

Piekkola, Hannu

Working Paper

Are individuals who are active and doing household work prone to retire earlier: Evidence from the use survey of older Finns

ETLA Discussion Papers, No. 1036

Provided in Cooperation with:

The Research Institute of the Finnish Economy (ETLA), Helsinki

Suggested Citation: Piekkola, Hannu (2006) : Are individuals who are active and doing household work prone to retire earlier: Evidence from the use survey of older Finns, ETLA Discussion Papers, No. 1036, The Research Institute of the Finnish Economy (ETLA), Helsinki

This Version is available at:

<https://hdl.handle.net/10419/63759>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

Keskusteluaiheita – Discussion papers

No. 1036

Hannu Piekkola

**ARE INDIVIDUALS WHO ARE ACTIVE AND
DOING HOUSEHOLD WORK PRONE
TO RETIRE EARLIER: EVIDENCE
FROM TIME USE SURVEY OF OLDER FINNS***

* Address for correspondence: The Research Institute of the Finnish Economy (ETLA)
Lönnrotinkatu 4B, FIN-00120 Helsinki. E-mail: Hannu.Piekkola@etla.fi, Fax: 358-9-
601 753

This study is part of project "Combining work and leisure time" financed by the VETO
programme of the Ministry of Social Affairs and Health.

PIEKKOLA, Hannu, ARE INDIVIDUALS WHO ARE ACTIVE AND DOING HOUSEHOLD WORK PRONE TO RETIRE EARLIER: EVIDENCE FROM TIME USE SURVEY OF OLDER FINNS. Helsinki: ETLA, Elinkeinoelämän Tutkimuslaitos, The Research Institute of the Finnish Economy, 2006, 30 p. (Keskusteluaiheita, Discussion Papers, ISSN 0781-6847; No. 1036).

ABSTRACT: This paper explains early retirement using Finnish time-use data for couples in 1999-2000 and follow up data on labour market status in 2000-2003. People busy in general stay in the labour market longer. However, non-work time activities such as household work and active leisure make retirement more attractive. Even though males do around one hour less household work per day than females throughout their different lifecycles, their retirement decision is most sensitive to the household work that they or their spouses supply. Household production model cannot explain this. We find joint household work unrelated to pecuniary incentives important, while find less support for mutual leisure to influence the retirement path.

JEL-codes: J26, J14, J22

Keywords: Early retirement, Time use research, Leisure

PIEKKOLA, Hannu, ARE INDIVIDUALS WHO ARE ACTIVE AND DOING HOUSEHOLD WORK PRONE TO RETIRE EARLIER: EVIDENCE FROM TIME USE SURVEY OF OLDER FINNS. Helsinki: ETLA, Elinkeinoelämän Tutkimuslaitos, The Research Institute of the Finnish Economy, 2006, 30 s. (Keskusteluaiheita, Discussion Papers, ISSN 0781-6847; No. 1036).

TIIVISTELMÄ: Tutkimuksessa tarkastellaan kotitaloustyön merkitystä Suomessa ajankäyttöaineistolla. Tutkimuksessa selitetään ikääntyneiden yli 53 vuotiaiden todennäköisyyttä poistua työelämästä vuosien 1999/2000 ajankäyttöaineistoa seuraavina neljänä vuotena. Eläketutkimuksessa käytetään ns. instrumentteja arvioimaan kotitaloustyötä, joka on luonteeltaan jatkuvaa soveltuen eksogeeniseksi selittäväksi tekijäksi. Taloudellisiin kannustimiin sisältyy tutkimuksessa optioarvot, jotka ilmaiset hyödyn siirtyä eläkkeelle nyt tai jonain tulevana vuotena. Tällöin vaakakupissa ovat mukana odotettavissa oleva eläkkeelläoloaika, lisäansiot jos työtä jatketaan ja odotettavissa oleva eläke. Tutkimuksessa saadaan tukea sille, että taloudellisilla kannustimilla on merkitystä eläkepäätöksessä. Jos eläkkeiden ennustetaan nousevan paljon jatkettaessa työelämässä, niin töitä tehdään pidempään. Hurd (1996) on todennut, että työajat ovat yleensä hyvin jäykkiä. Kannustimet vaikuttavatkin voimakkaimmin eläkepäätökseen joko olla tai ei olla työelämässä kuin siihen kuinka pitkää työviikkoa tehdään.

Tutkimuksen perusteella kiireiset ja aikapulaa kokevat pysyvät työelämässä pidempään. Tämä asettaa oman haastensa pyrittäessä sovittamaan työaikoja siten, että työn tarjonta säilyy suurena mahdollisimman pitkään. Muu kuin ansiotyöhön käytetty aika on jaettava passiiviseen ja aktiiviseen vapaa-aikaan ja kotitaloustyöhön. Kotitaloustyö on rinnasteinen aktiiviselle ajankäytölle etenkin miehillä. Niinpä kotitaloustyötä tekevät siirtyvät herkemmin eläkkeelle ja tätä selittää kotitaloustyön yhteys aktiiviseen vapaa-aikaan. Kaikkea kotitaloustyön tuottamaa hyötyä ja iloa ei siten voida korvata markkinoilta ostettavilla palveluilla. Tämä merkitsee sitä, että kotitaloustyöhön ja ansiotyöhön käytetty aika eivät ole täysin rinnasteisia.

Vaikka kotitaloustyöhön liittyy paljon aktiivisen vapaa-ajan piirteitä, on selvää, että mahdollisuudet korvata oma kotitaloustyö markkinoilta ostettavalla on tärkeää. Markkinoilta voidaan ostaa vähiten kiinnostava kotitaloustyö. Tämä voi vaikuttaa etenkin naisten työmarkkina-käyttäytymiseen, jos ja kun naisten tekemä kotitaloustyö on keskimäärin raskaampaa. Naiset vastaavatkin etenkin siivouksesta, ruuanlaitosta ja tiskauksesta. Jos mies tästä huolimatta tekee paljon kotitöitä, saattaa se todennäköisemmin olla mukavampaa. Miehillä etenkin ostosten teko lisääntyy ja kodin huoltotyöt. Voidaan kuitenkin väittää, että ne ovat lähempänä aktiivista vapaa-aikaa kuin naisen tekemät työt.

Yksi syy sukupuolittaisille eroille voi liittyä oletukseen, jonka mukaan kotitaloustyö täyttää työmarkkinoilta poistumisesta syntyvää aukkoa ajankäytössä. Naiset tekevät kotityöstä suuren osan jo ennestään ja kotityön lisäys eläkkeelle siirtymisen jälkeen ei ole sisällöllisesti merkittävää – siis vain täyttää aukkoa ajankäytössä. Kotitaloustyö ei siten ole eläkkeelle siirtymisen syy. Tutkimusten perusteella miesten työaika ei ole sen sijaan kovin paljoa lyhentynyt 50-54 -vuotiaana verrattuna parhaaseen työikään. Siten muuta kuin palkkatyötä on liian vähän ja vähäiselläkin kotitaloustyön kasvulla voi olla suurempi merkitys eläkepääätkäössä.

Syy eläkkeelle siirtymiselle on myös varmasti pyrkimys täyttää yhteisiä vapaa-ajan toiveita. 70 prosenttia 55-64 -vuotiaista onkin naimisissa, joten koko kotitalouden ajankäyttö on tärkeä lisätekijä eläkepääätkäössä. Puolisot tekevät kotitaloustyötä paljon yhdessä ja näin on etenkin eläkkeellä. Aikaisemmissa tutkimuksissa on todettu, että eläkeajatuksia on enemmän ja eläkkeelle siirtymisen todennäköisyys kasvaa, jos puoliso on eläkkeellä. Tässä tutkimuksessa ei kuitenkaan löydetä kovin merkittävää yhteyttä puolison työmarkkina-aseman ja eläkkeelle siirtymisen välillä. Puolison kotitaloustyön määrällä näyttää olevan suurempi merkitys eläkepääätkäöselle ennen eläkkeelle siirtymistä. Toisin sanoen eläkkeelle ei mennä sen vuoksi, että kotitaloustyötä voitaisiin tehdä yhdessä. Yllättäen myös naispuolison kotitaloustyö ennen eläkkeelle siirtymistä vaikuttaa miesten käyttäytymiseen. Sitä enemmän mies itse tai työssä käyvä naispuoliso tekee kotitaloustyötä, sitä todennäköisemmin mies siirtyy eläkkeelle.

1. Introduction

This study examines the motivation for retirement. The use of time-use data to model labour supply or retirement has been rather exiguous although the importance of time as a scarce resource in the economy has been approached theoretically since Becker (1965) and later by Juster and Stafford (1991). Mostly the focus has been on pecuniary incentives and demographic determinants, although family decision-making and caregiving responsibilities are considered central (Lumsdaine and Mitchell, 1999). When time-use data have been used with respect to the perspective of the elderly, the purpose has only been to describe their time-use and not to study behavioural implications (See, for example Niemi and Pääkkönen, 1990, 2002, OECD, 2000, Gauthier and Smeeding, 2003). OECD (2000) examines patterns of work and leisure throughout the lifecycle of people. The study finds that an individual's latter years are associated with greater passivity, even at the age of 55-59 when health factors should not yet be a major problem. The results are, however, only indicative since individuals of the same age with or without jobs are not directly compared.

