Private or public?

Explaining labour supply and practice choice among Norwegian physicians[1]

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Abstract

Research on Norwegian physicians' labour supply and practice choice is sparse. With regard to practice choice as research subject the scarcity is by and large the result of the nearly absence of a private specialist health care market in Norway. The latest years health care reforms have however fuelled the comprehensive increase in privately produced health care services. In this article labour supply and practice choice is explained by pecuniary and non-pecuniary job characteristics as well as a set of personal attributes. The results suggest that medical specialists' labour supply is associated with all three aspects. As for the pecuniary dimension, the income effect is dominating. For the non-pecuniary dimension valuation of leisure time, flexibility, professional challenges and surroundings, sense of security and ability to participate at conventions are of importance, whilst age, gender (and for female specialists whether she has children), interest in research and education, field of specialty and private sector job commitments are of significance among the personal attributes. Practice choice is best described by interest in research and education (in interaction with age), political affiliation and field of specialty (individual attributes), wage rate and other household income (pecuniary factors) and preferences for leisure, flexibility, professional surroundings, sense of security and ability to structure the work day self (non-pecuniary dimension). Furthermore the private work share varies significantly at the municipal level, and random intercept and random slope models performed better than the initial single level models. The implication of this study for future research is that both pecuniary and non-pecuniary determinants should be considered when analysing labour supply and practice choice among medical specialists. Tests for higher level variation should be performed.

Keywords: Labour supply, practice choice, private hospital, private practice, Norway.

1. Introduction

Privately employed doctors are frequently accused of being in the game only for the money. Although the labour supply literature has showed that private specialists commonly work more hours than their colleges in public hospitals, and have higher earnings (e.g. Sæter, 2005; Gruen et al, 2002; Sørensen & Grytten, 2003; Sloan, 1974-75), recent research contributions have stressed the importance of also non-pecuniary job characteristics when explaining total labour supply and practice choice (e.g. Scott, 1999, 2001; Ubach et al, 2003). In this paper Norwegian specialists' labour supply and allocation of work hours between private and public health care institutions are addressed. The explanatory variables at the individual level are categorised into three main groups: personal characteristics, pecuniary aspects and non-pecuniary job characteristics. At the regional and municipal levels variables controlling for the capacity and demand in the physicians' surroundings are included.

Even though the increase in privately produced health care has been significant, and the interest for the private health care sector tremendous the last five years, research contributions to explain private specialists' role within the Norwegian health care system have been few and far between. Some important exceptions are however the empirical works of Jørgenvåg and Kjekshus (2004), Jørgenvåg et al (2000), Husum et al (2005) and Sæther (2005). Jørgenvåg & Kjekshus (2004) shed some light on the capacity and activity among private contract specialists within the eastern health region, whereas Husum et al (2005) map the supply situation and accessibility to private contract specialists within psychiatric and physiological specialities in the mid health region. Jørgenvåg et al's study from 2000 provide information about private specialists' practice profiles and compare the activity and costs in private practices and public outpatient clinics within two counties. Sæther (2005) has analysed labour supply and sector choice among Norwegian physicians in 1995 and 1997. The aim of his study was first and foremost to estimate the effects of increased wages, and the outcomes revealed a modest response in total labour supply and a reallocation of hours in favour of the sector with increased wages. Sæther's study is in many respects similar to the current study – labour supply and practice choice among Norwegian physicians are the main topics. The differences are however three-fold. First the

current study utilises a more updated empirical material and only data from one point of time is used, second the focus in this paper is exclusively on specialists working in the specialised health care (i.e. GPs are not included) and third the extended data analyses allows for multiple level variation.

Among Norwegian analysis of labour supply Baltagi et al's (2005) study should be mentioned. They analyse how income and savings measures, indicators of work time and experience, some personal variables and some hospital specific measures influence labour supply. Their main finding is that the wage elasticity of hospital physicians is positive.

Data on Norwegian private specialists' activity is both hard to get hold of and commonly burdened with low quality. This paper's analyses are therefore based on an extensive survey of 1,254 (both private and public working) Norwegian specialists' responses regarding work time, income, personal aspects and valuation of a set of job characteristics. The aim of the study is to address three clearly important, but so far highly neglected, research questions: (i) what explains the total labour supply of physicians? (ii) what explains allocation of work time between private and public practice? (iii) are variations in labour supply and practice choice to be found at the individual or contextual level?

Theoretically the study design is embedded in labour economics. I will thus pursue pecuniary explanations also in this paper, but do however expect the explanatory pattern to be somewhat more complex and supplement more explanatory variables (for instance information about valuation of non-pecuniary job aspects) at the individual level. In the multilevel analyses variables measuring demand for health services (elderly share and living conditions) are integrated. At the supply-side, variables like the general practitioner rate, number of public hospital beds per capita and the efficiency level at public hospitals are included in the model. The integration of higher levels in the analyses will consequently facilitate an identification of how the explanatory power is distributed between the analytical levels, and enable me to draw some conclusions as to whether individual or contextual factors are of most importance when predicting total labour supply and allocation of work time between sectors.

The paper proceeds as follows: The next section provides some background information about the Norwegian health care system, with special attention granted to the private segment of the system. Next Section 3 outlines the theoretical approach to the research question. Section 4 accounts for the methods applied, and Section 5 specifies the empirical model. Finally Section 6 presents and accounts for the results and Section 7 contains some concluding remarks.

2. Private specialists in Norway

The Norwegian health care system is best described as public - financing is public and in 2004 96.5 per cent of all hospital admissions were at public hospitals. Nevertheless there exist a private supply of specialised care, offered by *private hospitals* and *private contract specialists*.

The 1999 resolution to integrate day surgery in the Activity Based Financing (ABF) system, led to a peak in the activity at *private hospitals*, and from 1999 to 2004 the number of elective operations carried out in authorised private hospitals rose from 2,854 to 34,769 (equivalent to 1.2 and 12.2 per cent of the total number of elective surgical interventions in Norway). This increase should at least partially be ascribed to the massive escalation in the Ministry of Health's authorisations of private hospitals during the period. The number of private hospitals rose from modest 2 in 1990 to ten times more by 2003. Moreover in 2002, when the Hospital Reform was introduced, The Ministry of Health explicitly encouraged large-scale contracting between the Regional Health Enterprises (RHEs) and private institutions in order to cope with high occupancy rates and steadily increasing waiting lists and waiting times at the public hospitals. Short time limits to accommodate to national standards of 'acceptable' waiting time and occupation rates thus led to widespread contracting in all five health regions. The result was a significant increase in the publicly financed share of the private hospitals' activity, and a total rise in the number of admissions to private hospitals representing almost a threefold increase during the period from 2002 to 2004 (The Norwegian Patient Register, 2005).

Private contract specialists constitute the other main branch within the private health care sector in Norway. Private contract specialists have traditionally been an important link in the chain of tasks attended to by the specialised care. The arrangement with grants (differentiated from 20 to 100 per cent) from the counties to the specialists was established in 1984. The political expectation was that the local demand for services would influence the number of private practices established. Nevertheless, the first years of the 1990s revealed that private practices without contracts mushroomed (Midttun & Hagen, 2005). As a consequence of this a law introduced in 1992 stated that all practices established from this point on were to have a contract in order to be entitled to reimbursement from the National Insurance Scheme (NIS). However, since the pace in new establishments was relatively slow, the results failed to appear. In 1998 a new law therefore replaced the 1992 act, stating that private specialists, regardless of when they had established their practice, were to enter specific contracts with a county to be qualified for reimbursements from the NIS. Consequently the number of FTEs encompassed by contracts more than doubled, from a total of 347 in 1997 to 727 in 1998[2]. After 2002 the RHEs prolonged nearly all the contracts the counties had with private contract specialists, and continued to pay operating grants. The RHEs have however been reluctant in granting new authorisations, and downscaling of the number of contracts has even been discussed. The figure from 1998 has consequently remained relatively stable throughout the latest years. Aside from operating grants, private contract practices are financed by reimbursements from the NIS and patient fees. As of 2002 day surgical interventions performed by contract specialists are part of the ABF-system.

