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SECESSIONS  
OF MUNICIPAL  
HEALTH CENTRE  
FEDERATIONS:  
EXPENDITURE AND  
PRODUCTIVITY  
EFFECTS

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**Abstract:** We examine the expenditure and efficiency effects of secessions of health centre federations between 1990 and 2003. Using both regression and matching techniques we find statistically significant effects. According to results, the per capita primary health care expenditure growth is approximately five percent higher in seceded health centres compared to all non-seceded health centres. Using nearest neighbour matching, we find that the average secession effect is eight percent on per capita primary health care expenditures. We find no effect on specialised health care expenditures. Using an indicator of health centre service volume, we find that secessions had no positive effects on the productivity development in the long term. The rapid expenditure growth of seceded health centres can thus be explained both by increasing service volume and decreasing productivity.

**Key words:** Health care expenditures, health centre secessions, economies of scale

**Tiivistelmä:** Tutkimuksessa arvioidaan terveyskeskuskuntayhtymien purkautumisten vaikutuksia perusterveydenhoidon menoihin, palveluvolyymiin ja tuottavuuteen vuosina 1990–2003. Tutkimusmenetelmänä on regressioanalyysi sekä ns. kaltaistettujen parien lähimmän naapurin menetelmä. Regressiotulosten mukaan terveyskeskuskuntayhtymän purkaneiden kuntien perusterveydenhuollon asukas-kohtaiset menot kasvoivat noin viisi prosenttia nopeammin kuin yhteistyötä jatkaneissa kuntayhtymissä. Ns. lähimmän naapurin menetelmällä laskettuna kuntayhtymän hajoamisen vaikutukseksi saatiin kahdeksan prosenttia. Terveyskeskuskuntayhtymän hajoamisella ei havaittu olevan vaikutusta erikoissairaanhoidon menojen kasvuun. Välittömästi terveyskeskuskuntayhtymien hajoamisen jälkeen tuottavuuskehitys oli parempi kuntayhtymästä irtautuneilla terveyskeskuksilla kuin kuntayhtymänä jatkaneilla terveyskeskuksilla, mutta myöhemmin tuottavuus laski niissä selvästi.

**Asiasanat:** Perusterveydenhuollon menot, kuntayhtymien hajoaminen, mittakaavaedut



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# 1. Introduction

According to a widely held view among Finnish policymakers, there is an urgent need to reform municipal structures. The aim in the planned reforms is to meet the challenges posed by demographic and economic trends on the production and provision of social and health services. For this purpose the government has launched a project where one of the main objectives is to enlarge the population base of the municipal services. As the median population of municipalities in Finland is below 5000 inhabitants, a key ingredient in the restructuring service provision is the amalgamation of small municipalities into larger local government authorities. In the case that amalgamation is rejected, the population base can be enlarged by co-operation of municipalities. They can, for example, form joint authorities which are responsible for producing particular services for the inhabitants of many neighbouring municipalities. In Finland, the small municipalities have traditionally cooperated especially in health care services. In the specialised hospital care they are obliged to cooperate by law.

The belief that “bigger” is better in local government service provision rests on the assumption of significant economies of scale and scope associated with the greater population size (Byrnes and Dollery 2002). But judging by the secessions of many health centre federations, which had earlier been formed to provide primary health care to inhabitants of many neighbouring municipalities, not all Finnish municipal decision makers seem to share the view that economies of scale prevail in primary health service production. Since the grant reform of 1993 which significantly reduced the regulatory powers of central national authorities with regard to how service provision at the local level should be organised, there has been a clear tendency for dissolving former health centre federations. Between 1993 and 2003 there occurred at total 37 such dissolutions.

In this study our purpose is to compare the development of costs, service volume and productive efficiency in primary health care in municipalities which have dissolved a health centre federation with the respective development in those municipalities which have continued the joint production of primary health services through health centre federations. We conduct our analyses using the traditional regression methods and the method of propensity score matching developed by Rosenbaum and Rubin (1983).

## **2. Previous studies on the effects of health centre reorganizations**

Health centres in Finland provide the bulk of primary health services in Finland. Their service mix is not, however limited to primary health services. Most of the health centres provide also inpatient care and dental care. Health centres are administrative units responsible for service provision within a specified area which either covers one municipality or a number of neighbouring municipalities. In the beginning of 2006 Finland had 247 health centres of which 68 were health centre federations.

Many studies have analysed efficiency of Finnish health centre production and found that efficiency variation among health centres is large (Luoma and Järviö 1992, 2000 Luoma et al. 1996, Rätty et al. 2005). According to a recent study, a substantial part of large efficiency differences among health centres are due to geographic and demographic differences between municipalities (Aaltonen 2006). A study investigating determinants of efficiency variation in early 1990s found that health centre federations were on average three percentage points less efficient than the health centres that were provided by a single municipality (Luoma et al. 1996). The tendency to dissolve health centre federations has been positively associated with health centre inefficiency (Luoma et al. 2004). Hence, there is some evidence that the secessions of health centres have been a selective process.

A common finding among studies which have investigated potential economies of scale in the provision of health services by health centres has been that expenditures are higher among the small and large health centres than among the medium-sized health centres when the amount of services, demographic and geographic factors, which affect costs, are controlled. According to Aaltonen (2006), the optimal population base of the health centre is around 25 000 inhabitants. The median population base of the health centres was less than 10000 inhabitants in 2004.