Hamermesh (2005) emphasizes the importance of making distinction between non-market activities such as household work and leisure and particularly so for older people. Piekkola and Leijola (2003) propose that three functions of household work might affect retirement. First, following the household production model by Gronau (1977), Graham and Green (1984) and Kerkhofs and Kooreman (2003), household work is 'work' that needs doing and men and women share these necessary chores. Household work is a close substitute for market work. Second, household work can provide structure and meaning to the day, a day that would otherwise be passive after one has retired. Household work after retirement, sometimes rather mechanically, become a substitute for the foregone market work. When the individual

was still actively working market and household work may not have been strong substitutes. Third, some household work is enjoyable leisure – cooking, gardening and is comparable to active leisure. Household work and active leisure are then close substitutes and cannot be assumed to merely affect the opportunity cost of household work, as in the household production model.

Piekkola and Leijola (2003) evaluate the replacement rates and option values, including the value of household work, before and after retirement for three income-levels in 7 European countries.¹ Such an approach implicitly assumes that household and market work can be considered as close substitutes. They show that the inclusion of household work in incentive calculations makes retirement more attractive, and that the results of the calculations correlate with the actual retirement ages in Europe. The present paper also examines household work as a substitute for active leisure. We also apply instrumenting techniques to describe household work as part of life-time patterns, using time-use data gathered by Statistics Finland in 2000. Time-use constraints may be linked to time-use over a lifecycle. Hamermesh (2005) argues that these constraints can be more binding for poorer families who cannot gain extra leisure time by purchasing household work from the market.

We identify the determinants of early retirement in an empirical model that also includes monetary and demographic variables to examine how (i) option values generated through pension wealth and (ii) household work and preferences for different leisure time activities influence early retirement decisions. We also analyse households in view of the findings in recent studies that male retirement decisions are most sensitive to the labour market decisions of their spouses (Coile 2003, Dahl et al., 2002, Johnson and Favreault, 2001) or to household

¹ The replacement rate expresses as a percentage an individual's net pension that accrues from his net income from labour, corrected for the value of household work. Option value expresses the tradeoff between retiring immediately and keeping the option open to retire at a later age.

work (Piekkola and Leijola, 2006). We have follow-up data on the employment status, gross earnings and retirement status of individuals for the subsequent years, so that in conjunction with income records and background characteristics, these provide a good base to examine the motivation behind early retirement. The study uses a binary probit model to explain the decision by aged workers to leave the labour market in 2000-2003, the subsequent period after the 1999-2000 time-use survey.

The section 2 describes the theoretical methodological background of the study. Section 3 describes pension system and presents some descriptive statistics of time use in Finland. Section 4 presents the results. The last section concludes.

2. Theoretical background

The theory presented by Gary S. Becker (1965) applies an economic approach to the allocation of time. It treats households as active producers of non-marketable commodities such as different leisure activities. These commodities are produced through a combination of market goods and services, the household members' own time, education, ability and other environmental variables. The decision of the "bundle of goods" to be consumed lays the frame for allocating time between work, leisure and the other main activity groups. In the traditional approach, market work has two opposite effects.

Consider weekly allocation of time to market work E , leisure L and household work H . An individual's hourly net wages are w per week yielding weekly earnings wE . Unearned income is I and the level of earnings has an effect on pension wealth, while here the retirement

age a is first assumed fixed. Pension wealth $PW_t \equiv P(a, w_{a-1}E_{a-1})$ is thus the level of the pension available at age t when retiring at age a , depending on net wages w and market work time E before retirement $a-1$. Pension wealth is the lump-sum equivalent of the total pension income a worker can expect to receive, taking into account pension level, retirement age and life expectancy. Time endowment is 168 hours per week, so that labour supply is $E \equiv 168 - L - H - P$, where P is exogenous time for personal needs (sleeping).

Time-use patterns also depend on how constrained individuals are in their time use. Hamermesh (2005) indicates that individuals are highly time constrained as marginal hours of market work substantially alter time-use patterns. Hurd (1996) argues that in the presence of labour market rigidities, work hours cannot be varied and the constraint will be to work more than an individual wants, or then not to work at all. Time use within homogeneous groups (by gender, education and marital status) still shows very similar patterns across countries, see Gershuny (2002) and Kooreman and Kapteyn (1987).

We may allow for fixed costs for leisure μ_L before and after retirement that may differ between genders. Household work may also require abilities that require investment over the longer period, which we denote by μ_H . One example of fixed costs is investment in taking care of a garden, which requires continuing upkeep. μ_H can also be assumed to be negative if household work before and after retirement is qualitatively different. One example is household work that replaces market work after retirement in order to give meaning to the day. When an individual is active in market work, he might consider household work as an extra obligation. For the consumers' utility (suppressing time indicator and ignoring time preference), and using budget constraint for composite good this gives $x = wE + I = w(168 - L - H - P) + I$ (normalising price of consumption good x to unity)

$$V = u[x(w(168 - L - H - P) + I), L, H, P, PW(w), \mu_L L, \mu_H H], \quad (1)$$

where x = the quantity of goods consumed. The optimal allocation of time between leisure L and household work H , holding personal care P fixed is from (1)

$$V_L : -wU_x + U_L + \mu_L U_{\mu L} = 0 ; \quad (2)$$

$$V_H : -wU_x + U_H + \mu_H U_{\mu H} = 0. \quad (3)$$

The fixed costs in leisure or household work $\mu_L > 0$, $\mu_H > 0$ raise the opportunity cost of market work. The relative substitution and income effects of market wages are studied in greater detail in Piekkola and Leijola (2003). We can now analogously examine in three ways how household work and leisure influence retirement.

- a) Household work and active leisure are close substitutes $\mu_L, \mu_H = 0$
- b) Household work and market work are close substitutes $\mu_L \geq 0, \mu_H \geq 0$
- c) Household work substitutes for the earlier market work $\mu_L \geq 0, \mu_H \leq 0$

The first alternative explanation is the conventional model, where all non-market work time, such as active leisure and household work, is qualitatively similar. Active leisure is defined to include voluntary help, organisational activity, neighbourly help, hobbies and sports. Leisure and household work are necessarily close substitutes and are not interlinked by time constraints $\mu_L, \mu_H = 0$. Individuals increase household work by about 10 hours per week after retirement and qualitatively this is more comparable to (active) leisure than to market work. Greater availability of active leisure time combined with enjoyable household work can also

be a precondition for successful retirement, see Fast et al. (2001). A higher return on household work can have both positive substitution and income effects on retirement if it is economically valuable and promotes leisure activities and/or mutual time use at home.

The second approach is to implement the household production function, as is done in Gronau (1977) and to consider market work and household work as close substitutes ($\mu_L \geq 0$, $\mu_H \geq 0$). The approach is extended by Graham and Green (1984) and Kerkhofs and Kooreman (2003) to include household work to serve simultaneously also as leisure, which affects the opportunity cost of household work. Individuals have flexibility in producing a household production good or the spouse specializes in it. This flexibility may not extend to continual leisure patterns $\mu_L \geq 0$. In the specialization by genders, the high-income earner specializes in market work and the low-income earner specializes in household work. One can “buy” extra time by purchasing the household work from the market or from the spouse.

The third alternative is that household work after retirement provides meaning to the day. After a successful work career, one suddenly has an extra 8-9 hours to spend and much of this time goes to household work. In this case, we do not have fixed household work costs but can consider the current household work to even lessen the opportunities to replace market work by household work $\mu_H \leq 0$. The more an individual is already involved in household work when employed, the fewer the opportunities for household work are after retirement. We can also allow for fixed costs on leisure, $\mu_L \geq 0$, if new leisure opportunities are limited after retirement.

Following Stock and Wise (1990), we report the incentives to stop working during the current year relative to retiring at some future optimal age. In many pension schemes, also in Finland,

the accrual rate is much higher in the final years prior to the legal retirement age. Pension entitlement is set at zero until the minimum entitlement age is reached, which in this case is defined as the early retirement age minus the period of relevant years preceding unemployment.

The effects of changes in wages and other income available are vetted using the option value approach. For each retirement age, the *option value* (OV) expresses the tradeoff between retiring immediately and keeping the option open to retire at a later age. In order to obtain an indicator of this variable, one has to choose an explicit utility function and then estimate the option value tied to this utility function on the basis of a set of relevant variables, among which are the income from the public pension and the wage outlook. Here the option value function also incorporates the utility of consumption and total non-work time in addition to the financial incentives. Let $V_s(a)$ refer to the expected discounted future utility at age t if the worker retires at age a and let it be specified as (see Stock and Wise, 1990, Coile and Gruber, 2000):

$$V_s(a) = \sum_{t=s}^{a-1} [Y_t]^\gamma (1 + \delta - z)^{-(t-s)} + \sum_{t=a}^T [\alpha P_t(a, Y_{a-1})]^\gamma (1 + \delta)^{-(t-s)}, \quad (4)$$

where T = the expected age of death at each age t by gender, s = the current period, a = the period of retirement, δ = the real discount factor 6%, z = annual wage growth 1%, Y_t = the wage income at age t , $P_t(a, Y_{a-1})$ = the level of pension available at age t when retiring at age a , depending on earlier wages; α = the relative utility of the pension benefits to the wages or the marginal utility of leisure; γ = the utility curvature parameter or the risk aversion parameter.