In addition to private full-time specialists working either at private hospitals or private practices, there is a longstanding tradition for specialists combining positions in private and public sector. In 2003 The Ministry of Health estimated that as much as 50 per cent of all Norwegian private specialists had part time employment at a public hospital (Ministry of Health, 2003). This high incidence of dual job holders is by and large the result of the political strategy of the health authorities: "20 per cent-contracts" to private practices have for instance frequently been offered as fringe

[2] Clinical psychologists and private specialists working in practices without contracts are not included in the figures.

benefits to specialists recruited to vacant positions at public hospitals (Jørgenvåg & Kjekshus, 2004).

As this brief summary indicates, the context Norwegian specialists are working in have changed dramatically during the last two decades. The health authorities' policies, the financing system, the extensive activity increase and not least the Hospital reform have granted more physicians with the opportunity to work more hours and part- or full time in private practice/private hospital.

3. Theoretical framework

In economics labour supply functions are specified in different ways (cf. Antonazzo et al, 2003). Here I am mainly interested in individual physicians' labour supply measured as total number of weekly work hours (H_i) and the share of the total work hours allocated to private clinics (P_i). I presuppose that the physicians freely can choose both the total number of weekly hours and the number of hours they use in private institutions. Following standard labour economics (cf. Blundell & MaCurdy, 1999), I presume that physicians at a time t take utility from consumption (C), leisure hours (L) and individual aspects (X):

$$U(C_t, L_t, X_t)$$

I further assume that the utility is maximized subject to a budget constraint stating that consumption equals income:

$$C_t = V_t + W_t(T-L)$$

where T is total time available, W is the wage rate, and V is non-labour income (e.g. income of spouse). Solving the maximising problem gives the total supply of work hours (H_i) as a function of the wage rate (W), non-labour income (V) and individual characteristics (X):

$$H_i = f(W, V, X)$$

Recent studies on physician's job preferences within the health sector (i.e. Scott, 1997, 1999, 2001; Ubach et al, 2005) also include a vector of job characteristics (Z) as an explanatory factor. Hence, the following equation will explain physicians' supply of work hours (H_i):

$$H_i = f(W, V, X, Z)$$

For simplicity I assume that the allocation of work hours in private clinics (P_i) is explained by similar variables:

$$P_i = f(W, V, X, Z)$$

The hypotheses are outlined in more detail in Section 5.

4. Methods

The sample studied in the analysis includes 1,254 specialists[3]. Initially all private specialists with (20-100 per cent) contracts and all specialists working 100 per cent of their time in a private hospital were pre-selected (total of 1,273 specialists). Next a control group of 1,261 specialists was selected randomly from The Norwegian Medical Association's member register. Among these there were 120 overlaps with the pre-selected list, leaving me with a total of 2,414 specialists. Since questionnaires were sent to all private contract specialists and specialists working 100 per cent in a private hospital, but only to 12.5 per cent of the specialists who are member of The Norwegian Medical Association, specialists working in public hospitals are underrepresented in the sample.[4] Cases with 90 per cent or more of the work time in public sector are therefore assigned a weight equal to 8 in the analyses. Data was collected through a postal questionnaire and the total response rate reached 52 per cent after having sent one reminder. Compared to similar studies analysing empirical material collected through postal questionnaires sent to physicians (e.g. Husum et al, 2005), the response rate of the current study is relatively high. Of the physicians who returned the questionnaire 510 had allocated all their work time to public hospitals,

[3] 24 of the specialists had however returned forms without giving work time information, and are thus not included in the analysis.
[4] Specialists in general practice are not included in these figures.

while 282 were working entirely at a private hospital or in a private practice. The remaining 462 had some combination of private and public jobs.

The questionnaire covered 22 questions providing background information about each respondent as well as work time information. Four of the questions concerned job preferences and preferences regarding income-leisure trade-offs. The latter questions had response categories based on five- or ten point Likert scales[5]. Of most interest for the research question was the respondents' reported total weekly work hours and the distribution of the work hours between public and private sector. The independent variables can be grouped into four thematic categories; wage rate (W), other income (V), individual characteristics (X) and non-pecuniary job characteristics (Z). W and V are commonly referred to as the pecuniary dimension. Non-pecuniary job characteristics incorporate indicators of willingness to trade off income against leisure and variables measuring the importance ascribed to flexibility, professional challenges, professional surroundings, feeling of security, opportunities to participate at conventions and ability to structure one own work day at the work place. Individual characteristics include gender, age, PhD, marital status, number of children the specialist is provider for, political affiliation and field of speciality[6]. The equations can be specified as follows:

$$\log H_i = \beta_0 + \beta_1 X + \beta_2 W + \beta_3 V + \beta_4 Z + \varepsilon$$

$$\log P_i = \beta_0 + \beta_1 X + \beta_2 W + \beta_3 V + \beta_4 Z + \varepsilon$$

Both equations facilitate ordinary least squares (OLS) regression analysis. Continuous variables (dependent and independent) are transformed by taking the logarithm of the variable.[7] Methodologically the research problem is also approached via multilevel analysis. MLwiN version 2.01 was used, and the method of estimation is iterative

[5] See the appendix for further information.
[6] In the labour supply models a dummy variable controlling for whether the specialist worked at least one per cent of the work hours in private sector is included.
[7] The variable measuring share of work time in private sector was distributed binomially, with many specialists working 0 or 100 per cent in private sector. The logarithmic transformation enabled use of linear regression analysis. Since the natural logarithm for 0 is not defined, these values were redefined to 0.0001.

generalised least squares (IGLS). IGLS was used in conjunction with a first-order marginal quasi-likelihood procedure. This method facilitates dynamic predictions about how processes at different levels – in this case individual, municipal and regional levels – interact with each other. The technique allows multilevel data structures to be analysed by estimating the effects of independent variables at various levels (e.g. Sønbø Kristiansen, 1996), at the same time as it allows modelling of variations in effects across groups. When dealing with research problems where explanatory variables most likely can be found at multiple analytical levels, disregarding the possibility of such a complex structure may have rather serious consequences (cf. Groenewegen, 1997; Leyland & Groenewegen, 2002; Rice & Leyland, 1996).

In this case multilevel modelling allows one to partition the variation into individual factors and higher level, contextual factors. Hence individual and higher level characteristics as well as their interactions can be assessed simultaneously (e.g. Rice & Leyland, 1996). The empirical models take the following form:

$$\log H_{ijk} = \beta_0 + \beta_1 X_{ijk} + \beta_2 W_{ijk} + \beta_3 V_{ijk} + \beta_4 Z_{ijk} + \beta_5 M_{jk} + \beta_6 R_k + v_k + u_{jk} + \varepsilon_{ijk}$$

$$\log P_{ijk} = \beta_0 + \beta_1 X_{ijk} + \beta_2 W_{ijk} + \beta_3 V_{ijk} + \beta_4 Z_{ijk} + \beta_5 M_{jk} + \beta_6 R_k + v_k + u_{jk} + \varepsilon_{ijk}$$

Where M is a vector for municipal specific characteristics, R is a vector for Health Region specific attributes, i refers to the physician, j to the municipal and k to the health region. v_k denotes the region residual, u_{jk} the municipal residual and e_{ijk} the individual residual.

5. Empirical model

Baltagi et al (2005) and Sæther's (2003) studies represent important contributions to the Norwegian labour supply literature. The research on private-public time allocation has on the other hand, with the exception of Sæther's study, been sparse. Øvretveit (2003) recognises that there by 2003 was a lack of Nordic studies on private sector involvement in health care. Two years later this observation can still be endorsed.

Questions regarding physicians' time allocation between public and private sector in Norway thus largely remain unanswered. I start out to analyse the following three mechanisms: 1) How can variations in the total labour supply among specialists be explained? 2) Which factors are relevant when explaining specialists' time allocation between private and public sector? 3) How does the variation differ between the three analytical levels in the model?

Inspired by labour economics specialists' total work hours and time allocation between private and public sector is understood as a function of pecuniary aspects (wage rate and non-labour income), non-pecuniary job characteristics and some individual attributes.

