960 (younger than the individuals in this sample – born 1934-53). For people born before 1954 the official retirement age is 65 years.

In 1979 pre-retirement benefit became an option for 60-year-olds born before 1954 with a working career longer than 30 years and who had contributed to this arrangement. In 1999 entitlement to the pre-retirement benefit became more stringent and in 2012 people born before 1954 could apply for this benefit at the age of 65 ½ years at the earliest and for a maximum of 5 years. For those born in or after 1963, the earliest age is 67 years and 3 years is the maximum period for receipt of this benefit.

In comparison, the French system allows people to retire as early as of 60 years of age, although the legal early retirement age was set to 62 years becoming effective in 2018, see Stancanelly & Van Soest (2012a).

The Danish public old-age retirement pension is a non-contribution system following the "pay-as-you-go" principle serving as a social safety net, which ensures a minimum living standard for all old people not on the labor market. The public old-age retirement pensions include a flat-rate payment and a means tested additional payment. The largest public pension benefit is equal to around 45 percent of an average production worker's income (APW).

The Danish labor market pension system – the second pillar – is based on agreements between the unions and the employers' organizations and depends solely on their own contributions. Since 1990, every part of the Danish labor market has had labor market pensions, where the employer usually pay two thirds and the employee one third equal to 9-16 percentage of the gross wage.

The third pillar of the Danish pension system is private pensions

with premiums paid individually by the holder of the pension. In 2008, 57 percent of all 18-64-year-old men and 52 percent of women had an individual private pension. These men and women had an average of 217,000 DKK and 156,000 DKK in private pensions, respectively (Amilon. 2012).

For an overview of the distribution of pension savings between different groups in the Danish population see the Ministry of Economy and Internal Affairs (Ministry of Economic Affairs and the Interior, 2014).

3. Data and descriptive statistics

The primary data source used here is the Danish Time-Use and Consumption Survey 2008/09 (DTUC). It consists of a randomly chosen sample drawn from the CPR register among 18-74-year-old Danes, of whom 68 percent (the response rate) or 6,000 individuals participated in a telephone (CATI) or a web-based (CAPI) interview during April 2008-March 2009. Of the participants, 3,755 completed diaries for a randomly chosen ordinary weekday and weekend day, and for those who had spouses, they did the same for the same two days, see Bonke & Fallesen (2009) for a further description of DTUC.

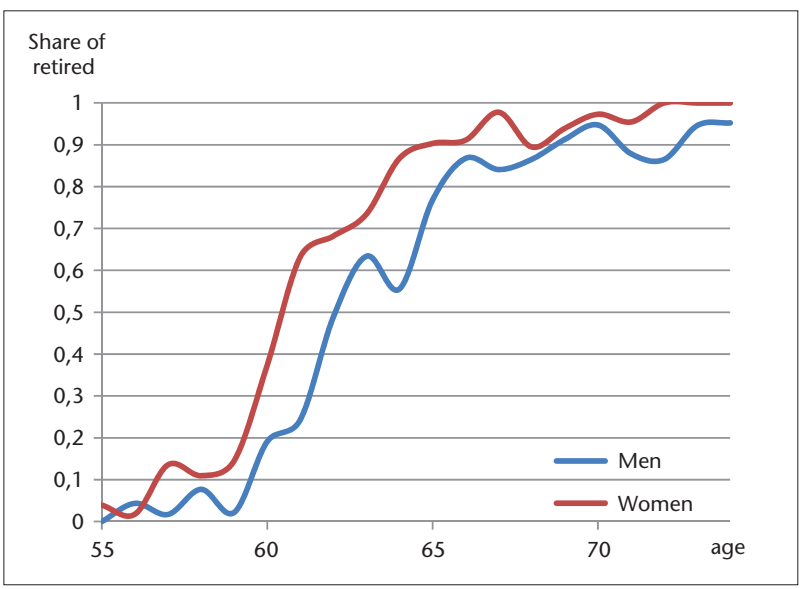
The present study includes 55-74-year-old married/cohabiting participants who completed diaries in the DTUC. Because the spouse of the respondent can be younger or older than the respondent, an age limit of 35 years is imposed. The number of couples included is 1,166 with survey information for both the husband and the wife merged with information about income, education, etc. obtained through the administrative registers in Statistics Denmark. Information about retirement ages of early and ordinary retirees who left the labor market as employed or unemployed during 1989-2012 stems from the administrative registers.