The utility of consumption is represented by an isoelastic utility function, $U(Y)=Y^\gamma$ and $U(P)=[\alpha P]^\gamma$. The utility parameters and discount rate are based on Coile (2003). The utility function parameter γ takes the value of 0.75. The change in the utility curvature parameter γ from 1 to 0.75 strengthens the marginal effects given later in table 6. One explanation is the lower weight given to the outliers. To capture utility from extra non-work time after retirement, the utility during retirement is weighted by $\alpha > 1$, which is set at 1.5 ($1/\alpha$ is the marginal disutility of work). Piekkola and Leijola (2003), instead, set this to unity and include pre- and post retirement household work in the calculation of total income. The incentive effects of option value on retirement is robust when we use alternative values for the marginal utility of leisure parameter α and the discount rate δ .

Consider now the optimal retirement decision a^* that the marginal incentives for leisure considered above indicate. The option value for a specific age is defined as the difference between the expected lifetime utility if the individual postpones his decision until the optimal retirement age and the expected value if he retires immediately. If the individual retires immediately, he loses a number of years of income and the higher pension benefits. But if he retires later, he will lose the forgone leisure time. The option value, giving the opportunity cost of retiring today, is

$$OV(a) = E_s [V(a)] - V_s(s), \quad (5)$$

where E = the expectation operator. The optimal retirement a^* should occur at an age when the option value becomes negative. Option value affects the retirement probability negatively. A higher option value provides the incentive to stay at work longer.

3. Pension System and Time Use of Finns

The early retirement system in Finland comprises of unemployment benefits and disability or unemployment pension for those people who retire or become unemployed before 65 years, the eligibility age for old-age pension. Those receiving disability or unemployment pension benefits constituted about 60 per cent of the age group 60-64 in the period during which the time use survey was made in 1999-2000. A special feature of the unemployment pension is that the people who turn 57 years during the unemployment period, i.e. when unemployment starts at the age of 55, are entitled to an extension of unemployment benefits until they turn 60 and start to receive unemployment pension. An individual, who is suffering from reduced work capacity because of illness, handicap or injury, is entitled to disability benefits (this applies to 25 per cent of the age group 60-64). The individual early retirement scheme is a special type of disability pension paid to an individual aged between 58 and 64 whose work capacity has significantly diminished but who has had a long work career.

The pension income and option values from (5) and (6) are calculated based on the assumption that a retired individual is on disability pension if aged below 57 years, and in the unemployment pension pipeline if aged between 57-64 years of age (unemployment pension not an option below this age). This assumption is possible, as the pension levels are roughly similar for the disability and unemployment pension pipeline schemes (see Appendix A). Huovinen and Piekkola (2002) have shown that these have been rather flexibly adopted, depending on the costs incurred by firms, as pension costs are heavily related to firm-size (large firms bear 75% of the costs of disability pension but much less for unemployment pension pipeline).

In the old pension system effective until 2005 the pensionable salary is the gross income net of the employee's pension contributions and corresponds to the average salary of the last 10

years.² Work experience determines the accrual of pension rights and is here assessed by age minus the number of years in school, with pre-school included. The work career spanning, on average, 30 years by the age of 55-59 is not far from the real average work experience of 27 years (Tuominen, 2001). Appendix shows how the pension level is linked to pensionably salary, work experience and the regulations on early retirement.

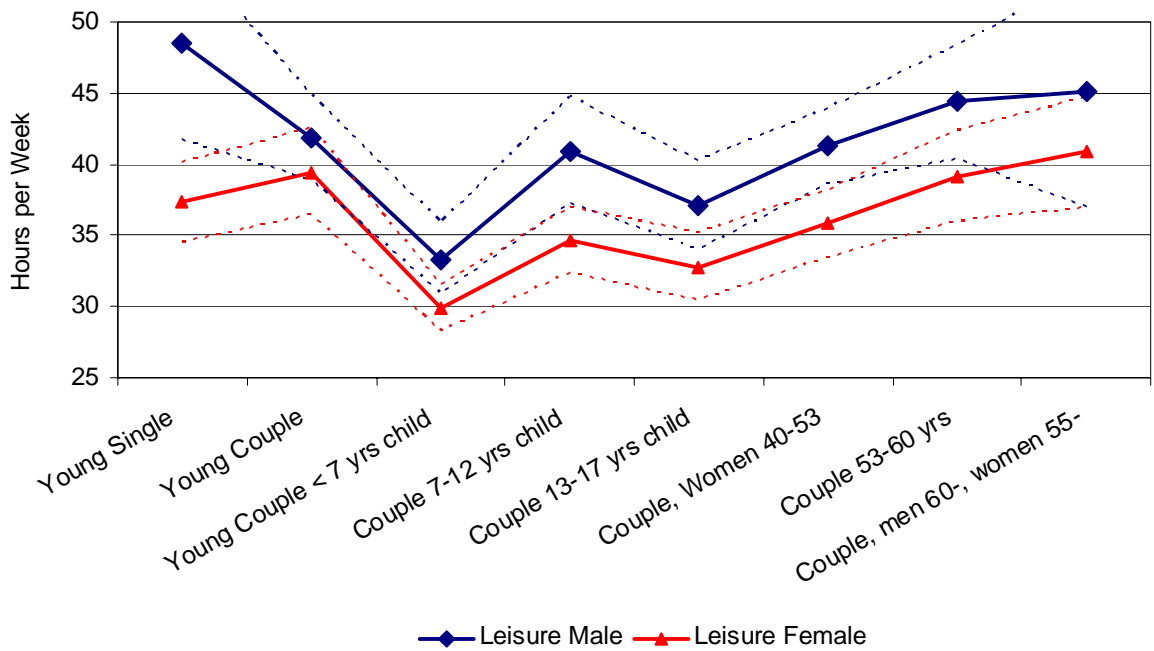
Time-use information was collected by Statistics Finland, by asking people to maintain a diary to record track of their daily activities in 2000 (from March 1999 to March 2000). The respondents recorded their activities for two randomly selected days, one of which was a weekday and the other weekend day. Recordkeeping was done without any pre-coded selection of activities. Daily activities were described by the respondents in their own words and coded according to the 185 different activities classified by Statistics Finland in 2002. All activities are grouped into four broad classes: market work, household work, leisure and self-care. In addition, we have an extra category for travelling, but work- and leisure-related travel is included for the whole market work or leisure time.³ All those who do not participate in the labour market, i.e. the unemployed, disability or unemployment pensioners, are considered as non-employed, while those taking care of their own household are the only marginal group. Students are omitted. Employment status is based on the situation registered at the end of the year 1999. The employed category thus also includes some respondents who were actually unemployed during the survey as well as individuals who were in the work life, but were absent either due to illness or vacation during the survey week. The time-use variables are the

² In a new system effective in 2005 pension accumulation is related to all earned salaries during one's entire work history, unemployment pension is substituted by continued unemployment pension pipeline after 60 years and additional incentives are introduced to postpone retirement after 62 years of age. The major change in early retirement is the restrictions made on part-time retirement and the abolishment of individual early retirement.

³ Of the 4,250 individuals of age 18-74 we exclude observations for other adults than for spouses or being the single adult (338 obs), unreliable income data (210 obs), and time use in personal needs or household work (9 obs). After these corrections time use of the adult family member in the four main time use categories do not suggest major outliers in multivariate data using the method of Hadi (1992, 1993) with education, gender and age as controls.

averages of the weekday and weekend measured as hours per week. The non-employed spent some 10 hours more in leisure than the employed. The following figure 1 shows the leisure time of males and females over their lifecycles (dash lines show 95% confidence intervals).

