What are the profiles and the determinants of physicians' activity? An empirical study.

The case of French GPs.

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1. Introduction

In the French health care system, general practitioners (GPs) and specialists can both choose private practice. They are paid on a fee-for-service basis. Physicians' corporations and public health insurance funds negotiate the level of fee for each medical act. Three quarters of the physicians receive their income from regulated fees only; their contractual status is called sector 1 (or fully-regulated sector). Almost a quarter can charge fees unrestrictedly above the regulated scale of charges; their contractual status is called sector 2 (free-pricing sector)[1]. Fees and surcharges are paid directly by the patient to the physician.

For each act, the conventional fee is the basis of reimbursement to the patient by his health public insurance and, for the co-insurance part, by his private or mutual complementary insurance. Some complementary insurance companies also refund surcharges. A very minor part of the physicians do not have agreement with health insurance funds. In that case, patients are paid back at a very low level (almost 1 euro for a consultation charged 20 euros by general practitioners).

Within this framework, private physicians can practice freely; they perfom different acts, give consultations, home visits for GPs, technical acts particularly for some specialists. Their activity volume depends on their own decisions, on patients' demand, on the clientele size…

[1] This sector was introduced in 1980 for all physicians. Since 1990, only some specialists with a particular in-hospital training can opt for this sector 2.

Their income depends on the volume and structure of their activity in sector 1, and on the level of their fees in sector 2.

Private physicians' activity is not very often investigated the economic litterature. Some studies give descriptive statistics about activity volume (*cf*. DREES n°9, 44, 83, 114, CNAMTS n° 23, 30, 108) or physicians' income (*cf* DREES n°3, 15, 89, 146, 254, CREDES n°1321, CERC, 1994). A few studies develop economic models focusing on physicians' activity. The traditional question of demand inducement is one way to explore physicians' activity (Delattre & Dormont, 2000, Rochaix, 1993, Rochaix & Largeron, 1989). The nature of the market for private medical services is another way to investigate physicians' decisions (Sloan, 1979, Wong 1996). In France, some models have also studied the contractual choice of the physician (Carrère, 1991, Lancry, 1989, Dubec & al., 2003), or the level of prescriptions (Lancry & Paris, 1997).

In these studies, physicians' activity is analysed assuming standard behaviour and through a one-dimensional variable, number of acts or level of fees or annual income. We should notice an exception with the study of Delattre (2000): he sets out an indicator of activity combining the proportion of technical acts and the level of fees. In all cases, the question is then to identify the economic determinants of this dependant variable. The standard behaviour hypothesis seems dissatisfying since we recognise the diversity of behaviours inherent in medical speciality, in patients' characteristics, in motivations (Croxson & al., 2001, Hellinger, 1996, Davis & al., 2000) and in medical and economic context (Mossé, 1997, Ryan, 1994, Darbon & Letourmy, 1989).

The purpose of our empirical study is to test an alternative hypothesis. We assume that private physicians are not homogeneous depending on their motivations, their practice decisions and their reactions to regulatory policies. We also assume that their activity cannot be explained through a one-dimensional model. The level of fees and the number of acts by physician are both indicators of their activity; the number of acts by patient, the structure of activity or the level of prescriptions are also indicators of this activity. Otherwise, we assume that not only economic determinants but also professional rules and economic and medical context influence the physician’s decisions.

In order to test our hypothesis, we set out an empirical study focusing on physicians in two regions of France (Aquitaine and Burgundy). We used two complementary methods to test the heterogeneity of private physicians' behaviours: a cluster analysis in order to identify different

practising profiles and econometric tests to exhibit the determinants of the multidimensional physicians' activity.

In the present paper, we focus on general practitioners (GPs) and we comment the results relative to the heterogeneity hypothesis. The data we consider concern 4700 GPs of the two regions and their activity for the year 2000. Our results show different ways of practising the same profession: among GPs, the clustering method shows that different groups must be distinguished according to their type of practise; otherwise, econometric results show that two different models must be drawn in order to understand rural GPs on one side and urban GPs on the other one.

2. Methods and models

Our empirical study focus on supply behaviour in the private medical services market. The subject of our analysis is the individual activity of the physician, the GP in the present paper. We assume that this individual activity is multidimensional. On an economic point of view, we can measure this multidimensional activity through the following variables: volume and structure of activity, fees and surcharges, biological and pharmaceutical prescriptions. The number of acts is measured by physician and by patient. By physician, it indicates the workload of the physician, which depends on his personal motivations for work, his available time and the size of his clientele. For the GPs, the percentage of home visits gives also an indicator of the GPs workload and moreover of the structure of his activity[2]. By patient, the number of acts gives an indicator of the intensity of health care. It depends jointly on demand and supply determinants: in his medical decisions, physician may respond to his personal motivations (for example, according to the demand inducement hypothesis, physicians can multiply the number of acts in order to increase their income) or to patients' demand and medical needs. Prescription decisions depend as well on supply and demand determinants. For instance, we'll see that physicians may adjust the length of consultation time and the length of prescription order.