The age band 54-74 years is used because it gives a 10-year interval around the official pension age, i.e. imposed by our discontinuity approach. However, we also do estimations with a 5-year age band to test the robustness of our analyses. Stancanelli & Van Soest (2013) also used two age bands, namely 50-70 years and 54-66 years in their study for France.

Figure 1 shows by age the number of 55-74-year-old married/cohabiting men and women who were pensioners in 2008/09. Unsurprisingly, the official pension age at 65 years implies that considerably more men of that age have retired compared with 64-year-olds, i.e. 77

and 56 percent, while for women the figures were 90 and 87 percent. Moreover, the opportunity to receive early pension benefits had an impact on retirement as 49 percent of the 62-year-old men relatively to 24 percent of the 61-year-old men had retired in 2008/09. For women the difference in the number of retirees was much smaller with 68 percent at the age of 62 years and 63 percent at the age of 61 years. Figure 1 also depicts that the average retirement age – half the age group had retired – was 62-63 years for men and 60-61 years for women.

Figure 1. *Share of retired men and women aged 55-74 years in 2008/09*



Source: DTUC

Because the average ages of men and women in the sample of 55-74-year-olds were 65.6 and 63.0 years, respectively, and two-thirds had retired, it indicates that very many spouses retired at the same time, see below. However, the spouses' age differential is higher when we compare couples where the husband had retired with couples where the husband was still active on the labor market. Conversely, if the wife had retired, the spouse's age differential was smaller than for couples where she had not yet left the labor market.

Regarding educational background, men and women on the labor market were more educated than retired men and women. This is not only due to a cohort effect because people with further education

generally retire later than skilled and unskilled workers and those without any post-secondary education (Table 1).

There is also a significant income differential between non-retired and retired men and women. Hence, 44-83-year-old retired men's personal gross income was 56.2 percent of non-retired men's, and for 41-86-year-old women the percentage was 68.6. Because of the correlation between income and retirement, income is not included in the estimation of the decision to retire – first stage, see below.

Table 1. *Descriptive statistics. Average and st.dev. 55-74-year-olds. 2008/09*

	Men		Women	
	Av.	St.dev.	Av.	St.dev.
Age (years)	65.63 (44-83)	6.22	62.96 (41-86)	6.26
Age (65+/-64) (share)	0.561		0.406	
Retired (share) <65 year 65+ year	0.660 0.326 0.917	0.499 0.469 0.276	0.646 0.429 0.949	.478 0.495 0.220
Further education (share) – Employed – Retired	0.208 0.272 0.172*	0.406 0.445 0.377	0.193 0.277 0.151*	0.394 0.48 0.358
Personal income before tax (DDK) – Employed – Retired	202.840 286.788 161.118*	175.597 249.896 88.848	174.869 220.895 151.443*	102.332 120.841 82.210
Participates in regular leisure activities every week (share) – Employed – Retired	0.471 0.537 0.436*	0.499 0.499 0.496	0.433 0.525 0.371*	0.496 0.500 0.483
# observations	610			556
		Men/women		
		Av.	St.dev.	
Satisfaction with leisure time (ip) 1-6 – Employed – Retired.		5.283/5.293 4.709/4.586 5.601*/5.567*	0.988/1.053 0.081/0.955 0.034/0.041	
Age differential M-W (years) – Employed – Retired		2.650 1.797/3.570 3.087*/2.070*	4.480/4.919 4.392/3.984	
Children – Employed – Retired		0.052 0.110 0.022*	0.223 0.313 0.145	
Cohabiting (share) – Employed – Retired		0.083 0.127 0.055*	0.276 0.333 0.229	
Renter (share) – Employed – Retired		0.217 0.183 0.235	0.413 0.387 0.424	
# observations		1,166		

*,**,***significant difference relative to employed on 0.05, 0.01 and 0.001 levels
Source: DTUC

The likelihood of participating in regular leisure-time activities on a weekly basis was smaller for pensioners than for non-pensioners, which is also the case when only 60-70-year-olds are considered. We also find that retired husbands and wives' satisfaction with the amount

of leisure was larger than for non-retired husbands and wives, and that husbands and wives' leisure satisfaction is the same before and after retirement.