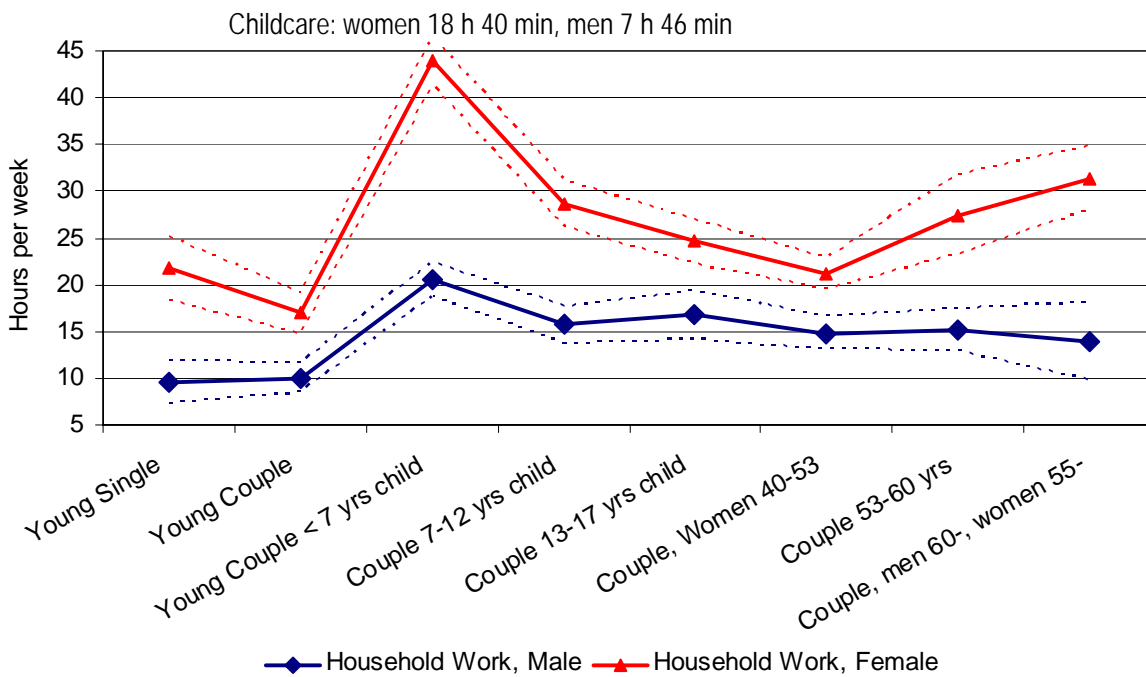
Figure 1. Leisure over Lifecycle



As can be seen, men have some 5 hours per week more leisure throughout the various cycles of their lives, and the difference does not diminish even when both spouses, for the most part, are retired, as in the case of the oldest couples. As children grow up and childcare responsibilities diminish, the pattern of increasing leisure is fairly smooth. The increase in leisure time starting at 40-45 years is explained by the average weekly working hours decreasing from a peak of 30 hours at 40-54 years to 14 hours at 55-64 years, and to only 1.5 hours at 65-74 years of age. Most of this is explained by the absolute withdrawal from work, although the typical work week also decreases to less than 25 hours for the 65-year olds those who are still employed.

Household work is to be understood broadly to cover every kind of activity conducted for the benefit of the household. This excludes neighbourly help or caring for relatives other than one’s own family. The following figure shows the changes in household work during the life-cycle of men and women.

Figure 2. Household Work of the Employed during Male and Female Lifecycles



The weekly peak hours are explained by childcare responsibilities when the youngest child is less than 7 years old. It can be seen that for the retired, the household work of men does not rise, whereas that of women increases substantially by more than 10 hours, compared to the middle-aged at 40-53 years. This, however, is seen later to have little relevance on the retirement decision.

We limit our analysis to spouses, thus excluding single-adult households. The data cover 66% of individuals in the age bracket 53-64 years. Among the 53-59 year old individuals, the highly educated workers have a high employment rate 85%, which exceeds the 56% rate for

individuals with less than higher tertiary education. Among the individuals in the 60-64-year age bracket, 40% of the highly educated, or almost half, stay at the labour market while only 16% of the lesser-educated workers do so. Table 1 shows the summary figures of the variables in the age group 53-64 years for employed individuals, excluding again single adult households. When there is a difference in the time use, the figures for the employed are given separately by gender and education level.

Table 1. Summary Employed with Spouse Aged 53-64 years

Variable	Education Level	Mean	Std. Err.	95% Confidence Interval	
Option Value Employed	Other (124 obs)	0.09	0.004	0.081	0.095
	Higher Tertiary (28 obs)	0.18	0.013	0.150	0.202
Household Work Male	Other	17.3	2.15	13.08	21.54
	Higher Tertiary	11.6	3.20	5.32	17.89
Household Work Female	Other	25.5	1.80	21.98	29.07
	Higher Tertiary	19.8	4.52	10.87	28.67
Gender					
Leisure	Male (76 obs)	40.3	1.95	36.49	44.15
	Female (76 obs)	37.9	1.50	34.95	40.84
Sport / Total Active Time %	Male	4 %	0.75 %	2.6 %	5.5 %
	Female	4 %	0.53 %	3.3 %	5.4 %
Home Work with Leisure as Secondary Activity	Male	0.6	0.21	0.19	1.01
	Female	1.0	0.19	0.60	1.34
Neighbour help 1-15h or Voluntary Help 1-14h %	Male	16 %	4.37 %	7.0 %	24.2 %
	Female	23 %	5.23 %	12.4 %	33.0 %
Neighbour help > 15h or Voluntary Help > 14h %	Male	13 %	3.84 %	5.0 %	20.1 %
	Female	16 %	4.62 %	6.7 %	24.9 %
Hobby / Leisure %	Male	3 %	0.67 %	1.2 %	3.8 %
	Female	2 %	0.45 %	1.0 %	2.7 %
Busy Sometimes %	Male	64 %	6.04 %	52.2 %	76.0 %
	Female	57 %	6.20 %	45.3 %	69.7 %
Busy Continuously %	Male	7 %	2.86 %	1.7 %	12.9 %
	Female	22 %	4.94 %	11.9 %	31.4 %

Table shows weekly time use or share involved in an activity or being busy. Option value is measured in utility. Other refers to other than higher tertiary education (university level).

It is noted that the option values measured in utility units are close to zero with the selected high discount rate of 6%, thus well highlighting the desire for early retirement. As can be seen, the highly educated have higher option values and less financial incentives to retire. This is explained by higher income in comparison to the value of post-retirement leisure.

Household work is less common for males, particularly so for the highly educated. Hobbies are measured as a share of total leisure time while sports are measured as a share of the total active time, which does not constitute time for personal needs. Hobbies as a share of leisure account for a fairly low share of total leisure time. This, together with the 4-5% share of active time for sports, represent here alternative forms of active leisure. Household work combining leisure as a secondary activity accounts for about 10% of total household work and is more typical for women. The figures would be 2.5 times higher for single adults as for younger couples.

4. Estimation results

We first examine household work according to individual and time use patterns. We also evaluate household work, and consider leisure as a secondary activity. Less than 10% of household work is done in conjunction with a leisure activity such as listening to the radio (see table 1). We expect household work that enables simultaneous leisure activity to be less time constrained and more constant throughout one's lifetime. Therefore we use it as one instrument when explaining retirement behaviour. Household work combined with leisure is estimated with a two-part model that takes into account the large number of zero observations. The two-part analysis by Manning *et al.* (1987) is appropriate when errors violate normality in two ways. First, there is significant censoring with a large share of household work having zero leisure. Second, household work with leisure as a secondary activity exhibits high skewness and has heavier than normal tails (skewness is 1.6 and kurtosis is 5.1). We first run probit estimation for the entire sample (individually for the employed and the non-employed). We then generate predicted values for the probability of having household work with leisure, mul-

tiplly this by the conditional expected value and use this in OLS estimation on a subsample of some household work with leisure as a secondary activity.

Table 2 gives the coefficients and marginal effects of the variables at a sample mean for dummy variables. In all the reported results, standard errors are sample weighted and corrected for strata and cluster sampling.

Table 2. Household Work (OLS) and With Leisures (Two-Part Estimation)

Variable	Employed			Non-Employed		
	OLS	With Leisure OLS	With Leisure > 0 Probit	OLS	With Leisure OLS	With Leisure > 0 Probit
Net Earnings	0.05 (0.1)	0.09 (1.1)	-0.01 (0.6)			
Female d	12.7*** (5)	-0.02 (0)	0.295** (3)	14.5*** (7.7)	-0.35 (0.7)	0.366*** (4.9)
Upper Secondary, Lower Tertiary d	4.40 (1.6)	1.100* (2.1)	-0.03 (0.2)	-1.84 (0.9)	-0.07 (0.1)	0.164* (2.3)
Higher Tertiary d	-3.57 (0.9)	-0.31 (0.5)	0.07 (0.4)	-7.839* (2.2)	1.20 (1.1)	0.21 (1.9)
Leisure with No Secondary Activity	0.00 (0)	0.00 (0)	-0.102*** (4.1)	0.00 (0)	0.00 (0)	-0.138*** (5.2)
Neighbour help 1-15h or Voluntary Help 1-14h	-2.29 (0.8)	1.399* (2.4)	0.00 (0)	-3.86 (1.7)	-0.21 (0.4)	0.00 (0)
Neighbour help > 15h or Voluntary Help > 14h	4.24 (1.2)	0.90 (1.7)	0.00 (0)	-7.604** (3.2)	0.57 (0.9)	0.00 (0)
Hobby / Leisure	37.293* (2.2)	1.07 (0.3)	2.024* (2.4)	-3.86 (0.4)	3.20 (1.4)	-0.37 (0.8)
Sport / Total Active Time	-11.32 (0.7)	16.081** (2.9)	0.79 (0.9)	-47.344*** (4.5)	-3.36 (0.8)	0.64 (1.4)
Busy Sometimes d	4.85 (1.9)	-0.01 (0)	0.22 (1.9)	-0.02 (0)	-0.03 (0)	-0.05 (0.6)
Busy Continuously d	-0.82 (0.2)	-2.003*** (3.3)	-0.04 (0.2)	8.24 (1.3)	2.55 (1.4)	0.01 (0)
Spouse's Household Work	0.15 (1.4)	0.00 (0)	0.00 (1.1)	0.259** (3.3)	0.00 (0)	0.00 (0)
Spouse Non-Employed d	-4.03 (1.5)	1.277* (2.5)	-0.09 (0.8)	-9.411*** (4.5)	0.81 (1.3)	-0.02 (0.2)
Municipal Size 100000 > d	-3.32 (1.4)	-0.15 (0.3)	-0.12 (0.9)	-6.398** (2.8)	0.01 (0)	0.13 (1.2)
Probability Household Work with Leisure		0.63 (1.3)		0.00 (0)	0.59 (1.4)	
Observations	148	148	148	228	228	228
R-squared	0.312	0.439		0.386	0.189	
F statistics	4.277	3.709	2.168	9.690	2.172	4.188
Predicted right%			59.9 %			52.0 %

Note. Marginal effects are reported for dummy variables. All estimations have as explanatory variables age, age squared, two education dummies, family help dummy, two additional region size dummies. Net earnings in thousand euros. (d) marginals for discrete change of dummy variable from 0 to 1, * p<0.05, ** p<0.01, *** p<0.001.