There are several reasons why one should expect that the smallest health centres tend to have lower efficiency than larger health centres. Small health centres may have difficulties in securing the optimal allocative mix in their use of inputs. They can have difficulties in replacing health employees, especially physicians, at the times there is a strong labour demand. Inpatient wards of small health centres may not be able to utilise economies of scale in their operation.

There are only a few case studies which have investigated secessions of health centre federations. On the basis of these studies (see e.g. Uusimäki, Pahkala and Perälä 1992) an important reason for the break-ups of health centre federations has been the conviction held by many member municipalities that they can



arrange primary health services for their inhabitants more cost-efficiently by producing these services themselves. In many case disputes about how to allocate health facilities among member municipalities has been another driving force for dissolution of health centre federations (see e.g. Ohtonen 1989).

### 3. Estimation strategy

We start the analysis by estimating simple regressions that explain the per capita health centre expenditures with various socio-demographic and economic variables and an indicator on whether secession has occurred. The regression approach is valid if all other variables that affect expenditures are controlled for, and if the functional form of the model is known. However, if these assumptions do not hold, the estimates of the secession effects may be severely biased.

In order to avoid the problems mentioned above, we use standard procedures described in the matching literature (e.g. Lechner 2002, Dehejia and Wahba 2002, Heckman et. al. 1997). The parameter of interest is the change in per capita spending in the seceded health centres due to the secession. Hence, applying the terminology of the matching literature, we attempt to estimate the expected treatment effect on the treated population.

In this paper we use nearest neighbour matching so that we first estimate a simple logit-model explaining the health centre secessions with a set of variables. We then select the comparison group from the non-seceded health centres that provide the closest match to the seceded health centres. We evaluate the effect of secessions by comparing the expenditure growth in the treatment and control groups.

There are some complications to the analysis as the secessions are by no means homogeneous events. For example, sometimes only one municipality departs from the joint authority (federation) and the rest of the members continue the cooperation. In other cases, the secession can mean that the joint authority ceases to operate (“the real secessions”). In this study, we concentrate on evaluating the effects of the “real secessions”. In addition, after the secession there is no longer information on the expenditures in the previous joint authority, but all estimates on the expenditure growth must be based on the joint outcomes of the separate municipalities. We solve this problem by re-defining the units of observation as municipality groups according to the previous joint authority instead of individual municipalities after the secession. The comparison group is then selected from the non-seceded health centre federations. After the comparison group is selected, we compare the mean expenditures of these groups over the period analysed. In practice, we calculate the average per capita spending in the treatment and control group using population weights within each treatment-control pair.

A further problem is that health centre secession does not necessarily lead into immediate effects on costs but expenditure effects can occur with a considerable lag. Therefore, we follow the health centres several years before and after the split-up. To create data where the effects of occurring in the different years can

be meaningfully compared we collect observations for the years from  $t - 5$  to  $t + 10$ , where  $t = 0$  denotes the year of the secession. The resulting data, therefore, follows different health centres for the different calendar years but the data is balanced in the sense that the distribution of calendar years in the treatment and the control group is exactly the same.

Lastly, it is possible that much of the expenditure differences between health centres can be explained by the service mix and the amount of services produced by the health centres (Aaltonen 2006). Therefore, in addition to expenditures, we also measure how the service volume and productivity (volume of services per expenditures -ratio) of the health centres has developed before and after the secession.

## 4. Data

The observation unit in this study is a public health centre that is organised either by a federation of municipalities or by a single municipality that has seceded from a federation. Most secessions in the 1990s took place during 1993–1995 (see Figure 1).

The data we use is derived from several routinely kept registers and statistics. The expenditure data on primary health care is obtained from the financial statistics of health centres maintained by Local and Regional Government Finland and ALTIKA -register maintained by Statistics Finland. Various socio-demographic and economic variables are also obtained from the ALTIKA -register.

Primary health care costs include personnel costs, material costs, costs of purchased services, rents and other costs. The bookkeeping system of the municipalities was changed in 1997 and therefore primary health care costs before and after 1997 are not perfectly comparable. The change should not, however, have a significant impact on the results presented in this paper. The expenditure on specialized health care is obtained from SOTKA -register maintained by STAKES. All the expenditures are deflated to 2003 price level using the price index for public municipal health care.

As we can see from Figures 2 and 3 health care costs decreased rapidly in the early 1990's because of the economic recession. Grant reform and associated regulatory reforms were introduced in 1993 and this might have affected the health care costs too.

Primary health care costs increased modestly between the years 1993–1999 but thereafter the expenditure growth has been quite rapid. This is the case for both the seceded health centre federations and the federations which continued their operation (Figure 2). It is interesting to note that at the beginning of the 1990's the expenditures were almost at the same level in the two observation groups. Since that, however, there has been a widening gap between expenditure developments of these two groups. As a result, in 2003 the per capita primary health care costs were 14 percent higher in municipalities that had seceded from a federation than in non-seceded health centre federations. All this gives a preliminary indication that secessions may have contributed to the growth of primary health care costs. In the case of specialized health care, we cannot observe a similar difference between the two groups (Figure 3).