[2] For the specialists, we have set out a specific indicator of the economic and technical intensity of their activity. See Béjean & Peyron 2002.

As stated above, we assume that physicians' behaviours are heterogeneous. To understand their activity, we must then take into account the diversity of these behaviours, diversity inherent in motivations, in clientele characteristics and in social and economical context.

This diversity can be investigated through classifying variables such as speciality, gender or location. For GPs, we set up different models of behaviour for rural and for urban physicians[3], since we assume that behaviours, motivations and decisions of rural GPs are different from the urban GPs' ones. In the range of determinants assumed to affect physicians' behaviours, the influence and the strength of one determinant may vary across physicians' categories and across different dimensions of their activity.

Another way to investigate diversity in behaviours is given by different clustering methods. Non-hierarchical clustering methods can produce homogeneous sub-groups inside a heterogeneous population: the aim is to identify these sub-groups according to selected variables. For the GPs, we undertake such a classification, in order to draw different "practising profiles". To our knowledge, this method has never been used to study medical decisions or physicians' activity. The variables chosen in order to set up the cluster analysis reflect the different dimensions of GPs' activity and supply. The classification is then interpreted and analysed through the variables that should influence this activity.

Cluster analysis

The classification has been carried out with a method of dynamic clustering. Clusters are formed gradually maximising each cluster's homogeneity (Cubic Clustering Criterion) and maximising also the discrimination performed by the analysis (Pseudo F Criterion)[4]. The clustering results depend on the choice of the variables used for the analysis. In our study, the clustering variables reflect the volume and the structure of GP's activity (number of acts, percentage of home visits), his clientele and the intensity of health care supplied by patient (clientele size, number of acts per patient, average total cost per patient), his prescription behaviour (percentage of patients with prescriptions in the period, , average pharmacy cost per patient, average biology cost per prescription order).

The number of clusters may vary from 2 to 7. In our study, the statistical criterions (minimal distance inside each cluster and maximal distance between clusters) require selecting 4 clusters. This method gives several sets of clusters. The analyst has to choose one of them according to statistical criterions. This choice remains partly subjective although all clustering

[3] For the specialists, we have set up different models for sector 1 and sector 2 practitioners.

results we have analysed exhibit the same characteristics. Differences between clustering results are really minor.

The cluster analysis has been carried out on all GPs of each region separately. In the present paper, we'll present the results for GPs living and working in Aquitaine.

The analysis gives 4 clusters that gather physicians sharing the same type of activity. These types represent dominant trends and not pure types. These types must be interpreted analysing the characteristics of each cluster. Individual characteristics of the physician (age, gender, seniority, contractual status), clientele characteristics (age, % of non-paying patients…), spatial context of the location (rural/urban, socio-economic characteristics of the population) and level of fees and surcharges can be used to analyse and specify each cluster.

Econometric analysis:

We used econometric analysis in order to identify the determinants of GPs' activity and to test heterogeneity among rural and urban GPs. As noted above, we assume that physicians' activity is combining different decisions: decisions relative to workload, activity volume and income, decisions relative to the willingness to accept home visits and prescription decisions. For each category of GPs, 5 models have been estimated by the OLS method, using a stepwise regression in order to select the significant variables. The dependant variables are the following:

- Annual number of acts per GP
- Average number of acts per patient
- Percentage of home visits
- Average pharmacy cost per patient with prescriptions
- Average pharmacy cost per prescription order

Independent variables reflect individual characteristics of the GP, characteristics and size of the clientele, medical and economic context. In some models, some activity variables assumed to be effective are added to the independent variables. For instance, the total number of acts is assumed to affect the percentage of home visits: urban GPs may refuse home visits if their income and workload are satisfying, when workload and proportion of home visits are positively connected for the rural GPs because they can't refuse home visits in rural areas.

[4] See Chaudon & Pinson 1981 for more precision about this clustering method.

Our empirical study associates these two complementary methods, econometric modelling and clustering, to explore the hypothesis of heterogeneity among GPs. These methods require individual data about GPs' activity.