Because we exclude people who received disability benefit but no old-age pension, no respondents – employed or retired – reported physical or mental disabilities (not shown in table). Unsurprisingly, more men and women with children living at home were employed than retired – 11 versus 2 percent – and the number of cohabiting couples was also the largest among employed people. Lastly, we find that renters retired at the same age as house owners.

a. Time allocation – leisure time

Here, leisure time is defined as the time *not* spent on the labor market or on commuting, doing household work, sleeping or personal care. Hence, leisure time is spent on socializing, on other activities (e.g. reading, TV, computer, sport), and on eating. We distinguish between "leisure time A", which is when people are socializing with others, "leisure time B", which is leisure time A and engagement in other leisure activities partaken together, and "leisure time C", which is leisure time B and time spent eating, see a similar categorization in Stancanelli & Van Soest (2012a, 2014).

For all three leisure-time categories we distinguish between joint time and individual time, where joint time means that the spouses are involved in the same activity at the same time of day, and individual time means that only one spouse is involved. However, we do not know whether joint means that the spouses are actually together or do the same activity alone or with other people – there is no such distinction in the questionnaire – neither do we know whether the spouses are together doing different leisure or other activities when their time is categorized as individual leisure time. This problem also holds for most other time-use surveys, see Bonke (2012).

The problem of not knowing whether the partners participated in the same activities at the same time is because the "together-with-whom" category in the DTUC refers to family members in general not necessarily only to the partner, which is also the case for the French time-use survey (Stancanelli & Van Soest (2012a, 2014). Another problem is that this information is not reported by all respondents.

We find that all kinds of individual leisure time – leisure time A, B and C – was shorter for wives than for husbands and that the times were also shorter for employed than for retired men and women: 2 and 2 ½–3 hours for leisure time A; 4 ½ and 6-6 ½ hours for leisure

time B; and 5 ½–6 and 7 ½–8 hours for leisure time C on an average day, i.e. weekdays and weekend days weighted together.

Moreover, joint leisure time (leisure time A) was also found shorter than husbands and wives' time spent individually on these activities. Where employed husbands and wives spent 34 minutes and those who were retired 52 minutes jointly, individual leisure time occupied 2 hours for those employed and nearly 3 hours for those retired (Table 2). Hence, the time spouses were involved in the same social activities (leisure A) was less than a third of the time they spent individually on such activities.

Table 2. *Descriptive statistics – leisure time before and after retirement. 55-74-year-olds. 2008/09*

	Hours average weekday			
		Av.	St.dev.	
Joint leisure time				
A – leisure		0.75	1.20	
Employed		0.56	0.86	
Retired		0.86*	1.34	
B – leisure		3.73	2.74	
Employed		2.83	2.21	
Retired		4.17*	2.87	
C – leisure		4.40	3.16	
Employed		3.45	2.59	
Retired		4.89*	3.32	
	Men		Women	
	Av.	St.dev.	Av.	St. dev.
Individual leisure time				
A – leisure	2.62	2.01	2.32[a]	1.81
Employed	2.10	1.67	1.95	1.65
Retired	2.90*	2.12	2.54*[a]	1.87
B – leisure	5.88	3.35	5.33[a]	2.96
Employed	4.82	2.92	4.33	2.58
Retired	6.41*	3.43	5.92*[a]	3.02
C – leisure	7.22	3.69	6.76[a]	3.26
Employed	6.03	3.22	5.61	2.83
Retired	7.83*	3.76	7.45*	3.31

*,**,***significant at 0.05, 0.01 and 0.001 levels
a. significant relative to men at 0.05 level
Source: DTUC