Figure 1 *Number of health centre federation secessions by year*

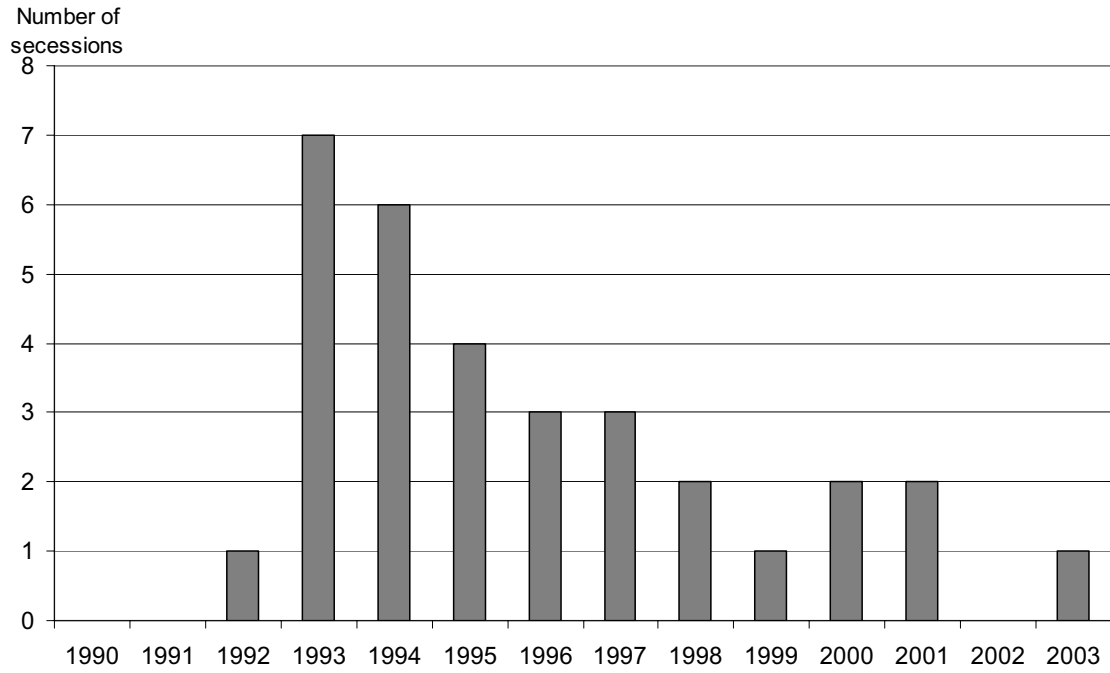


Figure 2 *Primary health care expenditure per capita*

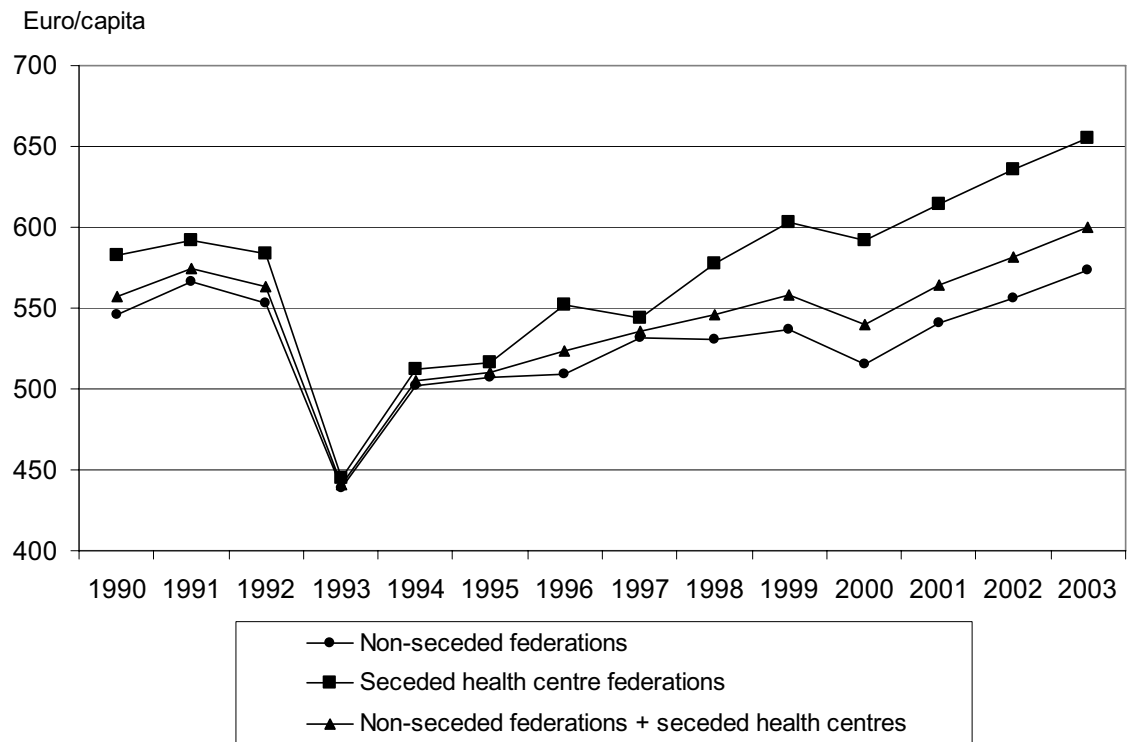
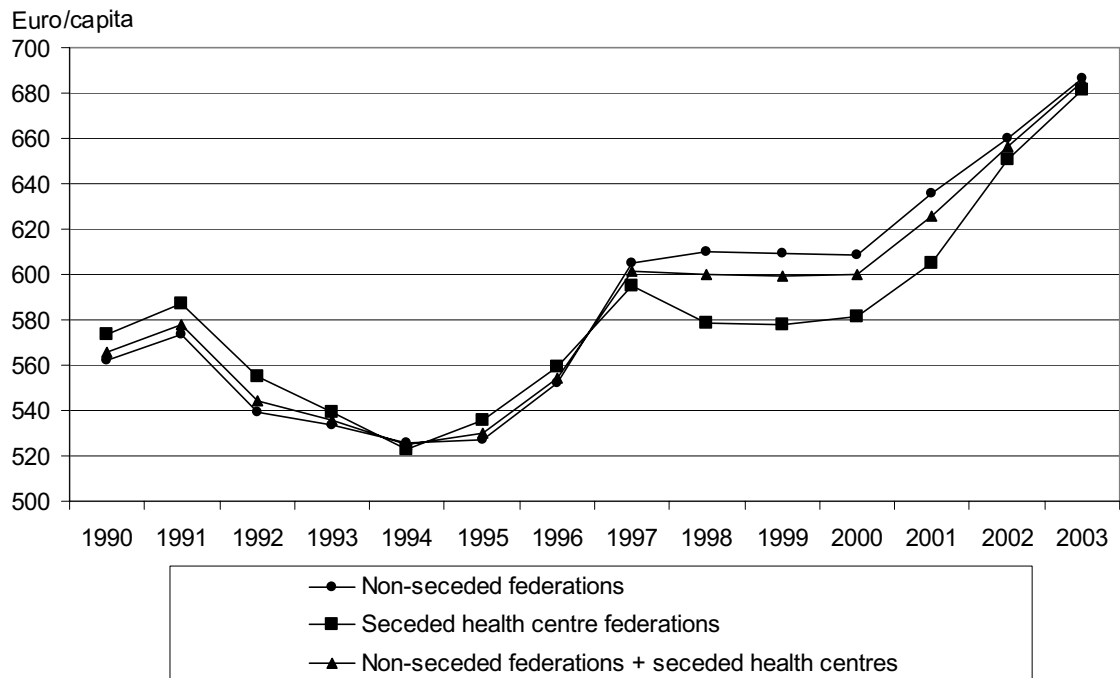
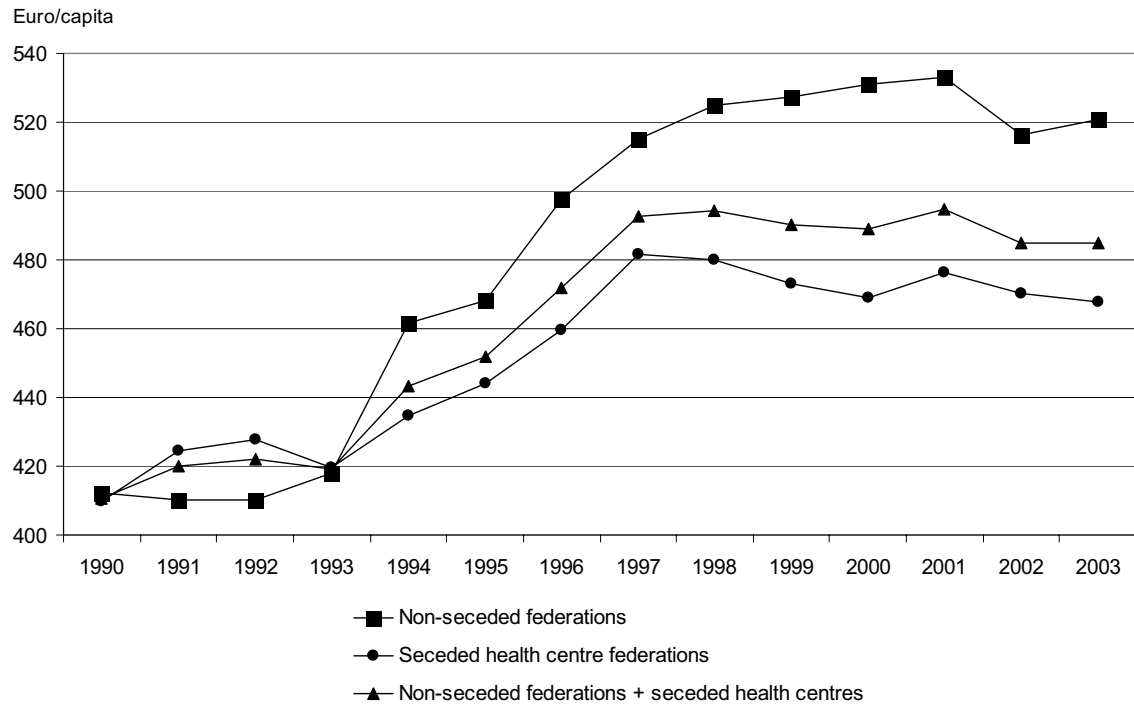


Figure 3 *Specialized health care expenditure per capita*



We measure the health centre output volume using four indicators for outpatient care (visits to physician, visits to other health care personnel, dental care visits and home nursing visits) and two indicators for inpatient care (short term acute care and long term chronic care). The data for years 1990–2001 is derived from financial statistics of health centres and report information register (KETI). The data for years 2002 and 2003 are derived from National Research and Development Centre for Welfare and Health (STAKES) statistics. Short term inpatient care is measured by the number of admissions into inpatient wards. Long term care is measured by the number of bed days. This data is derived from the Care Registers for Social Welfare and Health Care (HILMO). In order to have a single indicator for service output volume, we aggregate the outputs using the information of unit costs of each service as weights. Service volume differs between seceded and non-seceded health centres so that the output seems to have grown faster in seceded health centres (Figure 4). This is an indication that the rapid expenditure growth may be at least partially explained by service volume change. We will return to this topic in the discussion of the results.