The dependent variables are operationalised as:

- The logarithm of the mean number of work hours per week in 2004
- the logarithm of the share of the work hours allocated in private practise/private hospital

Both variables are continuous and transformed by taking the natural logarithm of the work hours and per cent shares. In the weighted sample 70 per cent of the physicians work only in public hospitals, 11 per cent solely in private sector, while the remaining fifth has some private-public job combination. The number of weekly work hours range from 10 to 95 with a mean value of 48[8]. The private work share varied from 0 to 100 with a mean equal to 8 per cent.

-Table 1 here-

The model incorporates some aspects of a *personal character*. Important variables in this respect are gender, age, interest in research and education (PhD), marital status, whether the physician has children or not, political affiliation and field of specialty. These factors are included in the empirical model and defined as follows: Gender and age are defined in the conventional manner. Whereas age is included as a continuous variable, gender is treated as a dichotomy with female as the reference category. As

[8] Out-of-office work hours are not included.

can be read from table 1, the mean age in the sample is 50 years and the proportion of men relative to women is as high as 71 per cent[9]. In line with for instance Sæther (2003), Libby & Thurston (2001), Sloan (1974-75) and Scott (1999) I expect women to appreciate leisure time more than men. This is assumed to be further amplified by having children (cf. Sloan, 1974-75; Rizzo & Blumenthal, 1994). Possible interactions between gender and children are thus controlled for through the inclusion of an interaction variable in models 1-4[10]. Moreover I expect female physicians to be less disposed for working in private practice/private hospital. This presumption is in line with Grytten et al's (2000) conclusion that female GPs prefer salaried contracts to fee-for-service-contracts[11]. Age is supposed to implement positively on the work time variable. As the physician grows older the weekly work hours are expected to increase. However, when the specialist approaches the retirement age of 67 the work load is expected to be scaled down somewhat. To control for this discontinuity a quadratic term for age is included in the analysis. The findings of Grytten et al (2000) and Sørensen and Grytten (2003) suggest that young physicians are more inclined to choose salaried contracts than fee-for-service payment. Age is therefore expected to influence the private share variable positively. Involvement in research and education is captured through a dummy variable measuring whether the specialist holds a PhD or is enrolled in a PhD program. In the sample 68 per cent of the respondents held a PhD or were currently working to complete a PhD education. A study by Rizzo and Blumenthal (1994) showed that physicians who teach work fewer hours. PhD work is closely associated with both teaching at universities and of course participation in academic activity. Clearly this might enhance the likelihood for working in a teaching position at a public hospital, and as a consequence of this being disrupted from following a normal hospital work schedule. I therefore expect doctors holding a PhD or participating in PhD education to work fewer hours than other physicians. Since research and education almost exclusively are the responsibilities of public hospitals, specialists holding a PhD/participating in a PhD program are furthermore expected to allocate more of their work time at public hospitals, i.e. the share of private sector

[9] These distributions are identical to the distribution in the total population of specialists (The Norwegian Medical Association, 2005).
[10] The interaction term did not return any significant effects for the models analysing private share of work hours, and is consequently not included in any of the model specification.
[11] Private contract specialists have an element of fee-for-service reimbursement in their income. This is also often, but not always, the case for specialists working in private hospitals.

work hours is assumed to be low. To test for possible interactions between age and PhD models with an interaction term included were tested. On the question of marital status the respondents had the choice between the categories "unmarried/single", "married/cohabitant", "divorced/separated" and "widow/widower". Since the category "married/cohabitant" covered as much as 85 per cent of the sample, this group was compared to the remaining categories combined in the analysis. Several studies have assessed the effect of marital status on time spent at work. Scott (2001) found that married or cohabiting GPs preferred to work more hours than others. Baltagi et al (2005) and Rizzo and Blumenthal (1994) did on the other hand fail to detect any corresponding effects. Although I lack any straightforward expectation as to how the marital status variable relates to the three dependent variables, I integrate it in the model as a control. Next the children dummy variable (1=having children, 0=not having children) indicates whether the respondent is provider for children below the age of 19, and the descriptive statistics reveal that 57 per cent of the physicians in the sample have children. Former studies have reported an unequivocal negative effect of this variable on labour supply (e.g. Sæther, 2003; Baltagi et al, 2005) and as afore-mentioned the magnitude of the effect has been especially strong for female physicians. The parameter estimate for the children dummy variable is thus assumed to have a negative sign. Since the private sector job often is an extra job on top of regular hours, having children is assumed to decrease the share of working hours in private practice/private hospital. The political affiliation variable is measured according to how the person responded to the question "How would you place yourself along a left-right axis in Norwegian politics?". The respondents could choose between numbers from 0 (farthest off to the left) to 10 (farthest off to the right). The data shows that the respondents on average placed themselves around the middle value, but slightly skewed towards the right hand side of the scale with a median value equal to 5.2. Whereas the effect of this variable on labour supply is uncertain, the assumption is that the higher the value on the political dimension, the higher the likelihood that a substantial part of the work hours are allocated to private practice/private hospital. This expectation is naturally embedded in research on political affiliation and attitudes towards privatisation (e.g. Christensen & Lægreid, 2003). Speciality is represented by a separate variable indicating which medical branch the respondent represents. Since internal medicine is the modal category, this is selected as a reference group. All specialties with less than 50 cases were collected

in a category named "other specialties".[12] Here I simply wish to control for possible variations in labour supply and practice choice between the specialties. It could for instance be that the workload in some specialities is higher than within others and that some specialities are more fit for the private sector. Finally a variable measuring whether the specialist work in private practice/hospital is integrated in the labour supply model. As should be clear by now, I expect specialists who work at least one per cent of their work hours in private practice/private hospital to also have a higher total number of work hours per week (cf. Sørensen & Grytten, 2003).

The *pecuniary* dimension is represented by variables measuring the wage rate and whether the household has other income or not. The doctors were asked to report their yearly gross income in 2004 in accordance with 11 categories with a 31,000 US dollars range each. The top category was "more than 310,000 US dollars". When estimating the wage rate the mean income value in each category was used, and for the top category 327,000 US dollars was set as mean value. To calculate the wage rate, the income was divided by the yearly number of hours worked. 48 work weeks per year was assumed. The wage rate varied from 12.5 to 180 US dollars with a mean equal to 60 US dollars[13]. The total household income was reported according to similar categories. If the total household income was in a higher income category than the physician's income alone, the value one was assigned to the family income dummy variable.[14] 76 per cent of the respondents reported a higher household income than personal income.

The relationships between total labour supply and the pecuniary variables are hard to predict. On the one hand high wage rates can be associated with a high number of hours worked. Such associations are in accordance with the so-called substitution effect - as the opportunity cost of leisure increases, work is encouraged. A substitution effect would be coherent with the findings of for instance Baltagi et al (2005), Rizzo and Blumenthal (1994) and Sæther (2003). On the other hand high wages spur

[12] Since only nine of 172 psychiatrists worked at public hospitals, this category was incorporated in the other specialty group.
[13] 15 cases with a wage rate above 187 US dollars were excluded. 50 physicians had missing values on this variable due to insufficient information about either work time or income and were consequently omitted from the analysis.
[14] For 52 cases with both physician income and household income in the highest category (more than 310,000 US dollars), the dummy variable was given the value zero.

demand for commodities, such as leisure time, and consequently a high wage rate might be associated with fewer number of hours worked - a phenomenon commonly referred to as the income effect (e.g. Ehrenberg & Smith, 1982). Which effect dominates is thus an empirical question. Moreover income- and substitution effects might replace each other, inducing the labour supply curve to bend backward at some point (e.g. Sloan, 1974-75), i.e. income maximising is an important determinant of total work hours only until the income level reaches a certain level which represents the point of income satisfaction. To account for this a quadratic term enters model 3, 4, 9 and 10.

Sæther (2003) demonstrates that a wage increase in the public sector – holding the private sector wage rate stable – leads to allocation of more time in the public sector at the expense of the private sector. If the wage rate in the private sector was to increase correspondingly, with no change in the public sector, the outcome would be the opposite. However my data set do not specify how the earnings are distributed among the sectors for the dual job holders. Consequently only a total wage rate can be estimated for each respondent. The association between the dependent variables measuring private sector work hours and the wage rate is therefore not as straightforward to predict.