3. Description of the data

For the year 2000, the data we consider concern 4695 GPs of the regions of Aquitaine (3225 GPs) and Burgundy (1470 GPs). This sample represents 95% of all private GPs registered in those regions. We concentrate on GPs strictly speaking (APE "à part entière"), i.e. physicians who began their activity before January 1st 1998, less than 65 years old, who don't work full-time in hospitals, who have a contract with health insurance funds. The data set is from the URCAM (health insurance groups) of Burgundy and of Aquitaine. It includes individual characteristics of the physicians, activity variables and characteristics of the clientele. Data about spatial, medical and economic context are from the data base supplied by the French national statistical institute (INSEE). Table 1 gives the list of the variables used in the clustering and econometric analyses.

Insert Table 1.

Health and medical context of Aquitaine and Burgundy are quite different. Aquitaine is one of the regions where physicians density is very high (345 physicians of all categories per 100 000 inhabitants in Aquitaine, 332 in the whole of France, and 118,4 private GPs per 100 000 inhabitants in Aquitaine, 102,6 in the whole of France). Burgundy is on the contrary one of the regions where health services supply is very low (private GPs density is 97,4 per 100 000 inhabitants) and where health care expenses are the lowest. We'll see later that, *ceteris paribus,* the location in one of these two regions affects GPs activity.

4. Results

Cluster analysis

Some personal characteristics like seniority or gender, are known to affect the physicians' choices relative to their professional activity, but the analysis of the individual impact of these characteristics do not reveal the whole diversity of this profession. For instance, it is well known that women choose more often some specialities, like dermatology or paediatrics, and prefer part-time activity, or that physicians increase the volume of their activity with their seniority. Those explanations seem over-simple to understand the diversity of physicians' activity. This diversity depends not only on their individual characteristics and on their selfish choices, but also on the constraints of the economic and medical context, and on the patients' demand.

As we noticed above, the cluster analysis is based upon 8 variables relatives to the multidimensional GPs' activity. The clustering results are then interpreted trough all the variables assumed to affect their activity: individual characteristics, clientele's characteristics, socio-economic context, health care supply context.

The cluster analysis we have made shows that, inside the private GPs' category, 4 clusters of practising profiles can be distinguished. This result confirms that the hypothesis of a standard behaviour is not satisfying. For instance, the physicians who have a very low volume of activity and a very little clientele constitute one cluster (cluster 4) that represents 23.5% of the whole sample, that is not a minor part. Almost half of those physicians are women, 75% of them are located in urban areas, but they do not have a part-time activity more often than their colleagues. They also have very low levels of pharmacy prescription. The characteristics of this cluster 4 express one particular way of practising general medicine. Those physicians attach more importance to the length of consultation time than to the length of prescription order and the particular type of their practise is more adequate for some patients' category (more women and more adults in their clientele). The structure of the clientele appears then to be based on the type of practice chosen by the physician.

Another cluster (cluster 2 that represents 11% of the sample) is on the contrary composed of physicians who have very high volumes of activity. Those physicians are more often located in rural areas and they practise under the constraints of the economic and sanitary context. They look after many of patients and they must accept high levels of home-visits. The morbidity of their clientele and of the local population explains high levels of prescriptions. For those physicians, since they have chosen their rural location, the opportunity to freely choose the volume of activity or the proportion of home visits appears to be restricted.

The four clusters given by the analysis are briefly described below. Tables 2 to 10 present the numerical results of the clustering analysis. Cluster 1 and 3 are nearest to the average of the sample, when clusters 2 and 4 represent extreme behaviours.

Cluster 1:

This cluster represents 33% of the sample. Only 10% of those physicians are women (21% in the whole sample); 93% of them belong to the fully regulated sector (sector 1). The volume of their activity is higher than the average (6450 acts against 5130 in the whole sample) and the number of acts per patient is also something over the average (4.15 acts per patient). The context of the area is not very good: the average distance to the nearest hospital is more than 13 kilometres, and the density of GPs is something lower than the average. More than 60% of those physicians are located in urban areas. Their prescription behaviour is not very different from the average of the sample. Their clientele includes a higher proportion of young patients than in the whole sample.

Cluster 2:

Cluster 2 gathers physicians who have a very high activity according to all dimensions: 9303 acts per year, 2336 patients (almost 1500 is the average in the whole sample). This high actiivty is not balanced by a lower number of acts by patient. On the contrary, they make 4.76 acts per patient in the year (4.15 in cluster 1 and 3.97 in the whole sample) and the costs of their pharmacy prescriptions are very high. The proportion of home visits is the highest one (30% of their consultations are home made). Their income very high also but they do not surcharge their fees. They are older and have a higher seniority than their colleagues. Only 4% of them are women. They practise more often in rural areas (46% of them). Health care supply is not very good in their location: density of GPs is the lowest of the 4 clusters of Aquitaine, but we must notice that this density and this medical supply remain high comparing their levels in other regions, in Burgundy particularly. This only characteristic cannot then explain very high levels of activity. The characteristics of their clientele are not very different from those of the whole sample and they have the same proportion of young patients than in cluster 1.

