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ASSESSING MUFACE'S MANAGED COMPETITION EXPERIMENT IN THE SPANISH HEALTH CARE SYSTEM.

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Abstract

Besides the influence of international experiences, the existing debate about implementing managed competition in Spain is grounded on MUFACE. MUFACE is an experimental publicly funded health care system, restricted to civil servants and their dependants, that meets all the conditions of managed competition among insurers.

This article tries to offer an analysis of some aspects of MUFACE. It includes firstly a formalization of the incentives (a capitation) imposed to insurers and their optimal behaviour. Secondly, it tries to assess the existence of risk selection and other equally "perverse" practices, like what we call *service selection*, in the presence of double insurance coverage.

Keywords: Health insurance, risk selection, health care reform, Spain, Reimbursement.

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INTRODUCTION

Strong winds of reform blow over the most developed countries'health care systems. The forces most frequently mentioned have to do with a rather uncontrollable increase in health care expenditure and no counterpart in terms of health care output indicators (Blendon et al., 1991).

Some authors (Drèze, 1994) find in moral hazard the *crux* of the unresolved problem of health care provision. Moral hazard problems are rooted in the behavior of both patients (demand side) and providers (supply side). On *the demand side*, moral hazard is a problem as soon as an insurance covers all kind of contingency and at any cost. On *the supply side*, many factors generate moral hazard problems. Among the most relevant we mention cost-plus (retrospective) reimbursement rules that have traditionally dominated in insurance-provider relationship.

As the root of the problem of inefficient cost increase, the solutions may be viewed as coming towards either the demand, the supply, or both sides of the markets. Towards *the demand side*, the proposals that are most frequently mentioned would consist in increasing the insured participation in costs. But other kinds of non-monetary active participation of insured individuals in the decisions dealing with the provision could be considered, like widening choices of insured. If choice exists, moral hazard might then be reduced in the sense pointed out by López-Casasnovas (in Barbera, 1996): insured will be forced to internalize their disappointments or disagreements about provision by just shifting provider, instead of making government responsible. Publicly financed health care systems have traditionally ignored these aspects of their health care system, in the name of paternalism and consumers'protection. However, as society grows more mature, better informed and educated about health care, that paternalism becomes anachronic. Consumers want to make choices and their own mistakes.

On *the supply side*, the literature proposes, as in the case of the demand side, to try to reach an optimal distribution of providers responsibilities in health care costs variations (Diamond, 1991, and Zeckhauser, 1970). In this search, the design and improvement of health providers'reimbursement systems are key elements.

All these proposals include ingredients of managed competition. Indeed, managed competition places special emphasis on such elements as choice, competing providers and transfer of financial risk from the purchaser (government) towards insured and providers. Reforms in this sense are seen in many countries as "the means to pursue nirvana, in terms of efficiency" (Maynard, 1994). One of the characteristics of this line of reform is that, in many cases, competition is preferably (Abel-Smith and Mossialos, 1994, and Hurst, 1991) set amongst providers that are vertically integrated and responsible for comprehensive care, like health maintenance organizations, GPFundholders, mutualities and insurers[1]. Regulated market structured this way is very appealing to many policy makers. The reason is that that structure of regulated markets implies targeting final outputs (health status) rather than intermediate outputs (medical activity), which is precisely one of the emphasis of publicly funded health care systems. And that may be the reason of the rapid success of these proposals. A second inherent characteristic of these models is that capitation is the reimbursement scheme chosen to transfer financial risk from the (public) purchaser towards providers. In fact, capitation constitutes one of the most important challenges of managed competition[2]. Most authors agree with Scheffler's idea

1 We will from now on talk of "insurers" when referring indistinctly to insurers and third party purchasers of health care.

2 Other challenges should not be ignored. For example, a very interesting debate has recently been open by Gouveia (1995) on the effects of competition. Gouveia assumes that technology plays the role of providers'differentiation, placing "the degree of effectiveness of technology as a second criterion for its use". He argues that "rather than increasing welfare, competition may decrease it, insofar as the growth in costs is not compensated by an increase in effectiveness (of technology), which is similar to the consequences of the increasing monopoly model." Also, Van de Ven (1995a) recalls that market-oriented reforms may improve efficiency but have not much to do with cost containment "in the sense of stabilizing the fraction of gross national product to be spent on health care." Some others denounce that political and social structures of some countries may provoke the failure of market-oriented reforms (Matsaganis, 1995). As many other innovations, the opening health care markets towards managed

(Scheffler, 1989) that capitation represents the Achilles'Heels of managed competition reforms (Pellisé and López-Casasnovas, 1992; Van de Ven, 1995b; Matsaganis and Glennerster, 1994).

Managed competition has centered most of the attention of last decades reformers of health care, taking Enthoven's Consumer Choice Health Plan (Enthoven, 1986, 1980, 1990; Enthoven and Kronich, 1989), as the prototype. It constitutes the baseline of the reforms in the United Kingdom, the Netherlands, Portugal, Chile, Denmark, Sweden, Ireland, New Zealand, the Russian Federation, Israel, ...and Spain.

The ground for a possible reform in Spain is MUFACE, an experimental health care system, restricted to civil servants and their dependents. It is a health care sub-system within the Social Security System in Spain. The particularity of MUFACE is that it makes insurance carriers, including the public INSALUD, compete for clients, by offering their health care plan and in exchange of a fixed capitation fee. So, MUFACE makes up some form of managed competition. MUFACE is playing a key role in the debate around the design of the Spanish Health Care System of the future. It is under persistent political scrutiny but never rigorously analyzed.

It is in the analysis of MUFACE that this research tries to make some contribution. We will try to do so by focusing on the distribution of risks between purchaser (government) and providers in a context of managed competition amongst insurance carriers. More specifically, it will place most of its attention onto capitation mechanisms which are the payment scheme usually implemented to reimburse competing insurance carriers. The research is structured in three parts. The first one includes a description of MUFACE system. The second part tries to formally deduce insurer's behaviuor under MUFACE incentive scheme. That part represents an extension of a previous model (Pellisé, 1994),

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competition is a sign of success. It also implies the need to challenge the consequences of its own success, though: we better get to know weaknesses and limitations of the model.

which was an application of Laffont and Tirole's (1993) formalization on incentives in procurement. Finally, section three shows some empirical assessment of some of the conclusions reached in the formalisation, like the existence of risk selection.

I. MUFACE IN THE CONTEXT OF THE SPANISH HEALTH CARE SYSTEM.

Figure 1 graphically represents the MUFACE system. MUFACE stands for "Mutua de los Funcionarios de la Administración Central del Estado". It is a governmental institution, responsible for contracting out the health services of Spanish civil servants (around 700,000 in 1993) and their dependants (about 900,000). The rest of Spaniards (around 38.5 million) get health services through the *general* system of the Social Security, the INSS (National Institute of the Social Security), by means of the only public provider, the INSALUD (National Institute for Health). MUFACE system is a *special* Social Security regime, applicable only to civil servants and their dependants. Both this *special* regime for civil servants and the *general* regime for the rest of Spaniards cohabit in the Social Security system.

[Figure 1, here]

Within MUFACE system, MUFACE is a governmental institution that plays the role of just a regulator bearing no financial risks. Its revenue is basically a proportion of the public budget, made up of income taxes (general budget) and employees (the State) and civil servants'contributions. MUFACE allocates its own resources for health care to a diversity of insurance carriers who are willing to supply health care services to MUFACE's enrolees, on a capitation basis. As a consequence, MUFACE does not really bear any financial risk. Figure 1b shows these main financial flows of MUFACE[3].

[Figure 1b, here][4]

One of the contracted insurance carriers is the public National Institute of Health (INSALUD), the same institution that provides health care services to the rest of Spaniards. But, while the latter have only this option, MUFACE enrolees can nowadays choose among the INSALUD and other (private) insurance carriers willing to participate in the MUFACE system. It is worth noting that, before 1977, MUFACE did not contract INSALUD, letting MUFACE enrolees choose among private carriers only. In the beginning of 1993, ten private companies chose to enter into a one year contract with MUFACE. ASISA and PREVIASA are two examples of them. They have about the same organisational structure as a Health Maintenance Organisation, and are required to offer at least the same coverage as the public agency INSALUD offers to the rest of Spaniards.

Civil servants choose an insurance carrier once a year (during the month of January), for themselves and their dependants. It is not an individual decision, that is, the hole family unit must choose the same carrier. Last January, 85% of the enrolees selected private carriers, and only 15% preferred the public agency INSALUD. Carriers are reimbursed a flat capitation fee, for each civil servant or dependant they have enrolled. The amount of this fixed fee is equal to the per capita public health care expenditure incurred by the INSALUD on all its covered population, that is on both the 15% of MUFACE enrolees who chose this agency and the rest (around 39 millions) of Spaniards.

3 The General Regime of the Social Security funding in 1992 was as follows: employees contributed in 3.8%, employers in 19.6% and the State, through general taxation, in 76.5% (DGAPS, 1994). So, the employee contribution was much higher in the case of civil servants than in the case of workers in the General Regime of the Social Security.

4 The concept "Other revenues" includes extraordinary revenues (1.5%), transfers from the State (deficit, 8.1%), and what the administration calls "cumulative excedent from previous years" (due State contributions), 30.7%.

MUFACE makes insurance carriers, including the public INSALUD, compete for clients, by offering their health care plan and in exchange of a fixed capitation fee. By placing carriers fully at risk and entitling enrolees to choose, MUFACE makes up some form of *internal market*. For this reason, it appeals to many health care system reformers. However, it also concerns many others, mainly for two reasons. First, it is an "unfair" privilege, since 1.5 million people can choose among insurance carriers while 39 million cannot, with no extra charge. This argument puts pressure on the government to terminate the MUFACE experiment. Second, it is felt that private carriers have "attracted" all the good risks, pushing bad risks into the public agency. In other words, the critics of MUFACE's internal market believe that this has created risk selection problems.

II. FORMALIZATION OF MUFACE INCENTIVE SCHEME.

Our formalization focuses on the contractual relationship between the regulatory institution represented by MUFACE and health care plans offered insurers carriers (including both INSALUD and private kinds of carriers). The centre of our attention is thus the upper half part of figure 1. More specifically, we are interested in modelling the response of insurers to the contractual arrangements set up in MUFACE. We will firstly offer the main ingredients and assumptions of our modelization, and will then show the resulting optimal behaviour of insurers, given the incentive scheme.

II. A THE ASSUMPTIONS.

II.A.1 The incentive scheme.