Figure 4 *Service volume in seceded and other health centres*



## **5. The results**

### **5.1 Regression analysis**

We start the analysis by explaining the per capita expenditures of primary health services with an indicator variable for health centre secession and other variables that we considered relevant. In the estimated models, we control for population base, tax base, private health service provision, age structure, population density, and sickness (disability prevalence) in the health centre area. The aim in the first model is to define the expenditure difference between the seceded and non-seceded health centres using panel data for the period 1990–2003. According to the results, the average level of expenditure on primary health care are two to three percentages higher in those municipalities which have seceded from health centre federations compared to those municipalities which have continued to provide service provision through a federation (Table 1). The result is statistically significant in all model variations. The difference in expenditure levels between these two groups could already be seen in Figure 2. It must be noted, though, that this result does not yet indicate anything about the effects of the secessions of health centre federations. It just reflects the difference in level of per capita expenditures in the seceded health centres compared to all other health centres.



*Table 1 Determinants of logged primary health care expenditure per capita*

	(1)	(2)	(3)
Secession dummy	0.028 (2.89)**	0.029 (3.00)**	0.022 (2.16)*
Ln population	0.267 (1.51)	0.041 (4.12)**	0.122 (13.39)**
Ln population squared	-0.016 (1.74)		
Ln taxable income	0.071 (2.30)*	0.063 (2.06)*	0.064 (1.95)
Ln private physician visits	-0.089 (6.04)**	-0.091 (6.18)**	-0.191 (13.67)**
The share of 65+	1.666 (12.94)**	1.657 (12.87)**	1.310 (9.67)**
Disability prevalence	0.002 (5.81)**	0.002 (5.93)**	0.003 (10.25)**
Ln population density	-0.120 (14.55)**	-0.115 (14.74)**	
Constant	4.316 (4.59)**	5.877 (20.63)**	6.207 (20.41)**
Observations	1483	1483	1483
R-squared	0.62	0.62	0.57

Absolute value of t-statistics in parentheses

\* Significant at 5% level; \*\* significant at 1% level

As the next step in the analysis, we estimate the difference-in-difference model. According to the results, the growth of per capita basic health care expenditures in seceded health centres is between four and five percent higher than in non-seceded health centre federations (Table 2).

*Table 2 Difference-in-difference estimates on determinants of primary health care expenditure*

	(1)	(2)	(3)
Secession dummy	0.038 (2.56)*	0.040 (2.80)**	0.054 (3.75)**
D.ln population	-30.401 (2.89)**	-30.905 (2.96)**	
D.ln population squared	1.484 (2.67)**	1.519 (2.75)**	
D.ln taxable income per capita	0.046 (0.34)		
D.ln private physician visits	0.056 (0.76)		
The share of 65+	-2.230 (0.74)		
D.disability prevalence	-0.000 (0.42)		
D.ln population density	0.000 (.)		
Constant	-0.024 (1.63)	-0.030 (2.52)*	-0.024 (2.08)*
Observations	401	401	401
R-squared	0.09	0.09	0.03

Absolute value of t-statistics in parentheses

\* Significant at 5% level; \*\* significant at 1% level

Finally, we test the time structure of the secession effect. We add time dummies in the model so that there is a separate dummy for the year of secession ( $t=0$ ), a second dummy for the following period ( $t=1$ ) and so on, up to six years after the secession. According to the results, the strongest effect of the secession on expenditure growth is one year after the secession. In the years to follow, the estimated effect is smaller and not statistically significant (Table 3).

*Table 3 Testing the time structure of the secession effect*

	(1)
D.ln population	-0.670 (0.24)
D.ln population squared	-0.01 (0.09)
D.ln taxable income per capita	-0.03 (0.36)
D.ln private physician visits	0.01 (0.37)
The share of 65+	2.50 (2.31)
D.disability prevalence	-0.00 (1.07)
D.ln population density	0.000 (.)
Fist year	0.035 (1.41)
Second year	0.053 (2.07)*
Third year	0.034 (1.35)
Fourth year	0.003 (0.11)
Fifth year	0.043 (1.62)
Sixth year	0.025 (0.90)
Constant	-0.007 (1.35)
Observations	1376
R-squared	0.05

Absolute value of t-statistics in parentheses

\* Significant at 5% level; \*\* significant at 1% level

## 5.2 Matching analysis

It is possible that the seceded health centres differ systematically from the rest of the federations because there is some specific characteristic or situation that drives them to secede. If we have not been able to control for these characteristics in the regression analysis, it may not be correct to compare the seceded units to all the other units, as we have done in the preceding section. An alternative way to approach the problem could then be to try to find units that

would be as similar as possible to the seceded health centres but who have not seceded. In this section, we shall estimate matching models to test the secession effect. We acknowledge the fact that matching analysis may not solve all our estimation problems. Nevertheless, it gives an interesting alternative to the regression approach for testing the secession effect.