Our model explains 32% of the variation in the household work of employed workers, which is comparable to Graham and Green (1984). It is noted that the net earnings from market work are weakly positive but always insignificantly related to household work. Therefore pecuniary incentives explain only a small portion of the household work. Household work estimates for the employed are given in columns 1 and 2, where it can be seen that weekly household work for females is significantly higher than for males, with a difference of 12.7 hours (14.5 hours for the non-employed). The differences are greater than those without any controls, 6 hours. Active leisure, such as neighbourly help, hobbies, sports, appears to be a close substitute for household work in column 1. This is strikingly true for the non-employed in column 4, since the non-employed who actively provide neighbourly or voluntary help do less household work by 4-8 hours. Some mutual sharing of household work is noted from the 4-hour decrease in housework if an individual's spouse is non-employed (column 1) and 9.4 hours less if both spouses are non-employed (column 4). But a spouse being busy with household work as such does not appear to reduce the total amount of household work, thus suggesting that much of the household work is, indeed, done together. Also, Niemi (2005) finds evidence for Finland that particularly the elderly do a considerable part of their household work together.

We can thus conclude that the traditional model of considering household work production as a pure substitute for market good does not hold. Similar to Solberg's and Wong's (1991) empirical analysis, we can observe a violation of the second hypothesis that household work is a substitute for market work. To begin with, pecuniary incentives such as earnings are scant explanations for household work. Second, neighbourly or voluntary help, hobbies and sports and household work are clearly alternative ways to spend one's time, thus not supporting traditional household production model. Third, spouses appear to do household work together and do not specialize in a similar manner, as in childcare, for example. Finally, it is also noted that a busy active life has a clear positive effect on the household work of the employed, whereas

there is no similar effect among the non-employed. The continually busy individuals may be the group whose desire to buy household work from the market is the most relevant.

We expect the supply of household work with leisure as secondary activity to be less time constrained, less marketable and being an even closer substitute to leisure than household work in general. As can be seen from table 2, the employed do housework with leisure on average 0.8 hours per week while the non-employed devote 2 hours per week to this task, with large number of zero observations. The two-part model includes the probability of combining household work with leisure, as explained before. The marginal effects from the probit estimation are reported in columns 3 and 6. The marginal effects of the explanatory factors are fairly similar on the part of both the employed and non-employed individuals. In comparison to males, females, irrespective of their employment status, have 30-37% greater likelihood of combining household work with leisure. Passive individuals who spend considerable leisure periods with no secondary activity are less likely to do household work in conjunction with leisure. The determinants for those who spend time on household work with leisure are reported in columns 2 and 5. The conditional predicted value is not significant. As can be seen, household work with leisure is linked to such active leisure as neighbourly/voluntary help, hobbies and sports, thus appearing to be a complement to active leisure.

In what follows, we account for the withdrawal from work in the subsequent years 2000-2003 after the 1999-2000 survey for individuals at age 53-64, with labour market status reported at the end of each year (for survey period in 1999). The estimation is based on probit and multinomial logit estimates in survey models. We include active leisure variables in the model in order to capture the possibility of household work being a close substitute for this. We use instrumenting techniques to explain household work according to factors which we assume not to be time constrained, thus reflecting a preference for household work over an individ-

ual's lifetime as well as shifting towards it after retirement. However, the instrumental variable estimations are calculated without adjustment for clustering or sample weights. Our first instrument is the spouse's household work. The spouse's household work is positively correlated with the household work (0.15), while is unrelated to the employment status (0.03). The second instrument is household work combined with leisure as secondary activity. This correlates with household work (0.22). The correlation to employment status (0.10) is not much lower but in table 2 appears to complement active leisure and is not a time constrained activity.

Other instruments include the longest hours spent in household work and leisure with no secondary activity. Longest hours spent in household work are a proxy for less time constrained household work. As an instrument, we also use the share of home work compared to total work time as given in the 1989 time-use survey. This projects the average household work over the lifecycle of the age, gender, education and socioeconomic group to which the individual belongs and is independent of his/her labour market status. Home work per total work time is taken from the 1989-90 survey for each particular group. The group categories include, besides gender, five-year age group, blue-collar workers, elementary schooling, also median income decile and marital status, yielding a total of 160 groups. All individuals are accounted for in 55 groups (no observations in the remainder 105 groups). We also use some other instruments that do not substantially change our main results. First, we expect the decision to provide voluntary work or neighbourly help to show persistent patterns and these are measured by two dummies for moderate and intensive voluntary or neighbourly help, as in table 2.⁴ Help to relatives is also assumed to indicate similar patterns. We also include a dummy for family help as an instrument indicating those who have helped relatives during the survey week (grandchildren, adult offspring, parents or other relatives). Sixty percent of females helped relatives in contrast to 42% for men.

⁴ Voluntary work (of women) is strongly related to a high income level, see findings for the US in Carlin (2001), while neighbourly help is more common among the non-educated and males.

Detailed information on the respondents' labour market status at the end of the survey year as well as on wages and income from capital and realty in 1999, 2001-2003 is register data from Statistics Finland. Dummies for the withdrawal from the labour market receive the value of one if the individual is retired or has taken early retirement, if the individual is permanently unemployed (thus within the unemployment pension pipeline) or if the individual received no salary income during the whole year. In the multinomial logit analysis we subdivide the retirees into those who are on old-age pension, unemployment pension pipeline or on early retirement. The latter group includes disability pensioners (the major group), individuals on early retirement (also implies deteriorating health) and part-time pensioners. The following table shows the share of the withdrawal options.

Table 3. Share of Non-Employed and Forms of Non-Employment by Education Levels in 2001-2003

Variable	Education Level	Mean	Std. Err.	95% Confidence Interval	
Non-Employed	Other	87 %	2 %	83 %	90 %
	Higher Tertiary	71 %	6 %	59 %	84 %
Retirement	Other	43 %	3 %	38 %	49 %
	Higher Tertiary	54 %	7 %	40 %	68 %
Unemployment, Unemployment Pension	Other	25 %	2 %	20 %	30 %
	Higher Tertiary	11 %	4 %	3 %	19 %
Disability Pension	Other	11 %	2 %	8 %	15 %
	Higher Tertiary	7 %	4 %	0 %	14 %

Only around 29% of the highly educated and 13% of other groups in employment at age 53-64 are still active in the worklife four years later after the 1999 time use survey. These results indicate a very high propensity to retire. Half of the non-employed respondents had retired on old-age pensions, which is possible in many occupations before the age of 65 (official retirement age in the public sector was 63). Others include family pensions or special pension arrangements covering agriculture workers. Retirement on the old-age pension plan before 65 years of age is included in non-employed group and kept as an alternative in the multinomial logit analysis. Unemployment and early retirement on the basis of the unemployment pension scheme is the second most important retirement option, particularly for workers other than the

highly educated, as reported by one-fourth of the respondents. 11% of the lesser educated and 7% of the highly educated workers are eventually covered by the disability pension.

Table 4. Work Withdrawal during 2000-2003 for older workers who had been employed in 1999.