In our analysis of MUFACE system, we consider insurance carriers (either public or private) as procured agencies. Each carrier's yearly per capita revenue (*AR*, paid by MUFACE) is, by definition, a fixed amount of money per enrolee that, on a yearly basis, has chosen it to provide health services. Consistently with Laffont and Tirole's conventions, we define that revenue as the linear summation of annual health care costs *C* and a net transfer *t*, per enrolee,

$$AR = C + t. \qquad (1)$$

The net transfer *t* defined by MUFACE is derived from the general form,

$$t = a - bC. \qquad (2)$$

The parameter *b* is a portion ($0<b<1$) of realised costs that is reimbursed by the regulator under the form of a net transfer. The value of this parameter defines the incentive power of the payment scheme, or, in other words, its degree of prospectivity. In MUFACE's environment, this parameter takes the extreme value of *1*.

With $b = 1$, the net transfer equals $t= a-C$, and carriers'average revenue $AR = C+t = a$. This kind of contract implies that insurers'average revenue has no relationship with realised costs. Such reimbursement scheme is usually called *fixed-price* or *prospective*. It places insurance carriers fully at risk for any fluctuation in realised costs, whether they are justifiable or not. Consequently, it is totally in carriers'interest to make their best endeavour to minimize average costs.

The parameter *a* is a fixed fee, independent from realised costs *C*. MUFACE has defined this parameter as the *level* of the capitation payment.

$$a = z + I, \quad (3.a)$$

where I is the INSALUD per capita expenditure for all its covered population. In fact, I is the INSALUD average expenditure not only on MUFACE enrolees (15% of 1.5 million enrolees), but also on the rest of (non-MUFACE) Spaniards covered by the so-called *general* system of the Social Security (99% of the almost 39 million who are neither civil servant nor dependants).

All together, the net transfer becomes:

$$t = a - C$$

$$t = z - (C-I), \quad (3.b)$$

showing that the net transfer paid to private insurers is positively related to any cost saving attained, when comparing their own average costs to those of the INSALUD.

II.A.2 Information asymmetries.

We assume that there is a problem of asymmetric information between MUFACE and insurance carriers. MUFACE cannot observe the cost-reducing effort made by carriers, nor that part of systematic variation in cost that is due to some characteristics of their demands (health status). At most, the regulator may verify an aggregate measure of costs.

The first source of these mentioned information asymmetries is the *moral hazard* factor, and the latter the *adverse selection* factor. Both factors determine the systematic variation of costs[5]. As defined by Ellis (1987), this latter factor is representative of the prospect "that certain facilities may systematically receive high- or low- cost patients". Other authors term this variation in cost "*not controllable*" (Manton et al., 1989), "*justifiable*" (Keeler, 1990) or "*patient- or provider- specific*" (Ellis and McGuire, 1988).

5 Random variations in cost are omitted for notational simplicity. Indeed, their inclusion does not change any of the findings.

Insurance carriers'cost function is assumed to be separable in production and asymmetric information variables. Leaving the production variables unchanged, we define the total cost function as

$$TC = (\beta - e)n + K, \qquad (4)$$

where β is usually referred to as the adverse selection parameter of the carrier. It is a very relevant ingredient of the model which will be analysed in-depth later on. e is the cost-saving effort per enrolee, n the number of enrolees who have chosen that company and K a fixed cost (which we set to zero for notational simplicity).

Let C be the average cost per enrolee ($C = \beta - e$). MUFACE cannot observe effort but knows that: (a) When effort is raised, costs decrease, at a decreasing rate ($C_e < 0$ and $C_{ee} \geq 0$); and, (b) Effort generates disutility to insurer carriers. Let $\psi(e)$ be the disutility function of effort, $\psi'(e) > 0$ and $\psi''(e) > 0$. MUFACE is aware of this relationship.

MUFACE offers all insurance carriers that are able to offer a health care plan that is comparable to INSALUD's the possibility of participating in MUFACE. They are free to do so, but they will accept the deal if, and only if, they are guaranteed a minimum level of expected utility (the reservation utility level). We are thus assuming individual rationality. We normalize the level of reservation utility at zero. Any level above that will be called the carrier's "rent" or "surplus".

Insurers are risk neutral and care only about their income and effort. We can write the firm's utility function as $U = t - \psi(e)$.

II.A.3 The adverse selection parameter.

The debate on risk selection often surrounding reforms containing some form of managed competition and capitation payments in Spain suggests the convenience of considering more than one scenario regarding insurers'specific costs. Indeed, every time the possibility of transforming the

Spanish National Health System into a National Insurance System has been debated in the political arena, the argument of risk selection has caught most of the attention. The mainspring of MUFACE detractors'argument has been the feeling that in the MUFACE experiment, private carriers have managed to "skim the cream", in the sense empirically assessed in similar scenarios by Newhouse (1982 and 1984) and Pauly (1984) for the American Medicare context, by Van de Ven and Van Vliet (1990) for the Dutch, and by Scheffler (1989) and Matsaganis and Glennester (1994) for the British context. This argument implicitely assumes that β is an *endogenous variable* to the insurance carrier. That is insurers play an active role in an incidental determination of justifiable costs through their selection of enrolees. Insurers optimize their pool of risks according to enrolees' expected yearly cost, in the same way an investor in a financial market would optimize its portfolio according to expected returns and risk.

However, risk selection in MUFACE has never been assessed empirically. As a consequence, private insurers stick to the position that either there are no systematic differences in cost (β is *uniform*, on average, across all carriers), or that any difference in cost is *exogenously determined* (heterogeneous but exogenous). They argue that, if any difference among insurers ever existed, it is due to reasons such as the historical origin of the insurance (inherited organisational structure), its location, or statutory restrictions (like religious goals). These sources of justifiable cost variation are exogenous to the agents'behaviour (in the short run at least), and independent of whether the agent signs up the contract with MUFACE or not.

The scenarios where β is *uniform* or *heterogeneous but exogenous* have already been treated elsewhere (Pellisé, 1994). It was then shown that, given the exogeneity and heterogeneity of risks faced by insurers, one should expect a problem of *pre-contractual self-selection* (or *adverse selection*) *among insurers*. That is, MUFACE as a regulatory agency should not expect to find "bad risks" among its contracted private insurers, as long as individual rationality and free participation are binding constraints.

The scenario we are dealing with in this paper have to do with a β that is *endogeneous.* We will here assume that variations in "justifiable" costs β are endogenously determined by insurers. That is, insurers may optimize their own pool of risks β by "attracting" good risks (healthy enrolees) and "avoiding" bad risks (unhealthy enrolees). Under this assumption, *we are extending Laffont and Tirole's formulation* (Laffont and Tirole, 1993). Both scenarios (that presented in Pellisé, 1994, and this one presented now) and corresponding results are complementary. They could in fact have been tested together. But not only would this have been more cumbersome, but also, their separation does not imply any loss of information and rather greatly simplifies the formalization.

II.A.4 Other related aspects of insurers' behaviour.

1) We group private insurers together under a uniform β. This simplification is possible if we consider that all private carriers play with uniform rules and if we want to concentrate on the endogenous aspects of β (leaving the exogenous aspects unchanged). $E(\beta_1) = B_1$ and $E(\beta_2) = B_2$ represent the expected values of MUFACE enrolee-specific costs (health status) of private insurers and INSALUD, respectively.

2) We will assume that risk selection is undertaken by private insurers. The INSALUD has a rather passive attitude (defensive at most) towards this selection. This attitude could be justified by the low weight that MUFACE enrolees represent in the total population attended by INSALUD, by the retrospective aspect of INSALUD reimbursement scheme, or by its public ownership.

Let $E(\beta)=B$ represent all MUFACE enrolee-specific costs. MUFACE enrolees distribution of β_2 is comparable to that of β for the rest of Spaniards. In other words, MUFACE enrolees have a health status that is comparable to that of the rest Spaniards. Moreover, we assume that, if no risk selection were undertaken, then the hazard functions of β of (i) all INSALUD enrolees (from MUFACE or not), of (ii) MUFACE beneficiaries altogether, only of (iii) those MUFACE enrolees in INSALUD and only of (iv) those in private carriers are all comparable for any given value of β. This implies the assumption that *ex-ante* (i.e. without risk selection), individuals are evenly distributed according to their health care needs across the multiple providers of the Social Security.

3) We will consider that β represents a monetary measure of unhealthiness. A high β individual is an unhealthy individual, and a low β individual is a healthy one. Usually, health care expenditure is lognormally distributed. Assuming there is a continuum of β in the interval $[\beta_L, \beta_H]$, then β, as well as β_1 and β_2 without risk selection, are distributed

$$\beta \sim Lognormal\,(B, \sigma^2).$$

4) In contrast, if risk selection is undertaken, private carriers distribution of their β is not the distribution just defined anymore. In fact, risk selection *truncates* the upper tail of the distribution of β_2 that private carriers would otherwise have without risk selection.

A first step in risk selection would be to "get rid of" the most expensive patient β_H in the interval $[\beta_L, \beta_H]$ of possible patients. Subsequent steps, following risk selection practices, would consist in progressively "get risk" of lower than β_H patients. Let's r_1 denote the healthiest enrolee affected by private carriers'selection, conditional upon all β that preferred a private provider in the interval $]r_1, \beta_H]$ did already suffer from selection. It is worth noting that as r_1 decreases risk selection becomes more severe.

As a consequence of risk selection, the distribution of private plans'β becomes a truncated distribution for any value of β greater or equal to r_1. Hence, the resulting mean of private carriers'justifiable costs is

$$E(\beta_1 / \beta_1 < r_1) = B_1 = E(\beta) - \sigma \lambda_1 (\alpha), \quad (5)$$

$$\text{with } \alpha = (r_1 - E(\beta)) / \sigma, \quad (6)$$

$$\lambda_1(\alpha) = \phi(\alpha) / \Phi(\alpha), \quad (7)$$

and, $E(\beta) = B$.

$\phi(\alpha)$ and $\Phi(\alpha)$ are standard probability density and cumulative distribution functions, respectively. For notational simplicity, we will, in what follows, use ϕ and Φ to refer to $\phi(\alpha)$ and $\Phi(\alpha)$, respectively.