Just like in the regression analysis reported in the previous section, in the matching analysis our interest is in the average expenditure effect of the secessions. Each seceded unit is matched to a control unit that has not seceded. Given the matched pairs, the secession effect is then calculated as the difference in the average expenditure development between the treatment group (seceded health centres) and the comparison group.

The results of the logit-estimations that are used to predict the propensity to secede are presented in Table 4. The values of all explanatory variables are from the year 1990<sup>1</sup>. All variables are in natural logarithm form except the population share of those aged 65 years or more. For each of the seceded health centre federations, a control unit from non-seceded health centre federations is selected on the basis of the results of the logit-estimations presented in Table 4.

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<sup>1</sup> We need to perform the matching prior to the time period used in the comparison. Hence, we use the first year available in our data (1990).

Table 4 Estimation results of the propensity score (dependent variable: secession dummy)

	(1)
Phe per capita <sup>§</sup>	0.66064 (0.3)
Population	-0.9196 (-1.45)
Shce per capita <sup>§§</sup>	2.069 (1.32)
Private phys. visits	-1.4738 (-1.67)
The share of 65+	-30.219 (-3.22)**
Disability prevalence	0.0271 (2.11)*
Population density	0.7031 (1.42)
Constant	-10.343 (-0.47)
Observations	106
Pseudo-R <sup>2</sup>	0.1591

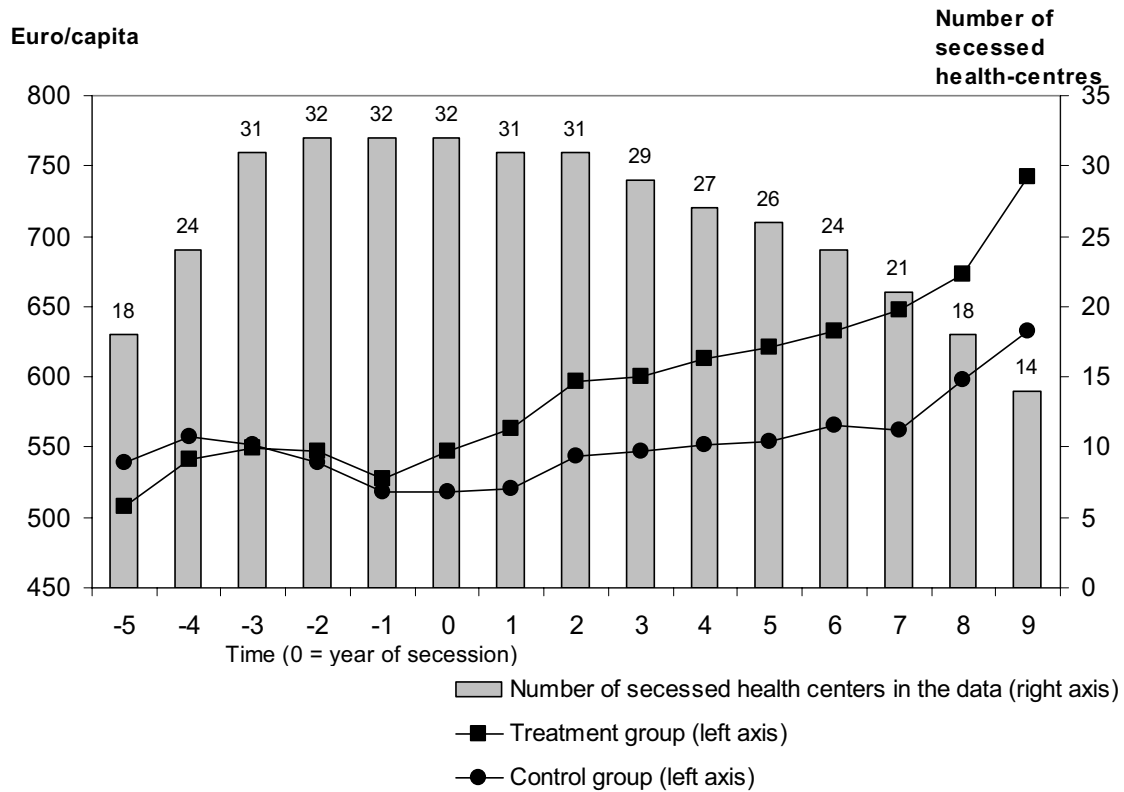
<sup>§</sup>phe = primary health care expenditure, <sup>§§</sup>shce = expenditure on specialized hospital care

Figure 5 shows expenditure development for seceded health centres (treatment group) and non-seceded control health centres (control group). It reveals considerable difference in primary health care expenditure development between the secession group and the comparison group. Per capita expenditure in the two groups is fairly close to each other prior to the secession (from year -5 to year 0). This is a good sign, because if we have managed to make a reasonable matching, the expenditures of the two groups should be fairly similar before the secession. Further, looking at Figure 5, we can see that the per capita primary health care expenditure begin to differ rather dramatically after the secession. Three years after the secession, expenditure is 50 euros per capita higher in seceded health centres and nine years after it is over 100 euros above the average expenditure in the comparison group. These are large figures in percentages as well. For instance, seven years after the secession expenditure is 15 percent higher in the secession group than in the comparison group. All this suggests that secession has not been financially beneficial for the seceded health centres. We must note, however, that this result does not necessarily indicate anything about changes in the availability or the quality of the services.

