CITY OF HELSINKI URBAN FACTS

Study reports
2007 | 9

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# Explaining Basic Service Expenditures of Finnish Municipalities

Cover picture: Helsingin kaupungin kuvapankki/ Pertti Nisonen

**Web version**
ISSN 1796-7236
ISBN 978-952-223-020-1

**Printed version**
ISSN 1455-7266

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**Preface**

Municipal economy is a constantly discussed topic in Finland. Demand for basic services produced by the municipalities is on the increase while scarce resources prevail in the production side. Raising productivity is difficult, which causes additional stress to the economy. A local government reform has been regarded necessary by the previous and current government despite the fact that the Finnish public sector has been receiving high rankings in international evaluations.

This report is a result of co-operation between City of Helsinki Urban Facts and University of Helsinki Department of Geography. The primary aim is to statistically explain differences in basic service expenditures of municipalities by their structural properties like population, location and political factors, a relatively unexplored area in Finland so far. This research provides useful background information for future plans and decisions.

According to the results of this work-in-progress report, the expenditure levels are affected by several demand- and supply-side factors, and these factors altogether account for some two thirds of the differences. And as such basic structures tend to change slowly, also expenditure differences can be expected to prevail.

Markus Laine

Acting research professor

**Esipuhe**

Kuntien taloudesta keskustellaan jatkuvasti. Kuntien tuottamien peruspalvelujen kysyntä kasvaa, mutta kuntasektorin resurssit ovat niukat. Palvelujen tuottavuuden nostamisessa on omat ongelmansa. Tämä asettaa taloudelle lisäpaineita. Vaikka suomalaiset julkispalvelut ovat kansainvälisten vertailujen mukaan korkeatasoisia ja ne on tuotettu kohtuuhinnoin, on tulevaisuus täynnä haasteita. Keväällä 2005 käynnistetyn kunta- ja palvelurakenteen uudistamishankkeen (PARAS) päämäärä onkin turvata asukkaille kuntien vastuulla olevat hyvinvointipalvelut myös jatkossa.

Tämä tutkimus on tehty Helsingin kaupungin tietokeskuksen ja Helsingin yliopiston maantieteen laitoksen yhteistyönä. Siinä on ensisijaisesti pyritty selvittämään, voidaanko kuntien peruspalvelujen menotasoeroja selittää erilaisten rakennetekijöiden avulla, ja mitkä rakennetekijät ovat näiden erojen muotoutumisessa merkittäviä. Kysymystä on meillä toistaiseksi tutkittu vähän, ja sitä lähestytään tilastollisten mallien avulla. Tutkimus tarjoaa taustatietoa tulevaisuutta koskevien suunnitelmien ja päätösten tueksi.

Alustavien tulosten mukaan menotasoerojen taustalla on useita rakenteellisia, sekä palvelujen kysyntään että niiden tarjontaan liittyviä syitä. Noin kaksi kolmasosaa kuntien välisistä eroista voitiin palauttaa tällaisiin tekijöihin. Ja koska kuntien perusrakenteet muuttuvat hitaasti, voidaan myös menotasoerojen odottaa säilyvän. Tutkimushanke jatkuu vuonna 2008.

Markus Laine
Vs. tutkimusprofessori

# Yhteenveto

## Taustaa

Peruskoulutuksen, terveys-, sosiaali- sekä sivistyspalvelujen järjestäminen on taloudellisesti kehittyneissä maissa yleensä julkisen sektorin tehtävä. Toisinaan, kuten Suomessa, julkinen sektori sekä rahoittaa että tuottaa valtaosan näistä palveluista, mutta muualla tuottaja on usein yksityinen tai voittoa tavoittelematon taho. Palvelujen tuottamisesta voidaan päättää joko keskitetysti tai hajautetusti. Esimerkiksi Ruotsissa, Norjassa ja Tanskassa[1] on ollut vallalla kolmiportainen julkinen hallinto, jossa palvelujen organisointi on jaettu kuntien ja välitason kesken. Suomen kaksiportainen hallinto poikkeaa muista pohjoismaista. Meillä kunnat vastaavat laajasta peruspalvelujen kirjosta, toimien palvelujen tuottajina joko yksin tai kuntien yhteenliittymien kautta. Peruspalvelujen järjestäminen vaatii kunnilta alueellisesti hajautettua verkostoa, jossa toimintayksiköiden koko riippuu palvelutyypistä, kunnan väestömäärästä sekä maantieteellisestä koosta ja rakenteesta.

Taloustiede on pyrkinyt useilla tavoin ja vaihtelevista näkökulmista valottamaan kuntien palvelutarjonnan kysymyksiä. Arvioitaessa julkisten menojen kokonaistason määräytymistä sekä menojen rakennetta ovat teoreettisina lähtökohtina yleensä ns. mediaanituloisen äänestäjän (median voter) sekä kärpäspaperivaikutuksen (flypaper effect) periaatteet. Julkisten palvelujen tehokkuuden teoreettiset asetelmat voidaan taas palauttaa ns. Leviathan-malliin. Myös virkamiesten, poliitikkojen ja painostusryhmien merkitystä on tutkittu. Teoreettiset perusmallit ovat kuitenkin liian pelkistettyjä, jotta niitä aina voitaisiin sellaisenaan soveltaa empiirisessä tutkimuksessa. Erityisesti Suomessa ja muissa pohjoismaissa kuntien toiminta on laaja-alaista. Meillä sekä valtiovalta että paikallistason edustuksellinen demokratia ohjaavat toimintaa monipuoluejärjestelmän oloissa. Tässä tilanteessa esimerkiksi mediaaniäänestäjämalli ei oikein sovellu empiirisen tutkimuksen perustaksi. Kun laaja-alainen teoriakehikko puuttuu, painotetaan empiirisissä tutkimuksissa yleensä jotain osakysymystä tai teoreettista hypoteesia, ja muut näkökulmat jätetään vähemmälle huomiolle. Tällöin menoja selitetään tavallisesti laajan muuttujajoukon avulla, mutta päähuomio kiinnitetään johonkin tiettyyn tekijään.

Kuntien menot ovat kahden eri tekijän tulo. Ensimmäinen tekijä on palvelujen määrä, periaatteessa laatuerojen suhteen korjattuna, ja toinen on palvelujen yksikköhinta (tai omassa tuotannossa yksikkökustannus). Jos hinnat ovat kuntapäättäjille annetut, kuntalaiset ja kuntapäättäjät ratkaisevat valinnoillaan menojen kokonaismäärän. Yksikköhinnat ja –kustannukset puolestaan riippuvat palvelusektorien toiminnan tehokkuudesta. Suurin osa kuntien peruspalvelujen tarjonnasta on kuntien omaa palvelutuotantoa. Valtiovalta asettaa kuntien toiminnalle reunaehtoja silloin, kun kyse on kuntien omasta tai kuntayhtymien palvelutuotannosta. Näiden ehtojen vallitessa kunnat sitten päättävät palvelujen resursseista, tuotannosta, organisoinnista ja palveluverkoston rakenteesta. Tässä asetelmassa kuntien välille syntyy tehokkuuseroja, jotka heijastavat muun muassa niiden toimintaolosuhteita sekä kykyä järjestää palvelutuotantonsa. Julkisen palvelutuotannon tehokkuuseroja on tutkittu verraten laaja-alaisesti myös Suomessa. Tutkimukset ovat koskeneet joko yksittäisiä sektoreita, kuten terveyskeskuksia, sairaaloita tai kouluja, tai palvelutarjontaa kokonaisuudessaan.

[1] Tanskan vuoden 2007 alusta voimaan tuleen kuntareformin tuloksena kuntien lukumäärä väheni 275:stä 96:een ja välitason alueiden lukumäärä 14:sta 5:een. Samalla niiden tehtäviä ja rahoituksen muotoja järjestettiin osin uudella tavalla.

Tämä raportti[2] esittelee vielä meneillään olevan tutkimustyön nykyvaihetta ja tähän mennessä käytetyillä aineistoilla ja menetelmillä saatuja tuloksia. Tutkimushankkeen tarkoituksena on ensinnäkin selvittää, mitkä tekijät selittävät hyvinvointipalveluihin henkeä kohti käytettyjen menojen eroja Suomen kunnissa. Hyvinvointipalveluilla tarkoitetaan terveys-, sosiaali-, koulutus- ja kulttuurisektorien menoja, jotka Suomessa kuuluvat kuntien lakisääteisiin tehtäviin. Välineenä käytetään regressioanalyysiä, ja selittävinä ilmiöinä on sekä kysyntä- että tarjontatekijöitä.

Aiemmissa kansainvälisissä tutkimuksissa pääpaino on ollut kysyntätekijöiden kuten tulojen, väestötekijöiden ja politiikkamuuttujien roolin tutkimuksessa. Tarjontapuolelta kuntien menokäyttäytymistä on selitetty mm. alueellisten palkkaerojen, byrokraattien toiminnan, julkisen sektorin työntekijöiden valtuustotoiminnan ja alueellisen rakenteen avulla.

Tässä tutkimuksessa erityishuomio kiinnitetään palvelutarjonnan tehokkuuteen kuntien menojen selittäjänä. Aiemmasta tutkimuksestamme saadaan tehokkuusluku, joka mittaa kuntien hyvinvointipalvelujen kustannustehokkuutta kokonaisuudessaan. Tämä luku sisällytetään muiden muuttujien rinnalla kuntien per capita -menoja selittäviin malleihin. Kunnan tehokkuusluku ei kerro, mistä korkea tai matala tehokkuus johtuu, mutta se summeeraa kunnan eron suhteessa tehokkaimmiksi havaittuihin kuntiin (joiden tehokkuusluku on 100 prosenttia). Tehokkuusluku voidaan tulkita käänteiseksi hintamuuttujaksi: tehokkuuden kasvu vastaa hinnan alennusta ja päinvastoin. Kasvavatko kuntien menot tehokkuuden kasvaessa, pysyvätkö ne samana vai vähenevätkö ne? Kuntien palvelutarjonnan tehokkuuslukuja ei tiettävästi ole aiemmin käytetty menojen selittäjinä. Esitämme myös tavanomaisempia malleja, joissa tehokkuuslukujen sijalla on useita tarjontapuolta kuvaavia muuttujia, jotka voidaan tulkita myös tehokkuuserojen selittäjiksi.

Tulostemme mukaan tehokkuuden kasvu vähentää kuntien henkeä kohti laskettuja hyvinvointipalvelumenoja. Kustannustehokkaissa kunnissa palvelutarjonnan edullisuus siis ei johda sellaiseen kysynnän kasvuun, että menot ylittäisivät tehottomampien kuntien menot. Tehokkuus siis vähentää kuntien menopaineita. Sitä vastoin kuntalaisten korkea tulotaso ja suuret valtionavut lisäävät kuntien menoja.

Toisena teemana tässä raportissa analysoidaan, miten kuntien verojen tai valtionapujen kautta saama tulonlisäys käytetään, ja eroaako erityyppisten kuntien menokäyttäytyminen toisistaan. Aineistona ovat kuntien menot ja niitä selittävien tekijöiden paneelitiedot. Tulosten mukaan suuremmilla kunnilla on taipumus lisätä menojaan enemmän kuin pienillä kunnilla, kun henkeä kohden lasketut tulot tai valtionavut kasvavat. Vastaavasti kunnat, joissa valtuuston poliittinen valta on hajautunut useille puolueille, lisäävät menojaan enemmän kuin keskittyneemmän vallan kunnat.

Seuraavassa selvitetään hieman yksityiskohtaisemmin tutkimusaineistoa, menetelmiä sekä tähän mennessä saatuja tuloksia.

## Tutkimuksen aineisto ja menetelmät

Tarkoituksena oli kattaa Suomen kunnat mahdollisimman laajasti. Kaksi suurempaa rajausta jouduttiin kuitenkin tekemään. Ensinnäkin Ahvenanmaa jätettiin vertailun ulkopuolelle. Pois jätettiin myös kunnat, jotka vuoden 1994 jälkeen ovat olleet osallisina kuntaliitoksessa.

[2] Tämän raportin edellisiä versioita on esitelty European Regional Science Associationin kongressissa Pariisissa 29.8. – 1.9. 2007. sekä International Atlantic Economic Societyn kongressisssa Savannahissa (Georgia) USA:ssa 7.-10. 10. 2007.

Tutkimukseen jäi kaikkiaan 388 kuntaa, joiden väkiluvun mediaani oli 5700 asukasta ja keskiarvo 11 700 asukasta. Alkuperäinen aineisto koski ajanjaksoa 1994-2004, josta tässä raportissa käsitellään vuosia 1997-2004. Aineisto saatiin Tilastokeskuksesta, ja osaa työssä käytetyistä indikaattoreista käytettiin hyväksi jo tekijöiden aiemmassa tutkimuksessa (Loikkanen ja Susiluoto 2005).

Työ soveltaa regressioanalyysin eri muotoja. Tilanteen ja aineiston vaatimusten mukaan on käytetty tavallista pienimmän neliösumman menetelmää, dummymuuttujaregressiota, kiinteiden vaikutusten mallia tai satunnaisvaikutusmallia. Mallien valinnassa ja estimoinnissa sovellettiin tavanmukaisia testausmenettelyjä.

Mallityötä on tarkoitus jatkaa mahdollisimman selkeiden ja tilastollisesti perusteltujen tulosten saamiseksi. On myös huomattava, ettei aineisto ole tutkimuksen kannalta ongelmaton. Tilastollisten luokitusten ja määritelmien muutokset erityisesti vuonna 1997 ja osin vuonna 2000 voivat vaikuttaa tuloksiin. On myös mahdollista, että aineiston luotettavuus vaihtelee jossain määrin kunnasta riippuen. Tällaisista heikkouksista ei kuitenkaan välttämättä aiheudu järjestelmällistä harhaa tuloksiin.

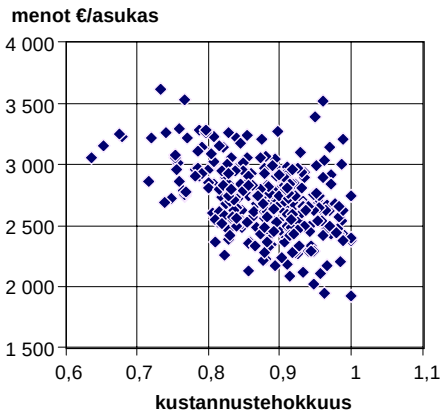
## Tulokset

Tuloksia tarkastellaan kahdessa osassa. Aluksi katsotaan muutamia kuntien käyttömenojen ja yksittäisten mahdollisten selittäjien välisiä riippuvuuksia eli korrelaatioita. Tämä auttaa hahmottamaan, millaisia tuloksia tilastollisista malleista voisi olla odotettavissa. Sitten esitetään tulokset regressiomalleista, joissa kuntien menoja hyvinvointipalveluihin selitetään useilla taustatekijöillä. Toiseksi tarkastellaan lyhyehkösti kuntien menojen muutoksia. Riippuuko kunnan rahankäyttö siitä, mistä rahat ovat peräisin? Kysymys liittyy ns. kärpäspaperivaikutukseen (flypaper effect), jota on eri maissa paljon tutkittu. Entä käyttäytyvätkö erilaiset, kuten erikokoiset tai kunnallispoliittisesti toisistaan eroavat kunnat samalla tavoin?