5) When unhealthy beneficiaries (with high β values) are "excluded" from private insurers, the public INSALUD in MUFACE takes care of them. The distribution of the systematic costs function due to this group of "selected" beneficiaries yields, on their own, an expected value of β like

$$E(\beta_1 / \beta_1 \geq r_1) = E(\beta) + \sigma \lambda_2 (\alpha), \quad (8)$$

with $\alpha = (r_1 - E(\beta)) / \sigma$,

$$\lambda_2(\alpha) = \phi(\alpha) / (1 - \Phi(\alpha)), \quad (9)$$

and, $E(\beta) = B$.

6) Expected costs of INSALUD are I. These costs are a weighted average of the expected costs of two groups of enrolees: (i) those who would be attended by INSALUD when no risk selection is undertaken (coming from MUFACE and also the rest of generally covered by INSALUD), and (ii) those who are "excluded" from private carriers. The expected costs of the former group of enrolees is $E(\beta) = B$, according to ingredients defined in point 3 and 4. And the expected costs of the latter groups is $E(\beta_1 / \beta_1 \geq r_1)$, as defined in equations (8) and (9).

The weight of the "excluded" individuals over all enrolees attended by INSALUD is $\mu = (1-\Phi)\varepsilon$. ε $(0 \leq \varepsilon \leq 1)$equals the proportion of MUFACE enrolees choosing private carriers (without risk selection) over the rest of individuals (not necessarily from MUFACE) attended by INSALUD. And

$(1-\Phi)$ is the probability that beneficiaries choosing a private carrier fall within the "excluded" group of enrolees. This probability equals zero when no risk selection is undertaken, increases with risk selection, and, hence, decreases with r_1.

Taking (8) and (9) into account,

$$E(\beta_2) = (1-\mu)\, E(\beta) + \mu\, E(\beta_1 \,/\beta_1 \geq r_1)$$

$$\Rightarrow E(\beta_2) = (1-\mu)\, E(\beta) + \mu\, B + \mu\, \sigma\, [\,\phi(\alpha) / (1 - \Phi(\alpha)]$$

$$\Rightarrow E(\beta_2) = B + \mu\, \sigma\, (\,\phi(\alpha) / (1 - \Phi(\alpha))$$

$$\Rightarrow E(\beta_2) = B + \varepsilon\, (1-\Phi)\, \sigma\, \lambda_2(\alpha) \qquad (10)$$

Consequently, the expected cost function of INSALUD becomes

$$I = E(\beta_2) - \hat{e} = B + \varepsilon\, (1-\Phi)\, \sigma\, \lambda_2(\alpha) - \hat{e}$$

$$\Rightarrow I = \hat{I} + \varepsilon\, (1-\Phi)\, \sigma\, \lambda_2(\alpha), \qquad (11)$$

with $\hat{I} = B - \hat{e}$, (12)

and $\hat{e}$ being the effort that INSALUD exerts. Moreover, since,

$$E(\beta) = B = \Phi\, E(\beta_1 \,/\beta_1 < r_1) + (1-\Phi)\, E(\beta_1 \,/\beta_1 \geq r_1),$$

then, equation (11) may be equally interpreted under the form

$$I = \hat{I} + \varepsilon\, \Phi\, \sigma\, \lambda_1(\alpha). \qquad (13)$$

7) Risk selection inflicts disutility to private carriers. Firstly, because there is the possibility that a patient is detected as having been selected out by a private carrier. In such a case, the responsible carrier is urged to reimburse INSALUD full health care costs. Secondly, because there is also the possibility that an insurer carrier might be denied future deals with MUFACE because of risk selection practices. This punishment has never been put into practice. The former compensation to INSALUD for risk selection is rather frequent in MUFACE. In 1992, 8.3 enrolees out of 100,000 in MUFACE

suffered from "extraordinary switches". Each of these cases did not cost less than 1.5 million Pesetas. (DGAPS, 1993). This is the kind of risk selection cost we will try to formalize here.

We call p the probability ($0<p\leq 1$)) that a selected individual (in the interval $[r_1,\beta_H]$) is detected, and whose health care costs have to be reimbursed by private carriers to the public INSALUD. Given equations (8), (9) and (12), the expected full cost private carriers should pay back to INSALUD is

$$p\,C^* = p\,[\,E(\beta_1 \,/\, \beta_1 \geq r_1) - \hat{e}\,] \qquad (14)$$

This expected cost function is increasing with r_1 (with $\partial^2(pC^*)/\partial r_1 > 0$). In other words, equation (14) is decreasing (and convex) with risk selection. Let's take an extreme example. An insurance carrier starts selecting. The first selected individual is the most expensive one, with $\beta=\beta_H$. Let's assume for a moment that INSALUD detects this selection with probability $p=1$. In such a case, that private carrier has to pay back INSALUD the cost of attending this patient, which is the highest cost $C_H = \beta_H - \hat{e}$. This is the cost defined by equation (14) for the special highest β case. If that insurance carrier kept on selecting, further costs to be paid back to INSALUD would be lower.

From that extreme example, one may infer that equation (14) gives a misleading approach to the disutility of selection. Actually, it just defines the expected per capita cost of "excluded" individuals that have been detected by INSALUD. It does not define its impact on private carriers expected total cost, and, consequently, on their net transfer. But that impact is what really matters to carriers.

In order to capture that impact, we need define the disutility of effort as a function of the share of "selected" individual over the rest of individuals among which the costs of selection have to be spilt over. Taking (14) and this spill over effect into account, the resulting disutility from risk selection ($\zeta(r_1)$) becomes

$$\zeta(r_1) = p\,[(1-\Phi)/\Phi]\;C^*$$

$$\zeta(r_1) = p\,[(1-\Phi)/\Phi][\,B + \sigma\,\lambda_2\,(\alpha)],$$

$\zeta(r_1) = p\,[(1\text{-}\Phi)/\Phi]\,\hat{I} + p\,\sigma\,(\phi(\alpha)\,/\,\Phi(\alpha),$

or, $\zeta(r_1) = p\,[(1\text{-}\Phi)/\Phi]\,\hat{I} + p\,\sigma\,\lambda_1(\alpha).$ (15)

The weight $[(1\text{-}\Phi)/\Phi]$ accounts for how much the unselected individuals (whose probability is $[1 - \Phi]$) are bound to bear because of the carrier selecting some individuals, whose probability is Φ and whose full health care costs will have to be paid back with probability p to INSALUD. This weight tends to zero when no risk selection is undertaken. It equals one when half of the individuals choosing private carriers are selected out. And tends to infinite when all individuals are selected out.

8) The net transfer to private carriers was defined by equation (3a) and (3b), $t_1 = z - (C - I)$, where I is the average (per capita) expenditure of INSALUD on MUFACE enrolees and on the rest of Spaniards.

With all the information offered by equations (5) to (15), the net transfer equation of private carriers becomes

$t_1 = z - (C - I)$

$t_1 = z - \{B - \sigma[\phi/\Phi] - e_1\} + \{B + \varepsilon(1-\Phi)\sigma[\phi/(1-\Phi)] - \hat{e}\}$

$t_1 = z + \sigma\,\lambda_1(\alpha)\,[\,1 + \varepsilon\,\Phi] + (e_1 - \hat{e}).$ (16)

II.B THE PROGRAM OF PRIVATE CARRIERS.

Private carriers utility is a function of the net transfer (t_1) less the disutility of risk selection ($\zeta(r_1)$) and the disutility of effort $\psi(e_1)$,

$U_1 = t_1 - \zeta(r_1) - \psi(e_1)$

$U_1 = z + \sigma\,\lambda_1(\alpha)\,[\,1 + \varepsilon\,\Phi] + (e_1 - \hat{e}) - p\,[(1\text{-}\Phi)/\Phi]\,\hat{I} - p\,\sigma\,\lambda_1(\alpha)$

$U_1 = z + \sigma\,\lambda_1(\alpha)\,[1 + \varepsilon\Phi - p] - p\,[(1\text{-}\Phi)/\Phi]\,I + (e_1 - \hat{e}) - \psi(e).$ (17)

We impose a constraint over the optimization program of insurers consisting in requiring that any additional risk selection is undertaken only if it brings to insurers equal or greater net transfer than disutility. This restriction implies that individual rationality prevails under risk selection. The form of this restriction is

$$\sigma \lambda_1(\alpha) [1 + \varepsilon\Phi - p] \geq p [(1-\Phi)/\Phi] I.$$

Note that $\lambda_1(\alpha) = \phi(\alpha)/\Phi(\alpha)$ is the *hazard function* for the distribution of enrolees remaining in private carriers, after risk selection has taken place. $\lambda_1(\alpha)$ may be interpreted as the probability that no more β_1 are less than r_1, given that $\beta_H - r_1$ (in the interval $[\beta_L, \beta_H]$) have already been selected out. As this probability rises, a greater proportion of unhealthy individuals has been successfully skimmed by private carriers.

This hazard function has positive slope and is convex with respect to risk selection, and negative slope with respect to r_1. High risk selection undertaken, corresponds to a higher values of the hazard functions.

Finally, the program of private insurers becomes,

Max $U_1 = z + \sigma \lambda_1(\alpha) [1 + \varepsilon\Phi - p] - p [(1-\Phi)/\Phi] I + (e_1 - \hat{e}) - \psi(e)$

subjected to $\sigma \lambda_1(\alpha) [1 + \varepsilon\Phi - p] \geq p [(1-\Phi)/\Phi] I$

II.C THE SOLUTIONS.

The solutions to private carriers' program are:

$$\psi'(e) = 1 \qquad (18)$$

$$p[(I/\sigma)(\phi/\Phi^2)] + \varepsilon\phi^2/\Phi = \sigma \varsigma_1(\alpha) [1 + \varepsilon\Phi - p] \qquad (19)$$

with $\varsigma_1(\alpha) = \partial[\lambda_1(\alpha)]/\partial\alpha = \lambda_1(\alpha) [\lambda_1(\alpha) + \alpha]$

According to equation (18), effort reaches, at the optimum, the level of complete information conditions, since insurers are residual claimants of any cost savings due to effort.

The right hand side of equation (19) are the marginal net benefits in terms of increased net transfer to private carriers by a marginal decrease of r_l, or, in other words, due to the reduction of the truncation point of the distribution of private carriers' β. These net benefits are threefold.

Firstly, net transfer is increased as a result of decreasing private carriers'own costs. This is equivalent to the marginal decrease of the truncation point of their β distribution, as r_l increases. Private carriers get all the benefits from such a reduction in cost because the capitation payment places them as full residual claimants. Secondly, by decreasing the truncation point, the portion of INSALUD's costs due to MUFACE beneficiaries that have suffered selection ($\varepsilon\Phi$) makes INSALUD average costs increase by $\varepsilon\Phi\lambda_l(\alpha)$. This increase in INSALUD costs produces an increase in the net transfer to private carrier through equation (10). And, finally, marginal net benefits are obtained by detracting the marginal costs of selecting out. These are a portion p of the gross marginal benefits of truncating private carriers'own costs ($\varsigma_l(\alpha)$).