According to the matching analysis results, the seceded health centres have about six percent higher expenditure level per capita than the comparison group. The

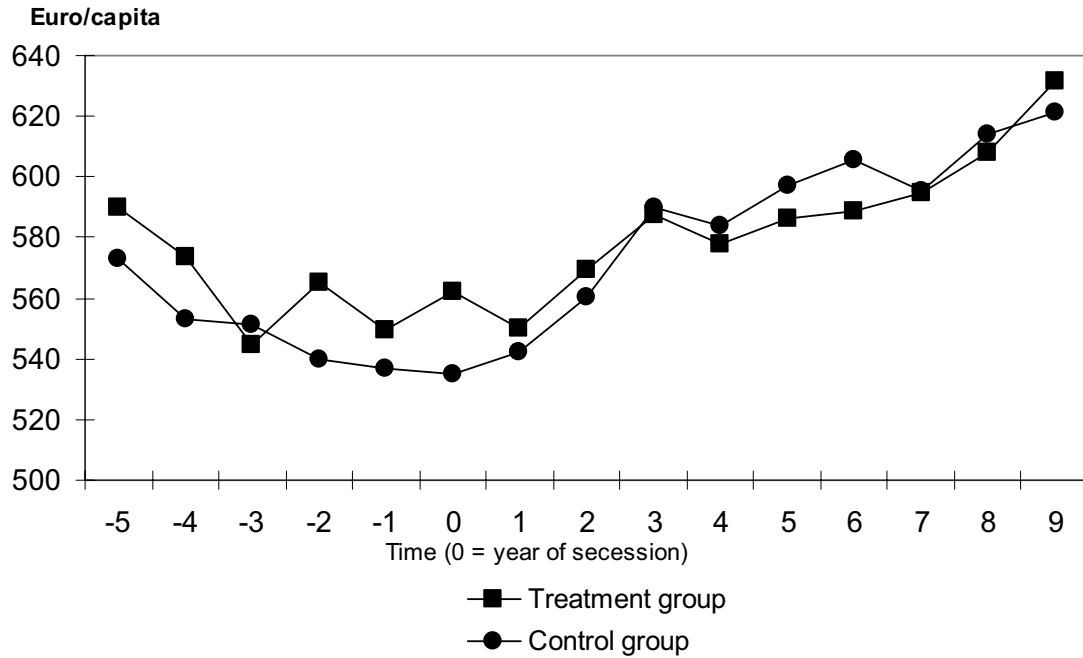
average effect of secession is estimated to be about eight percent on the expenditures (see appendix, Table 5). These effects are somewhat stronger than those estimated with OLS.

*Figure 5 The secession group vs. the control group before and after the secession: per capita expenditure on basic health care*



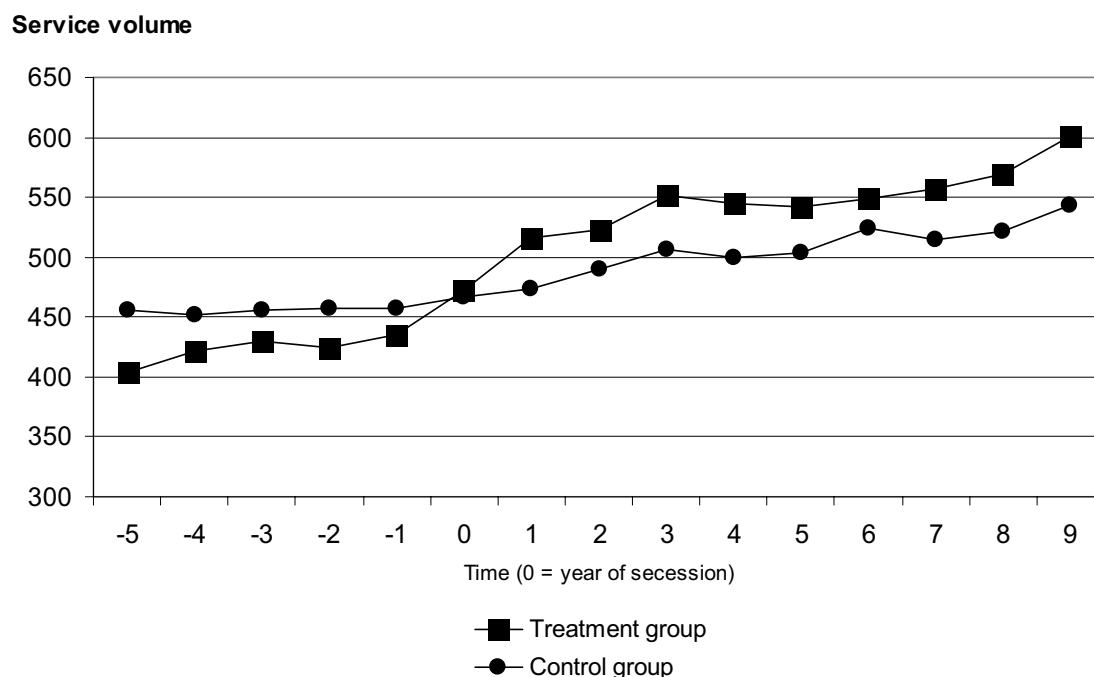
Since the secessions might have changed the balance of care between primary and specialized health care, we also made a comparison of the expenditure development in specialized hospital care between the secession group and the control group. As can be seen from Figure 6, the differences in the expenditure development between these two groups are quite small. Seven years after the secession expenditures are almost exactly the same in both groups.

