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BUSINESS SUBSIDIES AND EMPLOYMENT OF FIRMS: Overall Evaluation and Regional Extensions

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Abstract: This paper investigates the effects of business subsidies on the employment of firms in Finland, and explores possible regional differences in the effects. Employment of some 26,000 firms is followed annually between 1995-1998. We find that labour subsidies increase the firms' own employment payroll on average by 11 per cent. The marginal effect of subsidies however, is about 34 per cent. As firms pay, on average, 60 per cent of the employment payroll of a worker in a subsidised job, our results suggest that labour subsidies displace the firms' own employment expenditures. Moreover, the regional analysis indicates that the displacement effect has been milder in the Helsinki region than elsewhere, contributing to the divergence of regional economies. As an exception to the rule however, in some peripheral areas displacement has also been low. Finally, we do not find displacement or stimulation effects in the application of (i) Investment and Operation subsidies or (ii) R&D subsidies.

Key words: Evaluation, Employment, Business subsidies, Regions

Tiivistelmä: Tutkimuksessa arvioidaan yritystukien vaikuttavuutta yksityisten yritysten työllistämiseen vuosina 1995-1998 ja mahdollisia alueellisia eroja vaikuttavuudessa. Arvioitavina yritystukina ovat Työministeriön, Kauppa- ja teollisuusministeriön ja Teknologian kehittämiskeskuksen suorat tuet, joita ei yrityksen tarvitse maksaa takaisin. Havaitsemme, että Työministeriön työllisyystuet syrjäyttävät yritysten omia työllistämismenoja siten, että tukien vapauttamat varat, jotka ennen tukea menivät työvoimakuluihin, käytetään tukien aikana muuhun tarkoitukseen, kuten markkinointiin, osingonjakoon ym. Havaitsemme myös, että KTM:n ja TEKES:n tuilla ei ole vaikutusta yritysten työllistämiseen. Aluetarkastelu osoittaa, että tukien syrjäytysvaikutus on ollut heikompi Helsingin seutukunnassa muuhun Suomeen verrattuna. Tuet ovat siis tukeneet käynnissä olevaa alueiden välistä erilaistumista. Vaikutus ei ole kuitenkaan kovin selkeä sillä joillain maaseutualueilla on tulosten mukaan myös alhainen tuen syrjäytysvaikutus.

Asiasanat: arviointitutkimus, työllisyys, yritystuet, alueet

Yhteenveto

Tausta

Kansainvälisesti tarkasteltuna tutkimus- ja kehitystoiminta ja investoinnit ovat yritystuen pääasiallisimmat käyttökohteet. Työllisyystukia käytetään vähemmän, vaikka esimerkiksi Saksojen yhdistymisen yhteydessä arvioitiin, että investointitukien suosiminen työllisyystukien kustannuksella pahensi maan työttömyysongelmaa. Työllisyystuilla voi siis olla positiivisia vaikutuksia talouden ja yhteiskunnan kannalta.

Työllisyystukien joukossa perinteenä on ollut suosia työvoimakoulutusta suoran tukityöllistämiseen verrattuna. Tämä näkyy erityisesti anglosaksisissa maissa. Suomessa sen sijaan tukityöllistäminen on ollut työvoimakoulutusta suositumpaa. Esimerkiksi vuonna 1999 Suomessa oli noin 50 000 tukityöllistettyä ja noin 40 000 ihmistä työvoimakoulutuksessa.

Työllisyystukien vaikuttavuutta on yleensä arvioitu tarkastelemalla niihin osallistuneiden ihmisten menestymistä työmarkkinoilla työvoimakoulutuksen tai tukitöiden jälkeen. Työllisyystukien vaikutuksia yritysten toimintaan ei ole kuitenkaan juuri tutkittu.

Tavoite

Tässä tutkimuksessa arvioidaan yritystukien vaikuttavuutta yksityisten yritysten työllistämiseen vuosina 1995-1998 ja mahdollisia alueellisia eroja vaikuttavuudessa. Arvioitavina yritystukina ovat Työministeriön, Kauppa- ja teollisuusministeriön ja Teknologian kehittämiskeskuksen suorat tuet, joita ei yrityksen tarvitse maksaa takaisin. Vaikuttavuutta arvioidaan tuen kahden ensimmäisen ansaintavuoden aikana.

Menetelmä

Tutkimus suoritettiin nojaamalla viime vuosina nopeasti kehittyneisiin ekonometrisiin arviointimenetelmiin, joilla mitataan julkisen politiikan vaikutusta politiikan kohteena oleviin ihmisiin tai yrityksiin. Yritystukien vaikuttavuuden mittaamisessa on ongelmana se, että emme voi tietää yhdenkään tukea saaneen yrityksen työllisyyttä ilman tukea. Samalla tavalla emme voi havaita minkään tukea saamattoman yrityksen työllisyyttä tuen kera. Tämän ongelman vuoksi

tuen vaikutus tukea saaneisiin yrityksiin on estimoitava ekonometrisin menetelmin. Tavoitteena on luoda tukea saaneille yrityksille sellainen verrokkiryhmä, jotka poikkeavat tukea saaneista ainoastaan tuen saannin osalta. Muutoin tukea saaneiden ja ilman jääneiden yritysten pitäisi olla mahdollisimman samanlaisia.

Tämän kaltaiset julkisen politiikan vaikuttavuuden arvioinnit ovat olleet Suomessa tähän saakka erittäin harvinaisia. Euroopan Unionin rakennerahastoja on tosin arvioitu, mutta ne ovat olleet lähinnä ohjelmien prosessien arviointia eikä niissä ei ole pystytty mittaamaan rahastojen taloudellista vaikuttavuutta puhtaasti. Tämän vuoksi nyt käsillä oleva tutkimus jatkaa Suomessa kovin ohutta mutta sitäkin tärkeämpää tutkimuslinjaa.

Menetelmän tärkeyttä korostaa myös se, että sillä voidaan puolueettomasti arvioida eri tukilähteiden tuen vaikuttavuutta ilman että täytyisi tyytyä tuen antajien itsensä tekemiin arvioihin. Julkisen rahan jaon kannalta on olennaista, että tiedetään käyttökohteen ohella sen vaikuttavuus, jotta voidaan arvioida julkisten varojen käytön järkevyyttä.

Yritystuet

Yritystuet ovat projektiperusteisia ja niitä jaetaan yritysten hakemusten perusteella. Tuen saannin ehtona on yrityksen kannattava toiminta ja tuen käytön sopiminen tuen ehtoihin, jotka ovat hyvin moninaisia. Tukia myönnetään esimerkiksi alueperusteisina (vertikaalisina) tai horisontaalisina esimerkiksi pienyrityksille.

Tuet annetaan osarahoitteisina siten, että yritys itse laittaa omia varoja projektiin. KTM:n ja TEKES:n tuissa yritysten oma osuus projektin kustannuksista on keskimärin noin 20 %. Julkinen tuki annetaan yleensä projektin alettua niin, että yleensä maksusuoritus tapahtuu projektin keskivaiheilla ja lopussa. Poikkeuksena ovat yrittäjien starttirahat.

Työllistämistukia sen sijaan aletaan maksaa heti työllistämisprojektin alusta. Tukityöllistämisen tuki on keskimäärin noin € 620 kuukaudessa ja sitä annetaan keskimäärin 6 kuukauden ajalle. Työllistämistuen alainen työpaikka on kuten mikä tahansa työ, joten työntekijälle maksetaan voimassa olevan työehtosopimuksen mukainen palkka. Tyypillisimpiä työpaikkoja ovat sosiaalialan työ, kiinteistönhoito- ja siivoustyö sekä toimisto ja sihteerityö. Työnantaja maksaa palkan ja tuen välisen erotuksen. Sijoitusammattien keskimääräinen palkka on noin €1 560 kuukaudessa. Näin ollen yrityksen osuus tukityöllisen palkasta on noin 60 % ja tuen osuus 40 %. Tämä tarkoittaa että yhden euron tuenlisäyksen täytyy lisätä yrityksen omaa (yksityistä) työllisyyttä 1,5 euroa, jotta tuki olisi työllisyyttä lisäävää (€1 + €1,5 on €2,5, josta €1,5 euroa on 60 %). Yrityksen

oma (yksityinen) työllisyys tarkoittaa tässä yrityksen koko työllisyyttä vähennettynä julkisin varoin tuettu työllisyys.

Jos tuki saa aikaan pienemmän kasvun yrityksen omassa (yksityisessä) työllisyydessä, sen voi katsoa syrjäyttäneen yrityksen työllisyyteen varattuja varoja ja siirtää niitä muuhun käyttöön, kuten markkinointiin, investointeihin, osingonjakoon ym.

Aineisto

Analysoimme tutkimuksessa yritysten tilinpäätösaineistoa johon on liitetty tiedot mahdollisista yritystuista. Analysoimamme paneeliaineisto sisältää noita tietoja noin 26 000 yrityksestä neljän vuoden ajalta (1995-1998). Aineisto on verohallituksen rekisteriaineisto, jonka käytölle tutkijat ovat hankkineet käyttöluvan. Näin ollen tutkijat hyödyntävät julkisin varoin muutenkin hankittua ja ennestään olemassa olevaa aineistoa. Aineistosyistä mittaamme yritystukien työllisyysvaikutuksia palkkasummalla.

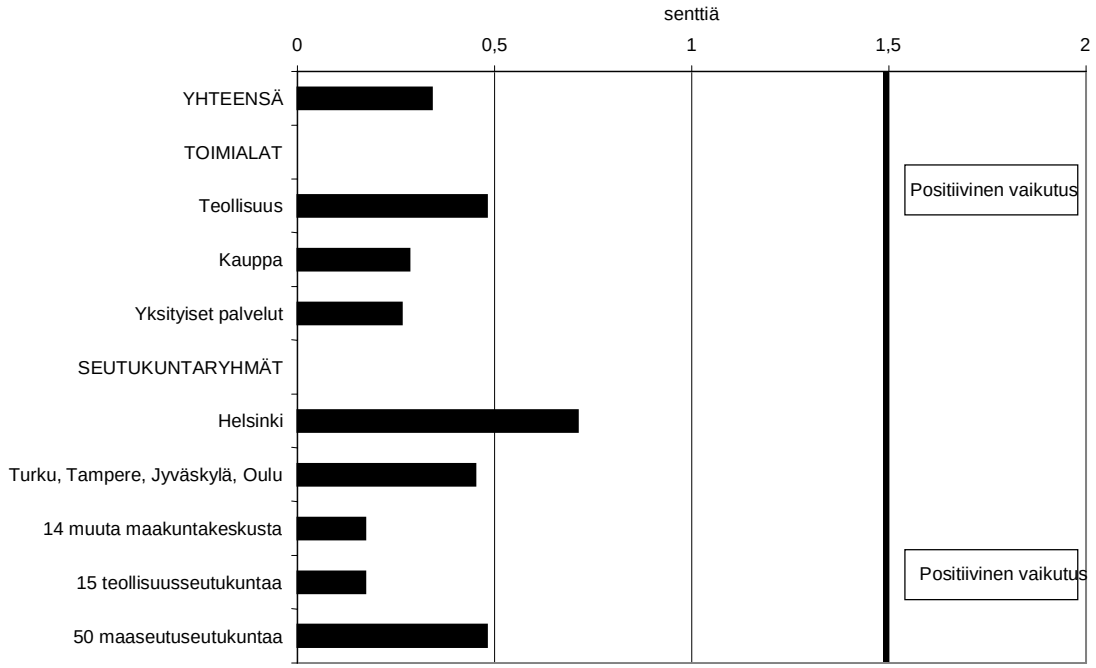
Aineiston yrityksistä 18 prosenttia on saanut jotain tukea vähintään yhtenä vuonna mainittuna aikana. Yleisin tuki on Työministeriön työllistämistuki (14%). KTM:n tukea on saanut otoksessa 6% yrityksistä ja TEKES:n tukea 1 %. Tukien keskimääräinen summa on € 21 592 yritystä kohden. Työllistämistuet ovat pienimpiä (k.m. €4 240) ja TEKES:n tuen suurimpia € 105 826. Toimialoittain tarkasteltuna tuen saanti on lähes kaksi kertaa todennäköisempää teollisuudessa kuin muilla toimialoilla.