The left hand side of equation (19) are the marginal spill-over effects of observing a greater amount individuals coming form private carriers on to the public INSALUD, due to risk selection instead of *ex-ante* choice of carrier. Theses affects are twofold: (i) on the average disutility of effort $\{p[(I/\sigma)(\phi/\Phi^2)]\}$, and, (ii), on the average costs of INSALUD (I) that are used as reference of the transfer function $t\ \{\varepsilon\phi^2/\Phi\}$.

These results are worth three comments. Firstly, they satisfy the sufficient conditions of a maximum with respect to r_l. Annex 1 shows the properties of the second derivative implying so.

Secondly, the constraint is not binding at the optimum, as shown in annex 2. As a consequence, we derive the following **proposition 1:**

Given an optimal level of net transfer under no risk selection environments, i.e. that would leave no rents under exogenous ß scenarios, the endogeneity of ß makes insurance carriers capture positive rents when risk selection is optimized. Consequently, from the regulator stand-point, if the regulator accepts the existence of risk selection, he could pay private carriers a lower net transfer (as compared to that paid under exogenous risk pools), up to the point where individual rationality conditions would still be satisfied.

Thirdly, those results may be extended for a net transfer such as

$$t_l = z - b\,(C - I),$$

where the degree of the incentive scheme b ($0 \leq b \leq 1$) is not constrained to be equal to one. Under these general conditions, the results of the insurance carriers'program yields:

$$\psi'(e) = b$$

$$p[(1/\sigma)(\phi/\Phi^2)] + b\,\varepsilon\phi^2/\Phi = \sigma\,\varsigma_l(\alpha)\,[\,b\,(1 + \varepsilon\Phi) - p]$$

This program provides the following **proposition 2:**

Besides the relevance of p, the degree of the incentive power of the capitation payment is equally relevant in determining carriers'risk selection behaviour. With b < 1 we would have, at the optimum, an effort lower than the complete information effort, but proportionally less risk selection: while benefits from selecting get lower, the disutility remains the same.Consequently, given the endogenous characteristic of risk pools, some rents could be extracted from private carriers by either changing the degree of prospectivity of the level of the capitation payment, or by setting a capitation payment lower than that resulting from an exogenous risk pool scenario, without violating the individual rationality constraint.

III. SOME EMPIRICAL IN-SIGHTS.

One of the most important implications of the formalization offered previously is that one should expect to observe risk selection problems in MUFACE. In fact, this is exactly what detractors of MUFACE more strongly argue against its extension to all Spaniards. In this part of the research we would like to offer some empirical in-sight into MUFACE's election of insurance carrier.

The main challenge faced along our empirical assessment of the incentives set up in MUFACE is related to the data. Trying to detect risk selection practices requires detecting that systematically lower than average cost patients choose private carriers and relatively more expensive patients choose INSALUD. However, this is precisely the kind of information that has not been provided by neither of the carriers participating in MUFACE nor MUFACE itself. For that reason, we needed to carry on the rest of the analysis on the grounds of indirect information on costs. Some sociodemographic indicators have shown to be correlated to individual health expenditure (Newhouse, 1986; Anderson et al., 1986; Van de Ven, 1990). This is the case of age, sex, income, education, supply (which may induce demand), and so on. We have used those links to offset the lack of information on direct costs of health care.

We base our analysis on the grounds of three sources of information somehow related to MUFACE. The first one is 1992 data contained in MUFACE's files related to its covered civil servants and dependents. The second and third relate to those who reported some relationship with MUFACE in the Spanish Households Budget Survey (HBS) of 1991 and in the National Survey on Health (NSH) of 1993, respectively.

III.A A FIRST GLANCE AT THE DATA SETS.

The debate about extending MUFACE to all Spaniards is usually centered on risk selection problems. Detractors of MUFACE believe that there are important risk selection problems, while private carriers disagree (A&S-Economía y Salud, 1993). Private carriers support their argument on the only comprehensive information on MUFACE enrollees: MUFACE's data bases. Unfortunately, that data base includes information on age, sex, residence and choice of insurance carrier[6] only Private carriers argue that there is evidence on the relative preference of the elderly for private carriers, contradicting the hypothesis of risk selection.

MUFACE offered us information on a sample of around 42,000 civil servants and their dependents. We found out that, while there is no significant difference by sex or residence, the elder tend to prefer a private carrier. Indeed, the weight of elderly is more important in private insurers (11%) than in INSALUD (6%). Figure 2 shows some insight into the age distribution of beneficiaries among carriers.

[Figure 2, here]

These findings do contradict the hypothesis of risk selection. However, one should be cautious about considering them a necessary nor sufficient condition. Firstly, because, given the usual per capita costs concentration curves, carriers need only to "skim the cream" of some few (say 5%[7]) highest spenders to save a large part (around 50%) of its costs. This means that: (i) using proxies as age give a very rough feeling of risk selection practices, and (ii), as pointed out by Newhouse (1986), unless very

6 This is the only information MUFACE gathers about their insured

7 Figures extracted from the spanish public mutuality PAMEM (1992).

large samples are used, risk selection is hard to detect because of that skewness in the distribution of capitated average costs.

Secondly, because of two institutional features related to MUFACE and which make that managed competition peculiar and risk selection harder to be detected. The first peculiarity is that, as we pointed out in the first section, INSALUD was not an available option for MUFACE enrollees until 1977. Loyalty in the choice of health care plans is quite strong (Neipp and Zeckhauser, 1985) mainly because of high information costs of shifting. If these costs may make internal markets in health hardly competitive per se, the problem worsens for those providers entering later in the market. This phenomenon has similarly been assessed in Medicare, by Luft (1982), Berenson (1986) and Van de Ven and Van Vliet (1995) in The Netherlands. Luft refers specifically to the case where a new provider enters the market, like INSALUD in the MUFACE system. He points out that people with existing ties to a physician may be less willing to try a new delivery system and that such people are probably less healthy.

Indeed, loyalty probably is an important issue in understanding the persistence of choice of provider in MUFACE. For example, civil servants working at the Ministry of Health used to be offered only ASISA in the past (before 1977). Loyalty could then explain why the vast majority (81.7%) of civil servants at the Ministry of Health remain in ASISA even in 1993

The second peculiarity about MUFACE's managed competition is related to what we will call *double insurance*. Even if it is not always legally correct, there remains the possibility for some MUFACE beneficiaries of having a simultaneously two public health care coverages: that offered by MUFACE, and that offered by the more general system of the Social Security.

If double insurance were true, there would be the possibility that unhealthy individuals in MUFACE tend to choose a private carrier, but keep a door open to the public INSALUD through double insurance. In such a case, the intuition would be that individuals with double insurance would use the INSALUD facilities for "serious health problems" (requiring the intensive use of high technology devices) and the private carriers for mild treatments. In fact this is what the Association of Consumers has recently reported in its periodical journal, on the basis of a delphy study and an opinion survey (OCU, 1995). Some individuals are more susceptible of being double insured than others. For instance, a typical case of double coverage would be that of a civil servant's *partner* who is covered by the Social Security general system through his/her job in the private sector, and applies simultaneously to MUFACE in order to become beneficiary (through his/her partner). In such a case, this kind of households optimizes its choice by selecting a private carrier in MUFACE (the general Social Security system does not offer any choice set). Another typical example is represented by the descendants of civil servants, once they enter the private job market and get covered by the general system of the Social Security. In such a case, unless they explicitly renounce to MUFACE, they may become doubled insured.

Not only does MUFACE records flaw because of ignoring utilization and cost information but also because they do not include information on double insurance. We have tried to overcome this second flaw by using two other data sets: the Household Budget Survey (the HBS) and the National Survey on Health (NSH). Both data sets corroborate the relevance of double insurance.

III.B THE HBS: ANOTHER RED FLAG ON DOUBLE INSURANCE.

One of the main advantages of the HBS as compared to the data reported by MUFACE is its inclusion of wide information on all the members of the family: their age, sex, education level, professional status and, very specially, health care coverage information.

1,699 families reported to have some member covered by MUFACE. We selected a series of explanatory variables grouped according to three criteria: variables determining health care needs, variables related to the supplied options, and variables related to income and education.

Table 1 reports the result of the regression analysis. The second column of table 1 includes the estimates of all explanatory variables mentioned before, the third column includes the estimates of only those variables that shown some significance. The explained variable is the probability of choosing the public INSALUD provider. Positive coefficients mean that a given variable is associated with a higher probability of preferring the public INSALUD provider. The column labeled marginal probability ("Mg. Prob.") represents the partial derivative of the regression equation. It evaluates the influence of one variable taking a certain value, moving from the reference cell and keeping the rest of variables unchanged, on the probability of choosing INSALUD. This derivative was evaluated at the sample mean level of the regression equation. Finally, some information is provided in the last lines of the table about the percentage of correct predictions succeeded by the model.

[Table 1, here]

The most important result is the strong influence of double insurance in the probability of choosing private carriers. This variable gets the value of one when a member of the family reported being MUFACE's beneficiary and, at the same time, having access to the general regime of the Social Security (necessarily provided by INSALUD). Those who pay a complementary private health insurance are associated with a higher probability of choosing INSALUD. This would be consistent with the idea of choosing a provider in MUFACE such that the possibility of having access to both public and private health care remains open.

In general, most variables related to health care need do not seem to have a strong relationship with the probability of choosing INSALUD. Having any retired member in the family is associated with a greater probability of choosing a private provider. The sign of this relationship is consistent with the loyalty towards private carriers described in previous paragraphs.

There is no clear relationship between town size and the choice of a provider. In some areas of Spain, public health care services were rather scarce until recently. Traditionally, in those areas, people would get covered paying an annual fee to the rural physician or local insurance companies ("igualas"). These are now being sub-contracted by larger carriers that deal with MUFACE. In other towns, the presence of private insurers is so weak that this options is almost inexistent. There seems to be no general rule.

In some Autonomous Communities, like Madrid and Catalunya, with an important private health care sector, the probability of choosing INSALUD is higher than in Andalucia. Andalucia is the reference Community for its being the most representative of national preferences. This result is coherent with the disparity between private sector relevance and geographic differences in the choice of provider described in previous research (Pellisé 1996).