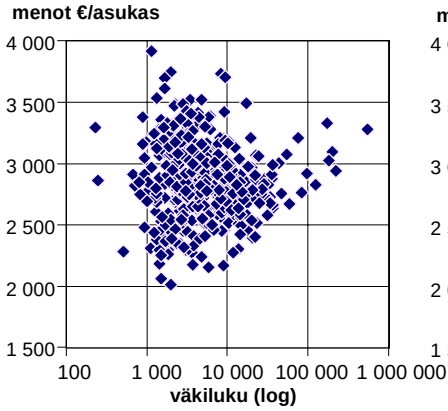
### Mitkä tekijät selittävät kuntien välisiä menotasoeroja?

Peruspalvelumenojen ja selittävien ilmiöiden suhteita tarkasteltiin ensin kahden muuttujan hajontakuvioiden avulla. Kuviossa 1 on tutkimuksen kannalta keskeinen tekijä, kunnan peruspalvelutarjonnan kustannustehokkuusluku, joka vaihtelee välillä 0-1. Kustannustehokkuutta tarkastellaan henkeä kohti laskettuja menoja vasten. Kuvion mukaan asukasta kohden lasketut menot ovat usein pienemmät, jos peruspalvelujen kustannustehokkuus on korkeampi. Väkiluvun ja menojen välillä ei sen sijaan näy yhteyttä (kuvio 2). Toisaalta menot ovat korkeammat, jos kunnassa on runsaasti vanhusväestöä (kuvio 3). Myös muita havaintoja tehtiin. Yllättävää oli, että alle 17-vuotiaiden osuus oli lievästi käänteisessä yhteydessä menoihin: mitä enemmän lapsia ja nuoria, sitä alhaisemmat olivat usein menot. Ulkomaalaisten lukumäärän ja menojen välillä ei löytynyt yhteyttä, mutta korkean työttömyyden kunnissa menot olivat yleensä korkeammat. Väestömäärän kasvu puolestaan liittyi alhaisempiin menoihin.

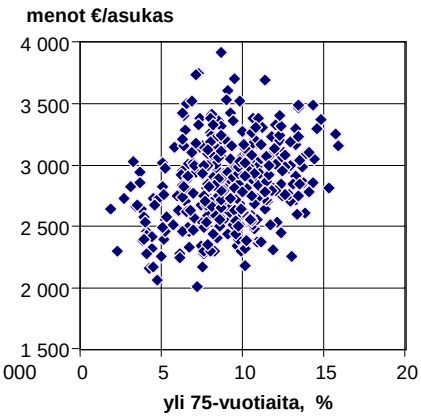
**Kuvio 1: DEA-tehokkuus ja menot per asukasvuonna 2002**




**Kuvio 2: Väkiluku (logaritminen) ja menot per asukas vuonna 2004**




**Kuvio 3: Yli 75-vuotiaan väestön osuus ja menot per asukas vuonna 2004**




Kahden ilmiön välinen suora tarkastelu ei kuitenkaan varsinaisesti kerro mitään niiden välisistä riippuvuuksista, koska asiaan vaikuttaa monia muitakin tekijöitä. Siksi eri selittäjien vaikutusta menoihin arvioitiin regressiomallien avulla. Välineinä käytettiin tavallista pienimmän neliösumman regressiota sekä poolattua regressiota vuosidummyin. Laskemien tulokset on tiivistetty alla olevaan taulukkoon 1. Mukana on tutkimuksen neljästä mallista kaksi keskeistä, joita voidaan kutsua ”kustannustehokkuusmalliksi” ja ”tarjontatekijämalliksi”. Molemmissa selitettävänä ilmiönä ovat kuntien hyvinvointipalveluihin käyttämät menot.

Yhteisiä selittäviä tekijöitä kummassakin mallissa ovat asukkaiden tulot, kuntien saamat valtionosuudet sekä erilaiset palvelujen kysyntään vaikuttavat väestö- ja politiikkatekijät. Mallien ero on siinä, miten palvelujen tarjontaan vaikuttavat seikat on otettu huomioon. Kustannustehokkuusmallissa tarjontaselittäjänä on vain palvelujen kustannustehokkuus. Se on hintatekijä: korkea kustannustehokkuus tarkoittaa, että palvelut voidaan tarjota edullisella hinnalla, ja päinvastoin. Tämän pitäisi vaikuttaa kunnan menoihin. Sen sijaan tarjontatekijämallissa tehokkuus eli käänteinen hinta on korvattu sellaisilla seikoilla ja olosuhteilla, jotka vaikuttavat palvelujen hintaan. Näitä ovat kunnan sijainti sekä tapa, jolla palvelut tuotetaan: onko esimerkiksi tuottajana kunta itse vai hankitaanko palvelut ostoina muualta.

Taulukosta 1 käy ilmi vaikutuksen suunta, mutta myös sen määrää voidaan alustavasti arvioida. Jatkossa määrää arvioidaan tarkemmin ja myös kunnittain.

Taulukon 1 ilmaisut tarkoittavat seuraavaa. + merkitsee, että ilmiön lisääntyessä menot kasvavat ko. mallin mukaan, - merkitsee vähenemistä, 0 = ei vaikutusta, () = vaikutus on tilastollisesti epävarma, ja ? tarkoittaa, että tulos tuntuu ennakkoon ajatellen ainakin hieman yllättävältä.

**Taulukko :** Eri taustatekijöiden vaikutus kuntien menoeroihin 1997-2002

| | kustannus-tehokkuusmalli | tarjonta-tekijämalli |
|---|---|---|
| Tulot ja hinnat | | |
| veronalaiset tulot / tulonsaaja | + | + |
| valtionosuudet /asukas | + | + |
| palvelujen kustannustehokkuus | - | |
| Kunnan koko, väestö ja sosioekonominen tila | | |
| väkiluku | + (alle 30 000 as. kunnilla pienemmät menot) | + (alle 30 000 as. kunnilla pienemmät menot) |
| väkiluvun kasvu | - | - |
| alle 17-vuotiaat | - ? | - ? |
| yli 75-vuotiaat | (+) | + |
| ulkomaan kansalaiset EU:sta ja Pohjois-Amerikasta | + | + |
| ulkomaan kansalaiset muualta | + | + |
| työttömyys | 0 ? | 0 ? |
| Sijainti | | |
| etäinen sijainti | | + |
| saaristokunta | | + |
| Palvelujen tuottaminen | | |
| palveluostot muulta kunnallissektorilta | | + |
| palveluostot yksityisiltä | | + |
| laaja palveluvalikoima | | + |
| alle 35-vuotiaat työntekijät | | + ? |
| Kunnallispolitiikka | | |
| vasemmiston edustus valtuustossa | + | 0 |
| kepun edustus valtuustossa | - | - |
| keskittynyt puoluerakenne valtuustossa | + | 0 |

Molempien mallien mukaan asukkaiden tulojen kasvu ja kunnan saamien valtionosuuksien lisäys kasvattavat kunnan menoja. Nämä tulokset vastaavat myös aiempien tutkimusten tuloksia. Kustannustehokkuus vaikuttaa sen sijaan menoja pienentävästi. Jos palvelutarjonnan tehokkuus kasvaa, hinta jolla palvelut voidaan tuottaa, laskee. Silloin tuloksen mukaan kunnan menot pienenevät. Käytettyjen palvelujen määrä saattaa kyllä kasvaa, mutta määrän kasvu on pienempää kuin hinnan lasku, jolloin kokonaismenot alenevat. Alustavien tulosten mukaan

kustannustehokkuuden paraneminen noin 10 prosentilla pienentäisi kunnan menoja noin 100 eurolla asukasta kohden, jos muut tekijät pysyvät ennallaan.

Myös väestön rakenne näyttää vaikuttavan menoihin. Väkiluvun itsenäistä vaikutusta on hankala tarkkaan arvioida. Sovelletut mallit viittaavat kuitenkin siihen suuntaan, että alle 30 000 asukkaan kunnissa menotaso on matalampi kuin suuremmissa kunnissa. Tasoero olisi noin 100 – 200 euroa asukasta kohden. Tarkempi arvio edellyttää jatkotyötä.

Jos kunnan väestönkasvu kiihtyy (tai väkiluku lakkaa vähenemästä) menot asukasta kohden laskevat. Tämä tuntuisi pätevän varsinkin silloin, kun kunnan väestö on aiemmin ollut vähenevä. Jos palvelujärjestelmässä on kapasiteettia, väestönmäärän kääntyminen laskusta nousuun voi lisätä käyttöastetta ja alentaa henkeä kohti laskettuja käyttömenoja. Väestöltään kasvavassa kunnassa puolestaan joudutaan yleensä investoimaan, jolloin rahaa jää vähemmän käyttömenoihin. Alustavien laskelmien mukaan investointien ottaminen mukaan laskelmaan ei kuitenkaan muuta tulosta. Asia kaipaa silti tarkempaa selvittelyä.

Väestön ikärakenne antaa osin yllättäviä tuloksia. Alle 17-vuotiaiden vaikutus menoihin näyttää olevan negatiivinen, verrattuna vertailuryhmänä oleviin 17-74-vuotiaisiin. Lasten päivähoidon, koulujen ja terveydenhuollon tarpeiden näkökulmasta tämä ei tunnu todennäköiseltä. Eräs selitys voisi olla se, että vertailukohtana olevan aikuisväestön sisäinen ikärakenne painottuu nuoriin, terveisiin työikäisiin, jos lapsia on paljon. Yli 75-vuotiaat lisäävät odotetusti menoja, vaikkei vaikutus ole kovin selvä. Ulkomaan kansalaiset sen sijaan kasvattavat menoja. Vaikutus on suuri teollistuneiden länsimaiden ulkopuolelta tulleiden osalta (noin viisinkertainen EU:n ja Pohjois-Amerikan kansalaisiin verrattuna). Työttömyysaste ei sen sijaan selittänyt kuntien hyvinvointipalvelumenoja, vaikka korkean työttömyyden voitaisiin odottaa kasvattavan niitä.

Sijainti- ja palvelurakennetekijät ovat tarjontatekijämallin selittäjiä. Sijainnilla on vaikutusta: mitä kauempana kunta on kotimaan taloudellisista keskuksista, sitä korkeammat ovat menot. Sijaintia mitattiin kunnan etäisyydellä muista kunnista siten, että näitä etäisyyksiä painotettiin päätekunnan väkiluvulla. Saaristokuntien menotaso asukasta kohden näyttää asettuvan noin 60-90 euroa korkeammalle kuin muiden kuntien.

Alustavien tulosten mukaan menot kasvavat myös, jos kuntayhtymiltä, muilta kunnilta tai yksityisiltä tuottajilta ostetaan runsaasti palveluja. Kysymys tuottajan valinnan vaikutuksesta on kiinnostava erityisesti, mitä tulee yksityiseen sektoriin kunnan vaihtoehtona. Tekijöiden aiemmassa tutkimuksessa esitettiin, että yksityisten palvelujen käyttö lisää palvelutarjonnan tehokkuutta (Loikkanen ja Susiluoto 2005). Tämä tuntuu potentiaalisesti ristiriitaiselta nyt tehdyn havainnon kanssa, joten asia vaatii lisäselvittelyä. Edelleen, jos kunta tarjoaa asukkailleen laajan palveluvalikoiman, kustannukset henkeä kohden kasvavat, mikä onkin uskottavaa. Yllättävää on sen sijaan, että nuoret työntekijät tulisivat kunnalle hiukan kalliimmaksi kuin vanhemmat.

Onko kunnallispolitiikalla tai äänestäjien puoluesuuntautumisella yhteyttä menotasoon? Kun kunnanvaltuuston puoluejakauman vaikutusta mitattiin, vertailukohtana olivat oikeistopuolueet. Menot asettuivat alhaisemmiksi niissä kunnissa, joissa Keskustapuolueen valtuustoedustus oli vahva. Tässä kohdin voitaisiin kysyä, voisiko kunnan elinkeinorakenne olla myös selittävä tekijä. Esimerkiksi lapsen kotihoito voi maatalousvaltaisessa kunnassa olla luonteva vaihtoehto kunnalliselle hoidolle. Vasemmiston osalta tulos oli epäselvempi, mutta pientä viitettä korkeammasta menotasosta voitiin havaita.

Eräillä tekijöillä ei näyttänyt olevan vaikutusta menoihin. Vaikka väestön kaksikielisyyden voitaisiin ajatella lisäävän palvelujen kustannuksia, ei ruotsinkielisten osuus kunnassa vaikuttanut menoihin. Kunnan taajama-asteella ei myöskään näyttänyt olevan merkitystä, vaikka tuntuisi uskottavalta, että tiiviissä yhdyskuntarakenteessa palvelut voitaisiin järjestää edullisemmin. Vaikutusta ei näyttänyt olevan myöskään sillä, onko kunta oman talousalueensa keskus. Paikallispolitiikan ilmiöistä äänestysaktiivisuudella tai sen muutoksella ei ollut merkitystä, ei myöskään kunnallisvaltuutettujen sukupuolijakaumalla.

Kustannustehokkuusmalli ja tarjontatekijämalli selittivät valtaosan (71-72 prosenttia) kuntien välisistä menoeroista asukasta kohden. Näyttää siis siltä, että nämä erot voidaan paljolti palauttaa aivan järkeenkäyviin tekijöihin. Menoerot johtuisivat pääosin erilaista olosuhteista, rakenneseikoista ja kuntalaisten omista mieltymyksistä (poliittisten valintojen kautta). Onko siis edes syytä odottaa, että menotaso olisi sama kaikkialla, kun asukkaiden tarpeet ja kuntien edellytykset tarjota palveluja vaihtelevat?

Tulos ei tarkoita sitä, ettei menoihin pystyttäisi vaikuttamaan käytännön toimin. Esimerkiksi eri johtamistavoilla, työn organisoinnilla ja palveluyksiköiden alueellisella sijoittumisella on varmastikin merkitystä. Nämä ilmiöt eivät ole mukana yllä olevissa malleissa. Teknisesti ajatellen ne sisältyvät malleissa kunkin kunnan jäännöstermeihin: menojen siihen osuuteen, jota mallit eivät pysty selittämään. Nämä jäännösmenot voivat olla kullekin kunnalle nollaa suurempia (kunnalla on korkeammat menot kuin sen taustatekijöiden perusteella voitaisiin odottaa), tai negatiivisia (kunnalla on odotettua matalammat menot). Jatkotyössä olisi kiinnostavaa selvittää, mitä organisatorisia ja muita tekijöitä näiden ”selittämättömien menojen” takana on.

**Miten verotulojen ja valtionosuuksien lisäys heijastuu kuntien käyttömenoihin?**

Raportissa tarkastellaan lyhyesti myös sitä, miten kuntien tulojen lisäys vaikuttaa niiden käyttömenoihin. Riippuuko menokäyttäytyminen siitä, miten tulot on saatu? Ns. kärpäspaperivaikutuksen (flypaper effect) mukaan julkiselta sektorilta saatu raha todennäköisesti kulutetaan herkemmin kuin verotulona kuntalaisilta saatu. Entä käyttävätkö erityyppiset kunnat lisätulon samalla tavalla? Kuinka nopeasti heijastuminen käyttömenoihin tapahtuu? Myös näihin kysymyksiin saadut vastaukset ovat alustavia.

Laskelmat tehtiin käyttäen muuttujien samanaikaisia tai viivästettyjä muutoksia eli differenssejä. Aineisto käsitti vuodet 1998-2004. Alustavien tilastollisten testien perustella aineisto jaettiin kahteen ryhmään, yli ja alle 6000 asukkaan kuntiin. Menetelminä käytettiin satunnaisvaikutusmallia ja kiinteiden vaikutusten mallia.