Tulokset ja johtopäätökset

Tulokset osoittavat, että Työministeriön työllisyystuet syrjäyttävät yritysten omia työllistämismenoja siten, että tukien vapauttamia varoja, joita ennen tukea meni palkkakuluihin, käytetään tukien aikana muuhun tarkoitukseen (taulukko 1). Jotta tuki olisi työllisyyttä lisäävä, yhden lisäeuron pitäisi lisätä yrityksen omia palkkamenoja vähintään 1,5 eurolla, kokonaisvaikutuksen ollessa 2,5 euroa (1 tuki-euro lisättynä 1,5 eurolla yrityksen omaa rahaa). Tulosten mukaan kuitenkin yksi euro lisää tukea lisää yrityksen omia työllisyysmenoja vain 34 sentillä, kokonaisvaikutuksen jäädessä 1,34 euroon (1 tuki-euro + 0,34 euroa yrityksen omaa rahaa). Näin yrityksen palkkamenot siis lisääntyvät 1,34 eurolla verrattuna tilanteeseen, jossa tukea ei saada. Loput 1,16 euroa (2,5 – 1,34 = 1,16) käytetään työllisyyden ulkopuoliseen tarkoitukseen. Raha joko säästetään tai käytetään esimerkiksi markkinointiin, investointeihin, osinkoihin, jne. Tämän osuuden

lopullista käyttöä tässä tutkimuksessa ei voitu kuitenkaan yksityiskohtaisesti selvittää.

Työllistämistuet eivät siis ole tehokas keino työllisyyden parantamisessa, sillä tukea saaneiden yritysten työllisyys olisi ollut lähes samanlainen ilman tukeakin. On kuitenkin otettava huomioon, että aikaisemmat tutkimukset ovat havainneet työllistämistukien parantavan tukitöissä olleiden ihmisten työnsaantia tukiperiodin jälkeen. Lisäksi tuen saannin vapauttamat varat ovat voineet tukea yrityksen menestymistä esimerkiksi lisääntyneiden markkinointi- tai investointiresurssien muodossa. Tämän vuoksi emme voi sanoa, onko työllistämistuen kokonaisvaikutus yhteiskunnan kannalta positiivinen vaiko negatiivinen.



Kuva 1. Yhden tukieuron lisäyksen vaikutus yrityksen palkkasummaan

Havaitsemme myös että KTM:n ja TEKES:n tuilla ei ole vaikutusta yritysten työllistämiseen. Nämä tuet eivät kiihdyttäneet eivätkä syrjäyttäneet yritysten työllisyyttä, mikä yrityksissä olisi ollut ilman tukeakin. KTM:n tukien osalta tulos on hieman yllättävä, sillä KTM:n tukien ainakin epäsuorana tavoitteena on edistää työllisyyttä. TEKES:n tukien osalta tulos on ymmärrettävä, sillä T&K –projektit ovat pitkäkestoisia ja riskialttiita, joten niiden vaikutus yrityksen työllisyyteen pitäisikin näkyä vasta kahta vuotta pidemmällä aikavälillä.

Alueelliset tulokset osoittavat että työllisyystukien syrjäytysvaikutus on ollut pienintä Helsingin seutukunnassa. Siellä yksi lisäeuro tukea lisää yrityksen omaa työllisyyttä 71 senttiä (taulukko 1). Tämä osoittaa, että julkiset yritystuet ovat tuottoisimpia siellä missä työvoiman kysyntä on ollut voimakkainta ja näin alueen yrityksillä parhaat mahdollisuudet hyödyntää tukityöllisten työpanosta. Vaikka vaikutus on kaksinkertainen keskimääräiseen 34 senttiin verrattuna, vaikutus on silti yrityksen yksityistä työllisyyttä syrjäyttävä, sillä yhden lisä euron suuruinen tuen lisäys pitäisi nostaa yrityksen palkkasummaa 1,5 eurolla. Helsingin alueen alhaisin syrjäytysvaikutus myös osoittaa, että työllisyystuet ovat edesauttaneet meneillään olevaa alueiden erilaistumista. Muissa kasvukeskuksissa (Turun, Tampereen, Jyväskylän ja Oulun seutukunnissa) yhden lisä euron vaikutus on 45 senttiä. Muissa maakuntakeskusseutukunnissa ja teollisuusvaltaisissa seutukunnissa vaikutus on niinkin pieni kuin 17 senttiä.

Johtopäätös alueiden erilaistumisen osalta ei ole kuitenkaan kovinkaan vahva, sillä harvaanasutulla maaseudulla syrjäytysvaikutus on yllättävän pieni. Siellä lisä euro nostaa yrityksen palkkasummaa noin 48 sentillä. Tämä on aluepoliittisesti lupaava tulos, sillä yritystuella on ollut harvaanasutulla maaseudulla samanlainen vaikutus kuin ns. muissa kasvukeskuksissa (pl. Helsinki). Näin ollen kaikkien kasvukeskusten ulkopuolella tarkasteltuna yritystuet ovat tukeneet yritystoimintaa siellä, missä tarve on ollut suurin.

Contents

1. Introduction

During the last decade there has been a sharp increase in public subsidies for research and development activities of private firms. Traditionally, investment subsidies constituted a major part of public subsidies, whereas labour subsidies have been distributed with less frequency. Despite their minor status, a more active role for labour subsidies has been advocated as well (Akerlof et al.; 1991). For example, the high proportion of investment subsidies relative to labour subsidies has been criticised to be sub-optimal, since it contributes to the unemployment problem (Begg and Portes, 1993).

Labour subsidies are given mainly to maintain and enhance human capital of the work force by training, whereas the role of subsidised jobs has been smaller. For instance, the EU average for labour market training relative to all labour market measures was 28 per cent in 1996; in the USA the same figure was 20 percent. In addition, the share of subsidised jobs was 25 and 5 per cent, respectively (Martin, 1998).

In Finland however, one finds a different situation. The share of labour market training relative to the total sum of active labour market measures was 33 per cent in 1996, whereas that of subsidised jobs was as high as 38 per cent (Martin, 2000). Moreover, the number of people in subsidised jobs has traditionally been higher than that in the labour market training programs (Ministry of Labour, 2000). For example in 1999 the number of people in subsidised jobs was a little over 50,000, whereas that in labour market training it was a little less than 40,000. Both figures are very substantial in a country with about 2.4 million people in active employment.[1]

Most of the studies on the effects of active labour market policies in Finland and elsewhere focus on the success of workers in the labour market (Blundell and Costa Dias, 2000; Björklun et al., 1991; Fay, 1996; Heckman, et al., 1999; Heckman 2001; LaLonde, 1995; Pehkonen, 1997; Skedinger, 1995). The consensus is that the effectiveness of subsidised jobs, as a labour market measure, has varied according to the sector where subsidies are applied. When studying the subsequent labour market success of people in subsidised jobs and subsidised training, subsidies to private sector employment in Finland have been found to generate positive effects, whereas those towards the public sector have not (Aho et al., 1999; Hämäläinen, 1999; Tuomala, 2000). Nevertheless, possible

[1] Note however that a large amount of subsidised jobs are in the public sector (municipalities) and the amount of direct subsidies to private firms constitute approximately only 1% of the total yearly budget appropriations of the Finnish government; and that is much less than the EU average (2.3% - Venetoklis (2001)). Nevertheless subsidised jobs are still a burden to the budget and thus must be scrutinised and evaluated on a continuous basis.

effects of labour subsidies on firms, where subsidised workers are employed, have hardly been studied so far.

A question of displacement can be raised in this context. Would the subsidised jobs have been created even without subsidies? A plethora of studies have addressed this question in the context of public subsidies (e.g. European Commission, 2000; Fuest et al., 2000; Irwin et al., 1996; Payne, 1998). A purpose of the present paper is to address this question by analysing the effects of subsidised jobs on the employment expenses and employment levels of private firms. We also investigate the effects of subsidies for R & D and those for Investments and Operations in private sector firms. Our empirical data spans from 1995 to 1998 and we concentrate on short-term impacts, studying effects during the first two years of the project's life.

We analyse a large sample of firms, taken from the registers compiled by the Finnish Tax Authority. In an international context, this administrative data is unique and rare; it covers the whole population of firms that pay taxes in Finland, including information on their financial statement accounts and possible business subsidies. One common feature of the evaluation studies on business subsidies is that they concentrate on manufacturing firms for data availability reasons. Our data deviates from this in that it include firms from various industries (manufacturing, construction, transportation, wholesale and retail trade, business services, etc.)

The governments of the majority of industrialised countries use subsidies to support economic development in sectors and regions with high level of unemployment. In recent years, regional development in Finland has resulted in increasing regional divergence in the form of higher geographic concentration of the population, jobs, production and standards of living, leaving large geographical areas lagging behind. Hence, another purpose of this paper is to test and evaluate whether public subsidies have contributed to or worked against this concentration.

We find that labour subsidies increase the firms' own employment payroll by an average of 11 per cent. Furthermore, the marginal effect of subsidies is 34 percent, i.e. one Euro more subsidy increases the firm's payroll 34 cents. As on average firms pay themselves 60 per cent of the employment costs of a worker in a subsidised job, our results suggest that labour subsidies displace the firms' own employment expenditures. Moreover, our regional analysis indicates that the displacement effect is weaker in the Capital region (Helsinki) than elsewhere, suggesting that labour subsidies have contributed to the divergence of regional economies in the country. This effect is not that clear however, as in some parts outside Helsinki the displacement effect is also low. Finally, we do not find displacement or stimulation effects in the application of (i) Investment and Operation subsidies or (ii) R&D subsidies.