Finally, income and education have little and unclear relationship with the choice of health plan in MUFACE.

III.C THE NSH: AN EXPLORATORY ANALYSIS OF HEALTH INDICATORS AND THE CHOICE OF HEALTH INSURANCE CARRIER IN MUFACE.

The National Survey on Health (NSH), run in 1993, should help us improve our understanding of risk selection in MUFACE in two senses. Firstly, by including quite detailed indicators on health status, life styles and habits, health care services utilization and demographic characteristics. And, secondly, by including information on the type of health care coverage, and, more important, on double insurance. The NSH reports the answers of more than 21,000 individuals sampled on a stratified fashion, representing the national territory. Among these interviewed individuals, 956 have declared to be MUFACE enrollees.

However, the NSH has a limitation that should be kept in mind along this part of our analysis. On the one hand, the choice of insurance carrier is a family one. On the other hand, the survey is individual. The hypothesis of risk selection states that bad risks will tend to choose the public carrier INSALUD. More precisely, given the choice procedure of MUFACE, one should say that those *families*, among whose members at least one is a bad risk, will tend to choose the public INSALUD. However, the NSH includes individual indicators. Consequently, we might find , for example, that a sampled good risk might have chosen INSALUD, just because one of the members of his/her family (about whom we have no information) is a bad risk. This inconsistency between the implication of the choice of carrier and the information captured by the survey may bring a rather important amount of noise in our analysis. Van de Ven and Van Vliet (1995) faced a similar problem in a comparable context on choice of insurer.

III.C.1 Variables chosen for the analysis.

The question related to insurance coverage included in the NSH offered a closed list of items representing different coverages. In broad terms, this list offered four basic kinds of alternatives that could be helpful to us:

A. The *MUFACE* special regime of the Social Security, with health care services provided by the *public INSALUD*;

B. The *MUFACE* special regime of the Social Security, with health care services provided by a *private carrier*;

C. The *general regime of the Social Security*, with services compulsorily provided by the public INSALUD;

D. Out-of-pocket complementary health insurance policy, contracted in the *private health insurance market*.

Individuals had the possibility of choosing a combination of these coverage including up to four of them simultaneously. For example, an individual could choose option A, or, alternatively, A and B (A+B), or, as well, A, B, C and D (A+B+C+D). The focus of our analysis are those reporting at least options A or B or A+B. The possibility of choosing more than one coverage made the classification of individuals according to their coverage more complex than in the NSH.

The combination of MUFACE coverage and the remaining options C and D, yields a frequency table like that presented in Table 2.

[Table 2, here]

As in the National Household Budget Survey of 1991, this table testifies of the importance of double (and even triple) insurance coverage. According to this table, 24% of MUFACE enrollees have more than one type of insurance policy, in spite of these policies covering basically the same health care services[8]. This percentage equals just 5% when we consider the whole NSH sample. Thus, MUFACE enrollees tend to have much more double insurance than the rest of Spaniards. Moreover, among those 24% of MUFACE enrollees, 92% have double insurance funded by the Social Security itself. And 59% of this latter group of enrollees have access to two kinds of providers (both reimbursed by the Social Security), private and public, simultaneously.

Reported double insurance may reflect fraud, compatibility of part-time jobs with different insurance policies, questionnaire mispecifications and/or answering mistakes. A three-hundred-page-

[8] Some items like orthopaedic prothesis and lens are better covered when a private carrier is chosen within MUFACE.

long report on this aspect of the survey, requested by the Spanish Ministry of Health to the public institution responsible for the survey (CSIC, 1994), lives room for all those possible explanations. These figures are quite consistent with those found with the HBS in our previous researches. The most important impact of this double insurance process, as far as we are concerned in this analysis, deals with the definition of the variable "insurance coverage". Taking into account that our interest lies mainly on the choice between private and public carrier, but considering that double insurance might be relevant, two variables have finally been defined.

The first variable concerns the choice of a private carrier within MUFACE options. It is labeled **Y***, and has two categories. Category *YPRIV* includes those individuals covered by MUFACE and choosing a private carrier, independently of double coverage[9]. Category *YPUB* includes the rest of individuals, i.e. the MUFACE enrollees not choosing any publicly funded private carrier. We will later on come back to these categories to make the distinction more meaningful.

The second variable places more emphasis on double insurance and is related to the kinds of providers an individual may actually have access to. This variable is labeled **PROV***, and has four categories.

PROVPU includes those individuals who have exclusively access to the public provider INSALUD, and not to any private provider.

COMPLE includes those choosing the INSALUD in MUFACE, and having paid, simultaneously, for complementary coverage in the private insurance market.

PROVPV includes those choosing a private carrier in MUFACE, and having no access to the public provider INSALUD, through neither of the Social Security regimes.

9 Variable Y* takes the value YPRIV if a MUFACE enrollee chooses a private carrier even if he/she says to have some other kind of insurance policy that gives him/her access to INSS/INSALUD.

SUSTIT includes those choosing a private carrier through MUFACE, keeping simultaneously their access to INSALUD, through any of the regimes of the Social Security.

The variable **PROV*** is nested by variable **Y***. Category *YPUB* aggregates both categories *PROVPU* and *COMPLE*. And category *YPRIV* groups *PROVPV* and *SUSTIT*. Table 3 shows the relationship between those two variables and categories defined by Table 2.

[Table 3, here]

An important information from this table is the proportion of those preferring a private carrier within MUFACE (43.2%) versus those preferring the INSALUD (the remaining 56.8%). These proportions equal 43.2 and 56.8 per cent, respectively. Meanwhile, these percentages are around 15 and 85 in the MUFACE population (MUFACE, 1994). Thus, that table does not seem to represent the population in term of relative preferences. This same discrepancy appeared in the data resulting form the HBS mentioned earlier. In that case, the percentages were equal to 54 and 46, respectively[10].

Besides insurance coverage variables, the survey collected a quite wide variety of information related to life style, health status and services utilization. We selected a set of them, trying to make the statistical analysis manageable. In fact, some variables were meaningless for our purposes, or had *ex-ante* little relevance in explaining health care costs. Some questions were rather redundant. And some yielded too many missing or extreme values. A preliminary analysis of the data, including initial mappings from MCA, the review of descriptive information published by the authors of the survey[11] (Arévalo, et al., 1994) and some unavoidable degree of discretionarity, helped us selecting variables and grouping categories. Grouping of categories, if any, was made according to medical and cost

[10] We formally requested the National Institute of Statistics that they explain this discrepancy, and no answer has yet been received

[11] As an illustrative case, the design of intervals for the variable age was that used by the authors in their descriptive analysis. Those aged 17 was a category on its own, because individuals of that age shown specific utilization patterns. At the hospital utilization level, their length of stay was, on average 10.2 days, whereas that of the immediate superior interval was 7.7 days.

criteria. Annex 3 summarizes the results of this process. Labels of categories appear in extensive and abbreviated form, and have no ordinal meaning.

III.C.2 The methodology chosen for our analysis of the data.

An appropriate model on the choice of insurance carrier by MUFACE enrollees is one built on the grounds of individual choice theoretical models. Their formalization requires that a vector of characteristics of different insurance carriers be quantified. We have not been able to reach such a quantification. In such circumstances, the immediate alternative usually proposed (Pudney, 1990) is to estimate an *ad-hoc* discrete regression equation on the choice of carrier and some individual characteristics on the demand side. However, the important proportion of discrete variables in the questionnaire and the wide variety of items collected by the survey made multiple correspondence analysis (MCA) desirable, at least as a first explorative stage[12].

MCA does not try to establish any causal relationship between a set of variables. In fact, this feature is shared with any *ad-hoc* regression model. Moreover, in spite of just being an exploratory tool, MCA has turned out to be more clarifying than some alternative probit regression estimates. Table 4 presents the results of a probit model based on the NSH[13]. A reason for that might be the special

12 MCA is extensively used in marketing research. Buchmuller, Currim and Abramson (1995) have recently presented a research on the choice of health plan using this kind of model.

13 The explained variable is the probability of MUFACE enrollees not choosing a private carrier (the probability of Y*=Ypub). Two equations are estimated, differentiate whether or not they include explanatory variables related to double coverage. In none of the equations the hypothesis that most categories have no influence on the probability of choosing the public INSALUD, when compared to the probability of the reference category, cannot be rejected. Two categories seem to be a common exception in both models. Having some relatively mild health problem (versus not having any) and using some health care services not intensively (versus not using them at all) may significantly increase the probability of choosing a private carrier by 10.8% and 16.4% respectively. These results are, by the way, consistent with those found in our first biplot interpretation of the MCA analysis offered before. But, besides the relevance of these two categories, the most important result is the role played by double insurance in the choice of carrier. Hence, as previous researches, the regression model does not bring much light on risk selection processes, but places special emphasis on double insurance.

ability of MCA to explore more than two categorical variables and synthesize the information on a two-dimensional scatterplot. Some other reasons might be found in the wide amount of indicators that had to be used as explanatory variables, and the existence of strong multicolineality and interactions amongst them.

[Table 4, here]

We have mainly tried to follow Michael J. Greenacre's manual (Greenacre, 1993) on correspondence analysis to build our own analysis. Afraid of our distorting his manual, in annex 4 we introduce some of his concepts on correspondence analysis that we will be referring to later on in our research. Annex 4 also reviews the specificities of the procedure we have followed for our MCA.

Multiple correspondence analysis (MCA) is "the more conventional approach to analyzing multivariate data by correspondence analysis, specially when there is a large number of variables. In MCA all associations amongst pair of variables are analyzed as well as each association between a variable and itself." (Greenacre, 1993, p.141). Non surprisingly, the starting point of MCA is a multiple contingency table including frequencies among active variables.

Table 5 provides that information. The absolute off-diagonal, diagonal, and row and column total frequencies of the actives variables constitute the *Burt matrix*, denoted **B**. We have added to it a set of rows and columns for the supplementary variable **PROV***.

[Table 5, here]

III.C.3 Display and interpretation of the results.

The right hand columns of Table 6 display the main statistical results of adjusted MCA. The first two principal axes (K=1,2), after adjusting, account for 63.5% of total inertia. This means that 36.5% of variation is lost by projecting the Burt matrix information onto two axes.

[Table 6, here]

Table 6 also reports the main results of MCA from the indicator matrix (SAS output) and from the Burt matrix. As expected, total inertia from **Z** is much higher than in the rest of cases, while the percentage of inertia is lower.