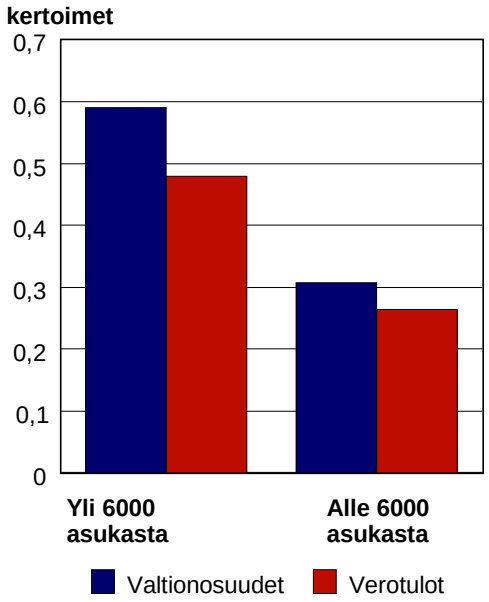
Tulosten mukaan käyttömenojen lisäyksen kertoimet ovat melko alhaisia verrattuna asiasta eri maissa tehtyihin tutkimuksiin. Yli 6000 asukkaan kunnissa valtionosuuksien sadan euron suuruinen kasvu johti kolmen vuoden sisällä noin 60 euron käyttömenojen lisäykseen, ja verotulojen kasvu vastaavasti 50 euron lisäykseen. Pienemmissä kunnissa löytyi vain huomattavasti vähäisempiä vaikutuksia, jonkin verran alle ja yli 30 euroa vastaavasti. Vaikka valtionosuuksille ja verotuloille arvioidut luvut ovat melko lähellä toisiaan, erot ovat odotetun suuntaisia. Tulos sopii yhteen sen ajatuksen kanssa, että ”ilmaiseksi” valtiolta saatu raha on omiaan johtamaan laajempaan kunnallistalouteen kuin verotuloina saatu raha, josta kuntapäättäjät joutuvat ainakin periaatteessa vastaamaan äänestäjilleen.

Mallien tilastolliseksi selitysasteeksi tuli yli 6000 asukkaan kunnille noin 35 prosenttia, mutta alle 6000 asukkaan pikkukuntien ryhmässä alle 20 prosenttia. Kuntien tulonlisäyksen käyttöä säätelevät siis monet muutkin seikat kuin ne, joita tässä on voitu käyttää selittäjinä.

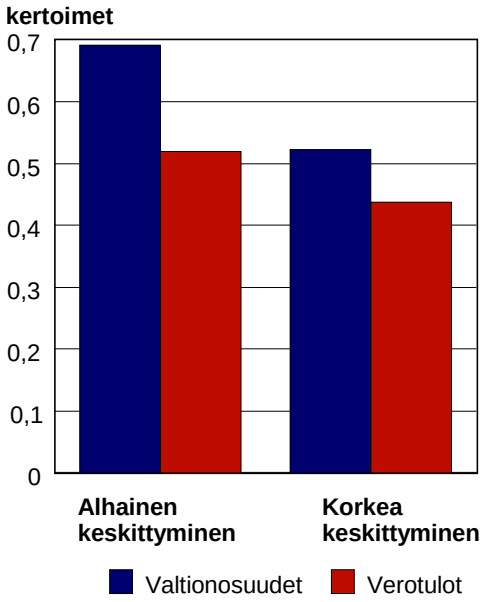
Myös eräät kuntien rakennetekijät näyttivät hieman vaikuttavan siihen, miten tulonlisäys kulutetaan. Jos vanhusten lukumäärä kasvaa, tulonlisäyksestä seuraava kulutus näyttää nousevan. Kääntäen, jos yksityiseltä sektorilta ostetaan enemmän palveluja, tulonlisäystä kulutetaan ehkä maltillisemmin. Vaikutus tuloksen kokonaiskuvaan oli kuitenkin pieni.

Entä ovatko kunnat yhtenäinen ryhmä, mitä tulee kulutuskäyttäytymiseen? Tulos näkyy kuvioista 4 ja 5, joiden luvut on saatu satunnaisvaikutusmallilla.

**Kuvio 4: Valtionosuuksien ja verotulojen menokertoimet yli ja alle 6000 asukkaan kunnissa**




**Kuvio 5: Valtionosuuksien ja verotulojen menokertoimet kunnanvaltuuston puolue-jakauman keskittyneisyyden mukaan**




Kuvioiden mukaan kuntien menokäyttäytyminen ei ole yhtenäistä – seikka, jota alan tutkimus ei yleensä ota lukuun. Pienet alle 6000 asukkaan kunnat käyttäisivät tulonlisäyksestään huomattavasti vähemmän kuin yli 6000 asukkaan kunnat. Myös kunnan puoluerakenne vaikuttaisi siihen, kuinka ahkerasti rahaa käytetään. Eroja ei näyttänyt syntyvän siitä, onko kunnanvaltuustossa vahva vasemmiston, oikeiston tai keskustan edustus, ei myöskään valtuuston sukupuolijakaumasta. Merkitystä ei ollut sillä, onko äänestysaktiivisuus korkea vai matala, kasvava vai laskeva. Sen sijaan rahankäyttöön tuntuu vaikuttavan se, kuinka monen puolueen kesken päätöksenteko valtuustossa jakautuu. Tulonlisäys kuluu käyttömenoihin herkemmin, jos valtuustossa on useita puolueita tasavahvasti edustettuna, kuin jos yksi tai muutama puolue dominoi päätöksentekoa. Havainto tuntuu uskottavalta kun ajatellaan, että kukin puolue pyrkii ajamaan omien kannattajiensa taloudellista etua. Kuinka nopeasti lisätulojen kulutus sitten tapahtuu? Laskelmien mukaan alle 6000 asukkaan kuntien menovaikutus toteutuu 1-2 vuodessa, eikä isompienkaan kuntien viive ole yli kolmea vuotta. Jatkossa on vielä erikseen selvitettävä muun muassa se, mikä on investointien merkitys nyt saaduille havainnoille.

## Lopuksi

Kuntien peruspalvelumenojen eroille löytyi useita rakenteellisia, sekä palvelujen kysyntään että tarjontaan liittyviä syitä. Hyvinkin kaksi kolmasosaa kuntien välisistä eroista voitiin johtaa tällaisista taustatekijöistä. Ja koska perusrakenteet muuttuvat hitaasti, on uskottavaa, että menoerotkin tulevat säilymään. Toiseksi havaittiin, että kooltaan ja poliittiselta rakenteeltaan erilaiset kunnat käyttävät saamansa tulonlisäyksen eri tavoin.

Tämän tutkimuksen kysymyksenasettelu koski kuntien asukasta kohden laskettuun menotasoon vaikuttavia kysyntä- ja tarjontatekijöitä. Esimerkiksi asukkaiden tyytyväisyyttä ei käsitelty, ei myöskään työntekijöiden hyvinvointia. Tyytyväisyys riippuu paitsi siitä, kuinka tehokkaasti palvelut tuotetaan, myös palvelutarjonnan sisäisestä rakenteesta ja alueellisesta saavutettavuudesta. Päätöksenteossa kuntien palveluja täytyy arvioida monista näkökulmista ja tämä tutkimus antaa eväitä vain osaan relevanteista kysymyksistä.

Jatkossa kuntien menoja selittäviä tilastollisia malleja ja osin aineistoja työstetään edelleen. Taustatekijöiden määrällistä vaikutusta kuntiin arvioidaan. Tuloksia tarkastellaan kuntaryhmittäin ja ehkä myös kunnittain. Tilastollisten mallien jäännöstermit antavat kiinnostavan lisänäkökulman: miksi joidenkin kuntien menot ovat korkeammat tai matalammat kuin taustaolosuhteiden perusteella voitaisiin päätellä? Tulokset julkaistaan myöhemmin omana loppuraporttinaan.

**Abstract:** The Finnish public sector is a two-tier system with central government and more than 400 municipalities, which have their own taxing power and provide an extensive list of basic services to citizens. These services are mostly produced by municipalities and to less degree bought from other local governments (or their joint organizations) and the private sector. In this paper we use data on 388 Finnish municipalities in 1997-2004, to study two separate questions concerning municipalities' aggregate expenditure on basic services including education, culture, social services and health services (merit goods). First, per capita expenditures on basic service provision are explained by income, grant, demographic and political variables, and as a new element, efficiency scores of providing these services. The efficiency scores are derived by applying Data Envelopment Analysis (DEA) to study the efficiency of municipal basic service provision utilizing volume indicators of services as outputs and net expenditures as inputs. In the second part of the paper, we study how changes in municipal tax income revenue and state grants affect municipal expenditure using panel data.

## 1. Introduction

Basic education, as well as health, social and cultural services are provided by the public sector in most developed countries. In some cases, like in Finland, the public sector not only finances most of the costs of these services, but also acts as the producer. In other ones, the private or non-profit sector is the main producer. Also, the level of government at which key provision/production decisions are made, can vary from a centrally organized service system to a highly decentralized system. For instance in France, health services in hospitals are provided by the national health system, which has a regional structure and its hospitals cover the whole country. Basic health services, however, are supplied by private doctors, whose customers' expenses are typically covered by insurance. Municipalities in France do not produce or provide health services, and the same is true for basic education. In Nordic countries Denmark, Norway and Sweden all had three tier governments in 2000 such that in addition to local public goods for instance basic education and social services were provided by municipalities whereas specialized health care and somewhat higher education were tasks of intermediate level. Recently Denmark has reduced the number on municipalities by obligatory mergers and abolished the intermediate level of the old system. In addition Norway has recently moved to a national hospital system.

Unlike its Nordic neighbors, Finland has all the time had a two tier government, where the provision of an extensive list of basic services is decentralized to municipalities. Municipalities and their joint organizations have most often produced the services and only to minor extent bought them from the private sector. The production of basic services (merit goods) requires a spatially dispersed network production units (day care centers, schools, health care units etc) where the scales of units vary from one service to another. Production of these services also implies that municipalities are big employers governed by politicians and bureaucrats. Also in Finland, since May 2005, there has been going on a government initiated reform process, where municipalities have to make plans to increase cooperation and/or initiate mergers with the aim of e.g. increasing efficiency in provision of services and to guarantee their provision without excessive pressure on financing them. A local government reform has been regarded necessary by the previous and current government despite the fact that the Finnish public sector has been receiving remarkably high rankings in international evaluations as a whole (see for instance Kuhry ed. 2004) and especially the Finnish school system has been celebrated by success of Finnish pupils in PISA tests

There are various important view-points from which public service provision at the municipal level can be evaluated. In economics literature various studies have analyzed factors, which determine total and sector level expenditure with the aim of testing for instance the median voter model since the pioneering work of Barr and Davis (1966) or the fly-paper effect hypothesis related to the effect of grants from higher to lower level governments (Courant et al. 1979). These are mainly related to allocative efficiency at municipal level, studying whether the total amount and the mix of publicly provided services is optimal from the consumer-voter perspective. In Leviathan type models of the public sector efficiency in the use of resources becomes an explicit topic. Here, the analysis tests whether bureaucrats at local level can extract resources from provision of services to citizens for their own good or expand public sector organizations to promote their own interests (Niskanen 1971). Also the role of politicians (or political parties) and pressure groups has been studied extensively.

Quite a few studies consider public producers/providers within one service (or merit good) sector and evaluate their performance from certain perspective. To give an example, schools have been evaluated and ranked on the basis of their achievements, like students' performance in tests. Alternatively, their resources (costs) have been studied with no direct link to outputs. A third

approach considers both outputs and resources trying to assess the efficiency of schools and may also consider the determinants of differences in efficiency. These three types of studies give answers to different questions.

The purpose of this paper is first to concentrate on what explains differences in per capita total expenditure of Finnish municipalities on basic services by which we mean education, culture, health and social services (merit goods). These are mandatory tasks of the municipal sector in Finland for which they receive grants in addition to their own revenue sources. Our regression models which explain expenditures of municipalities include besides demand factors (income, grant, demographic and political variables) also a measure of efficiency of supplying basic services. This measure is an efficiency score, which is equal to one for most efficient municipalities and the more less than one the less efficient the municipality is in provision of a set of basic services. Our specific aim is to test to what extent efficiency scores explain differences in expenditure. This depends upon whether an increase in efficiency (decrease in costs) increases volume (or quality) of provision to the extent that expenditure increases, remains the same or decreases. In the second part of the paper we try to explain changes of municipal expenditure by changes in state grants and tax income using panel data. This part of the paper is related to the much-studied fly-paper effect hypothesis (Courant et al. 1979) according to which lump sum grants should have more stimulative effect on the level of public expenditures than local private income. Our interest here is also on whether the local sector behaves uniformly as to the flypaper effect, a question discussed for instance in SaGbafi and Saruc (2004). Our data consists of 388 out of the more than 400 Finnish municipalities. In the regressions of the first part of the paper use pooled data and cross-sections during the period 1994-2004, while the second part uses data on the years 1998-2004. Municipalities, which have merged since 1994, are excluded as well as municipalities belonging to the Åland archipelago.

The paper proceeds as follows. In section 2 we discuss some central features of the Finnish municipal system, its importance in the economy and in the welfare service sector, as well as the sources of municipal income. In section 3, we first introduce the basic idea of the median voter model and its extension especially in Nordic applications, and then we describe the approach, data and methods of our own study. Section 4 presents some preliminary observations on relationships between municipal expenditure levels and some potential explanatory variables. In section 5 we present results of explaining expenditure differences of welfare services of Finnish municipalities with several structural factors. Section 6 gives some results on explaining municipal expenditure growth with growth of state grants and municipal tax income in Finland. Section 7 presents a short summary of our findings.

## 2. The role of municipalities in Finland

The Finnish public sector is a two-tier system with central government and at present 416 municipalities (452 in 2000), the latter ranging in size from a few hundred to more than half a million people. The main tasks of central government and social security funds mainly consist of providing national public goods, higher education and transfers, whereas the local public sector concentrates on local public goods and basic services (merit goods). The latter consist of social services and health care, education and cultural services, infrastructure maintenance and environmental protection. Nearly two-thirds of all public consumption and investment expenditure are used at local level in Finland.

One out of four employed people in Finland work in the public sector, and ¾ of these are in municipalities. And about 80 % of employees in the municipal sector work in social, health and

education services. Because the nationally dictated tasks of municipalities are broad and expensive, they co-operate in over 200 joint organizations, e.g. in health services and education. In Finland an intermediate government level with its own tax powers and directly elected decision making units does not exist. Finnish joint municipal authorities have no taxing powers of their own and their decision making bodies consist of council members of cooperating municipalities.

Municipalities levy a local income tax and a minor property tax (since 1993) on residential and non-residential real estate. Tax base and deductions are determined by central government, but each municipality decides independently on its income tax rate and tax rates (within bounds) for different forms of property. Earlier municipalities could tax corporate income directly, but after the tax reform of 1993 it became solely a central government tax. However, a share of the accrued corporate income tax revenue is paid to municipalities by portions that are fixed in the Income Tax Law. This share has been reduced over time.