Cluster 3:

Cluster 3 shows a particular practising profile. These physicians have a small clientele and low levels of annual activity but they perform more acts per patient than the average (4.18 acts per patient in class 3, 4.15 in class 1, 3.97 in the whole sample) and the cost of their

pharmacy prescriptions are higher than the average. They represent 32.2% of the sample. Their individual characteristics and the context of their location are not different from the average ones. The characteristics of the clientele explain higher costs per patient: the percentage of both older patients and of non-paying patients (i.e. patients with chronic or serious illness) is higher in their clientele than on the average.

Cluster 4:

As we have seen above, cluster 4 gather physicians with low levels of activity (more than half the numbers of acts per year less than the average, only 3,.07 acts per patient and 22% of home visits. Their fees are also low but the proportion of surcharges is higher in this cluster where 20% of the physicians belong to the free fees sector (sector 2). They are younger than their colleagues are and their seniority is lower than the average.

Insert Tables 2 to 10

The clustering analysis made with the Burgundy sample of GPs shows the same dominant trends. We notice that physicians who have high levels of annual number of acts have also high costs per patient. Their high activity appears not only in their workload but also in the intensity of health services and in the costs per patient or per prescription order. If it is not explained by the morbidity of the clientele, this result is unexpected. The economic context and the level of health services supply could explain these trends, but according to our results one may assume that there is a trade-off between the length of consultation time and the length of the prescription order and that physicians induce demand for their services. We shall comment on this hypothesis of induced demand in the next section that presents our econometric tests.

Econometric results

Five models have been estimated, first for all GPs then for urban GPs and for rural GPs separately. The results of their estimations are given in table 11. According to the influence of

the dependant variables, the main results lead to the following comments where we consider first the results for all GPs then the particularity of the results for rural GPs only.

Results for all GPs

Individual characteristics of the GP

Seniority has a significant positive influence in the five models.
The annual number of acts of a GP grows with his seniority. It can be related to a larger clientele or to a different way of practising medicine among several generations of GPs. This effect of seniority could be expected, especially since our sample is censored at 65 years old and so the decline of the older GPs' activity is not taken into account.
The average number of acts per patient, the percentage of home visits, the average pharmacy cost per patient with prescriptions and the average pharmacy cost per prescription order also grow with seniority. Because the age structure of the clientele is significant in these models and is a proxy variable for clientele morbidity, these positive effects of seniority mean more a GPS' generation impact rather a clientele morbidity influence.

The main feature of female physicians' activity is well known, their working time is shorter than male physicians. So, here, *ceteris paribus*, women have an annual number of acts lower than male GPs. But, the results also show that women have a lower number of acts per patient, a lower share of home visits in their practise, a lower level of pharmacy cost both per patient and per prescription order. This leads us to the conclusion that, beside a shorter working time, the female physicians have also a particular way of practising medicine.

The number of acts, the average number of acts per patient, the percentage of home visits and the level of pharmacy cost per patient or per prescription order are lower when the GP belongs to sector 2. By assuming that GPs are looking for a given income level, the higher remuneration per act in sector 2 can explain lower activity in this contractual sector. Besides, GPs in sector 2 have more often specialised practise like homeopathy or acupuncture that involves none or less expensive pharmacy prescriptions.

Insert Table 11

Characteristics and size of the clientele

The structure by age of the clientele (percentage of 70 years old patients or older and percentage of 16 or younger) can be interpreted as a proxy variable for higher morbidity and demand, but it can also be related to the age of the GP: the correlation is strong between these two variables.
The percentage of patients of 70 years old or older is significant for the number of acts, the number of acts per patient, the percentage of home visits and the level of pharmacy cost per patient or per prescription order. When his clientele is rather old, a GP makes fewer acts but a larger number of acts per patient; it is possible that physicians with an larger share of old patients are also older, their clientele being somewhat smaller but with serious illnesses and intense needs. This is why a large part of the GP activity is conducted at the patient home. Moreover, older patients mean also more pharmacy expenditures.

The percentage of patients 16 years old or younger is also significant for the number of acts and the number of acts per patient but in the opposite way. A similar interpretation can be put forward concerning younger GPs and the morbidity of a rather young clientele (the parents of the children).