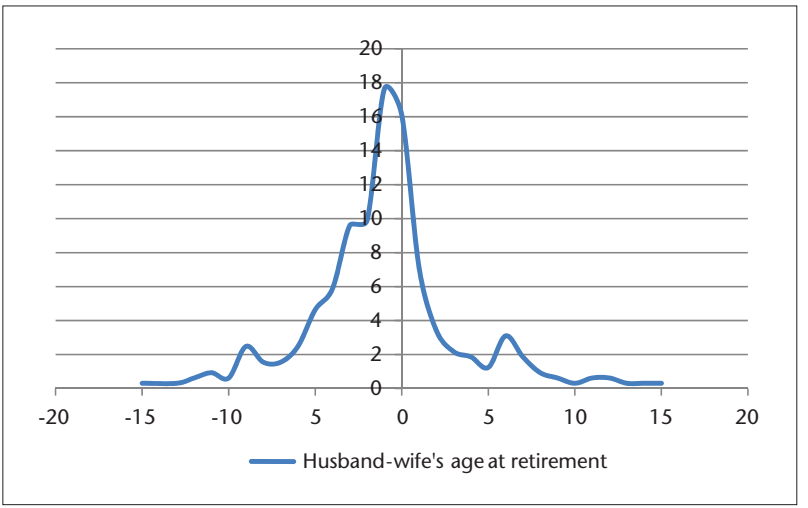
Relative to joint leisure time A, time spent simultaneously was much longer for leisure time B and C, which is also to be expected because of the higher number of activities in the latter leisure-time categories. Hence, employed spouses spent nearly 3 hours a day jointly on leisure time B, while employed husbands spent nearly 5 hours and

wives more than 4 hours individually on that leisure category. For retired husband and wives, the same time spent jointly was more than 4 hours against 6 ½ hours for husbands and 6 hours for wives spent individually. Lastly, we find that joint leisure including eating (leisure time C) occupied 3 ½ hours for those employed and nearly 5 hours for retired husbands and wives against 6 and 5 ½ hour of individual leisure C for those employed and around 7 ½ hours for retired husbands and wives, respectively.

b. Simultaneous retirement

The average age differential between spouses in this sample was 2.65 years, while it was 2.2 years for 50+-years-olds in a number of SHARE countries (Denmark, Sweden, Holland, Belgium, Germany, France, Austria, Switzerland, Spain, Italy and Greece) (Hospido & Zamarro. 2014). The most common retirement pattern for spouses aged 55-74 years was that husbands left the labor market one year after the wife, which was the case for 18 percent of the couples (Figure 2). Retirement within the same year occurred in 44 percent of the couples or with an age distance of more than two years, and for 61 percent, the husband retired one year earlier or three years later than did the wife. Lastly, the percentage of couples where the husband retired 2 or more years before versus 4 or more years later than his wife was about 20 percent each in couples with husbands aged 55-74 years.

Figure 2. *Difference in man and woman's time of retirement. Years. 55-74-year-olds. 2008/09*



Source: DTUC

4. Leisure time before and after retirement

Table 3 shows that leisure time C increased significantly until the time of retirement, more for men than for women. We control for age to avoid the increase in leisure time being only because of the higher ages being closer to retirement. Where husbands' individual leisure time C increased around 45 minutes, wives' only increased nearly 30 minutes per day until both retired – for the group of 55-74-years-olds – and for the joint leisure time C the increase was nearly half an hour for husbands and around 20 minutes for wives. After retirement, husbands and wives' joint and individual leisure time C did not increase. It must be mentioned that the average distances to retirement were 5.2 years and 5.0 years for husbands and wives, respectively, and 3 years for both sexes regarding the distance from the year of retirement. Hence, the changes in time use shown in Table 3 were around these mean points of time.

Table 3. *Men and women's leisure time before and after retirement. Hours per day OLS-regressions. 55-74-year-olds. 2008/09*

	Individual leisure time C Men		Individual leisure time C Women		Joint leisure time C			
					Man		Woman	
	Av.	St.dev.	Av.	St.dev.	Av.	St.dev.	Av.	St.dev.
Until retirement	.740***	.140	.428*	.174	.448***	.119	.387*	.161
After retirement	.019	.047	– .043	.036	– .023	.040	.063	.033
Age	– .066	.038	– .075*	.035	– .039	.032	.027	.032
Constant	11.048***	2.49	10.753***	2.308	6.730**	2.113	2.612	2.132
R^2	0.039		0.020		0.023		0.017	
#	708		531		708		531	