In addition to tax revenues, there are state grants to municipalities. Before 1993 about 99 % of state grants to municipalities were matching grants such that the matching rates varied by sector and characteristics of municipalities. In 1993 reform, grants became non-matching block grants based on so called “calculated expenditures”. Related to the economic crisis of early 1990s in Finland, the central government cut the grants throughout 1993 – 1996. They covered 50 % of net operating expenditure in 1993, whereas in 1998 they covered only 24 %. Fast income growth during late 1990s enabled the municipal sector to cover the grant reductions at least partly by relying on its own revenue sources. The role of user charges is important in case of utilities (electricity, gas and water), whereas they have either no role (education) or only a minor role in case of most basic services.

Since the 1993 reform, block grants consist of general grants and sector based block grants, which together with received or paid tax equalization form the total grant amount allocated to each municipality. This total is lump sum money, not tied to any particular activity. The 1997 grant reform revised the criteria for calculating sector specific components of block grants. In the tax base equalization system the central government has been a net contributor and thus it is not a pure zero sum game between municipalities.

Briefly stated, Finnish municipalities nowadays have in principle a lot of power in deciding how to allocate their own resources and lump-sum type transfers. Decentralization of power is, however, restricted since national laws determine the obligations of municipalities and give residents subjective rights to several basic services. Finally, we note that in Finnish municipal elections, votes are given to individuals rather than party lists. Furthermore, municipal governments include all parties represented in elected councils in proportion to the number of council members. Thus, there is no real opposition and municipal elections do not typically cause major changes in local politics. Referendums are possible but not binding, and they are not used frequently except in the case of mergers.

## 3. Studying local government expenditure decisions

### 3.1 Extensions of the median voter model

The topic of this empirical paper is to consider determination of expenditure on basic services by Finnish municipalities. More generally, the topic is related to how local governments end up allocating resources between private consumption and local public services, when their decision

environment and relations to central government activities and relations to eventual intermediate tiers are given.

In the modeling of local government decisions, the median voter model has been in a dominant position since early 1970s especially in the United States. Assuming majority voting as decision making process where two parties (or candidates) vote over a one-dimensional issue and the distribution of voter preferences is unimodal, the choice will correspond to the preferences of the median voter. In the applications of Borcherding and Deacon (1972) and Bergstrom and Goodman (1973) the demand for local government goods is a function of the price per unit of the publicly provided good to the community, the median voter's tax price and income, population size reflecting the impacts of congestion and a set of socio-economic variables that reflect differences in tastes. Here, it is assumed that the demand for local public goods of median income earner equals the demand of median voter in each jurisdiction. The model has been applied in empirical analysis with various types of data ranging from municipalities as observations to micro level data and quite a few of U.S applications give direct or indirect support to the median voter model (see Rubinfeld 1987 for a survey of earlier literature). As for results of studies in the U.S., both general local expenditures and specific types of expenditures depend most often positively on median voter's income, and negatively on the tax price faced by the median voter.

Despite the fact that the median voter model offers a consistent framework for the analysis of allocation of resources at local level, the model has its restrictions (Inman 1979). First, in indirect representative democracies at the local level, the electorate votes for people/parties and there is no direct vote concerning the size or contents of the local budgets. Second, the median voter is most powerful if there is a one dimensional issue to be decided upon in the political process. The applicability of the model is more questionable when local governments provide a multitude of services because majority rule does not ensure a stable equilibrium in multidimensional case. Third, in representative cases there are typically several parties competing for seats in local councils, and the decision making of elected councils cannot generally be assumed to correspond to the median voter model. Fourth, the central government (or other higher tiers) may restrict the budgets or the choices of local governments. Unlike in the median voter model where the decisive person chooses the volume and tax price of local public good, the tax rate (and the budget) may be completely dictated by central government restricting local choices. Also, the provision of goods may be subject to minimum level requirements as a result of central government regulations or legal subjective rights of citizens. Fifth, local governments don't necessarily buy the goods and services they provide from the market with uniform prices but they often produce them. In the latter case, local governments become large production units and the question arises who actually makes decisions. More specifically, what is the role of bureaucrats (Niskanen 1975), and special interest groups like public sector workers in municipal councils. Sixth, the locally provided good in the median voter model is easiest to think as a local public good, which once provided is equally available to all members of the jurisdiction. However, major part of municipal provision of services can consist of merit goods like education, health an social services, and in such a case decision making gets even more complicated as it also involves location of service delivery units. Seventh, in the case of merit goods, the production system consists of a network of production units (schools, libraries, health centre units) and the average and marginal unit cost may vary a lot across municipalities and within their boundaries depending where in the network output changes.

Most of these restrictions of the applicability of median voter model apply for instance to the local public sectors of Nordic countries. The short institutional description of the Finnish system in section 2 also indicated that it is rather far from the assumptions of the median voter model. This can also be seen in the articles included in RattsØ (1998) and especially in its PART II "Demand",

which includes empirical studies on the demand for local public goods and local expenditure studies with Norwegian and Swedish data. More or less all of them recognize quite a few limitations of the median voter model in Nordic cases, but their nature varies to some extent to one country to another. Common to all of them is the multi-product nature of local government supply and multi-party feature of decision making in representative (indirect) democratic systems where council member are elected. Central governments role varies such that e.g. in Norway the local tax rate is in practice the same nationally and the budget is fixed from a local perspective. In Finland, the municipalities can set local income tax rates freely whereas in property tax rates there is a given band within which the rates can be chosen. In all Nordic countries local public goods provision is in most cases obligatory at least to certain degree on the basis of national law, and in addition citizen rights to get services restrict local choices. In Finland, for instance the provision of basic education, basic health and social services to residents of municipalities is mandatory and families have subjective right for instance to publicly provided child care for children under certain age. These goods are mostly produced by the municipalities or bought from other municipalities or their joint organizations. In big (by area and/or population) municipalities, the production system consists of several "plants" which in this case are schools, subsidiaries of health centers, libraries etc. Private sector has only a very minor role in the provision of these services, which are more of the type of publicly provided private goods (merit goods) than pure local public goods. The fact that local governments are heavily engaged in production of a multitude of services emphasizes the potential role of bureaucrats in technology, location etc choices relative to the electorate (and median voter) and elected council members. Municipalities in Finland are complex systems and amongst the biggest employers in their jurisdictions.

Instead of an extensive literature review we only make some selective comments on previous work. As for empirical studies of Nordic local public sectors there have been number of studies and approaches in empirical analysis. Aronsson and Wikström (1996) test the median voter model against an extended model with Swedish data. Aronsson, Lundberg and Wikström (1999) study the role of intermediary tier, namely regional governments' behavior, on municipal level demand for local public services. In RØngen (1993) as well as Borge and RattsØ (1995) the allocation of local government expenditure across various services is studied with Norwegian data taking into account e.g. the fact that the budgets of municipalities are fixed as the municipal tax rates are the same for all jurisdictions. Sørensen (1995) studies the impacts of parties, committees and public sector politicians on local expenditure by type of service using micro survey data and municipality level data. Here, e.g. the role of municipal workers in their own municipality councils is highlighted. Sorensen and Hagen study the correspondence of citizens' preferences and those of elected politicians with micro survey data.

As for Finnish studies, the main interest in Oulasvirta (1997) was to study the impact of a change of grant system from matching grants to lump-sum type grants on aggregate and sector specific expenditures of municipalities. Dynamics of local government expenditure was the key question studied by Moisio (2002a). He analyzed the expenditure effect of grants compared to that of taxable incomes and to reveal possible causal interrelationships between municipalities' revenues and expenditures. In Moisio (2002b) he focuses on two issues. First, the expenditure response of Finnish municipalities to price and income changes during the matching grants period is examined. Second, the existence of the so-called "flypaper effect" under the formula-based grant period is tested. Two panel data sets are used: the last eight years (1985-1992) of the matching grants period and the first seven years (1993-1999) of the formula-based period. Seven expenditure categories are analyzed. The results of fixed effects panel regressions suggest that positive tax price elasticity parameters existed for most expenditure categories under the matching grants system. Only for the social welfare and health care sector, tax price elasticity was negative. In cross-section regressions the

price elasticities were negative. For the formula-based grants period, the results lend support to the "flypaper effect" because the estimated grant parameters were larger than the income parameters for most of the expenditure categories studied.

### 3.2. The approach of this study in studying the determination of municipal expenditure on basic services

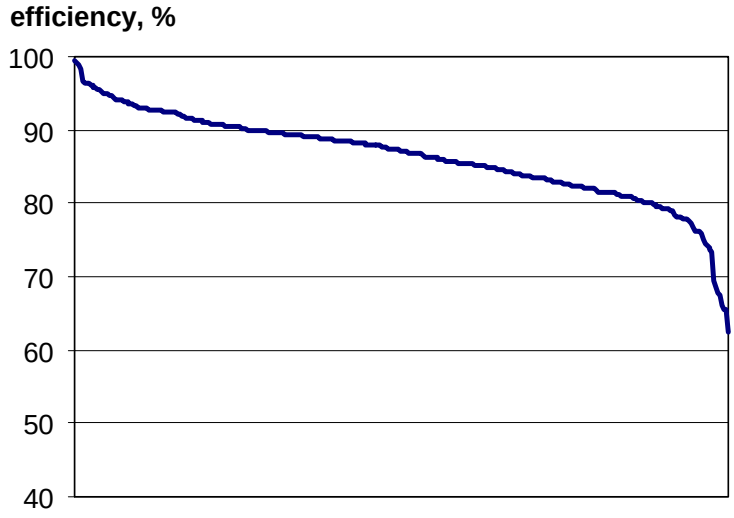
The purpose of this highly preliminary paper is to consider the determination of local public expenditures (per capita) on municipal basic services with Finnish data during 1994-2004. There will be two types of models. First, cross-section or pooled models for various time periods. Second, there will be separate panel type models which aim at explaining expenditure growth. Both represent work still very much in progress.

In the cross-section/pooled data models explanatory variables include rather typical demand variables such as income, grant and demographic variables as well as political variables. The novelty of the models is that we try to take into account the efficiency of provision of the services considered. This is important, because Finnish municipalities mostly produce the services by themselves and, to lesser degree, buy them from the private sector or other municipalities. The unit cost of services (or price) may vary to great extent depending on the production/provision system of municipalities. This cost variation should affect demand and thus expenditures on services. We want to test the role of efficiency of provision by including a related “efficiency” variable to our cross-section/pooled expenditure equations in addition to other variables, which will be introduced in section 3.3 in more detail.

Our variables measuring the efficiency of providing basic services are efficiency scores which range from zero to one (or from 0 to 100 %). The scores for basic services come from another study (Loikkanen and Susiluoto 2005), which concentrated on the efficiency of Finnish municipalities in the provision of basic services. In that study municipalities were regarded as multi-service providers, and we derived their frontier production function by Data Envelopment Analysis (DEA) using data on input(s) and outputs. The outputs included volumes of up to ten basic services and the single input variable was net expenditure used in the provision of included services. Municipalities on the production (or provision) frontier get an efficiency score of one. Depending on the relative distance to the frontier, other municipalities received scores more or less below one depending on their efficiency. We call these scores cost efficiency scores as they measure the cost (or expenditure) of providing services by own production or by purchasing them from other municipalities or the private sector.

Efficiency scores for municipalities were derived annually for 1994-2002. Instead of relying on a single DEA model, four models were run each year and their average was calculated. Averages of these figures were also calculated for time periods covering several years and the whole time span to find out longer term differences in efficiency of provision. Graph 1 displays the efficiency distribution of 353 municipalities based on average scores of four DEA models during 1994-2002. On the horizontal axis there are 353 municipalities in descending or of efficiency.

**Graph 1. Distribution of average efficiency scores of 353 Finnish municipalities during 1994-2002**




Source: Loikkanen & Susiluoto 2005

As the figure illustrates, there is considerable variation in cost efficiency of providing basic services, and this gives a good motive to test how it, in addition to other variables, affects municipal expenditures of the same services (as an aggregate). As a piece of information, we note that ten most efficient municipalities were rather small and located mostly in Southern Finland. Peripheral municipalities scored mostly below the others. Ten biggest cities showed rather varying performance ranking between 65 and 317.

Our basic hypothesis is that the cost efficiency scores are like (inversely operating) prices. When efficiency of provision is high, the unit cost (price) of provision is low, and demand for the basic services should be higher than when efficiency is low (high cost of provision). The impact on expenditure depends on the elasticity of demand with respect to cost efficiency. If the elasticity is above (below) one in absolute value, expenditure on basic services should increase (decrease) when efficiency of provision increases. In the case of unitary elasticity, there is no effect of a change in efficiency on expenditure.

In our per capita expenditure models we use municipality level data. As explanatory variables we shall include income and grant variables and efficiency scores as well as demographic and political variables which may affect the demand for basic services. Some variables which may affect demand for services may also affect the efficiency of providing them. For example political variables may affect besides demand for services, also the organization of producing (or providing) basic services at municipal level. For this purpose, it is useful to review our earlier results, obtained when we studied the determinants of efficiency scores by regressing them with variables related to demographic, geographic, economic and political variables (Loikkanen and Susiluoto 2005). It turned out that peripheral location, high income level (high wages), large population, high unemployment, diverse service structure and big share of services bought from other municipalities tend to reduce efficiency of municipal service provision. Big share of municipal workers in age group 35-49 years, dense urban structure and high education level of inhabitants tend to increase efficiency. These results apply to 1994-2002 and mostly for its sub-periods, too. Great state grants reduced efficiency in first years after the end of matching grant era in 1993. Later, during the block

grant era, our grant variable was unrelated to efficiency. As for variables which did not explain efficiency score variation, they included political party variables (in councils), turnover in elections or structure of municipalities (like population share of core municipality in region).

When choosing explanatory variables to our expenditure per capita models, our basic approach is to think that efficiency scores reflect the supply side and the other variables reflect demand for basic services. Thus, we do not include for instance density of population or mode of provision in our basic expenditure model as they affect the efficiency of supply. However, one may argue that they have an impact on demand as well through some channel. So we also test their role in expenditure models.

### 3.3. Data and methods

Our aim was initially to cover the Finnish municipal sector as widely as possible, including preferably all the over 400 municipalities. However it proved necessary to exclude two groups. First, the municipalities of the autonomous Åland region were excluded, as the statistics of this region may not in all cases follow the methods and concepts of Statistics Finland, causing comparability problems. The other group of excluded cases is those municipalities which have faced a municipal annexation since 1994. There have been 20 annexations during this period, half of them in 2005-2006 and involving also some larger towns. The reasons for exclusion of this group were in eventual difficulties in the interpretation of results, and also in the availability of sufficient time series for the today non-existing municipalities. Finally, four outlier municipalities were removed from the data. The final sample covered 388 municipalities with population median at 5700 and average at 11700 people.

Data was obtained from Statistics Finland. The most important single source was the official statistics of the municipal sector. The various other structural and sectoral time series were obtained from the regional database of Statistics Finland (ALTIKA). Some of the indicators used in this study were originally constructed for our earlier work (Loikkanen and Susiluoto 2005, Susiluoto and Loikkanen 2001).

Changes in statistical classifications and definitions may have an effect on our data and regression results. In particular, a new system of bookkeeping for municipalities was introduced in continental Finland in 1997. Also in 2000, small revisions in municipal statistics took place. Both revisions may cause comparability problems, and the earlier change was also reflected in poolability of data. Another potential problem is that the state of municipal bookkeeping may correlate with municipality size, and problems would result if this affects systematically the level of expenditures. The existence and size of this problem is difficult to assess; anyway no clear connection was found between municipalities' population and expenditure.