Variable	Multinomial Logit					
	Probit	IV Logit	Old-Age Pension	Unemployment, Unemployment Pension	Other Early Retirement Pension	
Option Value	-13.2 [3.5]**	-14.7 [3.5]**	-10.1 [2.5]*	-30.1 [1.2]**	-58.0 [2.0]**	-12.4 [1.5]
Log Unearned Income (Household)	-0.067 [1.9]	-0.048 [1.4]	-0.057 [1.0]	-0.164 [2.1]*	0.029 [0.3]	-0.116 [1.3]
Work Travel Time	0.013 [0.1]	0.010 [0.1]	0.062 [0.5]	0.012 [0.1]	-0.060 [0.3]	-0.113 [0.5]
Not Regular Working Time > 28 hours d	0.091 [0.2]	0.102 [1.5]	-0.048 [0.2]	0.19 [1.0]	0.09 [0.5]	-0.15 [1.1]
Part-Time Work or Work < 28 hours d	0.091 [1.4]	0.095 [1.3]	-0.030 [0.1]	0.29 [1.3]	-0.08 [0.7]	-0.08 [0.5]
Female d	0.007 [0.1]	0.133 [1.0]	-0.251 [1.5]	0.3 [1.9]	-0.4 [1.8]	0.2 [1.0]
Upper Secondary, Lower Tertiary d	-0.039 [0.6]	-0.023 [0.3]	-0.113 [0.7]	-0.1 [0.9]	0.0 [0.1]	0.1 [0.5]
Higher Tertiary d	0.129 [2.3]	0.148 [2.7]	0.217 [1.1]	0.5 [2.5]*	0.0 [0.3]	-0.3 [2.3]
Household Work / Total Work	0.457 [1.2]		2.279 [2.1]*	0.0 [1.7]	0.1 [0.7]	0.3 [1.5]*
Household Work / Total Work, Female		-0.105 [0.2]				
Household Work / Total Work, Male		1.098 [1.9]				
Sport / Total Active Time	0.449 [0.2]	-0.268 [0.1]	-3.103 [0.7]	-0.9 [0.1]	4.3 [0.6]	6.8 [0.8]
Busy Sometimes d	-0.178 [2.4]*	-0.164 [2.1]*	-0.245 [1.5]	-1.1 [0.9]	0.2 [0.2]	1.4 [0.8]
Busy Continuously d	-0.119 [0.9]	-0.122 [0.9]	-0.121 [0.5]	0.1 [0.9]	0.0 [0.03]	-0.3 [2.0]*
Spouse's Household Work	0.015 [1.7]					
Spouse's Household Work, Female		0.007 [0.5]		-0.4 [0.4]	1.6 [1.4]	-0.8 [0.9]
Spouse's Household Work, Male		0.031 [2.3]*		0.0 [0.3]	0.0 [0.2]	0.0 [0.4]
Spouse's Non-Employed d	-0.040 [0.6]			0.0 [1.3]	0.0 [0.7]	0.1 [2.4]*
Spouse's Non-Employed, Female d		0.096 [1.2]	0.082 [0.4]			
Spouse's Non-Employed, Male d		-0.296 [1.9]*	-0.299 [1.4]			
Spouse's Hobbies	-2.743 [1.2]	-3.551 [1.4]	-1.410 [0.4]	-0.3 [0.4]	-0.1 [0.1]	-0.7 [1.1]
Observations	145	145	145		145	
F Statistics	1.842	1.768			2.463	
Correctly specified (cut point >=0.5)	86.9 %	85.3 %	71.8 %			
Instrument Validity p-value			0.004			

Note. Marginal effects are reported for dummy variables. All estimations have three region size dummies. In column 3 household work is instrumented by household work in the respective group in 1987, spouse household work by gender, spouse household work with leisure as secondary activity, leisure with no secondary activity, longest uninterrupted hours (household work, neighbour or voluntary work, hobbies), number of children, family help, family help female, neighbour or voluntary help dummies. Other early retirement pension include disability pension, individual early retirement, part-time pension. z statistics in brackets *Significant at 95% confidence level, ** Significant at 99% confidence level.

The table 4 shows the estimation results. The third column shows the instrumental variable estimation and last three columns multinomial logit results. In all estimations, marginal effects are reported for dummy variables. The instrument estimation also passes the instrument validity test by Smith and Blundell (1986). This test is related to the Davidson-MacKinnon (1993) auxiliary regression test, where the predicted values for the endogenous variables are first estimated using the instruments and control variables. At the second stage, the predicted values together with original values are used in the same regression. Instruments are valid if the predicted values are of significance.

Prediction success of the three estimations explaining early retirement or non-employment can be measured with an index of correct predictions. The prediction success is rather high, around 87%. Pecuniary incentives include the option values estimated at the rate of both the current and unearned income of the entire household (capital incomes). Option values are strongly dependent on age because pension wealth accrual is linked to life expectancy. As can be seen, pecuniary incentives have the right sign, since those with lowest option values are the first to retire. However, marginal effects are fairly low when estimated at sample means. A relatively large increase in option value by 0.02 (two-standard deviation increase for highly educated) raises the retirement probability only around 8%.

The positive effect of a household's unearned income on early retirement is as expected. This supports the theory according to which wealth increases an individual's consumption possibilities and thus lowers the need for labour-market wages (for similar results see Perachhi and Welch, 1994, and Dahl et al., 1999).⁵ Time for work-related travel also inherits a strong income effect, which appears to be positively but insignificantly linked to the withdrawal from

⁵ Note also that in the data, the average unearned income of women exceeds that of men irrespective of labour market position.

worklife. It is noted that existing part-time work arrangements do not appear to “constitute a bridge” between full-time work and full retirement. The coefficient for part-time work is not statistically significant.

It is noted that the share of household work compared to total work enhances the early retirement probability for males in OLS (column 2), for all in the instrument estimation (column 3) and in the withdrawal based on other early retirement schemes (column 6). The instrument estimation in column 3 gives the strongest positive effect on the probability to retire. A seven-hour increase in household work per week (one hour per day) is associated with around 6%-point increase in the probability to retire. In column 2 we analyse household work and spouse’s household work according to gender. This shows evidence that men’s work withdrawal is clearly related on their share of household work as well as to the wife’s household work. On the part of females, instead, their own household work burden or that of their husbands has no implications on retirement.

Active leisure is measured by the share of sports and/or hobbies of the spouse. It is noted that an active sports life does not significantly affect the workforce withdrawal. The share of leisure time devoted to physical exercise among couples reaches a 9% peak for women and 12% for men in the age bracket 53-60. On the other hand, healthy individuals can work longer. On the other hand, if there is an extensive time investment in these activities, the individuals have more to do in non-work time or can be injured.

An interesting finding is that a higher tertiary education level (university level), *ceteris paribus*, increases the probability of withdrawal from work by around 12-22%, especially the withdrawal on an old-age pension below 65 years of age (see column 4). Option values and time use capture much of the difference by education groups, namely that 43% of the highly

educated are still working at the age of 60-64 versus 17% for other groups. The highly educated have higher option values for retirement postponement and also have lower supply of household work. Huovinen and Piekkola (2001) show that pensioners in Finland, either on the unemployment or disability schemes, are generally low-income earners and have shorter educational histories. They also show that the withdrawal of aged workers is weakly related to the long-term productivity and profitability of the firm. After controlling for option values and time use, we find instead that the highly educated are *more* prone to retire. Therefore the higher propensity to retire of less educated does not relate to the level of education as such, whereas to different background in general.

Around 60% of the individuals reported being busy sometimes while 7% of the males and 22% of the females consider themselves to be busy all the time, see table 1. It is noted that a busy life style is associated with a longer worklife. This is especially true for the majority of the workforce who are busy only sometimes. The double burden of work and household work does not, as such, necessarily drive an individual from labourwork. It may instead be the case that older workers with passive lifestyles with possibly no social ties live shorter lives and are thus motivated to retire.⁶ Individuals busy in non-market activities such as household work are prone to retire.

We conclude the following on the part of female and male household work. Males do household work activity that is a substitute for active leisure and in retirement men also take part of wife's duties. We thus find asymmetric substitutability of household work rather than asymmetric complementarities of leisure as stressed by Coile (2003): husband may substitute household work of wife but not the other way around. One apparent explanation is that wife is

⁶ Patricia et al. (2002), using a social network index, show that men who have a large number of friends, relatives and other social ties may live a longer, healthier life than their socially isolated peers.

already engaged more heavily in household activities and is not willing to do duties performed by husband (or do not retire for that reason). Women do a lot of household work but can also expect the male to assume a part of the responsibility once he retires. This would explain that large changes in household work observed for men when they turn non-employed men in Piekkola and Leijola (2003) in 7 European countries. We find instead less complementarity in leisure. If the wife is non-employed, the probability that the husband retires decreases by 29.6%. Finally, it would be tempting to claim that men who do a lot of household work have poorer health, and have less time for outdoor activities and do more household work. This may also relate to greater propensity to withdraw from work. However, we found no evidence that men doing more household work have poorer health. It can also be the case that for women, a part of the household work after retirement is rather mechanically a direct substitute for market work, following hypothesis (iii). Household work prior to retirement may then say very little about retirement incentives.

Clark et al. (1980), Coile and Gruber (2001), Dahl et al., (2002) and Johnson and Favreault (2001) all find that the spouse's participation in the labour market diminishes the motivation to withdraw. We obtain a different result here, as we can see that it is the spouse's household work activity, instead of the labour market status, that drives men from the labour market. To obtain further confirmation of the importance of the spouse's active time use rather than his/her labour market status, we have also included the spouse's hobbies in the analysis. Although the variable is never significant, it always has a negative sign. Thus there is motivation for retirement if the wife is engaged in household work but no incentive if she generally has active leisure activities or leisure time at her disposal.

Among the early-retired individuals, those on disability pensions constitute an important group in explaining the possible effects of health on the workforce withdrawal. It can be

claimed that a large number of these individuals are truly in poor health. We see that those who are busy continuously do not become disabled. The disability pension has also been used as a substitute for the unemployment pension, depending on which is cheaper for the firm (see Huovinen and Piekkola 2002).

5. Conclusions

Our focus aim was to link pecuniary incentives and time use, such as household work, to the retirement decision. Option values generated through pension wealth are important, although the marginal incentives are not greater than those created by the time allocated to household work or active leisure. We have also examined the importance of household work activities, active leisure and busy lifestyle, factors which explain most of the differences in the retirement behaviour of individuals with diverging levels of education. Those with tertiary education have somewhat stronger economic incentives not to consider early retirement. These are related to the pension wealth that accrues from additional work years. They also do less household work and the economic value of this is lower. High income earners also have better working conditions, enjoy a busy lifestyle and may expect to live longer and healthier during retirement.