Table 7 gives the principal coordinates of both axes for all categories, according to those three estimation methods. It also includes vertices corresponding to variables **Y*** and **PROV***, the first being active and the latter supplementary, will be later on used for asymmetric mapping.

[Table 7, here]

A first elementary approach to try to understand the results of MCA is plotting the adjusted MCA coordinates reported in table 7. Then, one would try to give a conceptual name to each principal axis (*K=1* and *K=2*), by interpreting the positions of some set of points, relative to that of another set of points. Figure 3 displays this (asymmetric) map, with vertices for the active variable **Y*** and for the supplementary categories included in variable **PROV***, and with the rest of categories in profile points.

[Figure 3, here}

But, more clarifying than that asymmetric mapping, there exists a biplot interpretation of MCA. As explained in annex 4, vertices positions may be rescaled to conform a biplot interpretation of the results.in this way simplifies the interpretation of profile points drawn onto the map. For example, figure 4 displays the calibrated biplot axis of categories *Ypub* (choosing the public INSALUD in MUFACE) and *Ypriv* (choosing a private carrier), of the active variable **Y***. When crossing the centroid (marked with a cross in Figure 4), the biplot axis takes the value of the average profile (55.1% for *YPub* and 44.9% for *YPriv*). Now, the estimated profiles of the other categories can be read off by projecting their positions perpendicularly onto these biplot axes. So, for example, if one projected category *salu2* (point *s2*, "feeling well"), on to the calibrated biplot axis of *Ypub* (the straight line crossing point *YPub* and the centroid) would take the value +1.57%. This values is an approximate value of the distance between the average profile of those choosing the public INSALUD (equal to 55,1%) and the specific profile of those choosing the public INSALUD under category *salu2*. In other words, MCA makes an *estimate* profile equal to 56.67% for categories *salu2* in *Ypub*. Similar to that estimated through MCA, the *observed* frequency of such category has the value 57.05% (55.1+1.95).

[Figure 4, here]

For the sake of the interpretation of the results obtained, we use a biplot interpretation like that of figure 4. However, while that one relates to categories *Ypub* and *Ypriv*, we will rather proceed on the grounds of more desegregated plots, based on categories nested by *Ypub* and *Ypriv*, subsequently.

1. Supplementary categories nested by *Ypriv*. We will concentrate on individuals choosing a private carrier first. Were service selection fully effective, in terms of positive rents for private providers, double insured individuals choosing a private carrier in MUFACE would tend to show "unhealthier indicators" than singled insured (by a private carrier). Figure 5 displays the calibrated biplot axes of *PROVpv* and *SUSTIT*. Note that the weighted average of both axes would produce the calibrated biplot axis of *Ypriv* drawn in Figure 4. This latter axis has been omitted here for simplicity, but the reader should keep in mind that it would be located somewhere in between both axis represented in Figure 5.

[Figure 5, here]

A first glance at this figure seems to show that enrollees having access to INSALUD are "healthier" and younger than those having exclusively access to private carriers. Thus, service selection could only be systematically practiced with relatively healthier individuals, specially if health status is measured in terms of the age and absence of chronic diagnosed conditions. If it exists, service selection is not providing private carriers in MUFACE with the maximum attainable rents. Two issues should be taken into account before taking further conclusions about service selection.

Firstly, if true, that apparently stronger association between healthier related indicators and double insurance would not in any case imply that service selection may not be undertaken. It would just imply that, in case of being truly practiced, it would be among the youngest and healthiest individuals who choose a private carrier.

Secondly, estimates of the distances of categories *PROVpv* and *SUSTIT* are associated with rather biased residuals against service selection, as shown in tables 8 and 9. The accuracy of this analysis should be questioned, and the analysis taken with some caution. Figure 6 splits observed distances from *Ypriv* into distances due to the group in *PROVpv* and distances due to the group in *SUSTIT*. This figure has been built using the raw distances shown in Table 8. For example, the observed distance of category *util1* from *Ypriv* equals 17.36, according to Table 8. Figure 6 displays this same distance as the sum of two forces: the distance of *util1* from *PROVpv* average profile (7.70) and from *SUSTIT* average profile (9.66). According to Figure 6, two features are worth a comment. Firstly, categories related to getting elder are mostly associated with having a simple private provider, and younger individuals with double insurance. In fact, double insurance is most probably practiced by the working population. This would explain why elder are relatively more important in category *PROVpv*. Secondly, categories associated with "feeling bad due to accidental and mild reasons" are associated with double insurance. When compared to the average profile of those choosing a private provider (*Ypriv*), double insured are mainly individuals in working age intervals, feeling accidentally very bad with one hospitalization or less during the year previous to the survey, or with no more than 2 outpatients visits during the fortnight previous to the interview, intensive sport keepers and hospitalized women due to birth. Meanwhile, those choosing a private carrier with no double insurance are, when compared to the average profiles of individuals in *Ypriv*, too young to work or above 65 years old.

[Tables 8 and 9, here]

Summarizing, enrollees choosing a private carrier in MUFACE may be split into two groups, according to whether they are double insured and, also, according to their different health status and care needs. The first group would include those having no double insurance and relatively elder (possibly with mobility problems). The second group of enrollees, one third of those choosing a private carrier, are middle aged with, if any, acute or unpredictable health problems. Only this latter group is susceptible of generating service selection.

[Figure 6, here]

This biplot analysis has brought us some light about service selection. Among those individuals choosing a private carrier, some groups in working age intervals seem to have more access to double insurance. So, service selection may hardly be undertaken among the elderly choosing a private carrier, since they are seldom double insured. More specifically, service selection may be undertaken among quite young individuals in working age intervals, those suffering from accidental health problems, implying the need for some acute services: feeling bad or very bad, requiring one hospitalization (possibly obstetric services), or some outpatient services, having their activity limited by accidental health reasons (mild pains) and depression, and being quite intensive sport keepers.

Bellón et al. (1994) analyzed the characteristics of double insured individuals in some area in Spain, and reached comparable results. They found out that heavy users of public health care services, with private coverage as well, were mainly young individuals, belonging to a high socioeconomic class, facing mental problems such as anxiety, nerve strikes, period pain, stomach ache, menopause and bad circulation problems.

2. Supplementary categories nested by *Ypub*. Figure 7 is the same display as Figure 5, now with calibrated biplot axes for categories *PROVpu* and *COMPLE*. The relationship we pointed out between figures 4 and 5 is now replicated between figures 4 and 7. In this latter case, the two axes corresponding to categories *PROVpu* and *COMPLE* (figure 7) yield a weighted averaged axis like that of figure 4 for *Ypub*.

[Figure 7]

The potential effect of service selection is somehow more evident among the group of MUFACE enrollees that have chosen the INSALUD. Among them, those having access *exclusively* to the public INSALUD (not double insured) show a stronger degree of association with indicators closely related to poor health status. Meanwhile, those who, having chosen INSALUD in MUFACE, acquire a complementary health insurance on their own expenses, are better associated with some unpredictable acute or just mild health problem (susceptible of generating frequent outpatient services).

The residuals implied by the biplot interpretation of categories *PROVpu* and are no less important than those obtained by categories *PROVpv* and *SUSTIT*. However, the positive aspect about the residuals for *Ypub* supplementary sub-categories is that their analysis does not lead to any modification of our previous explorative conclusions. In fact, the analysis of the residuals exhibited in tables 8 and 9 exacerbates the potential of service selection by private carriers.

As before, the biplot interpretation of MCA has brought some light on service selection. Among those choosing the public INSALUD, only the working youngest and generally healthiest contract a complementary health insurance policy in the private market: feeling well, aged under the 30s, needing at most one hospitalization along the year previous to the interview or a couple of outpatients visits, smokers and occasional sport keepers. In contrast, those having only access to INSALUD have chronic conditions unrelated to aging (diabetes, asthma, bronchitis,...), are the heaviest health care users (more than two hospitalizations in a year), are intensive sport keepers, 17 years old or not as young as those having complementary insurance, but neither as old as those choosing a private carrier.

Table 10 summarizes these most important associations between categories of active and supplementary variables. These biplot interpretations of active profiles and supplementary categories are quite consistent with intuition and the OCU study (OCU,1995), about private carriers marketing their policies among individuals who just need mild instead of high technology demanding treatments.

[Table 10, here]

The consequences of this marketing differentiation come as follows: whenever access costs (in terms of waiting lists, location, choice of physician, and so on) to primary care are lower in the private sector and technical quality is comparable in both sectors, then, heavy outpatient services users will tend to choose a private provider.

This same kind of decision results in the choice of health plan by American employees. In their case, different access costs from one plan to another take the form of deductible, stop-losses and premiums. The result is a similar self-selection process. For example, Ellis (1985) demonstrates that prior-year health expenditures have a substantial impact on health plan choice by employees of a firm: employees selecting the highest coverage option on average spent 5.4 times as much as employees in the lowest coverage option in the year prior to making their health plan and 3.6 times as much in the year after making the plan choice.

III.D SUMMARY OF THE EMPIRICAL ANALYSIS.

The goal of the empirical analysis was to test the existence of risk selection by private carriers. The data gives no clear-cut idea about it, but corroborates quite satisfactorily some of the intuitions and theoretical features stated in previous steps of this research. A first exploration of the data (from any of the sources used) seemed to show that private carriers were dealing with the elder, and hence, the unhealthiest enrollees of MUFACE. But further steps of our analysis, basically by means of MCA, helped us elicit some ideas about risk and service selection:

(i) Risk selection is not undertaken according to aging criteria. The elder appear to have chosen, in a greater degree, a private carrier in the MUFACE system. Possible rational for that may be found in either service selection or the inheritance of MUFACE choice structure as designed before the 70s.

* On the one hand, service selection among the elder does not seem to be a potential source of rents for private carriers, since this analysis shows that double insurance is not one of the characteristics of this groups of enrollees.

* On the other hand, the inherited past history of MUFACE may explain the relative preference of the elder for private carriers. Before MUFACE was set up, civil servants and their dependents had health services provided by private carriers exclusively. This group of Spaniards did not have access to INSALUD, through any regime of the Social Security. Moreover, MUFACE was formally structured at the end of the seventies, and the INSALUD was never contracted by MUFACE until some years later. Given this later participation of INSALUD in the MUFACE system, then, loyalty may explain the elder individuals'preferences for private providers.