The percentage of non paying patients is a proxy variable of the percentage of seriously ill patients. The number of acts per patient, the percentage of home visits, the level of pharmacy cost per patient and per prescription order increase with this variable.

The number of patients has been introduced as an independent variable in the number of acts per patient model. It is negatively significant. *Ceteris paribus*, a GP makes more acts per patient when he has fewer patients. In this case, we can conclude either that the GP has enough time to see his patient as often as they need or that he sees them more often than needed in order to reach his target income.

Economic context

The economic context takes into account two variables: the unemployment rate and the average income tax in the GP's district. The unemployment rate is negatively significant for the number of acts and the number of acts per patient. It is well-known that, despite a rather

worse health, the unemployed consult less the physicians. But the employment rate is positively significant for the percentage of home visits; employment is associated with social and psychological hardship, which perhaps lead the patient to call for more home visits.
The average of income tax is an indicator of the area wealth. It is significant and negative for the number of acts, significant and positive for the pharmacy cost per patient. These results are consistent with socio-economic studies which show that well-off households resort more to specialist than to GPs and have a higher pharmacy consumption.

Medical context

The distance to the nearest hospital is positively significant for the number of acts, the number of acts per patient, the percentage of home visits and the pharmacy cost per prescription order. When a GP is farther from a hospital, he has to take care of more patients and patients with more serious pathologies who need home visits and expensive pharmacy prescriptions.

Two measures of GP density are used in the models: the GP density in the district ("canton") and the GP density in the county ("department"). They are both significant but do not have the same influence. District density is negatively significant for the number of acts and the number of acts per patient. When density is high in a small area around the GP's town, he performs fewer acts, because the district patients are shared out between many physicians, and fewer acts per patient because high density in a district goes with more other medical facilities like hospital or specialists where the GP's patients will be partly attended. GPs thus have a local market share.
County density is also significant for the number of acts per patient and the percentage of home visits but positively. When the density is high in a larger area around the GP's locality, *ceteris paribus*, physicians have a higher number of acts per patient and their activity is composed of more home visits. This reaction can be a response to competitive surroundings and restores the usual induced demand hypothesis.

Location

The dummy variable which specifies the GP's belonging to a rural or urban space is not significant in any models. Nevertheless, we will show below that rural GPs have specific determinants for their activity.

The dummy variable which specifies the GP's belonging to the *Aquitaine* region or the *Bourgogne* region is on the contrary significant for the percentage of home visits and the pharmacy cost per prescription order. The GPs in *Aquitaine* have more home visits in their activity and more expensive prescription orders. For these two dependant variables, the presence of significant variables related to the number of acts, the clientele and the area characteristics leads us to conclude for a regional local standard. In a regional area, physicians (and patients) are used to a certain behaviour concerning home visits and a certain content for prescription order.

Number of acts

In the model of the percentage of home visits, the number of acts is negatively significant. When the number of acts grows, the percentage of visits decreases; when the workload (or the income) is satisfying the GP refuses or dissuades his patients from home visits. When the workload is too low, making home visits is a way to attract new patients.

In the model of pharmacy cost per patient and in the model of pharmacy cost per prescription order, the number of acts is positively significant. The pharmacy cost grows with the number of acts. We can assume that the consultation duration decreases with the number of acts, and that there is a kind of substitution between consultation duration and pharmacy prescriptions.

Rural GPs

When models are estimated for rural GPs only, several features appear when comparing them with the models for all GPs.

Mainly, individual characteristics are still significant but their t-statistics are a bit lower. Two variables are no longer significant, the contractual sector in the number of acts per patient model, and the gender in the percentage of home visits model. Despite the gender was very significant for all GPs' home visits model, it becomes non significant for rural GPs' home visits model. In rural space, being a woman does not change for a GP the percentage of home visits in the total number of acts. The women do not or perhaps cannot choose not making home visits.

Insert Table 12

For medical characteristics, different modifications appear.

In every model, distance to the nearest hospital is now non-significant. This distance has a higher average and less variability in rural space compared to urban space. The hospital is always rather far in rural space, so the GP's activity is drawn with hospitalisation opportunities.

GP densities do not have the same influence in the percentage of home visits model. For all GPs, the country density is positively significant. For the rural GPs it is no more significant, but the district density is now negatively significant.

In rural space, accepting or promoting home visits is not a response to perceived competitive surroundings but a medical duty the strength of which depends on the nearby medical density.

Moreover, in rural GPs home visits model, the number of acts is still significant but positively. For all GPs we saw that the percentage of home visits decreases with the number of acts; for rural GPs when the number of acts grows, the percentage of home visits also increases. In rural space, for increasing his activity, the GP must make more home visits. The home visits model is the model which changes the more when only rural GPs are taken into account. In rural space, home visits cannot be a choice or a strategy, they are an integral part of GP's activity.