The expectation for the total household income dummy is in accordance with the income effect described above. I assume that high total household income facilitates consumption of more leisure time, i.e. less work hours (cf. Sloan, 1974-75; Rizzo & Blumenthal, 1994). With regards to the variable measuring private work share the effects are assumed to be negative too since private work time allocation commonly is associated with having an extra job in private sector, and therefore working more hours all in all.

For the *non-pecuniary* factors the expectation is that valuation of leisure time, flexibility, professional challenges, professional surroundings, sense of security, convention participation and ability to structure one's own work day are of importance for both the total labour supply and practice choice. The leisure-variable builds on the following claim which the respondents were asked to consider: "If I was

offered to work 15 hours less than today each month in exchange for a salary reduction of 850 US dollars, I would have accepted the offer"[15]. The level of agreement with the claim was expressed at a scale from 1 (*strongly disagree*) to 10 (*strongly agree*). Naturally this variable is expected to affect the labour supply variable negatively: the stronger the agreement, the lower the number of hours worked. A negative association is also anticipated between the sector choice variables and the current variable since private work is frequently extra work hours at private hospitals or a private contract practice combined with employment in a public hospital. A high valuation of leisure time is therefore probably less compatible with a high work load in private practice/private hospital – at least for the dual job holders (cf. Sørensen & Grytten, 2003; Grytten et al, 2000). The other variables capturing non-pecuniary job characteristics were measured according to how the respondents considered the importance of flexibility, professional challenges, professional surroundings, sense of security, convention participation and ability to structure one's own work day for their contentment in the job situation. The response categories were "very important", "rather important", "little important", "quite unimportant" and "don't know". In the analysis the first category is assigned the value one, whereas the other values are given the value zero.[16] With regards to the labour supply variable there is a lack of studies on the effects of such non-pecuniary indicators on labour supply. Consequently I take a rather exploring approach and include the afore-mentioned variables without having any clear expectations beforehand. For the other dependent variable the flexibility and "structure work day" variables are assumed to affect the private sector work share positively, since both the ability to influence the work schedule and the opportunity to have a flexible work day must be considered better in private practices/private hospitals than public hospitals. Professional challenges and surroundings, sense of security and convention participation is however expected to be better ensured in the public sector.

At the municipal level variables measuring the elderly share, living conditions and the GP-rate are included. The elderly share of the population was defined as the percentage of the population aged older than 66 years. This share varied from 7 to 20

[15] The question is strongly inspired by one of the alternatives in Scott's (1999) discrete choice model.

with a mean equal to 13 in the sample. The living condition variable is an index consisting of a variety of indicators for living conditions in the municipal (see the appendix). All municipals are rated according to which value it takes on each of the indicators. If it is in the top percentile it means that the municipal is among the ten percent of the municipals with the highest value on the indicator. The total index represents the mean value on the seven indicators (the higher the value, the more living condition problems in the area)[17]. In the sample the values ranged from 2.4 to 9.1. The GP-rate indicates the number of GP FTEs per 100,000 inhabitants in the municipality. The GP density varied from 57 to 192 per 100,000 inhabitants. Elderly share and living conditions are assumed to affect the dependent variables positively, while the GP-rate previously has been shown to affect both specialists' labour supply and the likelihood for entering fee-for-service contracts negatively (Sloan, 1974-75; Sørensen & Grytten, 2003).

At the regional level measures for hospital bed-rate, efficiency and running expenses are incorporated in the multilevel models. The first variable is operationalised as the number of public hospital beds per 1,000 inhabitants in the region. The technical efficiency level at the public hospitals shows how efficient the hospitals have utilised their total resources relative to an efficiency frontier representing the best practice (cf. Biørn et al, 2002), and the running expenses (in 1,000 kroner) indicate how much money was spent in each Health region during the year. All three variables are important indicators of the supply situation in the region and their effects on the dependent variables are accounted for in the next section.

6. Results and discussion

In this section's first part the results from analyses of 10 models are presented. Next outcomes from multilevel analyses of four models are discussed.

I start out by reporting the results from the OLS-analysis of labour supply. Next the analysis of practice choice is accounted for.

[16] I believe that the non-pecuniary aspects must be considered as very important for the physician in order to provide any actual effects on the dependent variables. Thus the "very important" category is compared to the remaining categories in the analysis.
[17] See appendix for further specifications.

Labour supply

- Table 2 here-

First I look at the personal attributes. The gender/children, age, PhD and private practice variables return significant outcomes in accordance with the initial expectations. Women work less than men and the significant interaction effect between being a woman and having children suggests that having children further reduces the weekly work hours. The age (and age^2) variable generates stable positive (and negative) parameter estimates across the different specifications, implying that labour supply increases with age, but evens out and decreases somewhat as the physician approaches retirement age. As expected physicians holding a PhD and physicians who are enrolled in a PhD program work less than other specialists. Next – and also in line with the initial expectations – specialists who work part or full time in private sector work more hours altogether than other specialists.

Among the specialities, the parameter estimates for orthopaedics and anaesthesiologists stand out across all models. These profession groups work significantly more than the internists who represent the reference category. Ophthalmologists, on the other hand, seem to work less.

Notice first that the inclusion of the pecuniary variables into the model does not alter the afore-mentioned results much. For the two pecuniary variables, both wage rate and other household income return results significant at the conventional five per cent level. The variables exert a negative effect on the labour supply across all models, indicating that the income effect is dominating. In Models 3 and 4 a quadratic term of wage rate variable is integrated to control for possible curve linearity. The beta coefficients show that although wage rate is negatively associated with work hours, the specialists with the highest wage rates work more.

Model 4 further includes non-pecuniary attributes. The estimates show that physicians assessing professional surroundings and ability to participate at conventions as very important for their contentment at job work more hours than others. Appreciation of flexibility, professional challenges and security are negatively associated with labour

supply. Next, rather surprisingly specialists who value leisure time more highly than income work more than others. Although this outcome at first seems rather contra intuitively, a plausible explanation is that the presented scenario, where 850 US dollars are traded against 15 hours more leisure time per month, is not realistic compared to their everyday work situation. Commitments and demands regarding earnings or shift work might for instance limit the specialists' opportunities to pursuit what they perceive as an ideal work-leisure time balance.

Practice choice

-Tables 3 and 4-

With regard to the individual attributes' effects on practice choice the gender, age and PhD variables once more return significant effects (Models 5-7). For the gender variable, the negative effects presented in Models 5-7 fail to reappear in Models 8-10, implying that the independent effect in the former models now are caught by the pecuniary variables[18].

Physicians attending, or having finished, a PhD education at first seem to spend a higher share of the work time in private sector than other physicians (Models 5 and 7). This result contradicts the initial expectation that these physicians would be more prone to work at public hospitals. Clearly the effect of having a PhD could be conditioned by the age of the person. This was confirmed by incorporating an interaction term in Models 6, 8, 9 and 10. The outcomes show clear evidence of positive interplay between the two variables on the share of private sector work hours. My interpretation of this is that young physicians with a PhD – ceteris paribus – work less in private sector than older physicians holding a PhD. The political sympathy variable returns stable positive effects across all model specifications. These highly significant results hold also when the pecuniary and non-pecuniary variables enter the model and imply that the more conservative (right wing) the physician's political orientation, the more likely the physician is to work in private sector. Moreover some

[18] A model incorporating an interaction term for being a woman and having children was also tested. The variable failed to return a significant parameter estimate and the full model is thus not presented

specialties are more disposed for allocating a substantial part of the work time in private practices/private hospitals than others. Regardless of which model is considered ophthalmologists and specialists in oto, rhino and laryngology spend a higher share of their total work hours in private sector than internists. Compared to internists radiologists, paediatricians and specialists in obstetrics and gynaecology are less likely to work in private practices/private hospitals.

The lack of effects for both the marital status variable and the children variable (Models 8-10) is contrary to what I expected. With regard to the children dummy variable the result might simply indicate that this aspect is without significance when predicting the practice choice. Nevertheless one should be aware of the relatively crude categorisation of this variable. A more sophisticated categorisation allowing the number of children under school age to be known might therefore have altered the results. For the marital status variable a reclassification of the variable failed to modify the results mentionably.