The rest of the paper is organised as follows. Section 2 provides a description of the subsidy scheme in Finland. Section 3 contains the method of evaluation. Section 4 summarises the data at hand. Section 5 analyses and comments the measured impact of subsidies. Section 6 adds a regional dimension to the analysis, focusing specifically on the effects of labour subsidies. Section 7 concludes.

2. Subsidy schemes in Finland

In this section we discuss briefly the business subsidy system in Finland. An attempt to give a comprehensive overview here would be a lost cause considering the complexity of the system and our space constraints. We refer to the parties involved in distributing the subsidies, the types of subsidies, and the process followed.

The notion of business subsidies has different interpretations and covers many different policy 'instruments'. For this paper we define business subsidies as direct transfers of money to private sector firms from a Ministry or a government Agency. These transfers are grants, in that the recipient firm is not obliged to pay the money received back to the distributor, as in the case for example of subsidised loans[2].

In Finland business subsidies have been distributed to firms since the late 1960s. Nowadays the biggest distributor in terms of absolute amounts is the Ministry of Trade and Industry (KTM) through its regional units and one of its subsidiary Agencies, TEKES. Other important distributors is the Ministry of Labour (TM) and the Ministry of Agriculture. In our data set we examine direct subsidies distributed through the KTM, TEKES and the TM.

Subsidies are mostly distributed through the so called TE-Centres (Regional Employment and Economic Development Centres). Within each centre there are units of the aforementioned ministries and depending on the type of project in question and other criteria, (i.e. the applicant's geographical location) a firm submits its application for aid to its nearest TE-centre.

Specifically in the case of subsidies through the TM, one could classify subsidies as moneys that are given to firms not only through its units in the TE-centres, but though the local Labour offices as well. There, firms can apply for this type of support. Individuals can apply subsidy for a firm start-up (more on this below).

There are different types of subsidies, meaning that they are given for different purposes (projects). This is also reflected in the distributor of subsidies (the Ministry or the Agency through which the funds flow). For example, the KTM specialises in fixed asset investments (machinery/equipment), naturally to firms in the manufacturing sector and TEKES concentrates its subsidies distribution to high-tech R & D projects. The purpose of labour subsidies is to improve human resources development of the work force as well as to encourage firms to

[2] Under the general name of business subsidies however one could classify other 'subsidy instruments' as well; for instance subsidised loans, guarantees to an export firm, investment tax credits (ITCs) etc. See for example how manufacturing subsidies to firms are classified within each EU country in EC (2000, pp. 29-30).

increase employment. Labour subsidies are often directed to firms who employ workers, whose productivity is lower than the level needed in active labour markets. Therefore these people are not easily employable with the prevailing minimum wage level of the sector in question. Labour subsidies are used to fill the gap between wages that firms are willing to pay to these people and the prevailing wage level.

However there is no clear distinction of the types of projects that can be financed by a specific distributor nor of the goals that this subsidy is designed to achieve. For instance, the KTM can finance a fixed asset investment in a manufacturing firm that could be classified as an R & D investment (TEKES); it could also be that one goal of this specific project is to increase the amount of permanent jobs within the firm (TM). Though a firm may receive subsidies from more than one source within one year, no firm can have more than one subsidy at a time.

Ever since Finland joined the EU in 1995 she automatically became eligible for Structural Funds and Community Initiative program financing. One of the major recipients of these funds are firms. EU funds can be distributed vertically (i.e. to firms located in specific geographical areas, to firms with special characteristics -such as SMEs- etc.) or horizontally meaning that all firms are eligible as long as they fulfil some other basic criteria (i.e. the type of project in question).

The Finnish legislation related to subsidies is rather vague as to defining which firms should be eligible, but basically it stipulates that the potential recipients should be profitable or should have the prerequisites to become so.

There are special programs for start-up firms which can be financed with start-up capital and/or salary compensations.

For the type of subsidies we examine, the government distributors finance only part of the total project cost; the firm must find the rest of the costs from its own reserves, tapping the private credit markets or even finding yet another government grant distributor.

The amount of subsidies distributed per project, as proportion of the total cost, depends on the type of project, the type of firm, the geographical area where the firm is located, the source of subsidy (national, EU), etc. The average coverage of KTM subsidies is approximately 20%, but it can reach up to 60% of the total cost. For subsidies through TEKES the coverage depends on the type of high-tech development project. It ranges between 25% for product development costs, to 50% for costs relating to strategic planning, marketing, business partnership developments, etc. If the applicant is an SME the cost coverage increases by 10 percentage points.

For Labour related subsidies arranged directly through the local Labour offices it is based on an amount up to approx. € 840 per month for up to 10 months (in 2001). The level of worker's human capital in the subsidised job determines the exact amount of subsidy. The longer the worker has been unemployed prior the subsidy, the higher the subsidy. Similarly a lower level of education increases the subsidy. As the typical subsidised jobs are cleaners, clerks and secretaries, office workers, unskilled manufacturing workers and salesmen, we have estimated that on average firms pay themselves 60 per cent of the employment costs of a worker in a subsidised job.[3] This estimation is based on those workers' corresponding centralised union wage agreement.

On average the length of subsidised period is 6 months. Apart from their subsidised status, these jobs in private firms have exactly the same specifications as the non-subsidised ones. Although in principal the applicant individual can negotiate with the firm on an extra salary amount that the firm could pay him from its own funds, in general workers in subsidised jobs are paid according to the prevalent wage rate. In practice this means that the subsidy rate in subsidised jobs is 60 per cent, i.e. for each Euro received as subsidy, the firm must put on average 1.5 Euros of its own money when creating a subsidised job (1.5/(1+1.5)=0.60).

In the majority of cases, the firm that has been awarded certain amount of subsidies has first to make the disbursement of funds from its own resources. Then it has to submit the relevant invoices to the respective (local) distributing organisation and (only then) gets the agreed subsidy compensation. In cases where the matter calls for start-up capital or when the distributor part-subsidises labour related activities (salaries), the disbursement occurs as soon as the need arises. In other words, in terms of KTM and TEKES the subsidy is given at the middle and/or at the end of the project's investment period, whereas in terms of TM, the subsidy is given already from the start.

[3] Average subsidy is € 620 a month and average wage in a subsidised job is € 1560.

3. Framework of empirical analysis

As we mentioned in the previous section, firm subsidies in Finland are delivered on the basis of project specific applications. When a firm receives a subsidy, it has to contribute from its own sources. When receiving labour subsidies, firms must be able to demonstrate that individual(s) have been employed with the assistance of these subsidies (there is no direct employment responsibility in the two other types of subsidies[4]). Therefore, labour subsidies affect directly payroll, the number of personnel and the value-added of firms, as the subsidies are included in the total payroll firms pay during a financial year. This results in problems with the choice of an endogenous variable for the regression analysis, as the subsidies appear in both sides of the equation. However, we can overcome this, by subtracting from the firm's employment payroll the amount of subsidies received.[5] We call this variable the firm's own (or private) payroll and run alternative regressions, where three proxies for employment are the alternative endogenous variables. These proxies are the number of personnel, payroll and own payroll.

We estimate the effect of business subsidies in the following fashion. Let D=1 denote the event of receiving a subsidy and D=0 denote the event of not receiving a subsidy. Let y represent the log of firm's own employment (subsidised employment are subtracted from the firm's total employment). Let y0 and y1 be the log of firm's own employment level when the project is not subsidised (D=0) and when it is subsidised (D=1), respectively. The 'benefit' in the firm's own employment from receiving the subsidy is $\Delta y_t = y1_t - y0_t$, where Δy_t is the effect of subsidy that we would like to find out. In this context, positive Δy_t stimulates the firm's own employment, because extra employment that would have not been created without the subsidy, is indeed presently created. Note that the difference Δy can still be positive, even when the subsidy is superfluous and the released funds[6] are used to other employment expenses that could not have occurred before the subsidy funds became available.

Using the data at hand as a point of reference, this means that to be positively effective, R&D or Investment and Operation subsidies must stimulate the firms' employment in a statistically significant way. Labour subsidies are different however, as the firm must cover 60 per cent of the employment costs of the subsidised job. Therefore, labour subsidies are positively effective only if one

[4] The employment responsibility is indirect in the sense that the subsidies are given to Investment and R&D projects that most probably yield positive effects on employment.

[5] Sales would be another alternative, since subsidies do not directly affect the amount of goods and services a firm can sell (worker hired with the subsidy money does not necessarily help firm to sell extra unit of its product). On the other hand however, subsidies may distort sales figures, if they affect relative prices of production factors.

[6] The ones replaced by the subsidies.

Euro of subsidies stimulates firms' own (private) employment expenditures by more than 1.5 Euros (1+1.5=2.5 and 1.5/2.5=0.60).

If the subsidy effect is zero, the subsidy does not, on average, stimulate or displace the firm's own employment (payroll) expenditure. The firm adjusts its employment expenditures to accommodate the subsidised project, which the firm is committed to invest upon, when getting the subsidy[7]. In this case, subsidised and non-subsidised employment on average cancels out. Finally, a negative effect means that the subsidy displaces the firm's own employment expenditures, either because (i) not all of the released resources from subsidising a superfluous project are directed to other employment expenditures[8], or (ii) the subsidised project purely crowds out other non-subsidised employment.

Our method of analysis is a generalised version of the widely used difference-in-differences (DID) method in that our setting follows one set of firms that do not receive any subsidies in period t-1, but some of them start receiving subsidies in period t.[9] This method also has an advantage over the cross-sectional analysis, as it has observations for subsidised firms also before the period of subsidy. Then, we measure the effect of subsidies estimating the change in employment in subsidised firms compared to those that continue not receiving subsidies. This is carried out by a fixed effects estimation of the panel data.

The main econometric problem is that the effect of subsidy cannot be computed for any individual firm precisely, because data on the counterfactual are missing[10]. We do not know what the 'y0' would have been for firms that received subsidies. Thus, Δy_t has to be estimated. We estimate an average gain for the firms that received a subsidy in terms of payroll and personnel growth. This is called *the effect of treatment on the treated*.

We assume that conditional on the firm not having a subsidy at time t-1, receiving a subsidy at t shifts expected employment by β. Then,

$$E(y1_t \mid D_t=1, D_{t-1}=0) = E(y0_t \mid D_t=1, D_{t-1}=0) + \beta \qquad (1)$$

and

[7] However, in the Finnish case at least, there is no legal obligation to invest in the project successfully. That is, the firm does not have to return the subsidies if the project does not fulfil the whatever predefined goals are stated in the initial application and in the file attached to the decision when granting the subsidies.

[8] But to other activities such as marketing, etc.

[9] In standard differences-in-differences method one analyses two cross-sections, one before and one after the treatment.