The dummy variable "belonging to the *Aquitaine* region or the *Bourgogne* region" keep the same sign but is more significant (considering t-statistics) in the number of acts per patients, in the percentage of home visits and in the pharmacy costs models. *Ceteris paribus*, the difference is greater between a rural GP from Aquitaine and a rural GP from Bourgogne than between two urban GPs from the two regions. Regional standards of practise are stronger and more specific in rural spaces. Urban practice is more similar throughout all regions. Rural GPs have less continuing education and training, less contacts with far fellows, specialists and hospitals. So their practices are built and change according to nearest influences.

5. Conclusion

Our results show in several ways the heterogeneity of GPs activity. The econometric results prove that the activity determinants arise from different fields with which the physicians must

come to terms: his individual characteristics, his clientele characteristics, his location characteristics. Individuals preference about medical practise, work time or income, medical constraints, professional standards are both influential. Through these determinants influence, his decisions are partly free partly forced. The econometrics results prove that each dimension of a GP activity has its own determinants or its own relationship with a particular determinant. The results concerning the rural GPs also show that each GPs category can have specific determinants.

The clustering results also show that practise of general medicine is not uniform. It depends both on the physicians' individual choices and on the constraints that they must respect. The clustering analysis can reduce the complexity and the diversity of individual decisions and situations: each practising profile indicates one dominant trend in the multidimensional activity of GPs.

We have to take into account all these heterogeneous activity models in order to understand GPs' behaviours and reactions to regulatory policy. If an increase in regulated fees or an incentive policy is enacted assuming standard behaviours for all GPs, each category of physician will react in his particular way. The effective outcomes of the decision would then not be the expected ones.

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Table 1: variable definitions and origin

GP's individual characteristics			
age	Age of the GP	Years	Health insurance funds data base
anciennete_lib	seniority	Dummy variable 1 (less than 3 years) 2 (from 3 to 8 years) 3 (from 8 to 20 years) 4 (more than 20 years)	Health insurance funds data base
prasex_pra	gender	Dummy variable 1 (men) 2 (women)	Health insurance funds data base
cnvmtf_pra	Contractual sector	Dummy variable 1 (sector 1) 2 (sector 2)	Health insurance funds data base
	Type of practise	Dummy variable 1 (full-time private physician) 2 (part-time private physician)	Health insurance funds data base
GP's activity			
ACTO	Annual number of acts		Health insurance funds data base
partv	% of home visits		Health insurance funds data base
CTT	Clientele size	Number of patients	v
RA23	Annual number of acts per patient		Health insurance funds data base
RA14	% of patients with prescription order		Health insurance funds data base
RA 44	Cost of biology per prescription order		v
RA53	Cost of pharmacy prescriptions per patient		Health insurance funds data base
RA42	Cost of pharmacy per prescription order		Health insurance funds data base
RA46	Total cost per patient	Costs of acts and of prescriptions per patient	Health insurance funds data base
HOCO	Regulated fees		Health insurance funds data base
HONO	Total amount of fees		Health insurance funds data base
RA03	% of surcharges		Health insurance funds data base
Clientele characteristics			
RA07	% of less than 16 years old patients		Health insurance funds data base
RA08	% of 16 to 59 years old patients		Health insurance funds data base
RA09	% of 60 to 69 years old patients		Health insurance funds data base
RA10	% of more than 70 years old patients		Health insurance funds data base
RA11	% of non paying patients		Health insurance funds data base
RA12	% of patients		Health insurance funds data base
Economic and medical context			
distmoy	Distance to the nearest hospital	Average distance by district (canton)	INSEE
exist-etab	Presence of a hospital	Dummy variable 1 (yes) 2 (no)	INSEE
denscan	GP density / district (canton)	Number of GP/100 000 inhabitants	INSEE and Health Insurance funds data base
densmed	GP density / county (département)	Number of GP/100 000 inhabitants	Eco-santé (CREDES)
Txcho	Unemployment rate	% per district	INSEE
IMPOT_MOYE	Average income tax	Per district	INSEE
REV_SAL_MO	Average wage-earnings	Per district	INSEE
POL99	Type of the GP location	Dummy variable 1 (urban area) 2 (rural area)	INSEE
Region	Region of the GP location	Dummy variable 1 (Burgundy) 2 (Aquitaine)	Health insurance funds data base