Moreover, it may be hard for private carriers to skim out the elderly since, besides appreciating loyalty, the CIRES (1994) study showed that the elderly make up one of the groups that more emphasis places on some perceived aspects of quality of care like good personal treatment. These and other aspects of the amenities are the most important differential characteristic of private providers when compared to the public INSALUD.

(ii) Even though risk selection does not seem to be undertaken by aging related conditions, the data shows that it may be driven by other criteria and by the means of service selection (double insurance).

* Indeed, intensive hospital and outpatient health care users (*util2* and aged 17) and/or individuals with chronic conditions not closely related to aging (diabetes, allergies, asthma, bronchitis,...) have exclusively access to the INSALUD. The much lower presence of these kind of individuals in private carriers may testify to risk selection.

* Light and medium health care users (*util1*), with their activity recently limited by mental or mild accidental problems, young in working age intervals and/or very intensive sport keepers are better associated with double coverage (publicly or privately funded), and susceptible of being targeted on for service selection.

CONCLUSIONS.

This research has tried to contribute to the understanding of capitated payments in a context of managed competition among insurance carriers or equivalent providers. This kind of regulated competition is in the heart of actual debates about the future of our health care system in Spain. And the reasons for these markets being so relevant in Spain are mainly the influence of the debates and reform proposals in the rest of closer developed countries, as well as the controversial a natural experiment of managed competition nowadays existing in Spain: the MUFACE.

Following a description of MUFACE's managed competition, two sections constitute the core of this research. One includes a formalization of MUFACE regulatory environment and of its implications in terms of the incentives generated. The other section includes some empirical effort towards the assessment of some of the results found along the formalization.

Some of the results found along the formalization of MUFACE's reimbursement arrangements are that, firstly, effort exerted by insurers equals the first-order optimal level under complete information conditions. Secondly, the magnitude of the capitation payment is one of the potential flaws detected in MUFACE's reimbursement system. Thirdly, pre-contractual selection (of insurers dealing with MUFACE) is bound to occur if risks vary exogenously across insurers. And, finally, post-contractual risk selection (of enrollees) might also be observed if insurers are able to "skim the cream" and the reimbursement scheme is prospective.

Part of MUFACE problems related to the incentive scheme may be solved by blending the capitation with cost reimbursement. That is, by offering additional types of contracts that are blended with some measure of observed costs.

However, this formalization should be treated with caution because it does not account for some important elements of the MUFACE system. Among others, we have not analyzed the dynamics of the contractual system, insurers' competition, aspects of quality of care and output measurement, the role of economies of scale and scope in the insurers'marketing strategy, and transaction costs of enrollees when switching plans. In spite of these flaws, we hope that our analysis might have open new doors to the focus of capitated payments, not only in the context of MUFACE and but also in many recent reforms under way in developed countries.

The following section tried to test some of the results of the formalization, and more specially the existence of risk selection. When considering the empirical assessment of the existence of risk selection in MUFACE, one realizes that, in spite of a formalization of MUFACE that predicts risk selection in the system, reformers (and interest groups such as insurers) of the Spanish Health Care System stick to the argument that there is no risk selection in MUFACE. They illustrate this argument showing the distribution of enrollees according to the choice of private versus public carriers, by age and sex. Indeed their figures contradict any hypothesis of risk selection in MUFACE, given the generally accepted positive correlation between health expenditure and aging: the elderly relatively prefer private plans.

Our empirical analysis has tried to disentangle this contradiction, using a variety of data bases. Some very important lessons may be taken.

1. Firstly, our analysis proves how difficult it is in general to assess risk selection. Moreover, this difficulty gets worse in the case of MUFACE due to some institutional specificities, like the inextence of a private provider (INSALUD) until 1977. Consequently, unless an analysis of health plan switchers only is undertaken, any other analysis of MUFACE will yield lower estimates of risk selection. Analyzing all enrollees in MUFACE, without knowing who has recently switched,

who switches that year, who is an enrollee since 1977 or before (when the INSALUD became an optional health plan for the first time), and so on, does not help assessing risk selection.

Our analysis has captured the weight of history in the data, and how it determines risk selection: the majority of the elder stay in private companies due to loyalty. The effect of this weight of history on MUFACE should be interpreted taking two issues into account: Firstly, MUFACE history makes risk selection hard to assess from the general data. This does not mean though that the hypothesis of risk selection should be rejected. By skimming only the highest one percent spenders of the elderly, an insurance carrier may save around 25% of its costs. Secondly, this weight of history lowers with time. So, this same MUFACE system, with the same options as now and the same incentives, may yield very different results in the future.

2. A more sutil alternative to risk selection has been detected. We have called it *service selection*. It consists in making profit out of double insured enrollees, those who choose a private carrier in MUFACE, but manage to simultaneously keep their access to the INSALUD through any regime of the Social Security. With double insurance, enrollees may use privately provided services for mild health problems only (outpatient services) and publicly provided services for more serious health problems. Consequently, private carriers will not mind accepting high risk individuals, at very low health care costs for them. Indeed, they know that probably the INSALUD will have to deal with the expensive part of the health care of these patients. A regular data base like that of MUFACE files does not offer information on double insurance. We have been able to disentangle the effect of double insurance and risk selection on the grounds of two national surveys: that on the Household Budgets and that on Health indicators.

ANNEX 1: SUFFICIENT CONDITIONS FOR A MAXIMUM UNDER HETEROGENEOUS RISK POOLS

The second derivative of the net transfer equals

$$\partial^2 U/\partial r_1^{\,2} = \partial[\partial U/\partial r_1]/\partial r_1^{\,2}$$
$$= \partial\, \{ p[(1/\sigma).(\phi/\Phi^2)] + \varepsilon\phi^2/\Phi - \sigma\varsigma_1(\alpha).[1 + \varepsilon\Phi - p] \} / \partial r_1^{\,2}$$
$$= - p(1/\Phi\sigma^2)\, [\varsigma_1(\alpha) + (\phi/\Phi)^2] - \phi\varepsilon/\sigma\, \{1 - \varsigma_1(\alpha).[\varsigma_1(\alpha).(\Phi/\phi)^2 - 1] + \alpha\phi/\Phi\}$$
$$\Rightarrow \partial^2 U/\partial r_1^{\,2} \leq 0,$$

given that

$\Phi > 0$,
$\phi > 0$, and
$0 < \varsigma_1(\alpha) < 1$.

This non positivety ensures that the utility function is quasi-concave with regard to r_1. Hence, the solution offered by equation (28) is a maximum.

These conditions may be extended to the case where the net transfer does not imply a fully prospective payment scheme. In such a case, where the net transfer becomes

$$t_1 = z - b\,(C - I),$$

where b ($0 \leq b < 1$), the second derivative becomes

$$\partial^2 U/\partial r_1^{\,2} = - p(1/\Phi\sigma^2)\, [\varsigma_1(\alpha) + (\phi/\Phi)^2] - \phi b\varepsilon/\sigma\, \{1 - \varsigma_1(\alpha).[\varsigma_1(\alpha).(\Phi/\phi)^2 - 1] + +\alpha\phi/\Phi\}$$
$$\Rightarrow \partial^2 U/\partial r_1^{\,2} \leq 0.$$

ANNEX 2: CONDITIONS FOR THE UNBINDING CONSTRAINT UNDER HETEROGENEITY OF RISK POOLS.

The constrain we imposed to the program is

$$\sigma \lambda_1(\alpha) [1 + \varepsilon\Phi - p] \geq p [(1-\Phi)/\Phi] I. \quad \text{(A3.1)}$$

The unconstrained first-order conditions with respect to r_1 is,

$$\partial U/\partial r_1 = p[(I/\sigma).(\phi/\Phi^2)] + \varepsilon\phi^2/\Phi - \sigma\varsigma_1(\alpha).[1 + \varepsilon\Phi - p] = 0. \quad \text{(A3.2)}$$

Given equation (16) and the property of the hazard functions $(\alpha + \phi/\Phi) > 0$, this unconstrained first-order condition implies that

$$\sigma(\phi/\Phi).[1 + \varepsilon\Phi - p] = \{p[(I/\sigma).(\phi/\Phi^2)] + \varepsilon\phi^2/\Phi\} / (\alpha + \phi/\Phi). \quad \text{(A3.3)}$$

For that stationary point of the utility function exist under the constrain area, it suffices that the right hand side of equation (A3.3), which equals the left-hand-side of equation (A3.1) at the stationary point, is greater than $p [(1-\Phi)/\Phi] I$, from equation (A3.1).

$$\begin{aligned}
&\{p[(I/\sigma).(\phi/\Phi^2)] + \varepsilon\phi^2/\Phi\} / (\alpha + \phi/\Phi) > p [(1-\Phi)/\Phi] I \\
&\Leftrightarrow p\, I [(1-\Phi)/\Phi][\alpha + \phi/\Phi] < p [(I/\sigma).(\phi/\Phi^2)] + \varepsilon\phi^2/\Phi \\
&\Leftrightarrow p\, I [\phi/\Phi - (1-\Phi)(\phi\alpha+\Phi)]+ \sigma\varepsilon\phi^2 > 0 \\
&\Leftrightarrow p\, I (1-\Phi)(\phi/\Phi) [1 + (1-\Phi)\varsigma_2(\alpha)] > 0, \quad \text{(A3.4)}
\end{aligned}$$

which always happens when

$p > 0$,
$I > 0$,
$\Phi > 0$,
and $\phi > 0$.

In other words, inequality (A3.4) will be true whenever the disutility $\zeta(r_1)$ of selecting is positive.

ANNEX 3: VARIABLES AND CATEGORIES OF MCA.

SALU*= How do you perceive your health status?

- S1 = SALU1 Very good.
- S2 = SALU2 Good.
- S3 = SALU3 So-so.
- S4 = SALU4 Bad or very bad.

CRONI*= Have you been diagnosed any chronic condition? (listed conditions)

- C0 = CRONI0 No.
- CH = CRONI1 Yes, related to heart, hypertension or cholesterol problems.
- CD = CRONI2 Yes, related to diabetes, asthma, bronchitis, stomach ulcer, allergies, or other.

LIM*= Did you need to limit your main work or leisure activities due to any disease or pain? (listed diseases and pains)

- L0 = LIM0 No.
- LD = LIMDEP Yes, due to depression, nerves strikes or poor sleeping.
- LP = LIMDOL Yes, due to common pains, such as headaches, cough, flu, fever, ear pain, period pain, throat problems or fatigue.
- LH = LIMOTR Yes, due to other reasons, such as those related to heart, liver, stomach, blood pressure, joints or lung.