*,**,***significant at 0.05, 0.01 and 0.001-levels
Source: DTUC

Table 4. *Joint leisure time and simultaneous retirement. Hours per day. 55-74-year-olds. 2008/09*

	Joint leisure time A	Joint leisure time B	Joint leisure time C
	Hours/day (st. dev.)		
Simultaneous retirement (+.- 1 year difference)	0.953 (0.095)	4.336 (0.206)	5.164 (0.243)
Non-simultaneous retirement (>1 years difference)	0.840 (0.059)	4.233 (0.132)	4.920 (0.150)

Note: No significant difference between joint and non-joint retirement
Source: DTUC

Table 4 shows that the joint leisure time of couples retiring simultaneously – within one year's distance at the most – was of nearly the same length as the joint leisure time of couples where the spouses retired more than one year apart. This holds even when controlling for age differentials between the two groups (not shown in table).

5. The analyses

a. A double regression discontinuity approach

Because most Danes retire close to the official retirement age of 65, we use this information to analyze the relation between spouses' retirement and their use of individual and joint leisure time. An argument for using the official retirement age is that an increase from 65 to 67 of this official age in Germany implied that more people actually retired later (Coppola & Wilke. 2014). Applying a "discontinuity-approach", as we do here, assumes that retirement is not a continuous function of age, whereas the time spent on leisure is not considered dependent on peoples' age per se. This allows for identifying the causal relation of retirement on the time spent on leisure, i.e. the outcome, see Stancanelli & Van Soest (2011, 2012a, 2012b, 2014) and Battistin et *al.* (2009), who use the same approach when analyzing the retirement decision among Italian people.

Because early retirement benefit in Denmark is available from the age of 62 years and this age was the average retirement age in 2008, we also use 62 years of age as an instrument in our analyses, but it does not change the results significantly for which reason only the first stage-results are shown in Table A1 in Appendix.

Formalizing the analyses, the time spent on individual leisure, L^i, is to be explained by retirement, R^i, individual factors, Z^i and some residuals, v^i (error term):

$$L^i = R^i \gamma + Z^i \beta + v^i$$

By using the official retirement age as an instrument in a two-stage-least-squares analysis, where the error term is not necessarily uncorrelated with age, the first stage has the following form:

$$R^i = D^i \delta + Age^i D^i \eta + Age^i \iota + Z^i \beta + v^i,$$

where D is a dummy for 65+/64 years of age, and Age * D an interaction term for age and the age dummy. We assume that there is no discontinuity for the Z variables around the age of 65 years.

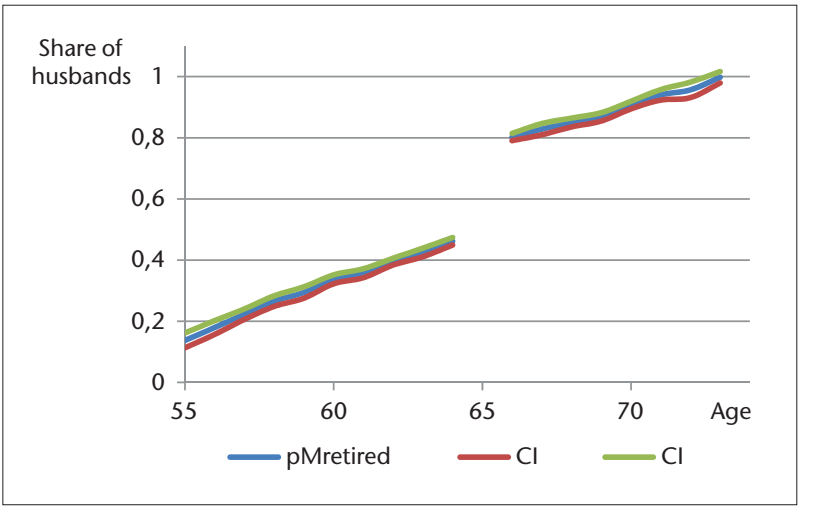
For joint leisure the specification of the equation is similar with the only exception that L^j (joint leisure) is dependent on the retirement of both spouses, R^m and R^f, their different ages, Age^m and Age^f, and the interaction between age and the age dummy for the husband and the wife, respectively. Additionally, the other factors, Z^m and Z^f, are now sex-specific.