Table 2: cluster analysis of GPs from Aquitaine (average values per cluster), n=3225

class_4	ACTO	CTT	RA14	RA23	RA44	RA46	RA53	partv
Classe n° 1	6450,63	1833,09	90,69	4,15	175,21	2383,18	1290,33	0,29
Classe n° 2	9302,91	2336,65	92,10	4,76	185,73	2785,49	1507,11	0,30
Classe n° 3	4381,35	1266,54	90,72	4,18	177,86	2553,66	1372,76	0,29
Classe n° 4	2410,56	1051,45	81,27	3,07	183,97	1374,25	707,36	0,22
TOTAL	**5130,67**	**1517,40**	**88,53**	**3,97**	**179,29**	**2240,37**	**1200,58**	**0,27**

Table 3: activity and fees (average values per cluster)

class_4	ACTO	C	CTT	RA23	V	partv	HOCO	HONO	RA03	RA24
Classe n° 1	6450,63	4380,77	1833,09	4,15	1876,75	0,29	759228,02	774118,91	1,65	2,79
Classe n° 2	9302,91	6221,11	2336,65	4,76	2817,65	0,30	1080660,46	1094012,36	1,04	3,20
Classe n° 3	4381,35	2965,17	1266,54	4,18	1295,42	0,29	517295,33	536687,11	2,81	2,79
Classe n° 4	2410,56	1627,14	1051,45	3,07	609,14	0,22	333277,35	365772,33	7,33	2,18
TOTAL	**5130,67**	**3471,45**	**1517,40**	**3,97**	**1519,28**	**0,27**	**614497,22**	**634856,43**	**3,33**	**2,69**

Table 4: gender (% of women, % of men per cluster)

prasex_pra class_4	Féminin	Masculin	TOTAL
Classe n° 1	10,0%	90,0%	**100%**
Classe n° 2	4,0%	96,0%	**100%**
Classe n° 3	21,4%	78,6%	**100%**
Classe n° 4	43,9%	56,1%	**100%**
TOTAL	**21,0%**	**79,0%**	**100%**

Table 5: contractual status (% sector 2, % sector 1 per cluster)

cnvmtf_pra class_4	Honoraires libres	Praticien conventionné sans DP	TOTAL
Classe n° 1	6,4%	93,6%	**100%**
Classe n° 2	4,0%	96,0%	**100%**
Classe n° 3	10,9%	89,1%	**100%**
Classe n° 4	20,6%	79,4%	**100%**
TOTAL	**11,0%**	**89,0%**	**100%**

Table 6: age, seniority (years per cluster)

class_4	age	ancienn ete_lib
Classe n° 1	**46,68**	**15,99**
Classe n° 2	**47,19**	**17,48**
Classe n° 3	**47,16**	**15,95**
Classe n° 4	**46,26**	**13,48**
TOTAL	**46,79**	**15,54**

Table 7: type of location (% of each type per cluster)

POL99 class_4	Dom. rurale	Multipolarisée	Périurbaine	Pôle urbain	TOTAL
Classe n° 1	37,8%	1,8%	12,5%	47,9%	**100%**
Classe n° 2	45,9%	4,4%	11,0%	38,7%	**100%**
Classe n° 3	29,0%	2,1%	8,4%	60,5%	**100%**
Classe n° 4	18,0%	1,7%	4,9%	75,3%	**100%**
TOTAL	**31,2%**	**2,2%**	**9,2%**	**57,5%**	**100%**

Table 8: economic and medical context (average values per cluster)

class_4	distmoy	IMPOT_MOYE	REV_SAL_MO	gene_pop	txchom	denscan	densmed
Classe n° 1	13,22	7485,44	104297,39	897,76	0,09	138,27	118,31
Classe n° 2	14,75	7096,21	102883,61	951,36	0,09	126,68	117,32
Classe n° 3	10,44	8054,47	106547,65	869,80	0,09	147,62	118,67
Classe n° 4	7,09	8578,26	108626,78	751,88	0,10	172,09	119,74
TOTAL	**11,02**	**7886,36**	**105896,77**	**859,79**	**0,09**	**148,20**	**118,65**

Table 9: costs and prescriptions per patient (average values per cluster)

class_4	CTT	RA14	RA44	RA46	RA47	RA53	RA42
Classe n° 1	1833,09	90,69	175,21	2383,18	1895,91	1290,33	226,93
Classe n° 2	2336,65	92,10	185,73	2785,49	2231,32	1507,11	247,86
Classe n° 3	1266,54	90,72	177,86	2553,66	2039,60	1372,76	235,76
Classe n° 4	1051,45	81,27	183,97	1374,25	1026,49	707,36	177,99
TOTAL	**1517,40**	**88,53**	**179,29**	**2240,37**	**1770,08**	**1200,58**	**220,28**