Regression methods were used in our somewhat preliminary modelling exercises which reflect work in progress. First, municipalities' expenditure on basic service provision were explained with various structural factors of the municipalities in 1994-2004. The variable to be explained was sum of per capita net operating expenditures in health, social and educational sectors, in 2000 prices (section 5). The basic idea was to test first whether demand for basic services type variables alone explain expenditures. Second, what is the role of our efficiency score measure when added to the set of explanatory variables. Third, what are the results if the supply side is taken into account by characteristics of municipalities (geographic etc. variables) instead of efficiency scores.

Although our data covered in principle the years 1994-2004, we have to limit its use to the years and municipalities for which we have efficiency scores (1994-2002). Note that all the years studied in this paper belong to the lump-sum grant era which replaced the matching grants beginning 1993. Another limitation was felt to be necessary after some testing was due to the book-keeping reforms. Given that 1997 is the first year of new book-keeping system, we use data on 1997-2002 in studying the determinants of per capita basic service expenditures. Our first experiments to use it as panel data with fixed effects (municipality dummies) did not give meaningful results. Thus, in this paper we report preliminary results based on pooling the data of six years and using year dummies. In addition to this, we report some results based on annual regressions for the years 1997-2002.

Second, at the end of this paper also changes in per capita net expenditures of the municipalities over time were explained with changes in state grants and tax incomes (section 6). As tax and grant increases may be used anywhere in the municipal economy, we included all sectors of the municipality into the variable to be explained (not only health, social and education sectors). Unlagged and lagged differences of explanatory variables were used up till three-year lags. Here, the data covered years 1998-2004 and it turned out necessary to divide the data at population of 6000 people, after which Hausman and F-tests pointed towards RE models for both groups.

## 4. Observations on expenditures on basic services and structural factors of municipalities

Before going to the regression results, the direct two-variable relations between net operating expenditure of basic service sectors and some potential explanatory variables in 2004 (for efficiency 2002) are shown in Figures 1 to 8.

First of all, it may be asked whether per capita net operating expenditure level for basic services is associated with cost efficiency of service provision (Figure 1). This question is central to our study. We can see that a clear negative correlation exists ($r = -0.43$). For other years 1994-2001 annual correlation is between $-0.47$ and $-0.70$. This result is plausible considering the nature of the efficiency variable.

Secondly we are interested in the role of municipality size for basic service expenditure level. Contrary to what might be expected, population of the municipality and expenditure is hardly at all correlated (Figure 2, $r = +0.08$). According to Finnish municipal statistics, per capita expenditures were highest in some small northern municipalities (mainly Lapland), whereas the lowest expenditure municipalities, while also being small were usually in South Finland. The largest municipalities by population were not in either end of cost distribution, even though some of them (Helsinki, Turku) are more in the top end. The result of small positive correlation between municipality size (population) and expenditure is valid also for other years than 2004 and expenditure concepts. The latter include gross expenditure (including investments), net operating expenditure with and without user charges for services (Table 1).

**Table 1**. Correlations between municipality population and per capita expenditure, using varying expenditure concepts, 1994-2004.

| | Expenditure concept | | |
|---|---|---|---|
| | net exp. | gross exp. | net exp. + user charges |
| Correlations: | | | |
| minimum | +0.05 | +0.09 | +0.08 |
| maximum | +0.18 | +0.21 | +0.19 |
| significant at 0.05 | 7/11 | 10/11 | 7/11 |

We would expect that day care and basic education needs would cause a positive connection between municipal basic service expenditures and the share of children in the population. However, this is not the case in the two-variable scatter diagram of figure 3, where the correlation is slightly negative (-0.26). The other age structure variable is the share of people over 75 years of age (figure 4). Here we have a slight positive correlation (+0.28), which has become somewhat larger during the study period 1994-2004.

The share of foreign citizens has traditionally been low in Finland, having only grown somewhat during the last decade (figure 5). Highest shares (3 to 6 per cent) are usually in the largest cities (Helsinki 5.2 % in 2004), while two thirds of the municipalities have a share less than 1 %. No clear correlation with expenditures is found (r = + 0.08).

Unemployment rate is an indicator of socioeconomic situation of municipality and its level is connected to expenditure on basic services (figure 6, r = +0.40)). The rates vary quite strongly, lowest figures being under 5 % in 2004 and highest around 25 %. Unemployment has been especially severe in the northern and eastern parts of Finland, especially in Lapland.

Figure 7 is connected with local politics. In addition to several other political variables an index of political concentration of municipal councils was constructed. It is basically a Herfindahl index of the shares of different political parties in the councils. An index value of 100 % means that only one party is represented, as was the case in some small archipelago municipalities in south-western Finland. The municipalities with diversified political structure tend to have big population and they including the capital region cities Helsinki, Espoo and Vantaa. A slight positive correlation exists between concentration of political power and per capita expenditure on basic services (r = +0.24).

Unlike population, population change (figure 8) has a clear negative correlation with per capita expenditure on basic services, the relation being clearer in municipalities with diminishing population (r = -0.49) than with increasing population (r = -0.29). In principle higher investment needs of municipalities showing more positive population development might provide an explanation, as in these cases less money would be left for current expenditures. However the result still holds if investment is added to expenditure (r = -0.42); actually investment and current expenditures are practically uncorrelated.

**Figure 1. DEA-efficiency and expenditure 2002**

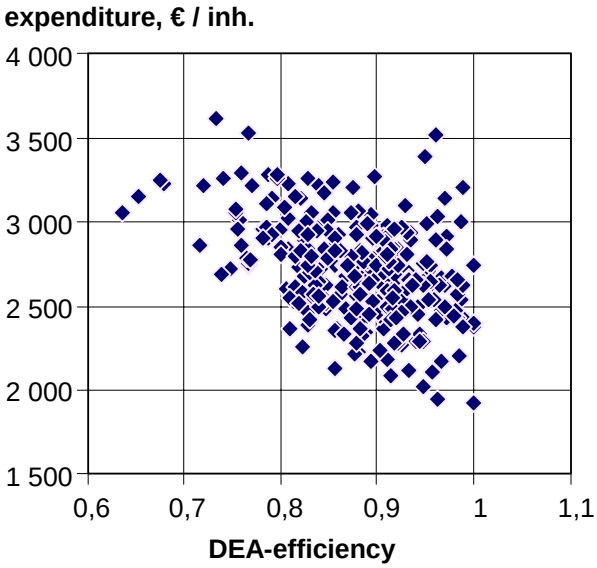



**Figure 2. Population and expenditure 2004**

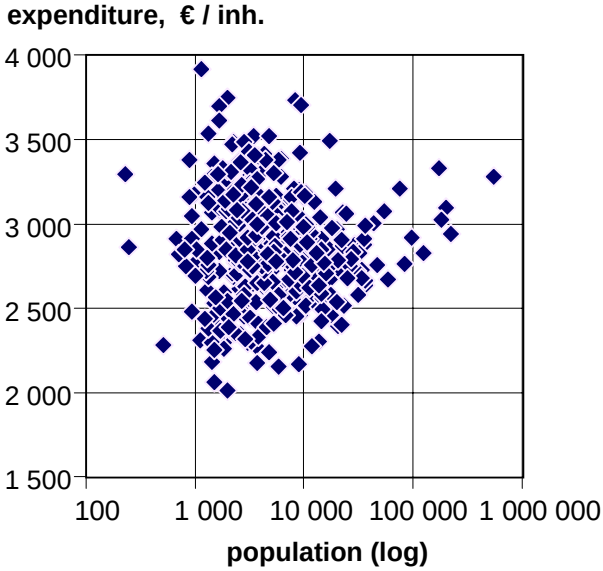



**Figure 3. Population below 17 years and expenditure 2004**

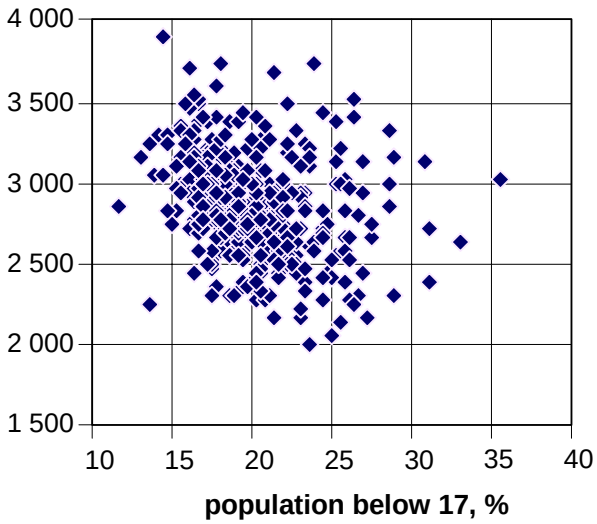



**Figure 4. Population over 75 years and expenditure 2004**

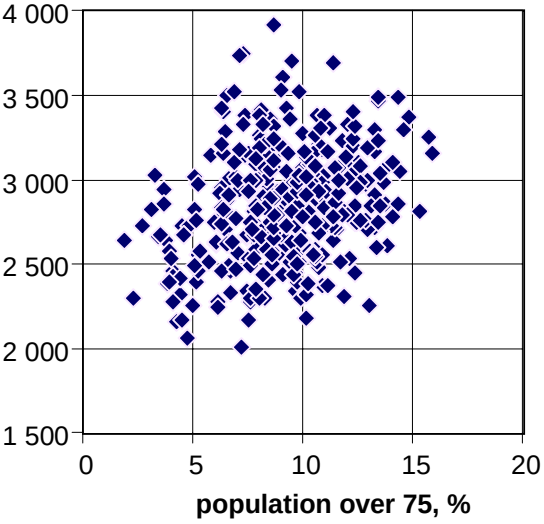


**Figure 5. Foreign citizens and expenditure 2004**

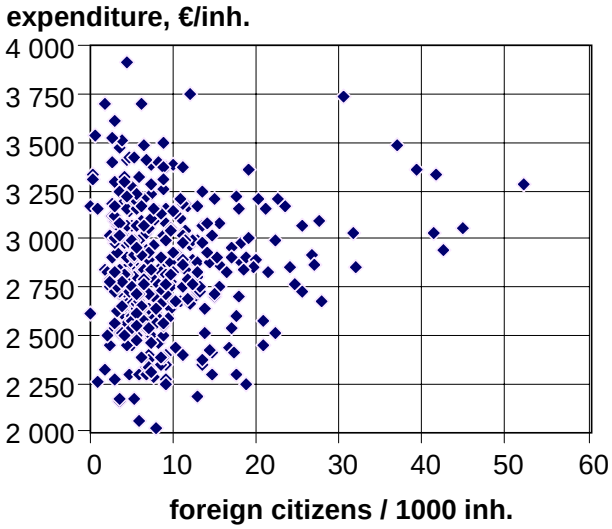



**Figure 6. Unemployment rate and expenditure 2004**

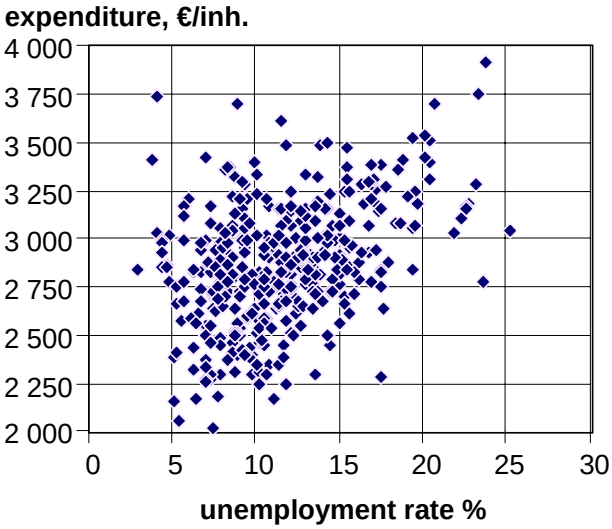



**Figure 7. Political concentration in municipal council and expenditure 2004**

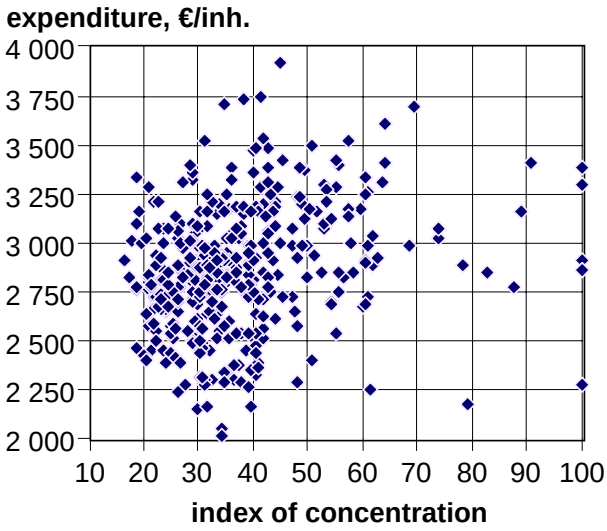
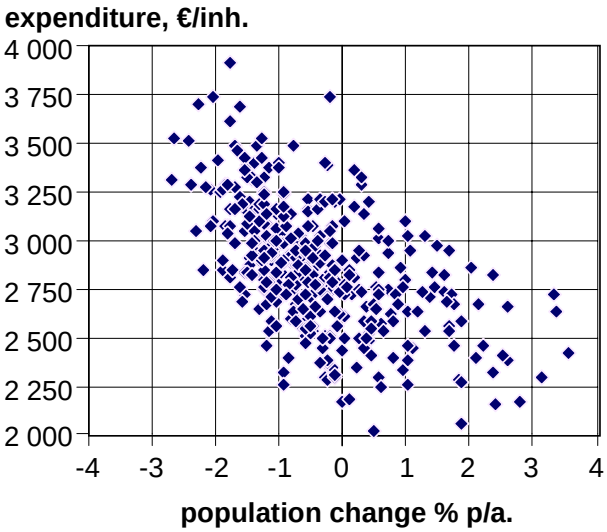



**Figure 8. Population change and expenditure 2004**



## 5. Expenditures on basic services and structure of municipalities: regression results

In this section regression results of the first part of the study are presented. They concern the effect of various structural factors on per capita net operating expenditure levels of Finnish municipalities. A list of all tested structural variables of the municipalities is in Appendix 1. They include demand for services variables related to average income level, grants, demographics and political variables at municipal level. The first model (column 1 in Table 2) contains these demand side variables. In column 2 we have included efficiency score of municipal basic service provision in addition to demand side covariates. In column 3 the efficiency score variable is replaced by a whole list of supply side variables related to location and physical structure of municipalities, but the demand side variables are there as in columns 1 and 3. Finally, in column 4, we have all the demand variables and, besides the efficiency scores, also the other supply side variables in the same model. This model is somewhat questionable as the supply side factors affect the efficiency of service provision according to our earlier results in Loikkanen and Susiluoto (2005). On the other hand, also lump-sum grants are dependent on characteristics of municipalities. These problems are only recognised at this stage of work in progress.

In all the four models, both the taxable income per recipient variable and the state grant per inhabitant variable have significantly positive coefficients. An increase in taxable income per income recipient of 100 € would bring an increase in municipal basic service expenditure of 2.9 to 3.5 € per inhabitant, while an increase of 100 € in per capita state grants would cause an expenditure increase of 46 to 60 €, which both sound plausible[3]. These results imply that the revenue source affects expenditure.