[10] It is not possible to have the same firms classified as having received and not having received subsidies during a certain time period.

$$\beta = E(y1_t - y0_t \mid D_t=1, D_{t-1}=0) = E(\Delta_t \mid D_t=1, D_{t-1}=0). \quad (2)$$

If the treatment and control group were randomly selected, the control group would provide a proper counterfactual. In this case an estimator β would be the simple difference in the mean employment by support status (status getting or not subsidies) in period t, conditional on not having received a subsidy at t-1. In other words, we would get an unbiased estimator, as there are no common or correlated factors determining both the probability of receiving a subsidy and the employment. In this case

$$E(y0_{it} \mid D_{it}=1, D_{it-1}=0) = E(y0_{it} \mid D_{it}=0, D_{it-1}=0) \quad (3).$$

However, in our case as in most public policy interventions, the target group (the firms) are not randomly selected to receive subsidies. First, the firms themselves come forward and apply for subsidies. Second, in order to be considered for financing they have to fulfil certain general and basic criteria imposed by the program under which the subsidies are distributed (i.e. based on their geographical location, their size, their general profitability, the type of project in question, the type of subsidy, etc). Third, there is evidence to argue that the subsidy distributing Ministries and Agencies tend to 'pick the winners' by giving subsidies more often to more profitable and promising firms compared to the general population. (Branstetter and Sakakibara, 1998; Klette, et al., 1999; Lipsky, 1980; Roper and Hewitt-Dundas, 2001; Venetoklis, 2001). Finally, the probability of receiving a subsidy and the growth rates of employment certainly differ among industries. In all of these cases, $E(y0_t \mid D_t=1, D_{t-1}=0)$ in equation (1) is not identified, i.e. $y0_t$ is not mean independent of D.

We try to achieve this mean independence by conditioning expected mean employment both in subsidised and non-subsidised groups of firms based on their observable and unobservable characteristics. When conditioning on observables, we regress employment on subsidy-status and additional regressors that are correlated with subsidy-status and employment.[11]

If there is no selection on unobservables, the following condition holds.

$$E(y0_{it} \mid X_{it}, D_{it}=1, D_{it-1}=0) = E(y0_{it} \mid X_{it}, D_{it}=0, D_{it-1}=0), \quad (4)$$

where X is a vector of covariates. Equation (4) says that conditional on X, the selection into the subsidy program is not based on variables correlated with $y0_{it}$.

Let us consider the observables. As mentioned above, there is evidence to suggest that policymakers are willing to subsidise firms that have the best prospects. This helps aid-distributors to allege that subsidies are effective. An

[11] Later in the paper we replace subsidy-status dummy with the log amount of subsidies.

indicator of high growth potential we use, is the profitability of firms. Apart from promising prospects, profitability eases liquidity constraints and creates room for future expansions, thus correlating with both subsidy-status and employment growth. The form of the variable is the gross profit/loss.[12] We could use this variable also as lagged by one year, when the subsidy agencies are choosing fundable projects. The lagged and current period variables are highly correlated however (correlation being 0.82) and the use of a lag would drop one estimable period[13] (Table A2 in Appendix). Due to the resulting multicollinearity, dramatically lower number of observations and very minor changes in results, we report below only the results obtained excluding the lagged profitability (results with lagged profitability are available upon request).

In order to further control for the selection, we also add the amount of sales, the average wage and fixed capital as log-form to the regression. These variables control differences between firms in output, wages and investments, all of which contribute to employment. Sales are also used in the literature as a proxy for future profitability (Klette, Moen, 1997; Lach, 2000). Wage controls for inflation, making the use of nominal, rather than real figures, sufficient.[14] Sales and fixed capital also control for differences between firms in size.

It is important to control for the size of firms. One consequence of the 'pick-the-winners' phenomenon is that subsidies are given more often to larger than to smaller firms, since most of the smallest firms are very young and thus less reliable survivors (Venetoklis, 2001). Moreover, it is a well-known fact that larger firms tend to have smaller relative growth rates than the smaller firms (Evans, 1987; Dunne and Hugher, 1988; Dunne et al. 1994). Therefore, the omission of a size variable would bias the estimates for the coefficient of the subsidy variable downwards, as subsidies are given more often to larger firms that have lower growth rates than smaller firms.

As far as other observable variables are concerned, it is argued that the regional impact of sectors is important. One key industry might be more important for a region than some other. Since regional officers of the subsidy agencies largely decide which firms are given subsidies, they may subsidise firms in one industry more often than its counterparts in another. On the other hand, there are clear

[12] We do not take logarithm of this variable, as a fraction of the firms make gross losses every year (losses are negative, thus cannot be logged).

[13] Initially we have four estimable years and over 26,000 cross-sectional observations. One period (i.e. about 26,000 observations) is lost when we include lagged subsidy and control variables in the model. If we added a second lag of profitability, the number of estimable years would drop to two.

[14] Converting nominal prices into real ones would be particularly problematic in equations where the effect of different amounts of subsidies is estimated. Payroll figures could be deflated by producer price indices, whereas it cannot be used in deflating the subsidy, as subsidies are given to firms operating in different industries.

differences in growth rates between industries. Hence, a joint 'effect' is that the industrial classification must be controlled.

In addition to the observables, we also take into account the effect of unobservable characteristics. Some of these are firm-specific but time-invariant. Others are common to all firms in one year but vary over time. We use time dummies to capture effects that are common to all the firms but vary over time. In terms of firm-specific effects, there might be regional differences in economic environment or industrial policies, or the legal form of firms could matter. Further, apart from the regional importance of industries, regional offices and officers may have different standards for applicant firms also for other reasons (Venetoklis, 1999). Some offices or officers may grant money to firms more easily than others, partially due to the fact that in some regions there may simply be more applicant firms. We remove all these time-invariant factors (some of which are firm-specific and the others industry- or region-specific) by estimating firm-specific fixed-effect models.

Moreover, the use of fixed effects also alleviates the problem of self-selection, which arises from the fact that we cannot observe all firm-specific factors that determine the probability of receiving subsidies and employment.

Thus, using all these controls and methods of analysis, we estimate the following equation:

$$E_{it} = \alpha + \beta D_{it} + \chi X_{it} + v_t + \eta_i + \varepsilon_{it} \qquad (5)$$

where, E can be (i) employment (number of personnel), (ii) total payroll (total = private + subsidy) or (iii) the firm's own (private) payroll; X is a vector of control variables (correlates with both E and D); v is a vector of time dummies, and η shows fixed effects (at the industry or individual level in our models below). D equals a dummy for subsidised firms. We also estimate models where log of subsidies are substituted for subsidy dummies. Coefficient β and χ measure the structural, selection-corrected, effect of the observables on E, whereas η is the 'selection effect' (omitted variable bias) relating employment and the observables. To sum up, the variables used in estimations are described in Table 1. Table A1 in Appendix gives descriptive statistics for these variables and Table A2 shows the correlations between the variables.

Table 1. Description of variables

Variable	Form of variable
Endogenous (alternatives to each other)	
The number of personnel	Ln (the number of personnel)
Payroll	Ln(the amount of payroll)
Own payroll	Ln(the amount of own payroll)
Variable of interest (alternatives to each other)	
Dummy for subsidised firms	1= when subsidised, 0 otherwise
Amount of subsidy	Ln(1 + the amount of subsidies)
Control variables	
Profitability	Gross profits/Losses
Sales	Ln(the amount of sales)
Fixed capital	Ln(the amount of fixed capital)
Average wage	Ln(payroll per personnel)
Sector effects	20 sector dummies
Year effects	Year dummies (1995-6-7-8)
Individual effects	Individual dummies per firm

Note: Ln is natural logarithm. Ln(1 + the amount of subsidies) is Ln(1) for non- subsidised firms.

4. Description of data set

Our sample has been taken from the registers compiled by the Finnish Tax Authority. These registers cover the whole population of firms that pay taxes in Finland, including information on their industrial sector, size, financial statement accounts and possible business subsidy receipts.

In the data analysed we keep only those firms that employ at least one fulltime person each year. We drop from the sample those firm if their log size of sales has changed more than +/-2.5 times over a year (this eliminates the effects of take-overs and mergers). We also drop firms that have non-plausibly low or high average wage (payroll/the number of personnel). Finally, after these restrictions, the variables in the remaining sample have missing values in some rows. Therefore, the number of observations varies from model specification to another.

The data set under analysis spans from 1995 to 1998 and the total of 103,082 observations refer here to firm-year pairs (Table 2). There are a little more than 26,000 firms in the data, which is more than one quarter of all the observations as the panel is unbalanced. The data includes over 18,000 subsidy records that correspond to 18 per cent of all observations. Most of the subsidies in our sample are given for employment purposes (14,241), whereas R&D subsides is the smallest group of the three. In contrast, the average size of R&D subsidies is as high as € 105,826, whereas that of an employment subsidy is only € 4,240. Also note that the sum of Investments and Operation subsidies is the largest (€ 200 million).

Table 2. Summary statistics for subsidies, 1995-1998

Subsidy type	Observations on subsidies	Per cent of all observations	Average subsidy, €	Sum of subsidies, € million
Employment (through the TM)	14,241	0.138	4,240	60
Investment and operation (KTM)	5,725	0.056	34,834	200
R & D (TEKES)	1,307	0.013	105,826	138
All subsidies	18,438	0.179	21,592	398
Observations with non-subsidised firms	84,644	0.821		
All observations (firm-year pairs, subsidised and non-subsidised firms)	103,082	1.000		

Note: One firm may have received subsidies from more than one source in one year.

In Table 3, we list various types of subsidies spent during the period 1995-1999 controlling for the distributor. We also include the proportion of a specific sub-type of subsidy compared to the overall amount of subsidies distributed per source. This gives an idea into which types of projects emphasis is placed per distributing organisation.

Be aware that this breakdown is at a very general level and it might not correspond to the exact division per subsidy type currently applied. We have compiled the table based on the data set at hand. In practice, the individual types of subsidies classified on a per-project-goal basis can be much more detailed. Finally note that due to data unavailability, the descriptive and econometric analysis that follows does not break down the amount of subsidies per sub-type, but just per source per year; that is we aggregate all the subsidies received by a firm from a specific source (TM, KTM , TEKES) during each year of the period 1995-1998. We call these subsidies as follows: Labour (TM), Investment and Operation (KTM), and R&D (TEKES) subsidies.