Table 10: clientele characteristics (% of each category per cluster)

class_4	RA07	RA08	RA09	RA10	RA11	RA12
Classe n° 1	20,60	55,09	9,78	14,53	21,39	5,68
Classe n° 2	20,59	55,03	9,63	14,75	22,16	5,66
Classe n° 3	18,98	54,98	9,99	16,05	22,43	5,97
Classe n° 4	18,62	58,75	9,82	12,88	20,56	7,80
TOTAL	**19,61**	**55,91**	**9,85**	**14,67**	**21,62**	**6,30**

Table 11: Econometric results. OLS regressions with 5 dependent variables. All GPs, n=4625
Parameter estimate
t value

	Number of acts	Number of acts per patient	Percentage of home visits	Pharmacy cost per patient	Pharmacy cost per prescription order
Intercept	8343 25.19	3.24 10.08	-0.252 -7.13	105.5 1.6	96.18 13.5
Seniority	20.45 4.83	0.017 7.21	0.0011 4.33	9.88 11.6	0.354 3.27
Gender	-1588 -20.6	-0.41 -9.03	-0.075 -14.79	ns	ns
Contractual group	-505.25 -10.34	-0.11 -3.98	-0.0483 -15.31	-59.91 -5.84	-7.29 -5.6
GP density/district ("canton')	-274109 -7.05	-179.29 -8.05	ns	-65436 -8.1	ns
GP density/country ("département")	ns	0.015 4.49	0.00102 2.69	ns	ns
Distance to the nearest hospital	12.02 3.39	0.0094 5.25	0.00048 2.21	3.27 4.49	0.879 10.83
Number of patients		-0.00047 -17.71			
Number of acts			-18.10^{-7} -1.96	0.068 23.55	0.0019 4.82
Number of acts per patient					8.46 12.42
% 16 or younger	22.51 4.16	-0.0241 -7.6	0.00913 26.87	2.15 1.92	0.9 6.33
%70 or older	-22.62 -4.28	0.0164 4.92	0.00727 19.81	26.87 22.61	2.85 18.88
% non paying patients	ns	0.0226 8.27	0.0049 16.37	6.42 6.56	0.78 6.38
Urban/rural	ns	ns	ns	ns	ns
Unemployment rate	-3942 -2.98	-3.16 -4.11	0.467 5.47	-412.25 -1.47	-24.10 -7.03
Income tax	-0.086 -6.33	ns	$5\ 10^{-6}$ 5.5	0.0068 2.41	ns
Region	111.80 1.62	0.147 1.91	0.0385 4.39	69.44 4.9	10.12 5.8
R^2 F	0.18 99.58	0.24 121.22	0.38 239.05	0.36 231.74	0.31 211.21

Table 12: Econometric results. OLS regressions with 5 dependent variables. Rural GPs, n=1469
Parameter estimate
t value

	Number of acts	Number of acts per patient	Percentage of home visits	Pharmacy cost per patient	Pharmacy cost per prescription order
Intercept	8290 12.91	3.36 7.26	0.15 -4.28	185.97 3.01	65.84 4.15
Seniority	23.01 7.38	0.0095 2.93	0.0015 4.4	1.9 1.5	ns
Gender	-1692 -11.25	-0.427 -6.24	ns	ns	ns
Contractual group	-500.6 -4.47	ns	-0.0372 -7.13	-43.90 -2.2	-12.67 -2.34
GP density/district ("canton')	-232112 -2.89	-122.5 -3.19	-11.46 -3.05	-64292 -4.71	ns
GP density/country ("département")	ns	0.0082 2.02	ns	ns	ns
Distance to the nearest hospital	ns	ns	$43\ 10^{-5}$ 1.72	ns	ns
Number of patients		-00037 -9.41			
Number of acts			39.10^{-7} 3.31	0.060 13.55	ns
Number of acts per patient					9.08 6.6
% 16 or younger	ns	-0.0273 -4.10	0.0059 8.58	ns	1.37 3.82
%70 or older	-56.52 -4.47	0.0142 2.27	0.0074 11.39	31.93 15.69	4.05 12.09
% non paying patients	ns	0.0329 5.89	0.0051 8.98	17.22 7.93	1.14 3.71
Unemployment rate	ns	ns	ns	ns	-15.16 -2.34
Income tax	ns	ns	$4\ 10^{-6}$ 3.35	ns	0.00402 6.34
Region	196.19 1.61	0.35 3.70	0.0618 11.01	ns	14.89 5.08
R^2 F	0.13 30.2	0.28 56.52	0.33 66.38	0.31 211.21	0.26 65.42