Elderly couples in particular do a considerable part of their household work together and household work is an important determinant of retirement. Household work may be a close substitute for market work, replace market work after retirement, or be comparable to active leisure. We use instruments that we believe will also indicate how the household work patterns of an individual during his/her worklife will affect their household work after retirement. With these instruments, household work turned out to be a significant explanation for early retirement.

We, however, find asymmetric substitutability of household work, where husband may take responsibilities of the wife who is working and even retire for that reason but not the other way around. It is also possible that household work done by men cannot be bought from the market, and substitution of household work for market work is not possible. Household work, or rather part of it such as gardening, can also be substitutable for active leisure. Household production model cannot explain all this. We find joint household work unrelated to pecuniary incentives, while also find less evidence for mutual leisure to influence the retirement path.

Evidently, in a number of cases, inflexible worktime arrangements may prematurely lead to early retirement. Many studies, including OECD (2001) and Piekkola (2003), hint that long working hours are more stressful for older workers. New flexible working arrangements are needed. However, existing part-time work arrangements cannot “bridge” the period between full-time work and full retirement, and OECD (2001) suggests that labour force actions be taken beforehand and not only once the worker turns out to be 55 years of age or older.

Overall, we can see that active and busy individuals stay longer in working life, but those active in non-market-work time are prone to retire earlier. Household work is an important part of this time use and therefore all non-market work time cannot be categorised to a broad measure of leisure. Household production model also works poorly as household work is unrelated to returns to market work.

References

- Becker G.S. (1965) The Theory of the Allocation of Time. *Economic Journal* 75 (September 1965): 1073-82.
- Coile, C. (2003), Retirement Incentives and Couple's Retirement Decisions, Centre for Retirement Research at Boston College Working Paper 2003-04.
- Dahl S-Å, Nilsen O.A. and K. Vaage (1999) Work or retirement? Exit routes for Norwegian elderly. IZA Discussion Paper No. 32.
- Dahl, Svønn-Age; Nilsen, Qivind Anti; Vaage, Kjell (2002) Gender Differences in Early Retirement Behaviour, IZA Discussion Paper No. 522.
- Davidson R. and J. G. MacKinnon (1993) *Estimation and Inference in Econometrics*: Oxford University Press.
- Fast J. E., Dosman D. and N.C. Keating (2001) Are Canadians Ageing Successfully? Findings from the 1998 Statistics Canada Time-use Survey. Presentation at the 2001 International Association of Time-use Research Oslo, Norway.
- Gauthier A. and T. Smeeding (2003) Time Use at Older Ages: Cross-National Differences, *Research on Aging*, 25 (May 2003): 247-274.
- Graham, J. W. and C. A. Green (1984) Estimating the Parameters of a Household Production Function with Joint Products. *The Review of Economics and Statistics* 65(2): 277-282.
- Gronau R. (1977) Leisure, Home Production, and Work – The Theory of the Allocation of Time Revisited, *Journal of Political Economy* 85(6): 1099-1123.
- Hadi A. S. (1992) Identifying multiple outliers in multivariate data. *Journal of the Royal Statistical Society B* 54: 761-771.
- Hadi A. S. (1993) A modification of a method for the detection of outliers in multivariate samples. *Journal of the Royal Statistical Society B* 56: 393-396.
- Hamermesh D. (2005) Why Not Retire? The Time and Timing Costs of Market Work. Michigan Retirement Research Center Working Paper No. 104.
- Hurd M.D. (1996) The Effect of Labor Market Rigidities on the Labor Force Behavior of Older Workers. In: (ed) Wise DA *Advances in the Economics of Aging* The University of Chicago Press, 1996, Chicago, 11-58
- Huovinen P. and H. Piekkola (2001) Withdrawal from Employment of Older Finnish Workers. *Australian Journal of Labour Economics* Vol. 4(4): 340-359.
- Huovinen P. and H. Piekkola (2002) The Time is Right? Early Retirement and Use of Time by Older Finns. ETLA (The Research Institute of The Finnish Economy) B-Series No. 189. Taloustieto, Helsinki.
- Johnson Richard W. and Melissa M. Favreault (2001). Retiring Together or Retiring Alone: The Impact of Spousal Employment and Disability on Retirement Decisions. CRR Working Paper 2001-01. Center for Retirement Research at Boston College.
- Juster T.F. and F.P. Stafford (1991), The Allocation of Time: Empirical Findings, Behavioral Models, and Problems of Measurement. *Journal of Economic Literature* June 1991, Volume XXIX no. 2: 471-522.

- Kerkhofs M. and P. Kooreman (2003), Identification and Estimation of a Class of Household Production Models. *Journal of Applied Econometrics* 18, 337-369.
- Kooreman P. and A. Kapteyn (1987) A Disaggregated Analysis of the Allocation of Time within the Household. *Journal of Political Economy* 95(21): 223-249.
- Lumsdaine R.L. And O.S. Mitchell (1999) New Developments in the Economic Analysis of Retirement. In: (ed) Ashenfelter O Card D *Handbook of Labor Economics*. Elsevier, Amsterdam, 3261-3308.
- Manning W.G, Duan. N, and W.H. Rogers, (1987) Monte Carlo Evidence on the Choice Between Sample Selection and Two-Part Models. *Journal of Econometrics*, Vol. 35: 59-82
- Niemi I. and H. Pääkkönen (1990) Time Use Changes in Finland in the 1980s. *Statistics Finland Studies* 174. Helsinki.
- Niemi I. and H. Pääkkönen (2002) Time Use Changes in Finland through the 1990s. *Statistics Finland. Culture and the Media* 2002:2. Helsinki.
- Niemi I. (2005) Iäkkäiden perheiden ajankäyttö (Time Use of Elderly Families) in Pääkkönen H. (ed.) *Perheiden ajankäyttö*. Statistics Finland. Helsinki.
- OECD (2000) *Reforms for an Ageing Society*. Social issues 2000. Organisation for Economic Co-Operation and Development, Paris.
- OECD (2001) *Ageing and Income: Financial Resources and Retirement in 9 OECD Countries*. Organisation for Economic Co-Operation and Development, Paris.
- Patricia M.E., Rimm E.B., Fitzmaurice Garrett, Kawachi Ichiro (2002), Social Ties and Change in Social Ties in Relation to Subsequent Total and Cause-specific Mortality and Coronary Heart Disease Incidence in Men *American Journal of Epidemiology* 2002;155:700-709.
- Perachhi F. and F. Welch (1994) Trends in Labor Force Transitions of Older Men and Women, *Journal of Labor Economics* 12, 210-242.
- Piekkola H. (2003) Työssä jaksaminen kiireiden ja vapaa-ajan puristuksissa – tutkimus ikääntyvien ajankäytöstä (Well-being at work under the pressure from hurry and leisure). *Well-being at Work Programme*. Ministry of Labour.
- Piekkola H. and L. Leijola (2003) Time Use and Options for Retirement in Europe. The Research Institute of The Finnish Economy (ETLA) Discussion Papers No. 868.
- Smith, R.J. and R.W. Blundell (1986) An exogeneity test for a simultaneous equation Tobit model with an application to labor supply. *Econometrica* 54, 679-686.
- Solberg E.J. and D.C. Wong (1991) Family Time Use Leisure, Home Production, Market Work, and Work Related Travel. *Journal of Human Resources* 27(3), 485-510.
- Statistics Finland (2001) *Time-use Research Surveys 1987-1988 and 1999-2000*. Statistics Finland, Helsinki.
- Stock JH. and D.A. Wise (1990) Pensions, the Option Value of Work and Retirement *Econometrica* 58(5): 1151-1180.
- Tuominen E., 2001, *Muuttuva työ ja eläketurva (Changing Work and Pensions)*. Finnish Centre for Pension Studies 2001:1.
- Työministeriö ja Sosiaali ja terveysministeriö (Ministry of Labour and Ministry of Social Affairs and Health) (2000) *Kansallisen ikäohjelman seurantaraportti (Implementation Report of National Programme on Ageing Workers)*. Sosiaali- ja terveysministeriön julkaisuja 2000:15 (Ministry of Social Affairs and Health Research reports No 15). Oy Edita Ab, Helsinki.

Appendix A. Finnish Pension Rules

The earnings-related pension depends on accrued pension rights during (self) employment: benefits are based on the number of years in employment, and the accrual rate: the pension starts to accrue from the age of 23. For the employment years prior to July 1962, the pension rate accrual is 0.5% per year. For employment after July 1962, the pension rate is 1.5% per year. From the age of 60 onwards, the pension rate is 2.5%. The maximum pension is 60% of the highest wage before retirement but with no other upper limit. Pension benefits are described by

$$Pension = Pensionable\ salary * Years\ of\ employment * Accrual\ rate \quad (a.1)$$

Pension benefits are indexed-based on wage development (50% before age 65, 80% from age 65 on) and prices (50% before age 65, 20% from age 65 on). Wage and consumer price index growth (pension incomes are indexed to these) follow the development for the years 1997-1999. No pension benefits are accrued on income earned after the age of 65 years but these earnings do increase the post-retirement pension entitlement by 0.6% per month. It is also possible to retire from the age of 60 years onward, but this actually reduces the level of pension payments by 0.4% for every month below age 65. The government pension is 428 euro a month, 382 euro for a married person, depending on the municipality of residence. This is reduced by one-half of the amount exceeding 41.2 euro a month of the pension based on employment contracts. It is not paid if the earnings-related pension exceeds 856-893 euro a month, depending on municipality. A married person receives no pension if his earnings-related pension exceeds 755-786 euro a month (1998 figures). The pension income is taxable. The tax rates for the year 2000 were used in calculating real net incomes. Additional sickness insurance for pensioners is 2.7 (in addition to 1.5).