Figure 3 shows that the likelihood of retiring increased up to and also after the age of 65 years for husbands and for wives. However, there is a significant level differential between the curves around the 65-years-olds – bigger for husbands than for wives. This shows that the official age of retirement is a reasonable predictor of retirement, especially men's retirement. The same is found in other studies for European countries (Coe & Zamarro. 2011; Hospido & Zamarro. 2014).

To test the discontinuity of the Z covariates around the age of 65 years, we estimated the likelihood of retirement as a function of these covariates (partners' education, the relative disposable incomes of the partners, civil status, season of the year, having children living at home and homeownership) and there was still a discontinuity around that age.

As mentioned in Chapter 3, we use three different measures of leisure as outcomes in the estimations assuming that an exogenous variation in the partners' retirement can be used to identify the causal effect of their retirement on their joint and individual leisure times.

Figure 3. *Predicted retirement for men and women as a function of the Z covariates 55-74-year-olds. 2008/09*



b. Results – 1st stage

In the following we show the results of the two-stage-least-square regressions, where the likelihood of retirement around the age of 65 years – the first stage – is estimated first, and then the impact of retirement on the spouses' joint and individual leisure time – the second stage estimation.

We find that it was three to four times more likely that men and women were retired after the age of 65 years than before they reached that age – for women 3.8 and for men 3.4, when we look only at 55-74-year-olds, take their respective ages into consideration and interact their ages with the age limit 64/65 years (Model I in Table 5). For men the differential remained even when controlling for the wife having passed the age of 64/65 years and the interaction between her age and the retirement age of 64/65 years, cf. Model II in Table 5. For women the likelihood of retirement around the age of 65 decreased – 3.8 relative to 3.0 – when controlling for the same factors as for men, cf. Model II relative to Model I. However, if we add controls for the partners' educational background, their relative income, having children, being married relative to cohabiting, and being renters – Model III – this did not impact the relationship between the official retirement age and the husband's or wife's retirement from the labor market.

When it comes to the spouses' retirement age – when s/he becomes 65 years of age – it is only when he reached that age that it impacted her retirement age, namely 1.4 times. When she was 65 years or older,

it had no impact on when her husband retired (Table 5). Hence, when the husband passed his 65th birthday there was an impact on his own and his wife's retirement, whereas her 65th birthday impacted only her own retirement not that of her husband.

We also find that the inclusion of the spouses' educational background, their relative income, having children, being married or cohabiting, and renters (Model III in Table 5) did not impact the correlation between the husband's or the wife's reaching the age of 65 years and their retirement decisions, nor did it have any impact on their spouses' decision. The coefficients remained of nearly the same size as those of the model without these controls (Model II in Table 5).

Because of the option of receiving early retirement benefit from the age of 62 years in 2008/09, many individuals left the labor market at that age, for which reason we replicated the analyses with the age of 61/62 years as the age limit, see Table A1 in the appendix. Unsurprisingly, the likelihood of retiring was smaller than around the age of 65 years independently of the model used, and again it is only when the husband reached the age of 62 years that the wife's retirement was affected. When she reached that age, it had no impact on her husband's decision regarding retiring.

For France, Stancanelli & Van Soest (2012a, 2014) find that at the age of 60 years, where early retirement is possible in France, the likelihood of retirement increased significantly for the husband as well as for the wife, whereas neither the husband's nor the wife's retirement age was influenced by their partner's 60th birthday.

For all models in Table 5 the R^2's are as high as 0.5.

c. Results – 2nd stage

Table 6 shows the impact of husbands and wives' retirement on their joint and individual leisure time taking into account that the retirement age depends on the spouses' ages, i.e. the first stage regression. For social leisure (leisure A) his or her retirement did not impact their joint time spent on this activity. Including other leisure activities (leisure B) the spouses' joint leisure increased by more than 1 hour or 39 percent when she retired, whereas his retirement had no impact on their joint leisure.