Adding the price-type cost efficiency variable to demand-oriented model 1, we end up at model 2; this brings an increase of $R^2$ from 0.665 to 0.707. We see that coefficients for income and grants do not change radically, even though the latter one is a bit lower in model 2. The efficiency variable itself is highly significant with a value of -1010 in model 2. This would mean that for example an efficiency increase of 10 DEA points[4] would bring a reduction in expenditures of about 100 € per capita. This would suggest an elasticity below one with respect to cost efficiency, even though at this preliminary stage of modelling the coefficients do not describe elasticities in any strict sense. Coefficients for the structural explanatory factors do mostly not change much when moving from model 1 to model 2, exceptions being the coefficients of elderly people and unemployment.

Replacing the cost efficiency variable with supply side variables of location and types of service provision (from model 2 to model 3) does not too much affect the demand side structural factors, left representation and political concentration in municipal councils now being the exception. The income and grants coefficients are now somewhat lower, while $R^2$ is not affected.

Again adding efficiency to this "larger" model (3) we end up with model 4. The efficiency variable is still highly significant and its value has only slightly dropped; also $R^2$ increases from 0.716 to 0.744. Income and grants coefficients are now virtually unchanged. Finally looking at the differences between the models 1 and 3, or alternatively 2 and 4, we see the effect of adding the supply side structural variables on the explanation. The result is a decrease in income and grant

[3] It should be noted that taxable income is measured per income recipient whereas state grants are per capita. As some 85 % of the Finnish population are income recipients, this would mean that coefficients of the income variable would rise somewhat if incomes were measure as per capita.

[4] The cost efficiency variable takes values between 0 and 1. Increase of efficiency of one point refers here to an increase of 0.01 in relative efficiency (e.g. from 0.90 to 0.91), which efficiency increase would be close to 1 per cent.

coefficients; also most structural demand coefficients are lowered. In both cases an increase in $R^2$ results from adding the supply factors.

Table 2 shows that also several types of structural factors of the municipalities seem to influence the expenditure levels of basic services in Finland. First of all is the possible effect of municipality population. Several linear and nonlinear formulations were attempted. According to the results municipalities below 30 000 people tend to have lower expenditure levels than bigger municipalities, the annual difference being some 50-200 € per inhabitant.

An increase of population seems to have a negative effect on per capita expenditures on basic services. This effect is larger in the municipalities where population has also previously been decreasing. The result is in line with the two-variable correlation of figure 7 above. In the data with municipalities over 2500 people in 1997-2002[5], annual growth of population of 1 % would bring cost reduction of about 70-90 €/capita, if population is decreasing. In municipalities with increasing population the effect would be about half that much.

What comes to age and nationality composition of population, a large expenditure effect came from foreign citizens coming from outside the EU or North-America. Annual increase would here be 20 to 23 € per inhabitant for increase of one foreigner per 1000 inhabitants. This equals extra expenditure for a municipality of almost 2000 € per month for a person from outside the EU or North-America. The expenditure effect of EU and North-America national was estimated to be about one fifth of the above group. As to age composition of population, the results are somewhat surprising. Contrary to what might be expected, high share of population under 17 years would bring lower expenditure levels in three of the four models. On the other hand the effect of elderly people seems to be cost increasing. The socioeconomic situation of the municipality was measured by the unemployment rate, but its effect was significant only in the demand model (1).

Two location factors were added as explanatory supply side variables in models 3 and 4, as these could also be expected to influence expenditure levels of public services. Domestic location of the municipality was measured with a peripherality index[6], in addition to which a dummy was used for archipelago municipalities. The coefficient of the peripherality variable was positive and significant in both models, while the archipelago dummy was significant only in model 3.

The way in which services are provided or organized seemed to have an effect on expenditure levels through several channels. Large amount of services bought either from other municipal sector (including joint municipal organizations) or from private producers, as well as a high share of young workers in the municipal service sector tended to increase expenditures, while providing only a narrow range of services decreased expenditures. Here it should be noted that the variable to be explained is expenditure level, not efficiency of service production or amount of services produced.

Of the local politics variables, the representation the Centre party in municipal councils gave the clearest results, as in all models 1 to 4 this variable had a significant negative effect on expenditures. Representation of the left parties got positive coefficients which, however, were mostly not significant. Concentration of municipal council representation into few political parties increased expenditures significantly in models 1 and 2.

[5] Our basic data mainly covers also small municipalities and the period 1994-2004, but this paper reports only results from the period 1997-2002.

[6] Value of the peripherality index for a municipality is a weighted average of road distancies between the municipality and all other domestic municipalities, with annual populations of the end municipalities as weights.

Even though the specification problems connected with table 2 clearly remain, calling for further work, good $R^2$ figures are obtained, ranging from 0.66 to 0.74. The signs and levels of explanatory variables are usually fairly stable between the models. As specification work is still needed, the high level of most t-values may partly be due to the "work-in-progress"-nature of this paper.

Some other tested variables had no effect on expenditures, including the share of Swedish-speaking population in municipality, degree of urbanization and a dummy testing whether the municipality is centre of its economic region. Of explanatory variables connected with local politics, voting activity or its change or share of female representation in municipal council had no effect.

The dependent in Table 2 was per capita net operating expenditure (without user charges). To find out the possible effect of including investments, these were added to operating expenditures in some preliminary models. The results were not fundamentally affected, although average $R^2$ in the annual OLS models dropped somewhat. This should not be too surprising considering the volatile nature of investments.

Finally, Appendix 3 shows results of annual OLS regression for models (1) to (4). What comes to the income, state grant and cost efficiency variables, the results of Table 2 get support from the annual regressions. The signs remain the same and almost all t-values are significant at 0.01 level in Appendix 3. In particular, the coefficients of the DEA cost efficiency variable are close to those of table 2. Also other explanatory variables give results fairly similar to those of table 2. The annual regressions have $R^2$ coefficients between 0.57 and 0.69. While some specification and normality problems still remain in most annual models, heteroscedasticity problem diminishes now and the overall impression about the models is clearly better than in table 2.

**Table 2: Explaining variation in basic service expenditure, Finnish municipalities 1997-2002.** [7]

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Constant | 1778 | 2585 | 1387 | 2433 |
| | (9.88***) | (14.10***) | (6.42***) | (10.82***) |
| Taxable income/income recipient, € | 0.0353 | 0.0347 | 0.030 | 0.0295 |
| | (5.70***) | (5.32***) | (5.11***) | (4.72***) |
| State grants/inhabitant, € | 0.595 | 0.547 | 0.489 | 0.464 |
| | (22.06***) | (20.34***) | (19.25***) | (18.07***) |
| Cost efficiency of supplied services, | | -1010 | | -876 |
| DEA index | | (-14.59***) | | (-13.06***) |
| Population (1/0): | | | | |
| below 10 000 | -209.4 | -222.1 | -133.4 | -141.4 |
| | (-9.43***) | (-10.99***) | (-6.20***) | (-7.01***) |
| 10 000-15 000 | -187.5 | -191.2 | -160.9 | -160.3 |
| | (-8.47***) | (-9.50***) | (-7.79***) | (-8.39***) |
| 15 000 - 20 000 | -85.39 | -118.2 | -53.0 | -79.1 |
| | (-3.60***) | (-5.59***) | (-2.46**) | (-4.02***) |
| 20 000-30 000 | -116.4 | -118.5 | -115.2 | -111.7 |
| | (-5.06***) | (-5.67***) | (-5.52***) | (-5.94***) |
| Population change: | | | | |
| (annual change, %)x(decreasing pop.) | -93.46 | -72.36 | -93.46 | -77.93 |
| | (-7.43***) | (-6.20***) | (-8.05***) | (-7.17***) |
| (annual change, %)x(increasing pop.) | -46.21 | -47.8 | -42.01 | -41.18 |
| | (-3.80***) | (-4.20***) | (-3.83***) | (-4.00***) |
| Population structure: | | | | |
| population 0-16 years of age, % | -14.05 | -8.81 | -6.87 | -2.54 |
| | (-4.49***) | (-2.82***) | (-2.33**) | (-0.85) |
| population over 75 years of age, % | -4.36 | 8.93 | 10.35 | 19.23 |
| | (-0.82) | (1.73*) | (2.08**) | (3.92***) |
| foreigners from EU & North Am./1000 inh. | 6.42 | 5.60 | 3.41 | 3.24 |
| | (5.81***) | (5.61***) | (3.13***) | (3.26***) |
| foreigners from other countries /1000 inh | 23.68 | 22.16 | 21.90 | 19.78 |
| | (6.67***) | (7.63***) | (7.41***) | (8.02***) |

[7] Heteroscedasticity corrected (Huber-White) t-values in parentheses. * significant at 0.1. ** at 0.05 and *** at 0.01 level. Variable to be explained is annual per capita net expenditure of health, social and educational services at 2000 prices, €. Due to availability of cost efficiency figures, models (1) - (4) are restricted to period 1997-2002. Only municipalities with over 2500 people included.

| | | | | |
|---|---|---|---|---|
| Unemployment rate % | 4.50 | 1.77 | 0.63 | -1.23 |
| | (2.61***) | (1.07) | (0.37) | (-0.74) |
| Location: | | | | |
| peripherality index (log) | | | 210.6 | 151.63 |
| | | | (10.48***) | (7.80***) |
| archipelago municipality (1/0) | | | 90.77 | 62.67 |
| | | | (2.10**) | (1.49) |
| Services provision factors: | | | | |
| purchases of services from: | | | | |
| other local public sector % | | | 0.735 | 0.515 |
| | | | (6.74***) | (4.79***) |
| private sector % | | | 1.586 | 2.867 |
| | | | (3.11***) | (5.08***) |
| age of workers less than 35 years, % | | | 5.476 | 4.14 |
| | | | (4.73***) | (4.02***) |
| narrow range of provided services | | | -8.457 | -8.38 |
| | | | (-11.65***) | (-12.15***) |
| Local political structure: | | | | |
| left parties in municipal council, % | 0.827 | 0.958 | 0.352 | 0.445 |
| | (1.82*) | (2.32**) | (0.84) | (1.13) |
| centre party in municipal council. % | -2.651 | -2.343 | -2.510 | -2.189 |
| | (-8.43***) | (-7.48***) | (-8.26***) | (-7.06***) |
| concentration of party structure | 1.96 | 1.360 | 0.695 | 0.590 |
| in municipal council, index | (4.41***) | (2.97***) | (1.47) | (1.22) |
| N | 299 | 299 | 299 | 299 |
| T | 6 | 6 | 6 | 6 |
| R2 | 0.665 | 0.707 | 0.716 | 0.744 |
| Ramsey Pr>F | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Jarque-Bera Pr > | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| VIF average | 3.44 | 3.35 | 3.24 | 3.20 |
| VIF maximum | 6.35 | 7.80 | 7.80 | 7.96 |

## 6. Municipal expenditure growth and growth of grants and tax income

In this section we present results of explaining growth of municipal expenditure by growth of state grants and municipal tax income. The topic of the section is tied with the so-called flypaper effect hypothesis, according to which we would expect expenditure out of grant increases given by the state to exceed expenditure out of ordinary tax income increases. The simple calculations presented here, touching a much-studied topic, do not claim to be conclusive; they should rather be seen as one phase of a still ongoing work. At the end of the section we take a brief look at possible non-homogeneity of the flypaper effect, especially what comes to the effect of local political variables (notably centralization of political structure).

Table 3 presents the results of explaining change in net expenditures with changes in state grants and tax incomes of the municipalities. The data now covers the period 1998-2004. While tests pointed at RE models, both FE and RE models are reported. In four of the eight models (1, 2, 5 and 6), only unlagged and three lagged differences of grants and taxes were used as explanatory variables, while in the remaining four (3, 4, 7, and 8) also certain structural factors are used. The structural variables were shares of people over 75 years, Swedish-speaking people, foreign citizens, as well as shares of services purchased from other municipal sector and private sector. $R^2$ varied from 0.333 to 0.405 in the bigger municipalities group and from 0.137 to 0.194 in the smaller municipalities group. The coefficients of taxes and grants changes were positive and significant up to three-year lags for the larger municipalities (becoming then insignificant), while for smaller municipalities the lags were shorter. As to the structural explanatory variables of the larger models, single unlagged or lagged changes were used in the various cases. Altogether the coefficients of the RE and FE models tend to be quite close to each other, while the $R^2$ figures are somewhat lower in RE models. As a detail, in models 3 and 4 purchasing services from outside tends to lower the expenditure levels.

The results are summarised in figures 9 to 11. Figure 9 shows sums of state grants and tax income coefficients for the eight FE and RE models of table 3. In all models the sums of spending coefficients for the larger municipalities are about twice larger (0.5 – 0.6) than for the small municipalities (around 0.3), setting the question whether municipalities of varying size have uniform spending behaviour. Second, in all models M1 to M8 estimated spending from grants increases is bigger than spending from tax increases, even though the difference is small. Third, all coefficient sums are fairly small, clearly less than one. Finally the different models give quite similar results for a given size group of municipalities.

The lag structures of RE models for the two size groups of municipalities (under and more than 6000 people) are in figure 10. The structures vary between grants and taxes. In the case of grants the expenditure growth effect is realized somewhat evenly during the first three years, after which the three years lagged coefficient is low (though still significant for the larger municipalities). For tax income changes the unlagged expenditure change is smaller and the peak is at a one-year lag. Also for tax income, the three years lagged coefficients are small (for small municipalities practically zero).

Finally, some very preliminary exploration was made about the possible effect of local political conditions on spending. The 160 municipalities with more than 6000 people were subdivided into two equal-sized groups according to the value of several local political variables. The variables were shares of left, right or centre party representation in municipal councils, voting activity, extent of female representation and political concentration index in councils. An interesting first result was obtained. Most political variables had no systematic effect on spending behaviour. However

political concentration of municipal councils seemed to have an influence. In figure 11 the municipalities are subdivided according to the value of the political party concentration index. In all models M1-M4 coefficient sums are always larger when political concentration is lower, both with state grants and tax income. Also the spending difference between the groups of high and low political concentration seems to be a bit larger from grants than from taxes. It looks as if having many political parties competing for scarce money in the municipal councils would cause marginal spending to rise, especially if money is coming from the central government.

It may be suspected that the above result is only due to differences in municipality size. If political concentration and size of municipality were negatively correlated (which could be plausible) while municipality size and spending correlated positively we could get the above result. We finally subdivided the municipalities into further sub-groups by size and once more estimated the models, but no systematic differences were found in spending behaviour between the size classes. Thus we would suspect that the spending differences are actually connected with local political conditions. While more work is certainly needed, the result can be seen as a tentative observation on possible behaviour differences between municipality groups.