As for the pecuniary dimension the variable capturing the wage rate is positively associated with the dependent variable: the higher the wage rate the higher the share of work hours in private practice/private hospital. A quadratic wage term is on the other hand negatively associated with private sector work (cf. Models 9 and 10), indicating that some low-wage rate specialists allocate a substantial part of their work hours in private sector. A closer inspection of the data reveals that these are mainly private contract specialists for whom the wage rate most likely have been heavily influenced by large investments the foregoing year. A corresponding negative effect is found for the other household income variable. The inclination to work in private sector is thereby reduced if the spouse or other household members contribute to the total family income.

Model 10 includes a set of non-pecuniary characteristics. First notice that higher appreciation of leisure than income once more influences the dependent variable positively and hence contrary to what was initially expected. Appreciation of professional surroundings and security at the work place significantly lowers the share

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here. I can however not rule out that such effects exist for for instance physicians with children under

of total work hours in private practice/private hospital. These results thereby lend support to our initial expectations. Furthermore valuation of flexibility in the work place and ability to structure the work day self is associated with a high private sector work share. These results also correspond well with what was expected.

Multilevel analysis

An initial analysis showed that there was no variation at the health regional level for either of the two dependent variables. Further analyses for this level were therefore not performed. The variable measuring labour supply had no municipal level variance, and all the multilevel models thus returned σ^2_{u0} values equal to zero. Allocation of work hours between private and public sector did on the other hand vary at the municipal level. As can be seen from Table 5, the intercept was allowed to vary randomly at level two (municipal) for Models I-IV[19]. $\sigma^2(\varepsilon_{ij})$ is the variance of the specialist specific error term, and indicates the random variation in share of private sector work time (log) across specialists. $\sigma^2(u_j)$ is the variance of the level 2 (municipal) error term and measures random variation of the intercept among the municipals. $\sigma^2(\varepsilon_{ij})$ is considerably larger then the variance of the municipal level error term $(\sigma^2(u_j))$ and thus gives an intra-municipal correlation (the proportion of the total residual variation which is due to differences between municipalities) equal to 0.004-0.01. About 0.4-1.0 per cent of the total variance in the dependent variable may thus be ascribed to differences between municipals, and for all models $\sigma^2(u_j)$ is significant and indicates the extent to which the j[th] municipal's intercept differs from the overall intercept. When comparing single level models with models where the intercept is allowed to vary randomly across municipals, the likelihood ratio statistic indicate that the latter models are significantly better than the former. In Model IV the municipals' elderly share, living conditions and GP rate enter the model, but neither of these variables return significant parameter estimates.

-Table 5-

school age (i.e. younger than 7 years), since the age of the children is not specified in the data material.

[19] 78 cases lacking information about the specialists' municipality of residence are excluded from the analysis.

To inquire whether variable coefficients vary across municipals they were included – one at the time – in the random parts of the respective models. The results are presented if the t-value was significant at the 10 per cent level. For all models the coefficient of orthopaedic specialty was found to vary randomly across municipals, suggesting that the effect of orthopaedic specialty on private work share varies among municipals. In Models II-IV corresponding effects were found for the variable "other specialty", whereas anaesthesiology and wage rate varied randomly across level 2 in Models III and IV. The covariance between $\sigma^2(u_j)$ and σ^2 of the respective variables provides information about the relation between the intercept and slopes. The results from Models III and IV show that the effect of wage rate on private work share was greater for municipals with high shares of private sector work (i.e. having a higher intercept). Consequently in municipals with a high share of private work hours among the physicians the effect of wage rate on private work share is higher. The other variables did not return significant covariance estimates. The relations between orthopaedic specialty and private work share and wage rate and private work share are illustrated graphically in Figures 1 and 2.

-Figures 1 and 2-

For both variables the municipal averages depart significantly from the overall averages. Whereas the random slope model for orthopaedic specialty shows no clear correlation patterns between the intercept and the slope, the random slope model for the wage rate shows a fanning out pattern for the municipal prediction lines in accordance with the positive intercept-slope covariance at level 2.

7. Concluding remarks

Introductorily I recognised a lack of literature on Norwegian physician's labour supply and practise choice. Inspired by labour economics the aim of this paper was to identify how pecuniary, non-pecuniary and individual attributes relate to labour supply and practise choice. All three dimensions contributed substantially to the explanation of variations in the two dependent variables, and the findings are with a few minor exceptions coherent with the existing literature on the field. Moreover the

multilevel analyses proved that - although the labour supply variable had no higher level variance and there was no health region level variation in private work share – including municipal level variation into the model for private work share significantly improved the model. Both random intercept models and random slopes models provided more adequate fits than the initial single level models.

The main drawbacks with the analyses are four-fold. First I was unable to perform separate analyses for specialists working in private contract practice and specialists working at private hospitals. This is due to the complex job composition many physicians have. More than 20 per cent of the sample physicians who work in private sector, combine jobs at private hospitals and private contract practises. Second private contract specialists are self-employed and can as a result of this deduct practice related expenses before taxes. The information about yearly gross income (and therefore wage rate) might consequently be conditioned by i.a. investments made the foregoing year. Third although a response rate of 52 is considered relatively high when physicians are the target group, the risk of bias in the sample is nevertheless present. Forth the assumption that all physicians decide for themselves how many hours they want to work and how they allocate their work hours between the sectors, is not necessarily in accordance with the physicians' own perception of the situation. For specialists working at public hospitals the work schedule might on the contrary be set, and for contract specialists the decision about type and size of contract might have been made years previously and in some cases "inherited" from a previous licence holder. The first, second and forth shortcomings are however interesting issues for future studies.

The striking increase in private specialist care supply in Norway should attract interest from economists, social scientists, physicians, statisticians and health service researchers. The scarcity of research on the subject – pointed out by for instance Øvretveit (2003) and Midttun and Hagen (2005) – should cause concern and inspire to not least Nordic comparative works on this highly interesting and rapidly changing field the next years.

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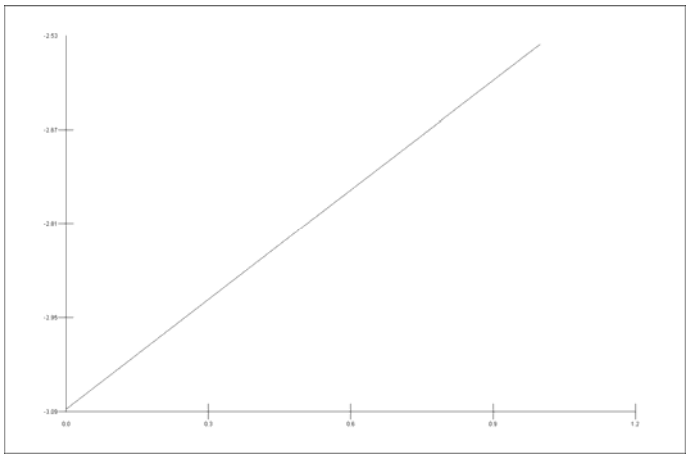
Figures

(i)



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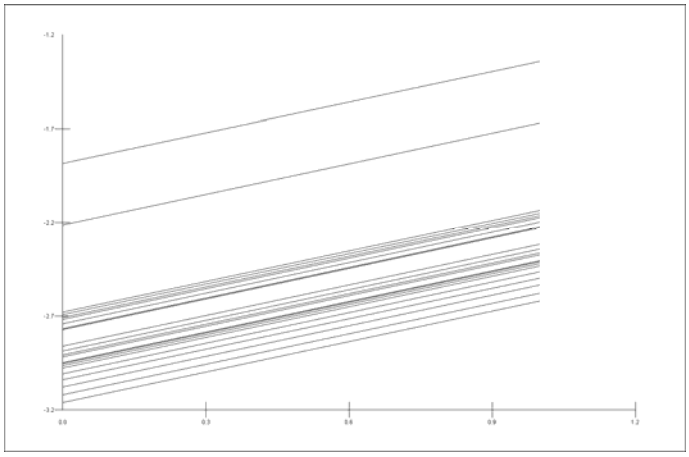