Table 3. Business subsidies distributed through the KTM, TM and TEKES during 1995-1999

Source and Type	%	%
KTM (Investment and Operation subsidies)		
Investments		
Regional investments	47	
Small enterprises (mainly for investments)	15	
Energy related investments	3	65
Operation subsidies		
Research and product development	16	
Small business development operations	7	
Internationalisation	8	
Environmental purposes	4	35
All	100	100
TM (labour subsidies)		
General labour subsidies and structural aid		
Investment with employment goal	2	
Training and work	6	
EU and Structural aid	21	30
Other labour-related subsidies		
Other labour related aid	15	
Other aid through TM	41	56
Aid to entrepreneurs		
Direct labour aid to entrepreneurs	5	
Direct training and work aid to entrepreneurs	8	
Combined subsidy to private sector entrepreneurs	1	14
All	100	100
TEKES (R & D subsidies)		
Product development subsidies		59
Subsidies for applied research		41
All		100

Note: Figures are provided by the Finnish Tax Authority (Verohallitus) database which are in turn compiled from data given to them by the Ministries/Agency in question.

Overall, these subsidies are small relative to the number of employees within the assisted firms. On average € 1,226 of subsidies are given per employee, or about 6 per cent of the firm's own payroll expenditures (Table 4). Here we also see that the average size of labour subsidies is smaller than that of other types of subsidies.

Table 4. Subsidies relative to employment among subsidised firms

	Relative to personnel	Relative to payroll	Relative to own payroll
Labour (TM)	498	0.027	0.032
Investment and operation (KTM)	1,703	0.072	0.076
R & D (TEKES)	4,409	0.146	0.151
All subsidies	1,226	0.053	0.059

Note: As some firms receive subsidies from more than one source in a year, the proportion of KTM and TEKES subsidies relative to payroll and own payroll differ from each other.

As found elsewhere, the size distribution of firms (measured in terms of number of employees) is highly skewed to the right (Column 1 in Table 5). Almost three-quarters of firms employ 10 people or less; and the proportion of large firms, employing more than 250 people, is just one per cent. The number of subsidies has a more even distribution than the size of firms (columns 2 and 3). The proportion of subsidies for firms employing less than 10 people is smaller than their share of firms, whereas the opposite applies to firms employing at least 10 people. Also, the amount of subsidies increases linearly with the size of the firms (column 4). The average amount of subsidies is approx. € 6,100 among the smallest firms, whereas it is as high as € 165,000 among the largest ones. In contrast, the average size of subsidy per employee decreases with the increasing size of firms (column 5).

Table 5. Firm size and subsidies

	(1)	(2)	(3)	(4)	(5)
Size of firm, number of employees	Proportion of all firms	Proportion of subsidised firms	2/1	Average subsidy per firm, €	Average subsidy per employee, €
1	0.153	0.034	0.2	6,096	6,057
2-10	0.565	0.420	0.7	7,392	1,597
10-50	0.227	0.382	1.7	16,145	727
50-250	0.045	0.128	2.8	47,971	488
More than 250	0.010	0.036	3.7	164,936	293
All	1.000	1.000	1.0	12,559	2,021

One novelty in this data set is that it includes firms outside the manufacturing sector. The proportion of manufacturing firms in our data is approx. 18 per cent of all the subsidised firms and its respective proportion of subsidy amounts is 36 per cent (Table 6). The other industrial sectors absorb a smaller proportion of subsidies relative to their number of firms, with the business service sector receiving the least subsidies amount per firm.

Table 6. Industrial structure in the data set

Industry	(1) Proportion of firms	(2) Proportion of subsidies	(2)/(1)
Manufacturing	0.181	0.355	2.0
Other industrial production	0.138	0.123	0.9
Whole sale and retail trade	0.300	0.249	0.8
Business services	0.196	0.124	0.6
Other private services	0.186	0.148	0.8
All	1.000	1.000	

Finally, we take a look at firms that did not receive any subsidies in the year t-1 and compare employment (number of employees) in subsidised and non-subsidised firms in year t (Table 7). It appears that firms who start receiving subsidies in period t have clearly more employees than those that continue to be non-subsidised in the same period (t). The mean employment of firms that have not received any subsidies in period t-1 or t is 10, whereas the respective figure for subsidised firms with labour subsidies is 29. Employment in firms that start receiving Investment and Operation subsidies is 31, whereas that of firms that get R&D subsidies in year t is as high as 132. The average difference between subsidised and non-subsidised firms is even higher, when we use their payroll as a comparison criterion.

Table 7. The mean employment of subsidised and non-subsidised firms in the year t; no subsidies in t-1

	No subsidies in year t	Subsidies in year t		
		Labour subsidies	Investment and operation	R&D
Personnel, number	10	29	31	132
Payroll, €	251,793	812,185	819,874	4,574,735
Own Payroll, €	251,793	808,769	819,874	4,574,735

Note: Payroll and Own Payroll figures are the same for firms that start receiving Investment and Operation subsidies and R&D subsidies, since there is no obligation to employ anyone with these subsidies. Therefore these subsidies do not trivially affect payroll.

Based on the aforementioned results, can we conclude that subsidies have a positive and substantial impact on the employment of firms? Unfortunately no, because these results fail to take into account two things. First, labour subsidies trivially affect employment and payroll, causing a spurious correlation between labour subsidies and employment (this applies only to subsidised jobs (TM), not to the subsidies from two other sources (KTM, TEKES)). As mentioned earlier, firms receiving labour subsidies *have* to employ someone with the money they get from the public source. Second, there is a possibility that subsidies are given more often to more promising firms that would grow faster than others even without subsidies.

We can alleviate the first problem the using the firms' own payroll as the endogenous variable. We subtract possible public labour subsidies from the firm's total payroll and compute a new variable that is called the firm's own (private) payroll. We find that, even in this variable, employment is vastly higher in subsidised firms compared to non-subsidised ones (Table 7).

The second problem refers to omitted variables and calls for regression analysis, an investigation which follows next.

5. Results

5.1 Average effect of subsidies

We continue the analysis of firms that have not received any subsidies in the year t-1 and regress three alternative employment variables on a subsidy dummy and a set of control variables described in Table 1 of section 3.

When compared to a simple mean difference between the groups, the regression analysis with observable controls yields a dramatic drop in the mean difference in employment between subsidised and non-subsidised firms (Left-hand side column in Table 8). In the personnel and payroll equations, the effect of labour subsidies is 19 per cent ($e^{0.177}$-1=0.194). The simple comparison earlier in Table 7 yielded a difference of 190 per cent ((29-10)/10). Note that the fixed-effects models presented in Table 8 and later on, take heteroscedasticity into account by using the Huber/White/Sandwich estimator of variance.

Table 8. Effect of labour subsidies; endogenous variable is ln(E_{it}); N=82,068

	Industry fixed effects		Individual fixed effects	
	Coefficient	R^2	Coefficient	(R^2-within)
Personnel, ln(E_{1t})	0.177 (24.7)	0.76	0.095 (16.5)	0.53
Payroll, ln(E_{2t})	0.177 (24.7)	0.78	0.095 (16.5)	0.29
Own Payroll, ln(E_{3t})	0.147 (20.4)	0.78	0.070 (12.2)	0.29

Note: E_i, i=1-3 where 1= personnel, 2= payroll and 3= own payroll. We compute the Huber/White/Sandwich estimator of variance to remove heteroscedasticity. Based on these estimators, t-values are given in parentheses. Subsidies are measured as dummy variable. Control variables include year-dummies, profitability (gross profit) in the current (t period) and lagged (t-1 period) form, as well as the log of the current period sales, average wage and fixed capital. Left-hand side equation has industry dummies and the right-hand side equation individual dummies. We also have controls for firms that have received other types of subsidies.

These results again suffer from the fact that subsidies trivially affect our personnel variable. To correct the problem and approximate the true effect in the payroll equation, we re-estimate it using an adjusted variable in which possible subsidies are subtracted from the total payroll. Though the effect is now smaller than before, the adjusted equation alleges that labour subsidies would still have a substantial positive effect on payroll, of 16 per cent ($e^{0.147}$-1=0.158).

It seems however that unobservable individual effects do explain the probability of receiving subsidies and the growth in employment (right hand side of Table 8). The results of firm-effect estimations show that on average labour subsidies increase log-employment and log-payroll by 0.095, whereas they increase the firms' log-own-payroll by 0.070. In terms of percentages the effects are 10.0 per cent and 7.3 per cent, respectively.

Finally, the results concerning subsidies for R & D and Investments and Operations indicate that the effects of these type of subsidies do not differ statistically from zero in the individual effect model. We also re-estimated the models excluding from the data firms that have received Investment and Operation subsidies or R&D subsidies. The result for labour subsidies remained the same as in Table 8.[15]

5.2 Effects over time

Next we explore whether labour subsidies have time effects in the sense that they would be more beneficial over a longer period than one year. Here we analyse firms that have not received subsidies in the year t-2 and include in the regressions dummies for both the current subsidies and subsidies received in t-1. We also add one lag for all control variables. In the personnel and payroll equations, the lagged effect of subsidy is as strong as the current one (column 1 in Table 9). The current subsidies effect on log-employment and payroll is 0.061, whereas the effect of lagged subsidies is 0.065, the sum equalling 0.126.

In the own-payroll equation the lagged effect is even stronger than the current one. The current effect on log-payroll is smaller than that obtained above (0.038), whereas that of lagged subsidies is 0.066. This implies that subsidies start bearing more fruits in a longer term than one year. The sum of the coefficients is 0.104, which equals to 11.0 per cent.[16] Although the sum of coefficients is smaller in the own-payroll equation than in the personnel one, the difference in very small in magnitude.

Allbight the fact that the equations of personnel and payroll suffer because subsidies trivially affect employment, there is still some information content in these results. When the average wage is excluded from the equation specification, the subsidy effect in the personnel equation appears to be higher

[15] These latter models are not shown here, but are available upon request.

[16] We also experimented including the profit variable lagged by two periods (i.e. lagged one period with respect to the one-period lagged subsidy dummy). In the current setting, firms are applying for subsidies in t-2. Therefore their suitability for subsidies is being evaluated at that period. In these models the high correlation between three variables of profitability becomes a problem (correlations being between 0.82 and 0.95). Further, another lag of profitability decreases the estimable years to two, and that dramatically decreases the number of observations. Regardless of these problems, the results remained remarkably similar to those reported in Table 9. These results are not shown here, but are available upon request.

than that in the payroll equation (column 2 in Table 9). The difference between the estimates implies that firms use subsidies to employ more people with low skills and low wages than people with high skills and wages. This causes the coefficient to be higher in the personnel equation compared to the payroll one when the average wage variable is excluded. On the other hand, one could argue that the change in coefficients is not necessarily due to the average wage of subsidised jobs, but rather due to a mis-specification of the equation.