Unemployment pension consists of (a) pension entitlement at the time of unemployment, (b) pension that would be forthcoming until age 60 = unemployment months until age 60*pension wage/1000 (after 500 days of unemployment), (c) forthcoming pension from the age of 60 = unemployment pension months until age 65(60 or less)*pension wage/1500 (after 500 days of unemployment), and (d) pension supplement after 500 days of unemployment: coefficient = $0.8 * \text{unemployment months} / (504 - \text{unemployment months})$. Unemployment months are days divided by 22 and figure 504 above shows months between age 23 and 65. Unemployment pension can then be defined as

$$\text{Unemployment pension} = \min [(a + b + c) * (1 + \text{coefficient}), 0.6 * \text{Pension wage}] \quad (\text{a.2})$$

Disability pension consists of (a) pension entitlement accrued at the time of disability, (b) forthcoming pension until age 50 = disability months until age 50* pension wage/800, (c) forthcoming pension at age 50-59 = disability months at age 50-59 (120 or less)*pension wage /1000, and (d) upcoming pension at age 60-65 = disability months at age 60-64 (60 or less)/1500. The disability pension can then be defined as

$$\text{Disability pension} = \min [(a + b + c + d), 0.6 * \text{Pension wage}] \quad (\text{a.3})$$

ELINKEINOELÄMÄN TUTKIMUSLAITOS (ETLA)
THE RESEARCH INSTITUTE OF THE FINNISH ECONOMY
LÖNNROTINKATU 4 B, FIN-00120 HELSINKI

Puh./Tel. (09) 609 900
Int. 358-9-609 900
<http://www.etla.fi>

Telefax (09) 601753
Int. 358-9-601 753

KESKUSTELUAIHEITA - DISCUSSION PAPERS ISSN 0781-6847

Julkaisut ovat saatavissa elektronisessa muodossa internet-osoitteessa:
<http://www.etla.fi/finnish/research/publications/searchengine>

- No 1003 TERTTU LUUKKONEN, Venture Capital Industry in Finland – Country Report for the Venture Fun Project. 27.02.2006. 48 p.
- No 1004 ELIAS OIKARINEN, Price Linkages Between Stock, Bond and Housing Markets – Evidence from Finnish Data. 15.02.2006. 36 p.
- No 1005 JUHA ALHO – NIKU MÄÄTTÄNEN, Aggregate Mortality Risk and The Insurance Value of Annuities. 21.02.2006. 15 p.
- No 1006 MORRIS TEUBAL – TERTTU LUUKKONEN, Venture Capital Industries and Policies: Some Cross-country Comparisons. 28.02.2006. 23 p.
- No 1007 MIKA PAJARINEN – PEKKA YLÄ-ANTTILA, Omistajuus ja yritysten menestyminen: Analyysia suomalaisella aineistolla. 01.03.2006. 42 s.
- No 1008 KARI E.O. ALHO, Labour Market Institutions and the Effectiveness of Tax and Benefit Policies in Enhancing Employment: A General Equilibrium Analysis. 29.03.2006. 43 p.
- No 1010 FRANCESCO DAVERI – MIKA MALIRANTA, Age, Technology and Labour Costs. 24.03.2006. 48 p.
- No 1011 MARKKU KOTILAINEN, Economic Shocks, Progressiveness of Taxation, and Indexation of Taxes and Public Expenditure in EMU. 03.04.2006. 29 p.
- No 1012 HELI KOSKI – TOBIAS KRETSCHMER, Innovation and Dominant Design in Mobile Telephony. 03.04.2006. 31 p.
- No 1013 HANNU HERNESNIEMI – MARTTI KULVIK, Helsingin seudun klusterit sekä erikoistuminen bioteknologiaan ja logistiikkaan. 11.04.2006. 44 s.
- No 1014 LAURA VALKONEN, Deregulation as a Means to Increase Competition and Productivity. Some Finnish experiences. 25.04.2006. 84 p.
- No 1015 VILLE KAITILA, Productivity, Hours Worked, and Tax/Benefit Systems in Europe and Beyond. 27.04.2006. 34 p.
- No 1016 OLAVI RANTALA, Sosiaalietuuksien rahoituksen hinta- ja hyvinvointivaikutukset kotitaloussektorissa. 05.05.2006. 21 s.
- No 1017 MAARIT LINDSTRÖM – MIKA PAJARINEN, The Use of Design in Finnish Manufacturing Firms. 05.05.2006. 26 p.
- No 1018 NIKU MÄÄTTÄNEN, Vapaaehtoiset eläkevakuutukset, verotus ja eläkkeelle siirtyminen. 05.05.2006. 25 s.

- No 1019 ESA VIITAMO – HANNU HERNESNIEMI, Ympäristöliiketoiminnan määrittely ja tilastollinen seuranta – Ympäristöalalle lisää kilpailukykyä. 15.05.2006. 58 s.
- No 1020 CHRISTOPHER PALMBERG – TUOMO NIKULAINEN, Industrial Renewal and Growth Through Nanotechnology? – An overview with focus on Finland. 17.05.2006. 45 p.
- No 1021 ESA VIITAMO, Markkinoiden toimivuuden arvioiminen – Suuntaviivoja vertailevalle kilpailututkimukselle.
- No 1022 OLLI MARTIKAINEN – JUSSI AUTERE – MARKKU NURMELA, Performance Improvement in Public Organizations – How to leverage ICT Investments. 30.05.2006. 38 p.
- No 1023 ARI HYYTINEN – MIKA MALIRANTA, When do Employees Leave Their Job for Entrepreneurship: Evidence from Linked Employer-employee Data. 31.05.2006. 24 p.
- No 1024 KARI E.O. ALHO, Climate Policies and Economic Growth. 31.05.2006. 23 p.
- No 1025 JYRKI ALI-YRKKÖ, Technology Sourcing through Acquisitions – Do High Quality Patents Attract Acquirers? 14.06.2006. 16 p.
- No 1026 DEREK C. JONES – PANU KALMI – MIKKO MÄKINEN, The Productivity Effects of Stock Option Schemes: Evidence from Finnish Panel Data. 15.06.2006. 36 p.
- No 1027 MIKKO MÄKINEN – PANU KALMI, Henkilöstöjohtaminen, henkilöstönn osallistuminen ja organisaatiomuutokset teollisuusyrityksissä. Aineistokuvaus puhelinkyselyn tuloksista. 16.06.2006. 27 s.
- No 1028 OLAVI RANTALA, T&K-panostusten kansantaloudelliset vaikutukset. 22.06.2006. 44 s.
- No 1029 ARI HYYTINEN – OLLI-PEKKA RUUSKANEN, What Makes an Entrepreneur Independent? Evidence from Time Use Survey. 22.06.2006. 23 p.
- No 1030 MARI MAUNULA, The Perceived Value-added of Venture Capital Investors. Evidence from Finnish Biotechnology Industry. 03.07.2006. 86 p.
- No 1031 JYRKI ALI-YRKKÖ – MIKA MALIRANTA, Impact of R&D on Productivity – Firm-level Evidence from Finland. 07.08.2006. 20 p.
- No 1032 TERTTU LUUKKONEN – MARI MAUNULA, 'Coaching' Small Biotech Companies into Success: The Value-adding Function of VC. 22.08.2006. 33 p.
- No 1033 LAURA VALKONEN, Perhevapaiden vaikutukset naisten ura- ja palkkakehitykseen – Kirjallisuuskatsaus. 30.08.2006. 38 s.
- No 1034 MIKA WIDGRÉN, Trade Potential, Intra-Industry Trade and Factor Content of Revealed Comparative Advantage in the Baltic Sea Region. 01.09.2006. 26 p.
- No 1035 RAIMO LOVIO – JARI JÄÄSKELÄINEN – JUHA LAURILA – KARI LILJA, Globalisaatio Suomen vanhojen teollisuuspaikkakuntien kehityksen muovaajana – Tapaustutkimus Varkauden kaupungista. 06.09.2006. 16 s.
- No 1036 HANNU PIEKKOLA, Are Individuals who are Active and Doing Household Work Prone to Retire Earlier: Evidence from Time Use Survey of Older Finns. 08.09.2006. 30 p.

Elinkeinoelämän Tutkimuslaitoksen julkaisemat "Keskusteluaiheet" ovat raportteja alustavista tutkimustuloksista ja väliraportteja tekeillä olevista tutkimuksista. Tässä sarjassa julkaistuja monisteita on mahdollista ostaa Taloustieto Oy:stä kopiointi- ja toimituskuluja vastaavaan hintaan.

Papers in this series are reports on preliminary research results and on studies in progress. They are sold by Taloustieto Oy for a nominal fee covering copying and postage costs.