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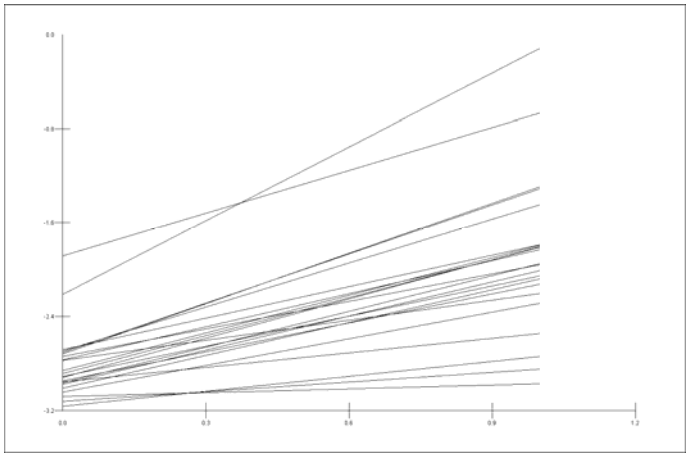
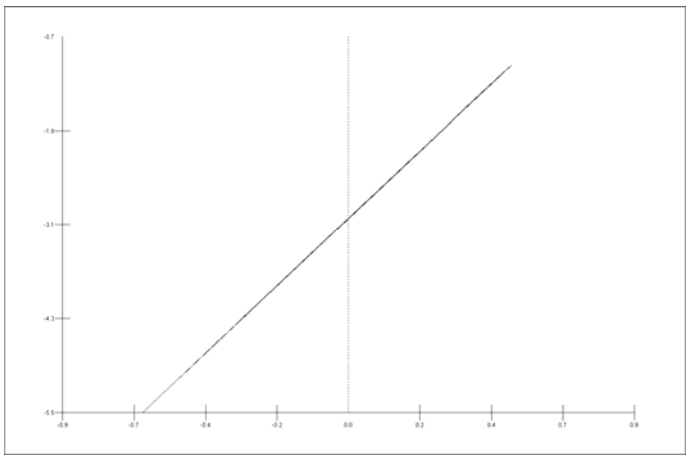


Figure 1: Relationship between predicted private work hours share (log) and orthopaedic speciality (i) without random intercept and random slopes (ii) with random municipal intercepts (iii) with random municipal intercepts and random orthopaedic specialty-slopes across counties

(i)



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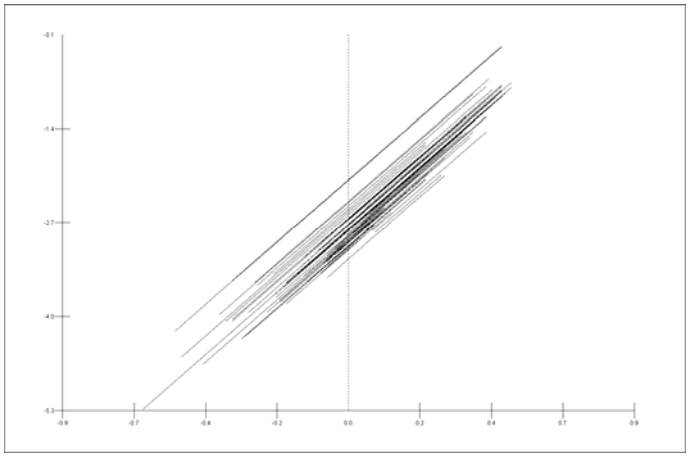

(iii)

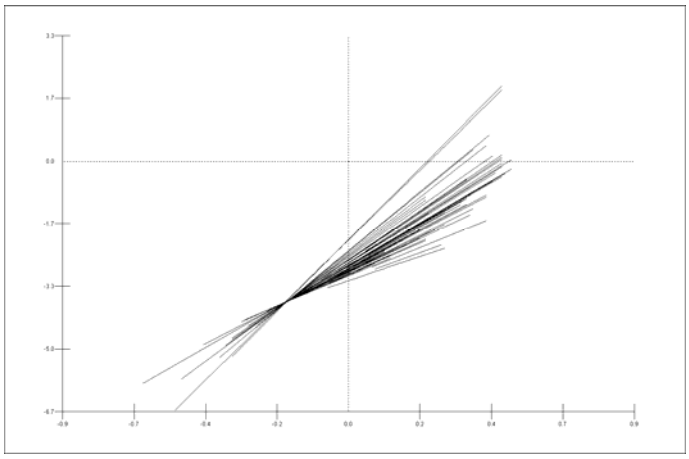

Figure 2: Relationship between predicted private work hours share (log) and wage rate (log) (i) without random intercept and random slopes (ii) with random municipal intercepts (iii) with random municipal intercepts and random orthopaedic specialty-slopes across municipals

Tables

Table 1: Descriptive statistics for the dependent and explanatory variables in the empirical analysis. Number of cases, mean, standard deviation, minimum and maximum values[20].

	N[21]	Mean	Standard deviation	Minimum value	Maximum value
Total labour supply	5,693.00	47.86	8.62	10.00	95.00
Total labour supply (log)	5,693.00	1.67	.08	1.00	1.98
Private share	5,701.00	7.87	24.69	.00	100.00
Private share (log)	5,701.00	-3.04	2.05	-4.00	2.00
Gender	5,691.00	.29	.45	.00	1.00
Age	5,693.00	50.07	8.96	31.00	74.00
Age (log)	5,693.00	1.69	.08	1.49	1.87
PhD	5,679.00	.68	.47	.00	1.00
Married	5,646.00	.85	.36	.00	1.00
Children	5,701.00	.57	.50	.00	1.00
Political sympathies	5,586.00	5.18	2.07	.00	10.00
Political sympathies (log)	5,551.00	.68	.21	.00	1.00
Orthopaedics	5,680.00	.05	.21	.00	1.00
Radiotherapy	5,680.00	.08	.27	.00	1.00
Internal medicine	5,680.00	.19	.39	.00	1.00
Paediatrics	5,680.00	.09	.28	.00	1.00
Obstetrics and gynaecology	5,680.00	.08	.27	.00	1.00
Oto, rhino and laryngology	5,680.00	.04	.19	.00	1.00
Ophthalmology	5,680.00	.04	.20	.00	1.00
Anaesthesiology	5,680.00	.11	.32	.00	1.00
Other speciality	5,680.00	.29	.45	.00	1.00
Working private	5,701.00	.18	.39	.00	1.00
Wage rate	5,633.00	371.89	127.60	81.17	1,166.67
Wage rate (log)	5,633.00	2.55	.13	1.91	3.07
Other household income	5,411.00	.76	.42	.00	1.00
Leisure-income preference	5,617.00	4.70	3.21	1.00	10.00
Leisure-income preference (log)	5,617.00	.54	.36	.00	1.00
Job characteristics – flexibility	5,616.00	.41	.49	.00	1.00
Job characteristics – professional challenges	5,679.00	.49	.50	.00	1.00
Job characteristics – professional surroundings	5,670.00	.70	.46	.00	1.00
Job characteristics – sense of security	5,669.00	.40	.49	.00	1.00
Job characteristics – convention participation	5,679.00	.40	.49	.00	1.00
Job characteristics – structure work day self	5,653.00	.40	.49	.00	1.00

[20] For the higher level variables 78 cases missing residence information are excluded from the data material.

[21] N is higher than the number of specialists in the sample due to weighing of the data. N also varies for the different variables due to variations in the number of missing values.

	N	Mean	Standard deviation	Minimum value	Maximum value
Elderly share	5,388.00	12.54	1.96	7.00	20.00
Living conditions	5,388.00	6.22	1.13	2.40	9.10
GP-rate	5,388.00	86.07	9.30	57.00	192.00
Hospital bed rate	5,338.00	274.54	47.76	228.00	357.00
Hospital efficiency	5,338.00	83.42	1.84	81.60	86.40
Running expenses	5,338.00	10,004,370.26	3,157,624.35	4,957,029.00	13,155,602.00

Table 2: Individual, pecuniary and non-pecuniary determinants of the logarithm of weekly work hours among Norwegian specialists. Unstandardised estimates with t-values in parenthesis. Two-tailed significance test.