We find the same pattern when eating is included as a leisure activity (leisure C). Hence, her retirement increased joint leisure time by more than 1 ½ hours or nearly 50 percent, whereas his retirement had no impact on their joint leisure.

Table 5. *Linear likelihood model of partners' retirement at the age of 65 years. First-stage regression 2SLS. 55-74-year-olds. 2008/09*

	Model I		Model II		Model III	
	Man retired	Woman retired	Man retired	Woman retired	Man retired	Woman retired
Man 65+/<65 years	3.367*** (0.361)	..	3.303*** (0.406)	1.383*** (0.398)	3.451*** (0.422)	1.676*** 0.408
Woman 65+/<65 years	..	3.840*** (0.378)	0.685 (0.425)	3.013*** (0.417)	0.565 (0.471)	2.908*** 0.456
Men's age	0.059*** (0.004)	..	0.054*** (0.005)	0.011* (0.005)	0.055*** 0.005	.0151** 0.005
Mretage	-0.048*** (0.006)	..	-0.048*** (O.006)	-0.019** 0.006	-0.050*** 0.007	-.0239*** 0.006
Women's age	..	0.067 (0.003)	0.014*** (0.004)	0.058*** 0.004	0.012* 0.004	.059*** 0.004
Wretage	..	-0.058*** (0.006)	-0.010 (0.006)	-0.045*** 0.006	-0.008 0.007	-.045*** 0.007
Controls[1]	No	No	No	No	Yes	Yes
Constant	-3.226*** .267	-3.541*** .183	-3.674*** 0.287	-3.688*** 0.281	-3.571*** 0.311	-4.107*** .301
Adj. R^2	0.464	0.500	0.480	0.513	0.480	0.528
#	1.188	1.152	1.144	1.144	1.124	1.124

*,**,***significant at 0.05, 0.01 and 0.001-levels
1. Education husband and wife, relative disposable income (M/K), summer interview, children, cohabiting, and renter.
Source: DTUC

Concerning the husband and the wife's individual leisure time A, B and C, we find no impact of the partner's retirement, which follows expectations (Table 6). Nor did the husband have more social leisure time when he retired, whereas her retirement offered her nearly 1 hour and 20 minutes or 70 percent more social leisure time. However, leisure time B increased by nearly 1 ½ hours or 30 percent for a retiring husband, and 2 ¼ hours or 51 percent for a retiring wife.

Table 6. *Partners retirement and individual and joint leisure time. 2SLS instrument-regression1 55-74-year-olds. 2008/09*

	Individual leisure time man	% change	Individual leisure time woman	% change	Joint leisure time	% change
	Leisure A					
Man retired	.567 (.425)	21.7	-.578 (.391)	-28.9	-.0075 (.264)	-2.0
Woman retired	-.030 (.408)	-1.6	1.384*** (.376)	**69.9**	.330 (.251)	58.9
Constant	2.871*** (.381)		2.201*** (.351)		1.074*** (.237)	
Wald qui²	78.57***		76.15***		22.21**	
Adj. R^2	0.077		0.027		0.022	
	Leisure B					
Man retired	1.467+ (.714)	**29.9**	-.746 (.627)	16.7	.204 (.578)	7.7
Woman retired	-.391 (.686)	-7.3	2.257*** (.602)	**51.3**	1.129* (.555)	**39.2**
Constant	3.309*** (.640)		4.730*** (.562)		3.383*** (.519)	
Wald qui²	49.20***		63.73***		65.08***	
Adj. R^2	0.065		0.067		0.077	
	Leisure C					
Man retired	1.528+ (.782)	**24.9**	-1.079 (.686)	18.8	-.179 (.672)	-4.9
Woman retired	-.330 (.751)	-4.9	2.854*** (.659)	**50.1**	1.658** (.645)	**47.5**
Constant	4.500*** (.702)		6.149*** (.615)		4.337*** (.602)	
Wald qui²	51.25***		78.44***		65.43***	
Adj. R^2	0.070		0.074		0.066	

1. Controls: Education husband and wife, relative disposable income (M/W), summer interview, children, cohabiting and renter. Including health does not impact the coefficients in the table.
Note: The coefficients do not change significantly if the retirement age is 62 years (not shown in table).
Source: DTUC

The biggest impact of retirement on leisure time is obtained when eating is included. Hence, retired husbands spent more than 1 ½ hours on leisure time (leisure C) compared with non-retired husbands, and for wives the difference was nearly 3 hours a day. The differentials measured in percentages, however, are of nearly the same size for the spouses irrespective of whether we look at leisure without and with eating included when the husband or the wife retires.