**Figure 9**. Coefficient sums of FE and RE models. Municipalities larger and smaller than 6000 inhabitants.

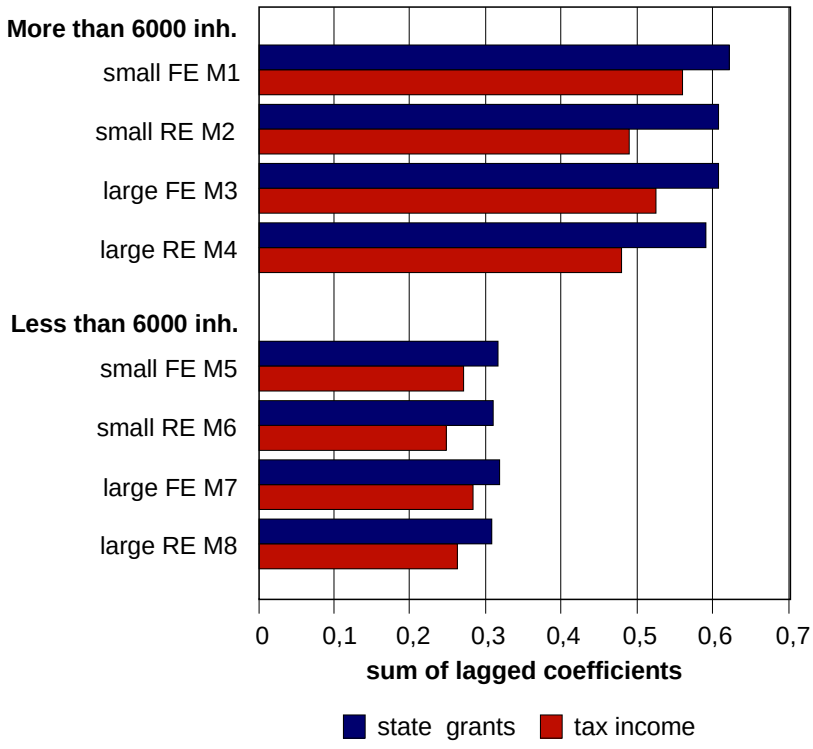


**Table 3. Explaining net expenditures growth with growth of state grants and tax income. FE and RE models, Finnish municipalities 1998-2004**[8]

| | Municipalities with more than 6000 inhabitants: | | | | Municipalities with less than 6000 inhabitants: | | | |
|---|---|---|---|---|---|---|---|---|
| | Model 1 FE | Model 2 RE | Model 3 FE | Model 4 RE | Model 5 FE | Model 6 RE | Model 7 FE | Model 8 RE |
| Constant | 100,63 | 89,02 | 82,68 | 75,62 | 64,13 | 102,96 | 55,76 | 96,49 |
| | (2,90***) | (23,64***) | (2,39**) | (14,30***) | (1,38) | (26,52***) | (1,20) | (4,57***) |
| Taxes €/inh., 2000p: | | | | | | | | |
| change t – (t-1) | 0,101 | 0,090 | 0,094 | 0,086 | 0,096 | 0,086 | 0,102 | 0,094 |
| | (5,86***) | (5,58***) | (5,53***) | (5,33***) | (3,90***) | (3,76***) | (4,15***) | (4,12***) |
| (t-1) – (t-2) | 0,218 | 0,206 | 0,215 | 0,203 | 0,176 | 0,165 | 0,177 | 0,167 |
| | (11,13***) | (11,41***) | (11,10***) | (11,29***) | (5,91***) | (6,11***) | (5,96***) | (6,20***) |
| (t-2) – (t-3) | 0,142 | 0,130 | 0,144 | 0,131 | 0,003 | -0,002 | 0,007 | 0,003 |
| | (6,10***) | (6,15***) | (6,26***) | (6,18***) | (0,09) | (-0,05) | (0,22) | (0,12) |
| (t-3) – (t-4) | 0,077 | 0,065 | 0,073 | 0,060 | -0,004 | -0,001 | -0,002 | 0,000 |
| | (2,93***) | (2,89***) | (2,81***) | (2,66***) | (-0,12) | (-0,05) | (-0,07) | (0,000) |
| State grants, €/inh., 2000p: | | | | | | | | |
| change t – (t-1) | 0,221 | 0,223 | 0,218 | 0,216 | 0,100 | 0,097 | 0,098 | 0,092 |
| | (6,88***) | (7,30***) | (6,90***) | (7,16***) | (3,64***) | (3,79***) | (3,57***) | (3,64***) |
| (t-1) – (t-2) | 0,131 | 0,125 | 0,127 | 0,119 | 0,075 | 0,079 | 0,079 | 0,081 |
| | (4,42***) | (4,47***) | (4,35***) | (4,31***) | (2,80***) | (3,16***) | (2,95***) | (3,25***) |
| (t-2) – (t-3) | 0,213 | 0,205 | 0,209 | 0,206 | 0,131 | 0,130 | 0,130 | 0,130 |
| | (7,59***) | (7,67***) | (7,53***) | (7,78***) | (4,97***) | (5,24***) | (4,97***) | (5,28***) |
| (t-3) – (t-4) | 0,058 | 0,055 | 0,054 | 0,050 | 0,011 | 0,005 | 0,012 | 0,005 |
| | (2,30**) | (2,31**) | (2,17**) | (2,16**) | (0,47) | (0,23) | (0,49) | (0,24) |

[8] One-way FE and RE models. Variable to be explained is change in real per capita net expenditure €. t values in parentheses, * significant at 0.1, ** 0.05 and ***0.01 level.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Population structure: | | | | | | | | |
| population over 75 years, % | | | 79,91 | 55,03 | | | 22,12 | 29,24 |
| change (t-1) – (t-2) | | | (3,51***) | (3,57***) | | | (1,92*) | (3,16***) |
| Swedish speaking % | | | | | | | 50,91 | 41,18 |
| change (t-2) – (t-3) | | | | | | | (3,00***) | (3,15***) |
| foreign citizens /1000 . | | | 5,83 | 4,48 | | | | |
| change (t-1) – (t-2) | | | (1,73*) | (1,67*) | | | | |
| Services purchased from: | | | | | | | | |
| other municipal sector % | | | -0,742 | -0,714 | | | | |
| change t – (t-1) | | | (-1,90*) | (-2,01**) | | | | |
| private sector, % | | | -3,64 | -3,402 | | | | |
| change t – (t-1) | | | (-3,73***) | (-3,85***) | | | | |
| $R^2$ | 0,383 | 0,333 | 0,405 | 0,354 | 0,185 | 0,137 | 0,194 | 0,150 |
| F-test | 1,00 | | 1,00 | | 1,00 | | 1,00 | |
| Hausman | | 0,676 | | 0,751 | | 0,970 | | 0,986 |
| N | 160 | 160 | 160 | 160 | 227 | 227 | 227 | 227 |

**Figure 10.** Explaining change in total current expenditures with lagged change in state grants and tax income. RE models.

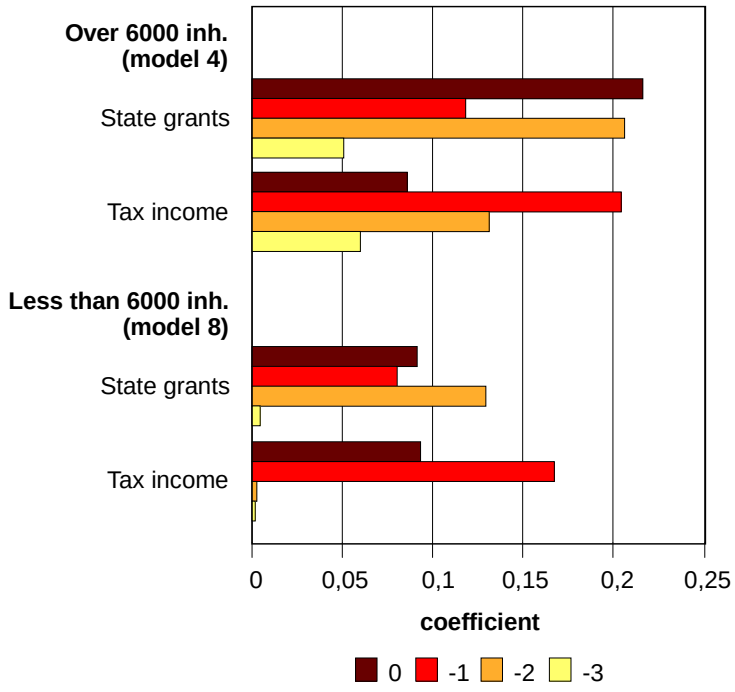
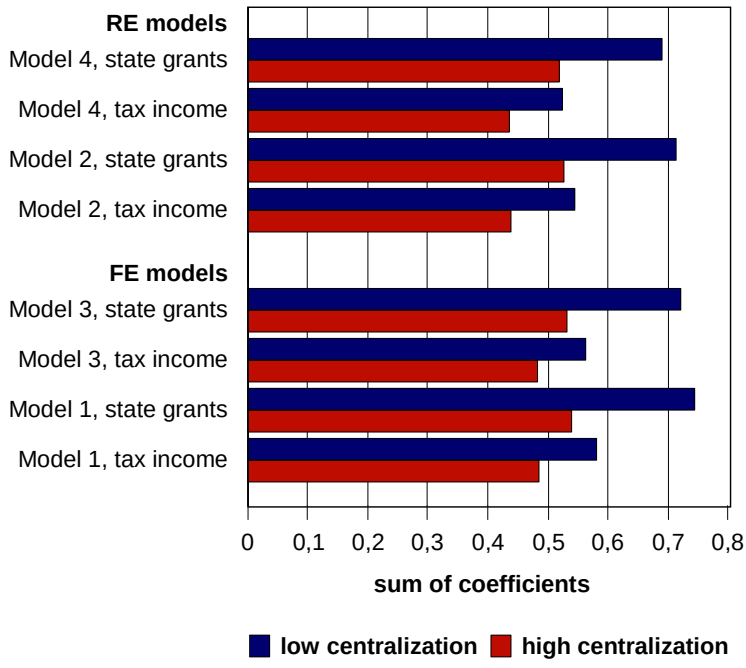



**Figure 11**. Coefficient sums of changes in state grants and tax incomes, municipalities grouped according to concentration of political parties in municipal councils. FE and RE models, 1998-2004.



## 7. Conclusions

Finland is a country with a two-tier government, consisting of central government and a strong municipal sector. The task of providing citizens with a wide range of welfare services has been given to municipalities, which also have taxing power of their own. At present altogether 416 municipalities exist, ranging in size from a few hundred to more than half a million people. At present a government initiated reform process is ongoing, in which Finnish municipalities make plans to increase cooperation or initiate mergers. Central aims or this process are to increase efficiency in provision of services and to guarantee their provision without excessive pressure on financing them. One purpose of this paper is to provide general background information for this reform.

The first and main aim of the study is to consider the determinants of municipalities' expenditure on basic services. Both demand and supply side variables are tested. In particular, we tested how the cost efficiency of basic service provision, which varies across municipalities, affects municipalities' per capita expenditure levels. Our efficiency variables are scores ranging from zero to one and they come from an earlier study (Loikkanen and Susiluoto 2005). Frontier production function of municipalities as multi-service providers was derived by Data Envelopment Analysis (DEA). Municipalities on the frontier got an efficiency score of one and the other municipalities received lower scores. We call these scores cost efficiency scores as they measure the cost of providing services, and we assume that the scores are like inversely operating prices. The impact on expenditure depends on the elasticity of demand with respect to cost efficiency.

Four models were estimated, starting from a regression with only demand side variables, including income, state grants, size, growth and population factors, unemployment as well as political variables. Cost efficiency and other supply side variables related to location and types of service provision were then added. According to our preliminary results, about 70 per cent of expenditure variation of the municipalities could be explained with these factors. The explanatory factors had generally plausible signs and the coefficients were mainly statistically significant. In particular, coefficients of the efficiency variable were negative and significant, implying an elasticity below one with respect to cost efficiency. Also coefficients for taxable income and state grants were positive and significant. It should be noted that these are the first results of an ongoing work, and are therefore still be subject to changes. Pooled data and annual cross section OLS were used, and at this stage our analysis is confined to 299 municipalities of over 2500 inhabitants and to the period 1997-2002.

As a second type of analysis, changes in municipal expenditures, caused by changes in state grants and tax income, were explained. Here, the data consisted of 388 Finnish municipalities in 1998-2004 and panel methods as well as and OLS were applied. Unlagged and lagged differences up to three-year lags were used in a panel setting. Explaining expenditure changes with state grants and tax changes touches the much-studied flypaper effect. Like in many earlier studies, also here spending out of grants exceeded spending out of taxes, even though the difference was not large and the coefficients were fairly small. Our preliminary results suggest that spending patterns are not homogenous between municipality groups. Larger municipalities seem to have larger spending coefficients than smaller municipalities, and also local political conditions seem to have an effect on spending.

**References**


Aronsson, Thomas & Wikstrom, Magnus, 1996. "Local public expenditure in Sweden a model where the median voter is not necessarily decisive," European Economic Review, Elsevier, vol. 40(9), pages 1705-1716, December.

Aronsson, Thomas, Lundberg, Johan and Wikström, Magnus (2000). "The Impact of Regional Public Expenditures on the Local Decision to Spend." Regional Science and Urban Economics 30, 185-2002.

Barr, J.L. – Davis, O.A. (1966): An Elementary political and economic theory of the expenditures of local governments. Southern Economic Journal 33, 149-165.

Baumol, W.J. (1967): Macroeconomics of Unbalanced Growth: The Anatomy of Urban Crisis. American Economic Review, Vol. 57, 415-426.

Bergstrom, Theodore C & Goodman, Robert P, 1973. "Private Demands for Public Goods," American Economic Review, American Economic Association, vol. 63(3), pages 280-96, June.

Borcherding, Thomas E. &. Deacon, Robert T. 1972: The Demand for the Services of Non-Federal Governments. The American Economic Review, Vol. 62, No. 5, 891-901.

Borge, Lars-Erik & RattsØ, Jorn, 1995. "Demographic shift, relative costs and the allocation of local public consumption in Norway," Regional Science and Urban Economics, Elsevier, vol. 25(6), pages 705-726, December.

Borge, Lars-Erik & Sørensen, Rune J. 2002: "Aggregating Spending Preferences: An Empirical Analysis of Party Preferences in Norwegian Local Governments", Public Choice, Volume 110, Numbers 3-4/ March.

Courant, D.F. – Gramlich, E.M – Rubinfeldt, D.L. (1979): The stimulative effects of intergovernmental grants: Or why money sticks where it hits. In P. Mieszkowski and W.H. Oakland (Eds.), Fiscal federalism and grant-in-aid. Washington DC: The Urban Institute.

Inman, R. P. (1979), The Fiscal Performance of Local Governments: An Interpretative Review, in P. Mieszkowski and M. Straszheim (eds.) Current Issues in Urban Economics, Baltimore, The John Hopkings University Press.

Kuhry (ed.) (2004): Public Sector Performance. Social and Cultural Planning Office of the Netherlands. The Hague.

Loikkanen, H.A. – Susiluoto, I. (2004): Cost efficiency of Finnish municipalities 1994-2002. An application of DEA and Tobit methods. Paper prepared for the 44st Congress of the European Regional Science Association, Porto, Portugal, 25. – 29. August 2004.

Loikkanen, H.A. – Susiluoto, I. (2005): Cost Efficiency of Finnish Municipalities in Basic Service Provision 1994-2002. Urban Public Economics Review 4/2005, p. 39-64.

Moisio, Antti 2002. "Determinants of Expenditure Variation in Finnish Municipalities," VATT Discussion Papers 269, Government Institute for Economic Research (VATT).

Niskanen.; W. (1971): Bureaucracy and Representative Government. Chicago: Aldine-Atherton.

Oulasvirta, Lasse, 1997. " Real and Perceived Effects of Changing the Grant System from Specific to General Grants," Public Choice, Springer, vol. 91(3-4), pages 397-416, June.

RattsØ, Jørn ed. (1998): Fiscal Federalism and State-Local Finance. The Scandinavian Perspective. Cheltenham UK. Edward Elgar.