	Model 1	Model 2	Model 3	Model 4
Gender	-.02** (2.55)	-.02*** (5.29)	-.02*** (5.21)	-.02*** (4.71)
Age (log)	2.10*** (4.58)	1.03*** (3.14)	.97*** (2.93)	.86*** (2.63)
Age^2 (log)	-1.12*** (4.58)	-.51*** (3.06)	-.48*** (2.85)	-.42** (2.52)
PhD	-.03*** (9.24)	-.02*** (10.47)	-.02*** (10.43)	-.02*** (8.98)
Married	-.02*** (3.76)	.00 (.42)	.00 (.27)	.00 (.04)
Children	.01* (1.92)	.00 (1.40)	.00 (1.39)	.00 (1.01)
Political sympathies (log)	-.01 (1.16)	.02*** (3.01)	.02*** (3.13)	.01* (1.88)
Orthopaedics	.04*** (5.45)	.04*** (7.06)	.04*** (6.99)	.03*** (6.42)
Radiotherapy	-.00 (.28)	-.00 (.58)	-.00 (.65)	-.00 (.46)
Paediatrics	-.01 (1.31)	-.02*** (3.62)	-.01*** (3.50)	-.01 (1.14)
Obstetrics and gynaecology	.01* (1.90)	.01* (1.71)	.01* (1.66)	.00 (.37)
Oto, rhino and laryngology	-.03*** (3.82)	-.00 (.30)	.00 (.33)	-.00 (.09)
Ophthalmology	-.02** (2.30)	-.02*** (4.28)	-.02*** (4.33)	-.02*** (4.43)
Anaesthesiology	.01* (1.68)	.01*** (3.28)	.01*** (3.14)	.01** (2.28)
Other speciality	-.00 (.20)	.00 (.26)	.00 (.09)	-.00 (1.51)
Working private at all	.02*** (4.53)	.03*** (10.54)	.03*** (10.62)	.03*** (10.48)
Gender*children	-.02*** (3.40)	-.03*** (5.91)	-.03*** (5.88)	-.03*** (5.82)
Wage rate (log)		-.25*** (29.19)	-.97*** (3.12)	-.88*** (2.90)
Other household income		-.02*** (7.10)	-.02*** (7.08)	-.02*** (7.15)
Wage $rate^2$ (log)			.36** (2.31)	.33** (2.17)
Leisure-income preference (log)				.02*** (5.83)
Job characteristics – flexibility				-.01*** (4.85)
Job characteristics – professional challenges				-.02*** (7.89)
Job characteristics – professional surroundings				.01*** (2.89)
Job characteristics – sense of security				-.01*** (4.38)
Job characteristics – convention participation				.02*** (6.63)
Job characteristics – structure work day self				.00 (.50)
Intercept	1.96*** (46.48)	2.31*** (71.13)	2.30*** (70.54)	2.20*** (67.19)
R-square	.05	.22	.22	.24
N[22]	5,479	5,155	5,155	4,933

*** = $p \leq .01$, ** = $p \leq .05$, * = $p \leq .10$.

[22] N is the number of cases after weighting of the cases.

Table 3: The influence of individual characteristics on the logarithm of share of work hours in private sector. Unstandardised estimates with t-values in parenthesis. Two-tailed significance test.

	Model 5	Model 6	Model 7
Gender	-.42*** (15.55)	-.39*** (6.26)	-.42*** (6.72)
Age (log)	4.20*** (10.61)	.67 (1.04)	-28.86*** (3.84)
Age^2 (log)			16.73*** (3.95)
PhD	.42*** (7.26)	-28.63*** (6.91)	.44*** (7.56)
Married	-.10 (1.32)	-.12 (1.57)	-.11 (1.50)
Children	.15** (2.33)	.14** (2.30)	.12** (1.96)
Political sympathies (log)	1.13*** (8.90)	1.12*** (8.91)	1.16*** (9.15)
Orthopaedics	.37*** (2.70)	.37*** (2.74)	.30** (2.22)
Radiotherapy	-.54*** (5.01)	-.54*** (5.06)	-.55*** (5.07)
Paediatrics	-.70*** (6.59)	-.68*** (6.40)	-.71*** (6.70)
Obstetrics and gynaecology	-.39*** (3.59)	-.41*** (3.77)	-.43*** (3.92)
Oto, rhino and laryngology	.98*** (6.69)	.96*** (6.58)	.96*** (6.53)
Ophthalmology	.71*** (4.89)	.68*** (4.75)	.71*** (4.91)
Anaesthesiology	-.14 (1.46)	-.12 (1.20)	-.18* (1.86)
Other speciality	-.21*** (2.82)	-.21*** (2.87)	-.24*** (3.21)
PhD*age (log)		5.10*** (7.01)	
Intercept	-10.94*** (15.55)	15.46*** (4.03)	-11.62*** (16.07)
R-square	.11	.11	.11
N[23]	5,487	5,487	5,487

*** = $p \leq .01$, ** = $p \leq .05$, * = $p \leq .10$.

[23] N is the number of cases after weighting of the cases.

Table 4: The influence of individual, pecuniary and non-pecuniary characteristics on the logarithm of share of work hours in private sector. Unstandardised estimates with t-values in parenthesis. Two-tailed significance test.

	Model 8	Model 9	Model 10
Gender	-.05 (.80)	-.07 (1.04)	-.09 (1.32)
Age (log)	-.76 (1.20)	-1.03 (1.63)	-.65 (1.01)
PhD	-26.67*** (6.62)	-28.47*** (7.03)	-25.90*** (6.22)
Married	.05 (.56)	.07 (.77)	.19** (2.04)
Children	.05 (.88)	.05 (.84)	.03 (.54)
Political sympathies (log)	.80*** (6.51)	.78*** (6.32)	.71*** (5.62)
Orthopaedics	.21 (1.57)	.22 (1.64)	.25* (1.86)
Radiotherapy	-.87*** (8.15)	-.86*** (8.04)	-.78*** (7.16)
Paediatrics	-.79*** (7.72)	-.81*** (7.89)	-.69*** (6.59)
Obstetrics and gynaecology	-.64*** (6.03)	-.63*** (5.97)	-.59*** (5.42)
Oto, rhino and laryngology	.74*** (5.05)	.75*** (5.08)	.83*** (5.43)
Ophthalmology	.45*** (3.22)	.46*** (3.30)	.45*** (3.23)
Anaesthesiology	-.35*** (3.73)	-.33*** (3.50)	-.29*** (3.05)
Other speciality	-.35*** (4.69)	-.33*** (4.43)	-.24*** (3.16)
PhD*age (log)	4.75*** (6.70)	5.06*** (7.11)	4.62*** (6.31)
Wage rate (log)	4.46*** (21.13)	34.14*** (4.36)	30.06*** (3.82)
Other household income	-.30*** (3.89)	-.30*** (3.91)	-.42*** (5.23)
Wage rate^2 (log)		-14.88*** (3.80)	-13.03*** (3.30)
Leisure-income preference			.26*** (3.46)
Job characteristics – flexibility			.52*** (8.95)
Job characteristics – professional challenges			.06 (.98)
Job characteristics – professional surroundings			-.37*** (5.84)
Job characteristics – sense of security			-.20*** (3.51)
Job characteristics – convention participation			-.06 (.97)
Job characteristics – structure work day self			.14** (2.28)
Intercept	5.53 (1.48)	7.47** (1.98)	5.90 (1.53)
R-square	.19	.20	.22
N[24]	5,155	5,155	4,933

*** = $p \leq .01$, ** = $p \leq .05$, * = $p \leq .10$.

[24] N is the number of cases after weighting of the cases.

Table 5: Results from multilevel analysis. Unstandardised estimates with sandwich standard errors in parenthesis. Continuous predictor variables are centred. Two-tailed significance test.