Table 9. Effect of Labour (TM) subsidies with a lag; Individual fixed effects; endogenous variable is ln(E_{it}), i=1-3

Ln(E_{it})	Variable of interest	(1)	RHS variables in (1) excluding average wage	RHS variables in (1) excluding fixed capital
Personnel	D_t	0.061 (7.0)	0.118 (9.8)	0.066 (7.7)
	D_{t-1}	0.065 (6.5)	0.112 (8.1)	0.073 (7.5)
		0.126 ***	0.130 ***	0.139 ***
	N (R^2)	42,883 (0.65)	42,882 (0.11)	44,925 (0.63)
Payroll	D_t	0.061 (8.1)	0.050 (6.2)	0.066 (8.7)
	D_{t-1}	0.065 (7.5)	0.061 (6.6)	0.073 (8.5)
		0.126 ***	0.111 ***	0.139 ***
	N (R^2)	42,883 (0.27)	42,882 (0.16)	44,925 (0.26)
Own payroll	D_t	0.038 (5.1)	0.027 (3.4)	0.043 (5.7)
	D_{t-1}	0.066 (7.6)	0.062 (6.7)	0.075 (8.6)
		0.104 ***	0.089 ***	0.118 ***
	N (R^2)	42,882 (0.27)	42,882 (0.16)	44,924 (0.26)

Note: E_i, i=1-3 where 1= personnel, 2= payroll and 3= own payroll. We compute the Huber/White/Sandwich estimator of variance to remove heteroscedasticity. Based on these estimators, t-values are given in parentheses. D is a dummy for labour subsidies. Control variables include the profits (gross profit), sales, average wage and fixed capital in the current and lagged form. We also have controls for firms that have received other types of subsidies. *** denote statistical significance at the 1 per cent level, ** denote statistical significance at the 5 per cent level, and * denotes statistical significance at the 10 per cent level.

When fixed capital is excluded from the equations, the sum of coefficients for the subsidy dummies increases from 0.089 to 0.118 in the log-own-payroll equation (column (3) in Table 9). This equals to 9.3 and 12.5 per cent, respectively, and suggests that subsidies allow firms to allocate their payroll expenditures to physical investments, which gives further spur to employment.

Finally, we checked the effects of the subsidies from other two sources. For Investment and Operation subsidies or R & D subsidies we do not necessarily have to estimate the own-payroll equation, as these subsidies include no obligation to employ anyone with the subsidy received. Nevertheless, results remain very similar across the three alternative endogenous variables. When investigating the personnel equation, it turns out that the joint effect of the two other types of subsidies is zero when evaluated at the conventional levels of significance (Table 10). They are not statistically significant even when we allow investments to take place (i.e. we exclude fixed capital from the equation). Note however that the joint effect of Investment and Operation subsidies is significant at the 10 per cent level.

Table 10. Effect of business subsidies on the number of personnel; Individual fixed effects; endogenous variable is ln(personnel)

	Including fixed capital as control			Excluding fixed capital as control		
	Coefficient (TM-subsidies)	Coefficient (KTM-subsidies)	Coefficient (TEKES-subsidies)	Coefficient (TM-subsidies)	Coefficient (KTM-subsidies)	Coefficient (TEKES-subsidies)
D_t	0.061 (7.0)	0.001 (0.1)	-0.054 (-0.9)	0.066 (7.7)	0.004 (0.2)	-0.056 (-0.9)
D_{t-1}	0.065 (6.5)	0.044 (2.6)	0.001 (0.0)	0.073 (7.5)	0.049 (2.8)	-0.000 (-0.0)
Sum	0.126 ***	0.045 ( )	-0.053 ( )	0.139 ***	0.053 (*)	-0.056 ( )
N (R^2-within)	42,882 (0.65)			44,925 (0.63)		

Note: D is a dummy for subsidies. Apart from fixed capital, control variables include the profits (gross profit), sales and average wage in the current and lagged form. We compute the Huber/White/Sandwich estimator of variance to remove heteroscedasticity. Based on these estimators, t-values are given in parentheses. *** denote statistical significance at the 1 per cent level, ** denote statistical significance at the 5 per cent level, and * denotes statistical significance at the 10 per cent level.

The marginal significance of the Investment and Operation subsidies are due to the fact that, the lagged effect of Investment and Operation subsidies is positive. This implies that subsidised investments start bearing fruit in a longer term. However, the first year is not long enough a evaluate its significance. The effect of R&D subsidies is insignificant, which is plausible in the sense that R&D

projects are long term projects without any direct employment targets during the short period of two years in which we conduct our analysis.

5.3 Different amounts of subsidies and marginal effects

In this section we augment the analysis by exploring the effect of *sized* business subsidies. Starting with the investigation of labour subsidies, the sum of subsidies given to one firm in a year is mostly quite modest (*Table 11*). On average, 23 per cent of subsidies are € 1500 or less, and 92 per cent of subsidies are € 8000 or less.

Table 11. Descriptives for labour subsidies

€	N of subsidies	Percent
1-1,500	3,312	0.233
1,501-4,000	7,006	0.492
4,001-8,000	2,748	0.193
8,001-170,000	1,175	0.083
All	14,241	1.000

It appears that the size of subsidies between € 1,501-4,000 per year is the most effective, as the sum of the lagged and current period coefficients is the highest (Table 12). The largest amounts of subsidies have been the least efficient, since they have yielded an effect of similar magnitude as the smallest amounts. When insignificant coefficients are ignored, the differences between the sums of coefficients remain very similar. Results suggest that our approximately 10-per cent subsidy effect in dummy specifications is mainly accounted for by subsidies between € 1,500-8,000 per year, or yielding € 3,000-16,000 in two years.

Table 12. Different amounts of labour subsidies; Individual fixed effects; Endogenous variable is log of own payroll

Dummies by subsidy size, €	Sum of coefficients	Sum of statistically significant coefficients
1-1,500	0.082 (***)	0.082
1,501-4,000	0.116 (***)	0.116
4,001-8,000	0.113 (***)	0.113
8,001- 170,000	0.085 ( )	0.036
N (R^2-within)	42,916	0.27

Note: p-values of the test for joint significance of the current and lagged period dummies are given in parentheses. Control variables include profitability, sales and fixed capital in the current and lagged form, and subsidies from two other sources. (***) denotes statistical significance at the 1 % level, (**) denotes statistical significance at the 5 % level and (*) denotes statistical significance at the 10 % level.

As above we also checked the effectiveness of 'Investments and Operation' subsidies. We split these subsidies into four equal sized categories. It turned out that no group was statistically significant.[17] This is due to the fact that current period coefficients are not significant.

Below, we estimate the marginal effects of subsidies using log-log models (*Table 13*). Results indicate that the elasticity of the firm's own payroll with respect to labour subsidies is 0.0108, an estimate that is very close to that obtained with the dummy specification.

As the average proportion of subsidies relative to own payroll is 0.032 (see Table 4), the marginal effect of subsidies is 0.34 (0.0108/0.0322), i.e. one Euro of extra subsidies generates 34 cents of more employment payroll. The magnitude of the effect is modest. To create one extra job (lasting one year), the amount of labour subsidies needed is € 17,700 per year (the average payroll per employee is € 23, 800 per year), the rate of subsidy relative to the cost of one job being 0.75. The effect is actually too modest to be positively effective. Since on average the firm cover 60 per cent of the costs of a subsidised job, this suggests that labour subsidies have displaced firms own employment payroll, allowing firms to allocate their employment expenditures to other uses.[18]

[17] Results for these models are not shown, but are available upon request. Also note that due to the low number of R & D subsidy observations, effects of R & D subsidies utilising this four category sub-classification can not be conclusive.

[18] If firms share is 60 %, then the public share is 40%. When the public subsidies is increased by one Euro, the share of the firm must increase at least by 1.5 (1/0.40=2.5 and 1.5/2.5=0.60) in order to have a positive effect.

We also check whether there is any difference in the elasticity of labour subsidies across the industrial sector of firms. It turns out that the elasticity is rather similar over the sectors (*Table 13*). In business services the elasticity is 0.012 and in manufacturing it is 0.0106 per cent. In Wholesale and Retail Trade the elasticity is somewhat smaller, 0.0091. The effect has not caused capital to be substituted by labour, as we control for fixed capital.

Table 13. Elasticity of own payroll with respect to labour subsidies; Endogenous variable is ln (own payroll)

Variable	Coefficient	t-value	N	R^2-within
$Ln(subsidy)_t$	0.0038	4.8		
$Ln(subsidy)_{t-1}$	0.0070	7.7		
Sum	0.0108	(***)	42,864	0.27
Results by industry	Sum of coefficients	t-value	N	R^2-within
Manufacturing	0.0106	(***)	13,047	0.34
Whole sale and retail trade	0.0091	(**)	13,757	0.22
Other private services	0.0124	(***)	16,074	0.28

Note: (***) denotes statistical significance at the 1 % level, (**) denotes statistical significance at the 5 % level and (*) denotes statistical significance at the 10 % level. We compute the Huber/White/Sandwich estimator of variance to remove heteroscedasticity. Based on these estimators, t-values are given in parentheses. Control variables include profitability, sales and fixed capital in the current and lagged form, and subsidies from two other sources.

In Table 14 we report the coefficients and heteroscedasticity- corrected t-values for all variables in an own-payroll equation. The elasticity of KTM subsidies with respect to the own payroll (sum of the two coefficients) is 0.0040 (column (2) in Table 14), whereas the elasticity of TEKES subsidies is -0.0049. Neither of the subsidies are statistically significant when the joint significance of current and lagged variables is evaluated.[19] As found earlier however, the lagged KTM subsidies is again individually statistically significant. When evaluating the economic significance, we compute the marginal effect, which is as low as 0.005

[19] The same applies to an otherwise similar model where we use the number of personnel as our endogenous variable. - Results are not shown but are available upon request.

(0.0040/0.76).[20] This implies that one Euro increase in 'Investment and Operation' subsidies increase payroll in firms on average by the miniscule amount of half a cent; this indicates that despite of their statistical significance, KTM subsidies have not affected employment from an economic and practical point of view.

Finally, again in Table 14 it appears that demand, approximated by the sales of firms, is positively associated with employment Similarly fixed capital has a positive coefficient. These results accord with respective findings in literature (Hamersmesh, 1993). In contrast, the average wage has a perverse positive sign. This result is accounted for by the construct of the wage variable. Since it is the log of payroll per the number of personnel, the same (payroll) variable appears in both sides of the equation, causing the positive sign of the variable.

[20] Recall that 0.076 is the average proportion of KTM subsidies to the payroll, as shown in Table 4.