RØngen, Gunnar (1995): Efficiency in the provision of local public goods in Norway. European Journal of Political Economy, Volume 11, 253-264.

Rubinfelt, D.L. (1987): The Economics of the Local Public Sector. In A.J. Auerbach & M. Feldstein (eds.), Handbook of Public Economics. Amsterdam. Elsevier Science Publications.

SaGbafi, S. - Saruc, N. (2004): Intergovernmental Transfers and the Flypaper Effect in Turkey Turkish Studies, Volume 5, Number 2, Summer 2004 , pp. 79-92(14)

Sørensen, Rune J. 1995: Do Local Politicians Respond To Citizens' Demands? A Microanalysis of Norwegian Local Government. Scandinavian Political Studies, Vol. 19, 53-71.

Susiluoto, I – Loikkanen, H.A. (2001): Seutukuntien taloudellinen tehokkuus 1988-1999 (Regional economic efficiency). City of Helsinki Urban Facts Research Series 2001:9, Helsinki, Finland.

Wildasin, D.E. (1986): Urban Public Finance, London, Harwood Academic Publishers.

## Appendix 1. Explanatory variables of regression analysis

Revenue sources:
- taxable income per income recipient
- taxes per inhabitant
- grants per inhabitant

Population size, structure and change:
- number of inhabitants
- population change (%/a during last 5 years)
- persons under 17 years, %
- persons 75 years and over, %
- Swedish-speaking inhabitants, %
- foreign citizens from Europe and North America, /1000 inh.
- foreign citizens from other countries, /1000 inh.

Socio-economic situation:
- share of adult population with higher university degree, %
- unemployment rate, %
- persons receiving municipal income support /1000 inh.

Physical location and structure:
- land area $km^2$
- population density persons/ $km^2$
- urbanisation rate, %
- municipality is centre of its economic region (1/0)
- archipelago municipality (1/0)
- peripherality (average weighted distance from other municipalities, km)

Production of municipal services:
- share of workers 35-49 years old in municipal service sector, %
- share of workers 50 years or more in municipal service sector, %
- limited range of supplied welfare services, index
- share of welfare services purchased from joint municipal authorities and other municipalities, %
- share of welfare services bought from private producers, %

Municipal politics:
- voting activity in previous municipal elections, %
- change of voting activity between two previous municipal elections, %
- share of left parties in municipal council, %
- share of Centre party in municipal council, %
- share of females in municipal council, %
- political party centralization in municipal council, index (Herfindahl)
- change of party structure in municipal council between two last elections, index

**Appendix 2: Explaining net expenditures growth with growth of state grants and tax income. Municipalities with high and low concentration of political parties in municipal councils. FE and RE models of Finnish municipalities with more than 6000 people, 1998-2004**[9]

| | | Random effects: | | | | Fixed effects: | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Model 4 low political concentration | Model 4 high political concentration | Model 2 low pol. concentration | Model 2 high political concentration | Model 3 low political concentration | Model 3 high pol. concentration | Model 1 low political concentration | Model 1 high pol. concentration |
| Constant | | 83.64 | 72.52 | 92.58 | 88.97 | 103.5 | 100.4 | 115.0 | 112.8 |
| | | (11.10***) | (9.64***) | (17.20***) | (16.96***) | (3.07***) | (2.82***) | (3.49***) | (3.14***) |
| Taxes €/inh., 2000p: | | | | | | | | | |
| change | t – (t-1) | 0.105 | 0.074 | 0.115 | 0.076 | 0.123 | 0.080 | 0.134 | 0.084 |
| | | (4.36***) | (3.40***) | (4.74***) | (3.51***) | (4.86***) | (3.42***) | (5.27***) | (3.58***) |
| | (t-1) – (t-2) | 0.275 | 0.152 | 0.284 | 0.150 | 0.289 | 0.162 | 0.300 | 0.160 |
| | | (10.70***) | (6.03***) | (11.02***) | (5.98***) | (10.79***) | (5.84***) | (11.09***) | (5.71***) |
| | (t-2) – (t-3) | 0.118 | 0.136 | 0.117 | 0.133 | 0.127 | 0.151 | 0.124 | 0.147 |
| | | (3.90***) | (4.57***) | (3.85***) | (4.54***) | (4.00***) | (4.57***) | (3.86***) | (4.40***) |
| | (t-3) – (t-4) | 0.025 | 0.075 | 0.028 | 0.080 | 0.023 | 0.090 | 0.024 | 0.095 |
| | | (0.76) | (2.42**) | (0.84) | (2.58**) | (0.65) | (2.42**) | (0.65) | (2.53**) |
| State grants, €/inh., 2000p: | | | | | | | | | |
| change | t – (t-1) | 0.288 | 0.166 | 0.307 | 0.162 | 0.295 | 0.169 | 0.312 | 0.161 |
| | | (6.48***) | (4.02***) | (6.90***) | (3.88***) | (6.42***) | (3.85***) | (6.73***) | (3.63***) |
| | (t-1) – (t-2) | 0.090 | 0.136 | 0.086 | 0.145 | 0.095 | 0.145 | 0.087 | 0.154 |
| | | (2.17**) | (3.60***) | (2.06**) | (3.84***) | (2.20**) | (3.62***) | (1.99**) | (3.81***) |
| | (t-2) – (t-3) | 0.244 | 0.178 | 0.241 | 0.180 | 0.247 | 0.179 | 0.250 | 0.186 |
| | | (6.30***) | (4.89***) | (6.20***) | (4.90***) | (6.21***) | (4.67***) | (6.22***) | (4.80***) |
| | (t-3) – (t-4) | 0.069 | 0.040 | 0.078 | 0.039 | 0.085 | 0.040 | 0.093 | 0.039 |
| | | (2.07**) | (1.22) | (2.32**) | (1.16) | (2.42**) | (1.14) | (2.63***) | (1.08) |

[9] One-way FE and RE models. Variable to be explained is change in real per capita net expenditure €. t values in parentheses, * significant at 0.1, ** 0.05 and ***0.01 level.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Population structure: | | | | | | | | |
| population over 75 years, % | 33.95 | 64.09 | | | 50.15 | 91.57 | | |
| change (t-1) – (t-2) | (1.42) | (3.11***) | | | (1.33) | (3.17***) | | |
| foreign citizens /1000 | 6.070 | 2.650 | | | 9.107 | 2.772 | | |
| change (t-1) – (t-2) | (1.69*) | (0.66) | | | (1.98**) | (0.57) | | |
| Services purchased from: | | | | | | | | |
| other municipal sector % | -0.611 | -0.808 | | | -0.722 | -0.762 | | |
| change t – (t-1) | (-1.29) | (-1.52) | | | (-1.42) | (-1.30) | | |
| private sector, % | -7.41 | -2.729 | | | -8.168 | -2.889 | | |
| change t – (t-1) | (-3.08***) | (-2.80***) | | | (-3.19***) | (-2.65***) | | |
| $R^2$ | 0.433 | 0.305 | 0.416 | 0.278 | 0.495 | 0.350 | 0.474 | 0.323 |
| F-test | | | | | 0.957 | 1.00 | 0.987 | 1.00 |
| Hausman | 0.337 | 0.991 | 0.314 | 0.991 | | | | |
| N | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 |
| T | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 |

**Appendix 3. Explaining variation in basic service expenditure, Finnish municipalities, annual OLS 2001 and 2002.** [10]

| | Model 1 | | Model 2 | | Model 3 | | Model 4 | |
|---|---|---|---|---|---|---|---|---|
| | 2001 [a] | 2002 [a] | 2001 | 2002 [a] | 2001 | 2002 | 2001 | 2002 |
| Constant | 1431 | 1603 | 2300 | 2526 | 1084 | 1100 | 2271 | 2451 |
| | (5.72***) | (3.68***) | (7.81***) | (4.97***) | (2.24**) | (2.28**) | (4.63***) | (4.84***) |
| Taxable income/income recipient, € | 0.0500 | 0.0297 | 0.0478 | 0.0235 | 0.0433 | 0.0235 | 0.0410 | 0.0178 |
| | (10.45***) | (1.81*) | (7.44***) | (1.26) | (6.40***) | (4.16***) | (6.46***) | (3.31***) |
| State grants/inhabitant, € | 0.553 | 0.429 | 0.509 | 0.351 | 0.474 | 0.338 | 0.445 | 0.288 |
| | (10.10***) | (6.26***) | (9.78***) | (1.56) | (8.64***) | (6.79***) | (8.64***) | (6.04***) |
| Cost efficiency of supplied services, | | | -1133 | -1201 | | | -1066 | -1065 |
| DEA index | | | (-6.70***) | (-6.45***) | | | (-6.34***) | (-6.02***) |
| Population (1/0): | | | | | | | | |
| alle 10 000 | -212.4 | -193.8 | -214.7 | -219.5 | -135.1 | -94.18 | -137.7 | -112.3 |
| | (-4.11***) | (-3.50***) | (-4.30***) | (-3.98***) | (-2.42**) | (-1.66*) | (-2.63***) | (-2.10**) |
| 10 000-15 000 | -163.5 | -215.0 | -155.1 | -219.6 | -133.5 | -166.7 | -124.5 | -165.7 |
| | -3.10***) | (-4.16***) | (-3.01***) | (-4.30***) | (-2.45**) | (-2.94***) | (-2.44**) | (-3.11***) |
| 15 000 - 20 000 | -46.93 | -83.67 | -81.49 | -133.24 | -10.57 | -28.43 | -43.15 | -67.62 |
| | (-0.82) | (-1.40) | (-1.33) | (-2.37**) | (-0.17) | (-0.43) | (-0.72) | (-1.09) |
| 20 000-30 000 | -99.36 | -93.59 | -87.04 | -111.2 | -97.1 | -93.61 | -78.93 | -97.72 |
| | (-1.92*) | (-1.65*) | (-1.48) | (-2.04**) | (-1.60) | (-1.50) | (-1.39) | (-1.66*) |

[10] t-values in parentheses. t-values of models with sign [a] have been heteroscedasticity-corrected (Huber-White). * significant at 0.1. ** at 0.05 and *** at 0.01 level. Variable to be explained is annual per capita net expenditure of health, social and educational services at 2000 prices, €. Only municipalities with over 2500 people included.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Population change (1/0): | | | | | | | | |
| (annual change, %)x(decreasing pop.) | -116.55 | -125.65 | -89.53 | -110.2 | -109.6 | -121.41 | -90.56 | -116.4 |
| | (-3.61***) | (-3.96***) | (-3.43***) | (-3.81***) | (-3.87***) | (-3.98***) | (-3.39***) | (-4.06***) |
| (annual change, %)x(increasing pop.) | -51.67 | -45.88 | -46.70 | -55.81 | -48.01 | -43.73 | -42.91 | -53.01 |
| | (-2.13**) | (-1.72*) | (-2.09**) | (-2.29**) | (-2.02**) | (-1.89*) | (-1.93*) | (-2.43**) |
| Population structure: | | | | | | | | |
| population 0-16 years of age, % | -12.87 | 2.10 | -6.21 | 13.42 | -8.68 | 4.67 | -2.33 | 14.59 |
| | (-1.60) | (0.24) | (-0.81) | (1.62) | (-1.08) | (0.60) | (-0.31) | (1.94*) |
| population over 75 years of age, % | 0.029 | (6.94 | 16.42 | 29.11 | 12.18 | 22.24 | 24.76 | 36.76 |
| | (0.00) | (0.56) | (1.51) | (2.53**) | (1.01) | (1.89*) | (2.16**) | (3.24***) |
| foreigners from EU & North Am./1000 inh. | 6.17 | 6.06 | 5.25 | 5.43 | 3.55 | 1.64 | 3.15 | 1.90 |
| | (2.40**) | (2.09**) | (2.12**) | (2.04**) | (1.36) | (0.60) | (1.29) | (0.73) |
| foreigners from other countries /1000 inh | 20.05 | 29.01 | 20.73 | 27.45 | 17.48 | 28.45 | 17.37 | 25.67 |
| | (2.19**) | (3.90***) | (3.58***) | (4.36***) | (2.86***) | (4.63***) | (3.04***) | (4.43***) |
| Unemployment rate % | 8.04 | 9.84 | 5.26 | 7.26 | 4.25 | 4.73 | 2.12 | 3.82 |
| | (2.19**) | (2.25**) | (1.40) | (1.55) | (1.05) | (1.10) | (0.56) | (0.95) |
| Location and physical structure: | | | | | | | | |
| peripherality index (log) | | | | | 192.2 | 249.7 | 130.0 | 157.7 |
| | | | | | (3.30***) | (4.22***) | (2.34**) | (2.73***) |
| archipelago municipality (1/0) | | | | | 79.3 | 100.3 | 55.7 | 95.4 |
| | | | | | (0.89) | (1.08) | (0.67) | (1.09) |
| Services provision factors: | | | | | | | | |
| purchases of services from: | | | | | | | | |
| other local public sector % | | | | | 0.436 | 0.594 | 0.208 | 0.324 |
| | | | | | (1.42) | (1.74*) | (0.72) | (1.00) |
| private sector % | | | | | 2.221 | 2.962 | 3.687 | 4.544 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | (1.34) | (1.36) | (2.34**) | (2.20**) |
| age of workers less than 35 years, % | | | | | 6.73 | 9.89 | 5.26 | 8.73 |
| | | | | | (2.24**) | (3.09***) | (1.86*) | (2.89***) |
| narrow range of provided services | | | | | -7.54 | -9.50 | -7.42 | -9.43 |
| | | | | | (-3.68***) | (-4.69***) | (-3.87***) | (-4.94***) |
| Local political structure: | | | | | | | | |
| left parties in municipal council, % | 0.872 | -0.386 | 0.852 | -0.609 | 0.567 | -0.677 | 0.415 | -1.05 |
| | (0.81) | (-0.32) | (0.76) | (-0.52) | (0.49) | (-0.56) | (0.38) | (-0.92) |
| centre party in municipal council. % | -2.71 | -3.46 | -2.65 | -3.53 | -2.53 | -3.22 | -2.42 | -3.24 |
| | (-3.90***) | (-4.02***) | (-3.46***) | (-4.07***) | (-3.19***) | (-3.59***) | (-3.26***) | (-4.26***) |
| centralisation of party structure | 2.22 | 1.79 | 1.57 | 1.40 | 1.07 | 0.67 | 0.762 | 0.808 |
| in council, index | (1.88*) | (1.39) | (1.20) | (1.04) | (0.77) | (0.47) | (0.59) | (0.60) |
| N | 299 | 299 | 299 | 299 | 299 | 299 | 299 | 299 |
| R2 | 0.609 | 0.572 | 0.662 | 0.629 | 0.648 | 0.637 | 0.692 | 0.679 |
| White | 0.012 | 0.048 | 0.197 | 0.008 | 0.412 | 0.417 | 0.680 | 0.312 |
| Ramsey Pr>F | 0.017 | <0.0001 | 0.286 | <0.0001 | 0.102 | 0.0003 | 0.206 | 0.00034 |
| Jarque-Bera Pr > | 0.001 | 0.040 | 0.044 | <0.0001 | 0.051 | 0.015 | 0.120 | <0.0001 |
| VIF average | 3.51 | 3.33 | 3.43 | 3.30 | 3.35 | 3.19 | 3.30 | 3.18 |
| VIF maximum | 6.52 | 6.10 | 6.73 | 6.46 | 7.96 | 7.54 | 8.21 | 7.90 |