	Model I	Model II	Model III	Model IV
Fixed effects				
Gender	-.39*** (.09)	-.07 (.08)	-.07 (.09)	-.03 (.09)
Age (log)	.60 (1.22)	-.87 (.98)	-.46 (.90)	-.08 (.96)
PhD	.43*** (.10)	.35*** (.12)	.41*** (.14)	.34** (.16)
Age (log)*PhD	5.12*** (1.92)	4.85*** (1.65)	4.55*** (1.51)	4.10** (1.59)
Married	-.11 (.17)	.06 (.25)	.20 (.26)	.28 (.27)
Children	.11 (.16)	.03 (.15)	.01 (.14)	.04 (.14)
Political sympathies (log)	1.14*** (.26)	.82*** (.29)	.74*** (.25)	.64*** (.24)
Orthopaedics	.45 (.39)	.28 (.39)	.35 (.40)	.23 (.39)
Radiotherapy	-.48** (.21)	-.85*** (.20)	-.73*** (.25)	-.72*** (.26)
Paediatrics	-.67*** (.15)	-.80*** (.19)	-.65*** (.24)	-.65*** (.24)
Obstetrics and gynaecology	-.36 (.22)	-.57*** (.20)	-.50** (.20)	-.47** (.21)
Oto, rhino and laryngology	.98*** (.32)	.71** (.30)	.80** (.32)	.89** (.34)
Ophthalmology	.66* (.38)	.43 (.32)	.43 (.28)	.45 (.28)
Anaesthesiology	-.09 (.28)	-.33 (.30)	-.29 (.28)	-.28 (.28)
Other speciality	-.16 (.23)	-.32 (.21)	-.21 (.20)	-.24 (.20)
Wage rate (log)		4.39*** (.41)	3.97*** (.45)	4.08*** (.45)
Other household income		-.32 (.23)	-.42** (.21)	-.47** (.23)
Leisure-income preference (log)			.29* (.15)	.28* (.15)
Flexibility			.54*** (.13)	.56*** (.13)
Professional challenges			.07 (.16)	.08 (.16)
Professional surroundings			-.41*** (.13)	-.41*** (.13)
Sense of security			-.19 (.19)	-.21 (.19)
Convention participation			-.05 (.13)	-.00 (.12)
Structure work day self			.13 (.17)	.14 (.17)
GP rate				.00 (.01)
Elderly share				.06 (.05)
Living conditions				-.06 (.07)
Intercept	-3.08*** (.26)	-2.81*** (.17)	-2.85*** (.19)	-2.89*** (.19)
Random effects				
Level 1				
$\sigma^2(\varepsilon_{ij})$	17.60*** (.63)	15.77*** (.64)	15.15*** (.63)	15.07*** (.66)
Level 2				
$\sigma^2(\mu_j)$	.07** (.03)	.15** (.06)	.21** (.08)	.19*** (.07)
σ (orthopaedic specialty)	1.54** (.59)	1.72*** (.53)	1.93*** (.56)	1.75*** (.51)
$\sigma(\mu_j$,orthopaedic specialty)	.09 (.15)	.06 (.20)	.17 (.18)	.22 (.17)
σ (other speciality)		.37* (.20)	.51** (.24)	.36* (.20)
$\sigma(\mu_j$, other speciality)		-.03 (.09)	.04 (.11)	.04 (.10)
σ (anaesthesiology)			.76* (.43)	.75* (.43)
$\sigma(\mu_j$, anaesthesiology)			.04 (.11)	.04 (.11)
σ (wage rate (log))			4.77** (1.94)	5.63*** (1.98)
$\sigma(\mu_j$, wage rate (log))			.88*** (.31)	1.05*** (.32)

*** = p ≤ .01, ** = p ≤ .05, * = p ≤ .10.

Appendix

Labour supply (log): The natural logarithm of total number of work hours per week in 2004.

Private work share (log): The natural logarithm of share of work hours spent in private practice/private hospital in 2004.

Gender: Dummy variable for which the value of one is assigned to cases where the physician is female.

Age (log): The natural logarithm of the physician's age in 2005.

PhD: Dummy variable for which the value of one is assigned to cases where the physician holds a PhD or is enrolled in a PhD program.

Married: Dummy variable for which the value of one is assigned to cases where the physician's marital status is married or cohabiting.

Children: Dummy variable for which the value of one is assigned to cases where the physician has children aged 18 or younger.

Political sympathies (log): The natural logarithm of the placing along a left-right scale from 0 to 10 where the left hand side (starting with 0) represents the political left and the right hand side (ending with 10) represents the political right.

Orthopaedics: Dummy variable for which the value of one is assigned to cases where the physician is a specialist in orthopaedics.

Radiotherapy: Dummy variable for which the value of one is assigned to cases where the physician is a radiologist.

Internal medicine: Dummy variable for which the value of one is assigned to cases where the physician is a specialist in internal medicine.

Paediatrics: Dummy variable for which the value of one is assigned to cases where the physician is a specialist in paediatrics.

Obstetrics and gynaecology: Dummy variable for which the value of one is assigned to cases where the physician is a specialist in obstetrics and/or gynaecology.

Oto, rhino and laryngology: Dummy variable for which the value of one is assigned to cases where the physician is a specialist in oto, rhino and laryngology.

Ophthalmology: Dummy variable for which the value of one is assigned to cases where the physician is a specialist in ophthalmology.

Anaesthesiology: Dummy variable for which the value of one is assigned to cases where the physician is a specialist in anaesthesiology.

Other speciality: Dummy variable for which the value of one is assigned to cases where the physician is a specialist in an other speciality.

Work private at all: Dummy variable for which the value of one is assigned to cases where the physician had worked at least one per cent of the work hours each week in private practice and/or private hospital in 2004.

Wage rate (log): The natural logarithm of the yearly gross income in 2004 (mean values in the 11 categories with 31,000 US dollars ranges) divided by the total number of work hours per week in 2004 times 48 work weeks during the year. The results and descriptive statistics are reported in Norwegian kroner.

Other household income: Dummy variable for which the value of one is assigned to cases where the total household income was in a higher income category than the physician income. For cases where the top category was reported for both physician income and household income, the value zero was assigned.

Leisure-income preference: The natural logarithm of the level of agreement with the claim "If I was offered to work 15 hours less than today per month in exchange for a salary reduction of 850 US dollars, I would have accepted the offer". The scale ranges from 1 (strongly disagree) to 10 (strongly agree) (cf. Scott, 1999).

Flexibility: Dummy variable for which the value of one is assigned to cases where the physician values flexibility as very important for his/her job contentment.

Professional challenges: Dummy variable for which the value of one is assigned to cases where the physician values professional challenges as very important for his/her job contentment.

Professional surroundings: Dummy variable for which the value of one is assigned to cases where the physician values professional surroundings as very important for his/her job contentment.

Sense of security: Dummy variable for which the value of one is assigned to cases where the physician values sense of security as very important for his/her job contentment.

Convention participation: Dummy variable for which the value of one is assigned to cases where the physician values convention participation as very important for his/her job contentment.

Structure work day self: Dummy variable for which the value of one is assigned to cases where the physician values the ability to structure the work day self as very important for his/her job contentment.

Elderly share: The share of the municipal's population aged 67 years or older by the start of the year. Source: Statistics Norway.

Living conditions: The index is additive and constructed on the basis of the following indicators:

Social assistance: number of persons aged 16 years and older receiving social assistance per 100 inhabitants.
-Mortality: number of deceased persons per 100.000 inhabitants, based on age- and gender-standardised annual averages from 1998-2002.
-Disability assistance: proportion of the population aged 16-49 receiving disability assistance per 1.000 inhabitants aged 16-49.
-Rehabilitation assistance: number of persons aged 16-66 receiving rehabilitation assistance per 1.000 inhabitants.
-Violence: number of persons charged for criminal acts of violence per 10.000 inhabitants, annual averages from 2000 and 2001.
-Unemployment: number of registered unemployed persons and participants in unemployment measures per 100 inhabitants aged 25-66, first quarter of 2004.
-Transitional benefits: number of persons receiving transitional benefits per 100 women aged 20-39.
-Education: Proportion of population 30-39 years with only primary education in 2001.

Source: The Commune Database, Norwegian Social Science Data Services.

GP rate: The number of GPs per 100,000 inhabitants in the municipality in 2003. Source: The Commune Database, Norwegian Social Science Data Services.

Hospital bed rate: Total number of public hospital beds per capita in the Health region in 2003. Source: Huseby, 2004.

Hospital efficiency: Mean technical efficiency level at the public hospitals in the Health region in 2003. Source: Huseby, 2004.

Health region's running expenses: Total running expenses (in 1,000 Norwegian kroner) during 2003 per health region. Source: Huseby, 2004.