Table 14. Effects of business subsidies on the own payroll; log-log model;

	(1)		(2)	
Variable	Coefficient	t-value	Coefficient	t-value
$Ln(subsidy)_t$, TM	0.0038	4.0	0.0043	4.5
$Ln(subsidy)_{t-1}$, TM	0.0070	6.5	0.0079	7.5
$Ln(subsidy)_t$, KTM	-0.0002	-0.2	0.0001	0.1
$Ln(subsidy)_{t-1}$, KTM	0.0034	1.9	0.0039	2.2
$Ln(subsidy)_t$, TEKES	-0.0044	-0.8	-0.0047	-0.9
$Ln(subsidy)_{t-1}$, TEKES	-0.0000	-0.0	-0.0002	-0.0
Gross profit $_t$	0.0012	2.7	0.0013	2.7
Gross profit $_{t-1}$	-0.0001	-0.2	-0.0000	-0.0
Year 1997	0.0427	13.9	0.0391	13.1
Year 1998	0.0701	9.5	0.0636	8.5
$Ln(sales)_t$	0.1804	9.6	0.1907	10.5
$Ln(sales)_{t-1}$	0.0771	5.9	0.0870	6.4
$Ln(fixed\ capital)_t$	0.0412	7.7		
$Ln(fixed\ capital)_{t-1}$	0.0261	5.7		
Average wage $_t$	0.2036	-18.0	0.2113	18.8
Average wage $_{t-1}$	-0.0878	-8.5	-0.0854	-8.4
Constant	7.507	18.4	7.900	19.0
N; R^2-within	42,865; 0.65		44,906; 0.63	

Note: Model (2) excludes fixed capital controls. We compute the Huber/White/Sandwich estimator of variance to remove heteroscedasticity. Based on these estimators, t-values are given in own column.

6. Regional analysis

In this section we conduct a regional analysis of our data. We divide the regions of Finland into five different functional groups and cross tabulate them with six industrial sectors (Table 15). The capital region, Helsinki, is characterised by a higher per capita GDP and a higher proportion of jobs in private services compared to the respective figures of the other groups. In the 'other large university regions' and the 'other provincial centres', the proportion of public sector is somewhat higher than elsewhere. The 'manufacturing regions' are characterised by relatively high per capita GDP and (naturally) by the high presence of manufacturing jobs. In the 'countryside', the proportion of agricultural jobs is of course high, whereas the per capita GDP is, as expected, the lowest. We list all sub-regions within these six groups in Table A3 in the Appendix.

Table 15. Summary statistics for regional groups, 1999

Group	Capital region	Other large university centres	Other provincial centres	Intermediate manufacturing centres	Countryside
Population	1,163,841	876,010	1,178,559	735,743	1,211,343
GDP/capita, €	30,800	21,121	18,123	20,000	14,050
Industrial structure, %					
Agriculture	0.4	1.3	4.5	5.6	14.4
Manufacturing	13.2	22.1	21.4	30.9	21.6
Construction	5.0	5.9	5.7	5.5	5.0
Private services	55.6	37.7	33.8	29.7	26.3
Public services	24.1	29.2	30.7	24.4	28.0
Other	1.7	3.7	3.9	3.9	4.8

Note: Source Statistic Finland

Economic development has varied across regions since the mid-1990s when Finland started to recover from a severe economic recession (Figure 1). During the recession, employment deteriorated fast everywhere in Finland, whereas since the mid-1990s the capital region and other large university regions have outperformed positively the rest of Finland. Employment in the countryside has been remarkably poor, as the 1999 levels have stayed more or less the same as the ones just after the gloomiest years of recession.

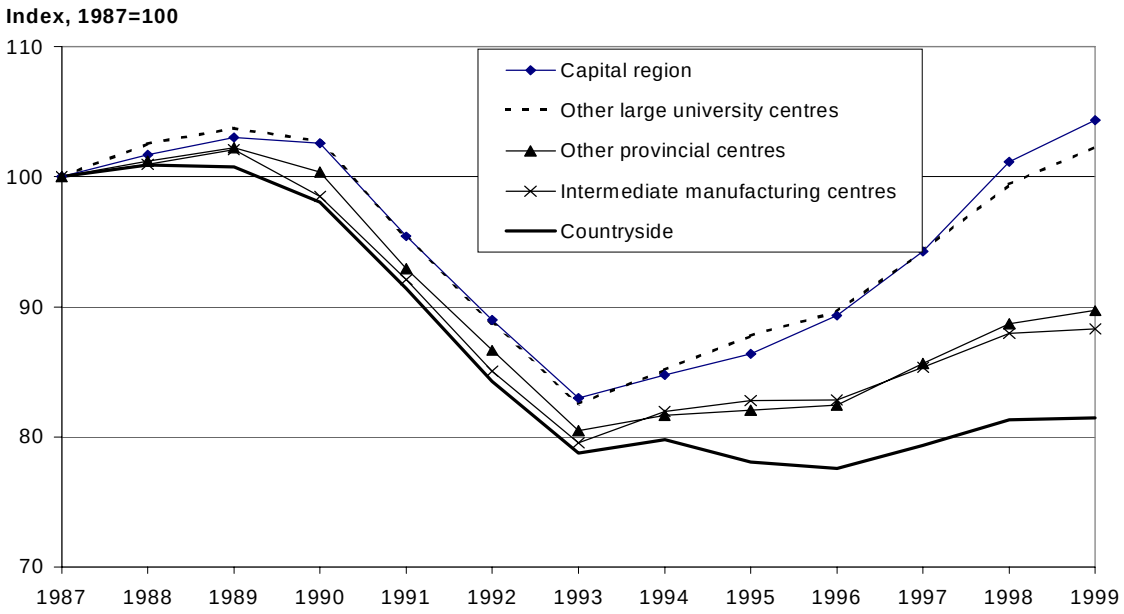


Figure 1. Evolution of the number of jobs across regional groups, 1987-1999

The number of observations across the regional groups ranges from 12,000 to 29,000 (Table 16). The size of firms (approximated by the mean payroll) increases when moving from Countryside to Capital Region. The mean firm size is over three times large in Capital Region than in Countryside. In contrast, the number of subsidised firms relative to the non-subsidised ones decreases when we move from Countryside to Capital Region. In Countryside nine per cent of firms have received subsidies, whereas in Helsinki the respective figure is 3 per cent. The mean size of subsidy is very similar across the groups, being between €3,600 and € 4,500.

Table 16. Summary statistics of labour subsidies across regions

	Observations	The mean payroll, €	N of subsidies	Share of firms subsidised	The mean of subsidies, €
Countryside	18,146	27,9699	1,671	0.09	4,435
Intermediate industrial centres	12,084	38,7438	769	0.06	4,499
Other provincial centres	20,720	38,6378	1,370	0.07	4,486
Other large university centres	17,563	41,8324	810	0.05	3,609
Capital region	28,977	92,1276	906	0.03	4,178

Note: We have dropped firms for which we do not have information on regional location.

It appears that the elasticity of payroll with respect to subsidies increases over time. Apart from 'Other Provincial Centres', the elasticity of lagged subsidies is statistically significant and stronger than the effect of the current period subsidies (column (1), Table 17). This of course is something to be expected. The regional differences between the elasticities are surprisingly large. The total effect of subsidies (the sum) is the strongest in 'Countryside' and 'Capital Region', whereas it appears to be low in 'Other Provincial Centres' and 'Intermediate Manufacturing Regions'. The elasticity is two or three times larger in the former group compared to the latter.

This analysis is problematic due to the fact that the unit of observation is the firm. Some firms have several branch plants, which makes the determination of location cumbersome. However, as our description in section 4 showed, the mean size of firms (in terms of number of personnel) is very low. This implies that the number of firms with more than one establishment is fairly small as well. If the structure of the large firms located in our different geographical classifications 'differ', then the effect of the labour subsidies on the firm's own employment would change and give more accurate estimate when the large firms are omitted from the regression models. However, when the regressions are re-estimated excluding the largest firms that most probably have more than one plant, results remain surprisingly similar, (column (2), Table 17). This implies that the location of the largest firms is not biasing our results.

Table 17. Regional variations in the effects of labour subsidies on the own payroll; individual fixed effects

	(1)		Largest firms dropped	
	Coefficient	N; R^2-within	Coefficient	N; R^2-within
Countryside		7,473;		7,347
Ln(subsidy), t	0.0066 (3.5)	(0.26)	0.0065 (3.5)	(0.26)
Ln(subsidy), t-1	0.0083 (4.1)		0.0083 (4.1)	
Sum	0.0149(***)		0.0148(***)	
Intermediate manufacturing regions		5,137; (0.33)		5,037 (0.34)
Ln(subsidy), t	0.0021 (1.0)		0.0023 (1.0)	
Ln(subsidy), t-1	0.0032 (1.3)		0.0030 (1.3)	
Sum	0.0053( )		0.0053( )	
Other provincial centres		8,691;		8,560
Ln(subsidy), t	0.0030 (2.2)	(0.34)	0.0029 (2.1)	(0.34)
Ln(subsidy), t-1	0.0024 (1.5)		0.0021 (1.3)	
Sum	0.0054(**)		0.0050(**)	
Other large university centres		7,658;		7,518
Ln(subsidy), t	0.0022 (1.3)	(0.28)	0.0022 (1.3)	(0.29)
Ln(subsidy), t-1	0.0077 (3.9)		0.0077 (3.8)	
Sum	0.0099(**)		0.0099(**)	
Capital region		12,632		12,272
Ln(subsidy), t	0.0039 (2.1)	(0.26)	0.0038 (0.3)	(0.26)
Ln(subsidy), t-1	0.0095 (4.3)		0.0098 (2.4)	
Sum	0.0134(***)		0.0136(***)	

Note: Control variables include sales, fixed capital, wages and profitability in the current and lagged form and subsidies from two other sources. We compute the Huber/White/Sandwich estimator of variance to remove heteroscedasticity. Based on these estimators, t-values are given in parentheses. (***) denotes statistical significance at the 1 % level, (**) denotes statistical significance at the 5 % level and (*) denotes statistical significance at the 10 % level.

As previously, we now calculate the marginal effect using the estimates for elasticity and the proportion of subsidies to own payroll (Table 18). The proportion of subsidies to own payroll is higher in the 'Countryside' and 'Intermediate industrial centres' than elsewhere. The differences in this proportion between the regional groups are so large, that the regional differences in marginal effects are clearly different from those in elasticities. In marginal effect 'Countryside' is not at the top anymore, whereas 'Capital region' has the highest marginal effects. Interpreting the results when the largest firms are excluded, it appears that one Euro more of subsidies increases the firm's own payroll levels (in monetary terms) by 71 cents in 'Capital region', some 45-48 cents in 'Other large university centres' and 'Countryside', respectively, and 17 cents in 'Manufacturing centres' and 'Intermediate industrial centres'. The

difference between the two extremes is indeed large, as the average marginal effect over all groups was found to be 34 cents.

Table 18. Marginal effects by regional group; largest firms excluded

	Subsidy / own payroll	Elasticity	Marginal effect
Countryside	0.031	0.015	0.484
Intermediate industrial centres	0.031	0.005	0.174
Other provincial centres	0.029	0.005	0.174
Other large university centres	0.022	0.010	0.450
Capital region	0.019	0.014	0.705

Although the marginal effect in Capital region is as high as 0.7, it still points to displacement, as the firm's share of the payroll in a subsidised job is 60 per cent. This means that one subsidy-Euro to be effective, it should have encouraged the firm to increase its own payroll by more than 1.5 Euros.[21] Nevertheless, the mildest displacement effect in 'Capital region' suggests that public moneys have been used most effectively in areas where there is the highest growth in demand and therefore the best possibilities to take advantage of cheaper labour.