Figure 6 *The secession group vs. control group before and after the secession: per capita expenditure on specialized hospital care*



Next we turn to analyse whether this difference in expenditures can be explained by the increasing volume of services or whether it is caused by the unit cost differences in the service production. Figure 7 shows that the service volume (measured by key outputs of health centres weighted by their unit costs) has grown significantly faster in seceded health centres than in non-seceded health centres. In seven years following the secession, the service volume of seceded health centres grew by 18 percent whereas it grew only by 10 percent in health centres which formed the control group.

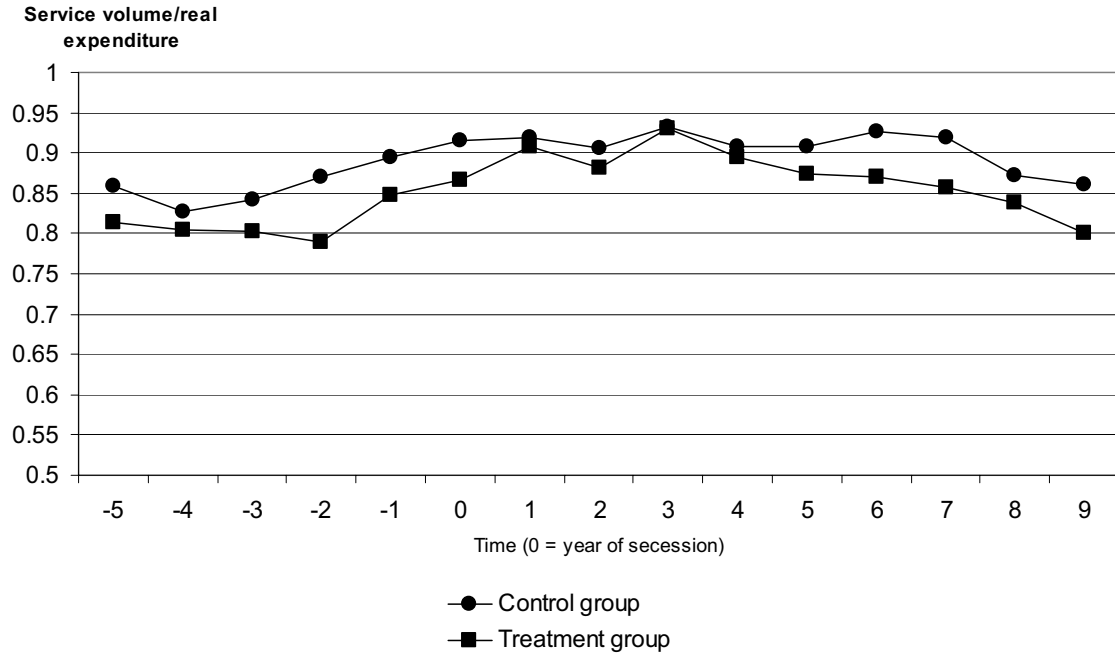
Figure 7 The secession group vs. the control group before and after the secession: per capita volume of services



Dividing service volume measure by real expenditure of health centres gives us a crude measure of health centre productivity. Figure 8 shows that before secession, the productivity level was lower in seceded health centres than in control group, but after secession the productivity differences between these two groups almost vanished. In any case, after four years of the secessions the productivity differences started to increase again, and productivity differences were almost at the same level after five years of secessions as they were before the secessions. It seems, then, that secessions had no positive effects on the productivity development of the health centres in the long term. The rapid expenditure growth of seceded health centres can thus be explained both by increasing service volume and decreasing productivity.



Figure 8 *The secession group vs. the control group before and after the secession: volume of services divided by real health centre expenditure*



## 6. Discussion

In this paper we have examined health expenditure development of those municipalities that have dissolved the health centre federation. In practice, we compare the expenditure development in the seceded health centres to those health centre federations that have continued their operation.

According to our results, which are based both on regression and nearest neighbour matching methods, primary health expenditure has grown significantly faster in the seceded health centres than in the non-seceded health centres. If municipalities have attempted to achieve cost savings by splitting up former health centre federations and establishing their own health centre, our results indicate that they have failed to do so. If, instead of cost savings, the municipalities sought for increased service volume, our results show that they have been successful.

However, the productivity of seceded health centres shows an interesting pattern. Compared to non-seceded health centres, the seceded health centres show a more positive productivity development just prior to the secession and few years after that. But thereafter, the productivity of seceded health centres seems to fall quite rapidly. In other words, it seems that cost control has not been as successful as the increase in service volume.

As a final remark we note that most of the new one-municipality health centres formed by secession are quite small. Therefore, our results in this paper are consistent with previous results indicating that there are significant diseconomies of scale among the smallest health centres (Luoma and Moisio 2005). The rapid rise in primary health care expenditure among the small municipalities that have seceded from former health centre federations then raises the question how they can financially cope with the rising need of health services in the future. This is especially tricky question for those municipalities whose tax revenues and state grants increase only modestly.

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## Appendix

*Table 5 The estimated average treatment effects using nearest neighbour matching*

	n. treat.	n. contr.	ATT	Std. Err.	t
The average overall difference	448	280	0.055	0.016	3.385
The average effect of secession	259	175	0.08	0.017	4.824



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