Compared with the results of Stancanelli & Van Soest (2012a, 2014) for France, the major difference is that we do not find any impact of Danish men's retirement on their wives' individual leisure time. In France the wife's leisure time decreases when her husband leaves the labor market. However, when French husbands retire, the couple's joint leisure time increases, which is not the case in Denmark, where there is no such impact on spouses' joint leisure time. Although the decrease in French wives' individual leisure time is of the same size as the increase in joint leisure time, this does not mean more time spent on household work, which actually decreases, when their husbands leave the labor market.

6. Conclusion

There is a number of studies on when people retire from the labor market with the focus on work efforts, savings and economic conditions in general. However, only a few have addressed the impact of spouses' preferences for leisure on the desire to spend leisure time together. This is despite the fact that spouses' leisure complementarity may contribute to the understanding of joint retirement.

Here, we investigated the impact of married and cohabiting men and women's retirement on their joint and individual leisure time taking into consideration the influence of their preferences for leisure relative to income. For the causality problem – do preferences impact retirement or is it retirement that determines preferences – we have used the public pension age, when most people retire, as an instrument in the retirement estimation.

The information on the age of retirement stems from administrative registers in Statistics Denmark and DTUC-2008/09, which is a survey of randomly chosen Danes' labor market attachment, and time use for the same weekday and weekend day for both partners in married and cohabiting couples. By looking at couples where the husband is aged 55-74 years and distinguishing between employed and retired spouses, we found that the latter group did not have more individual and joint leisure time than did the first group, and that leisure time is longer the broader the definition is of that time.

We also found that simultaneous retirement – within a year's distance at the largest – did not impact the spouses' joint leisure time more than non-simultaneous retirement.

In the discontinuity regression analysis, where 65-year-olds – the

old-age public pension age – was used as an instrument to avoid the problem of reverse causality – we found that the wife's retirement increased her social leisure time, leisure time extended, and leisure time inclusive of eating time, whereas leisure time and eating time, not the social leisure time, increased when the husband retired. However, we found no impact of the partner's retirement on the husband's or wife's individual leisure time. However, their joint leisure time inclusive of time spent eating increased, when the wife retired, whereas the husband's retirement had no impact whatsoever on the length of their joint leisure time.

Comparing these results with those for France, the difference is that in France the wife's leisure time decreases when her husband leaves the labor market. Further, when French husbands retire, the spouses' joint leisure time increases, which is not the case in Denmark, where there is no such impact on spouses' joint leisure time. Why this country differential appears is beyond the scope of this paper to explain.

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Appendix

Table A1. *Linear likelihood models for partners' retirement at 62 years of age. First-stage regression 2SLS. 55-74-year-olds. 2008/09.*

	Model I		Model II		Model III	
	Man retired	Woman retired	Man retired	Woman retired	Man retired	Woman retired
Man 62+/<62 yrs	0.401*** (0.034)	..	0.413*** (0.036)	0.191*** (0.035)	0.407*** (0.036)	0.199*** 0.035
Woman 62+/<62 yrs	..	0.417*** (0.033)	0.042 (0.035)	0.353*** (0.034)	0.031 (0.036)	0.322*** 0.035
Partner's age	No	No	Yes	Yes	Yes	Yes
Controls[1]	No	No	No	No	Yes	Yes
Constant	-0.529*** .190	-1.399*** .185	-0.609* 0.243	-0.768*** 0.237	-0.469*** 0.258	-1.005*** .249
Adj. R^2	0.488	0.522	0.500	0.537	0.498	0.545
#	1.188	1.152	1.144	1.144	1.124	1.124

*.**.*** significant at 0.05, 0.01 and 0.001 levels

1. Education of the man and the wife, relative disposable income (M/W), summer interview, children, cohabiting, renter.

Source: DTUC