In 'Intermediate Industrial Centres' and 'Other Provincial Centres' the labour subsidies have caused a very strong displacement effect. One subsidy-Euro has resulted in 17 cents increase in own payroll. In 'Countryside' the displacement effect has been milder than that; 48 cents have been put to the employment payroll. This relatively mild displacement implies that outside 'Capital Region' regional policy has been more effective in areas where the need for development has been the greatest.

[21] We showed earlier that if firms share is 60 %, then the public share is 40%. When the public subsidies is increased by one Euro, the share of the firm must increase at least by 1.5 (1/0.40=2.5 and 1.5/2.5=0.60) in order to have a positive effect.

7. Conclusion

This paper evaluated the effect of business subsidies on the employment of firms during 1995-1998. The main finding was that labour subsidies increase firms' own employment payroll on average by 11 per cent. The marginal effect of subsidies however, is 34 per cent. As on average firms pay themselves at least 60 per cent of the employment payroll of a worker in a subsidised job, our result suggests that labour subsidies displace the firms' own employment expenditures. This means that labour subsidies allow firms to reallocate their employment expenditure to other uses. For example in our sample, firms receiving labour subsidies tended to invest more in their physical capital than other firms. These investments contribute slightly but positively to the firms' own employment expenditure.

When considering the actual purpose of labour subsidies, the strong displacement effect is not that surprising. The purpose of labour subsidies is to improve human resources development of the work force as well as to encourage firms to increase employment. Labour subsidies are often directed to firms who employ workers, whose productivity is lower than the level needed in active labour markets. Therefore these people are not easily employable with the prevailing minimum wage level of the sector in question. Labour subsidies are used to fill the gap between wages that firms are willing to pay to these people and the prevailing wage level.

However, poor performance of labour subsidies raises the question of whether this public outlay could be used more efficiently otherwise. One alternative is to shift subsidised jobs from the private to the public sector. We have a shortage of workers, particularly in the large health care sector, and this could easily accommodate more subsidised jobs. Earlier studies have shown a weakness in this policy, however (Aho et al.1999, Hämäläinen, 1999). A finding usually is that working in a subsidised job, has improved the subsequent labour market performance of the participant, only when the subsidised job has been in the private sector. Subsidised jobs in the public sector have not created this kind of improvement. Alternatively, we could use the resources currently devoted to labour subsidies as a tax reduction, which would improve employment in the economy by increasing disposable income. Thirdly, labour subsidies could be used more effectively in other the labour market measures. For example, we could increase training and education or improve the efficiency of other public labour market services.

This paper studied the effectiveness of labour subsidies from the firm perspective. Before a final policy conclusion is made, a wider perspective is needed. For example, a subsidy may release a firm's own funds to a use that improves the firm's performance. Investments and marketing are examples of

such uses. Further, we know from earlier studies that labour subsidies have indeed improved the subsequent labour market success of the program's participants. Therefore, we cannot tell with absolute certainty whether the overall social effect of labour subsidies is positive or negative.

Regional results show that the displacement effect of labour subsidies is the smallest in 'Capital region'. This suggests that public moneys have been used most effectively in areas where there is the highest growth in demand and therefore the best possibilities to take advantage of subsidised (cheaper) labour. This also implies that labour subsidies have contributed somewhat to the ongoing divergence of regional economies in Finland. The displacement however, does not increase linearly with a decreasing urbanisation. In 'Countryside' the displacement effect has been milder than that in the 'Intermediate industrial centres' or 'Other provincial centres'. This relatively mild displacement implies that regional policy has been more effective in areas where the need for development has been the greatest.

We do not find displacement or stimulation effects in the application of Investment and Operation subsidies or R&D subsidies. This means that the subsidy does not, on average, stimulate or displace the firm's own employment (payroll) expenditures. The firm adjusts its employment expenditures to accommodate the subsidised project, which the firm is committed to invest upon when getting the subsidy. In this case, subsidised and non-subsidised employment on average cancels out. The zero effect of Investment and Operation subsidies is somewhat surprising, as there is an indirect goal behind these subsidies that they would result in extra employment. The zero effect of R&D subsidies is something to be expected, since R&D projects are risky, long term projects without any direct employment targets during the short period of two years in which we conduct our analysis. Nevertheless, the zero effect is more promising than a displacement effect.

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APPENDIX

Table A1. Description of variables

Variable	Mean; standard deviation	Min ; Max
Endogenous		
Ln (the number of personnel)	1.732 ; 1.240	0 ; 9.53
Ln(the amount of payroll, FIM)	13.451 ; 1.335	11.16 ; 22.03
Ln(the amount of own payroll, FIM)	13.360 ; 1.343	7.98 ; 21.83
Exogenous		
Variable of interest		
Dummy for TM subsidies	0.138 ; 0.345	0 ; 1
Dummy for KTM subsidies	0.056 ; 0.229	0 ; 1
Dummy for TEKES subsidies	0.013 ; 0.119	0 ; 1
Ln(the amount of TM subsidies)	1.334 ; 3.350	0 ; 13.81
Ln(the amount of KTM subsidies)	0.623 ; 2.588	0 ; 16.01
Ln(the amount of TEKES subsidies)	0.157 ; 1.396	0 ; 16.80
Controls		
Gross profits, FIM million	5.566 ; 75. 970	-272.1 ; 9692
Ln(the amount of sales, FIM)	14.806 ; 1.530	0 ; 24.02
Ln(the amount of fixed capital, FIM)	12.238 ; 2.026	0 ; 23.94
Ln(payroll per personnel)	11.719 ; 0.436	11.16 ; 16.12

Note: Ln is natural logarithm.

Table 2A. Correlation table.

	1.	2.	3.	4.	5.	6.	7.
1. ln(TM subsidy), t	1.0000						
2. ln(TM subsidy), t-1	0.4312	1.0000					
3. ln(KTM subsidy), t	0.1520	0.1819	1.0000				
4. ln(KTM subsidy), t-1	0.1400	0.1736	0.5689	1.0000			
5. ln(TEKES subsidy), t	0.0583	0.0860	0.2284	0.2090	1.0000		
6. ln(TEKES subsidy), t-1	0.0453	0.0707	0.1907	0.1967	0.6371	1.0000	
7. gross profit, t	0.0445	0.0674	0.0819	0.0589	0.1678	0.1107	1.0000
8. gross profit, t-1	0.0474	0.0589	0.0815	0.0451	0.1640	0.1384	0.8163
9. Year 1997	-0.0550	-0.1372	-0.1018	-0.0886	-0.0657	-0.0588	-0.0188
10. Year 1998	-0.0465	-0.0705	-0.0585	-0.0562	-0.0290	-0.0279	-0.0207
11. Ln(sales), t	0.1947	0.2095	0.2071	0.2008	0.1527	0.1456	0.2348
12. Ln(sales), t-1	0.1844	0.2073	0.2059	0.1990	0.1509	0.1459	0.2298
13. Ln(fixed capital), t	0.1701	0.1945	0.2389	0.2269	0.1408	0.1367	0.1940
14. Ln(fixed capital), t-1	0.1594	0.1898	0.2343	0.2270	0.1401	0.1388	0.1955
15. Average wage, t	-0.0323	0.0009	0.0539	0.0553	0.0900	0.0851	0.0926
16. Average wage, t-1	-0.0189	-0.0323	0.0444	0.0482	0.0805	0.0805	0.0957

	7.	8.	9.	10.	11.	12.	13.	14.	15.
7. gross profit, t-1	1.0000								
8. Year 1997	-0.0197	1.0000							
9. Year 1998	-0.0188	-0.2416	1.0000						
10. Ln(sales), t	0.2137	-0.0400	-0.1078	1.0000					
11. Ln(sales), t-1	0.2126	-0.0458	-0.1083	0.9430	1.0000				
12. Ln(fixed capital), t	0.1780	-0.0587	-0.0801	0.6358	0.6318	1.0000			
13. Ln(fixed capital), t-1	0.1804	-0.0578	-0.0849	0.6263	0.6328	0.9459	1.0000		
14. Average wage, t	0.0808	-0.0462	-0.1115	0.2200	0.2048	0.1424	0.1397	1.0000	
15. Average wage, t-1	0.0859	0.0384	-0.0936	0.2342	0.2501	0.1614	0.1631	0.6377	1.0000

Table A3. Regional sub-regions by regional group

Capital Region	Other Large University Centres		Other Provincial Centres		Intermediate Industrial Centres	
011 Helsinki	131	Jyväskylä	201	Porvoo	103	Savonlinna
	023	Turku	081	Kouvola	052	Riihimäki
	064	Tampere	071	Lahti	082	Kotka-Hamina
	171	Oulu	043	Pori	013	Tammisaari
			211	Mariehamn	154	Jakobstadsregionen
			101	Mikkeli	022	Salo
			182	Kajaani	093	Imatra
			122	Joensuu	135	Äänekoski
			051	Hämeenlinna	134	Jämsä
			191	Rovaniemi	063	Etelä-Pirkanmaa
			162	Kokkola	041	Rauma
			142	Pohjoiset seinänaapurit	012	Lohja
			152	Vaasa	114	Varkaus
			091	Lappeenranta	174	Raahe
			112	Kuopio	192	Kemi-Tornio

Countryside			
094	Kärkikunnat	068	Lounais-Pirkanmaa
146	Järviseutu	053	Forssa
153	Sydösterbottens kustregion	024	Vakka-Suomi
124	Keski-Karjala	066	Koillis-Pirkanmaa
111	Ylä-Savo	177	Ylivieska
115	Sisä-Savo	197	Pohjois-Lappi
176	Nivala-Haapajärvi	196	Tunturi-Lappi
141	Suupohja	194	Koillis-Lappi
144	Kuusiokunnat	181	Kehys-Kainuu
172	Lakeus	178	Koillismaa
044	Pohjois-Satakunta	193	Torniolaakso
143	Eteläiset seinänaapurit	123	Ilomantsi
025	Loimaa	175	Siikalatva
121	Outokumpu	173	Ii
062	Kaakkois-Pirkanmaa	212	Föglö
067	Pohjois-Pirkanmaa	125	Pielisen Karjala
065	Itä-Pirkanmaa	137	Viitasaari
021	Åboland-Turunmaa	161	Kaustinen
042	Kaakkois-Satakunta	102	Juva
145	Härmänmaa	136	Saarijärvi
202	Loviisa	113	Koillis-Savo
105	Pieksämäki	104	Joroinen
151	Kyrönmaa	132	Kaakkoinen Keski-Suomi
061	Luoteis-Pirkanmaa	133	Keuruu
072	Itä-Häme	092	Länsi-Saimaa

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