UTIL*= Have you used outpatient services along the last fortnight, or inpatient services along the past twelve months?

- U0 = UTIL0 Not inpatient services and no more than one outpatient visit.
- U1 = UTIL1 One short stay in hospital (less than 8 days) or/and more than one outpatient visit, excluding birth reasons,.
- U2 = UTIL2 One long stay in hospital (8 days or more) and/or more than one stay in hospital last year, with or without outpatient services utilization, and excluding birth reasons of hospitalization.
- UP = UTILP Any hospitalization, with or without outpatient visits, due to birth.

VIE*= Those aged 65 or more, were asked to rate their ability to undertake some activities in a scale from one to three. Twenty-seven kinds of activities were calibrated. These activities were mainly of three kinds: basic needs (eat, dress up, have a shower, ...), domestic activities (wash up, clean up,...) and mobility (walk, take a bus, climb up stairs,...). Each of the items was calibrated in a scale of one ("can do the activity without any help"), two ("can do it with some help") or three ("cannot do it at all"). The variable VIE* is a categorical variable based on the overall average of the scores resulting from the calibration of those 27 items.

- V0 = VIE0 Those aged under 65 or rating zero in all items.
- V1 = VIE1 Those rating more than zero but less than two.
- V2 = VIE2 Those rating two or more.

EJFIS*= How much sport do you practice during your leisure time?

E1 = EJFIS1 None.
E2 = EJFIS2 Occasionally (some activities requiring minimum effort).
E3 = EJFIS3 Regularly (some sport more than once a month).
E4 = EJFIS4 Seriously (some sport more than once a week).

FUM*= Do you smoke?

FS = FUMS Occasionally or usually.
FN = FUMN Never.

SEX= **H = HOM** Man.
M = MUJ Woman.

AGE= **17 = EDA17** Aged 17.
20 = 17-24 Aged [18,24].
30 = 25-44 Aged [25,44].
50 = 45-64 Aged [45,64].
70 = 65-74 Aged [65,74].
75 = 75 o+ Aged 75 or more.

Y*= Choice of insurance carrier within MUFACE.

YPUBL INSALUD. Note that this category includes both **PROVPU** and **COMPLEM** as defined by the variable **PROV***.
YPRIV A private insurance carrier. Note that this category includes both **PROVPV** and **SUSTIT** as defined by the variable **PROV***.

PROV*= Provider the individual may have access to, according to his/her public and private coverage.

PROVPU INSALUD has been chosen, and the individual has no other privately financed coverage.
COMPLE INSALUD has been chosen, but the individual is, simultaneously, privately paying for a private health insurance coverage.
PROVPV The individual has chosen a private carrier within the MUFACE system, and has no access to the INSALUD.
SUSTIT The individual has chosen a private carrier within the MUFACE system, but has simultaneously access to the INSALUD by double public coverage, either through MUFACE or the general regime of the Social Security.

ANNEX 4: AN OVERVIEW OF MCA AND THE SPECIFICITIES OF OUR ANALYSIS.

« An overview of MCA.

Correspondence analysis offers the possibility of summarizing multi-dimensional data by means of a two-dimensional graphical representation. The starting point of correspondence analysis is a contingency table amongst a set of categorical data. The comparison of relative frequencies (*profiles*) of each category against the rest of categories with the corresponding row or column masses (*average profiles*) are used to obtain chi-squared statistic measures of discrepancies. These chi-squared distances constitute the basic tool for identifying a subspace with lower dimensions, usually two, than the original contingency table. It then projects the profiles points onto such a sub-space.

An important concept of correspondence analysis is the *inertia*, which quantifies the amount of variation accounted for by the correspondence principal axes (Greenacre, 1984). The inertia of a contingency table is the Chi-squared statistic divided by the total of the table. It can also be interpreted as the weighted average of Chi-squared distances between profiles and masses. If the subspace has two dimensions, a map with two *principal axes* results from the correspondence analysis. The accuracy, or quality, of the resulting display is measured by a quantity called *the percentage of inertia*, corresponding to the sum of the percentage of total inertia that each of the axis is able to represent.

The coordinate positions of profiles with respect to a principal axis are called *principal coordinates*. They might be analyzed as an approximation to their true higher-dimensional positions. *Vertices*, unit profiles, may also be projected onto the optimal subspace, yielding *standard coordinates*. Vertices are unit profiles in the sense that their weighted sum of squares is equal to one, their weight being the masses (Greenacre, 1984). Vertices are exactly equal to profile points divided by a *scaling factor* for each axis. This scaling factor equals the *singular value*, i.e. the square root of the principal inertia along that axis.

Correspondence analysis, besides a graphical interpretation tool of the contingency table, provides optimal scales for the attributes in terms of the variance-maximizing criterion.

A map with categories represented by their principal coordinates and/or standard coordinates may be obtained. When all categories are represented in their principal coordinates (or profile positions), we are building a *symmetric map*. When a set of categories are represented in standard coordinates and the rest in their profile position, we are building an *asymmetric map*. Asymmetric mapping might help the interpretation (Greenacre and Hastie, 1987) in two ways. Firstly, vertices might be used as reference points to interpret the spread of profiles. Secondly, given optimal scaling, vertices positions might be rescaled to conform to a biplot interpretation of the data. This rescaling means that vertices are pulled in towards the origin by an amount equal to the mass associated with the vertex category. Biplot axes are then built passing through rescaled vertices and the origin. Finally, principal coordinates may be read directly off the map by projecting them on to the biplot axes.

« **MCA and SAS programming.**

We have carried out MCA with SAS Software. Consequently, although the more traditional MCA is based on the Burt matrix, the SAS procedure *PROC CORRESP* defines MCA in a slightly different way. SAS defines MCA as the analysis of a matrix which codes the original data in the form of dummy variables. SAS builds a large matrix **Z**[1], with as many rows as observations and as many columns as categories, consisting of zeros and ones. The ones in each row indicate the responses in the appropriate columns (categories). Greenacre calls this **Z** matrix an *indicator matrix*, sometimes it is called a *pseudocontingency table* (Carroll, Green and Schaffer, 1987) and SAS manuals refer to it as a *design matrix*.

The only effect of working with an indicator matrix is that the principal inertias resulting from it equal the square roots of those resulting from the analysis of a Burt matrix. Otherwise, the standard coordinates are the same. Some authors (Carroll, Green and Schaffer, 1987) consider that performing MCA on an indicator matrix provides symmetric mapping with major interpretation advantages. However, some authors consider that this approach may have some flaws (Greenacre, 1989).

« **MCA and adjusted MCA.**

MCA has some advantages: it is easy to implement and execute, and the resulting coordinates of the categories on the first principal axis provide an optimal scale. However, it has also some disadvantages (Greenacre, 1993 and 1989) derived from the combination of both the off-diagonal and diagonal blocks of the Burt matrix. "The most apparent symptom of this problem is the fact that the total inertia in a MCA is generally high while the percentage of inertia along the principal axes are invariably low. This gives the impression that the maps are poor displays of the data, whereas the real reason is the inability of the method to accurately display the diagonal blocks." (Greenacre, 1993, p.143).

Those are the reasons why we have tried to refine the results of MCA. Following Greenacre's recommendations, each principal axis is rescaled "so that the solution maps the associations in the off-diagonal blocks as accurately as it can."(Greenacre, 1993, p145).

« **Active and supplementary variables.**

Variable **Y*** was introduced as an active variable in the multiple correspondence analysis, while **PROV*** as a supplementary. The reasons for that are that, firstly, **Y*** nests **PROV*** and is better balanced; Secondly, that **PROV***, in spite of being just a supplementary variable, is still "useful in interpreting features discovered in the primary data" (Greenacre, 1993).

1 Greenacre, 1993, module 17.

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Figure 1:
The MUFACE system

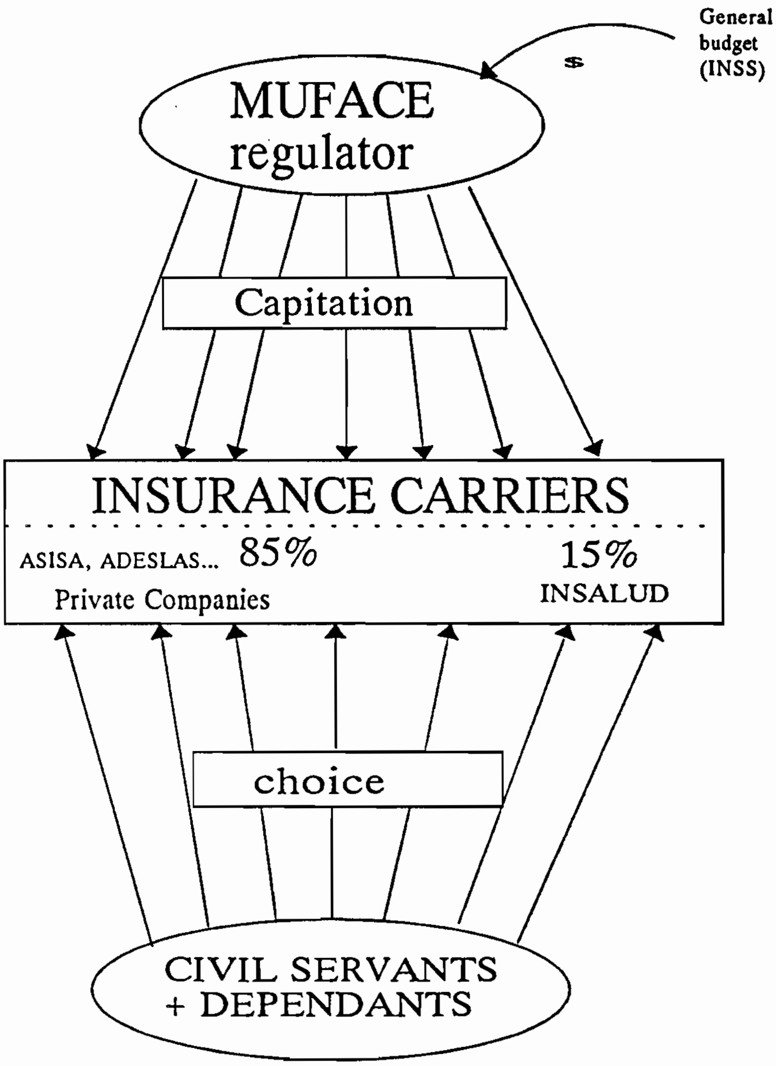
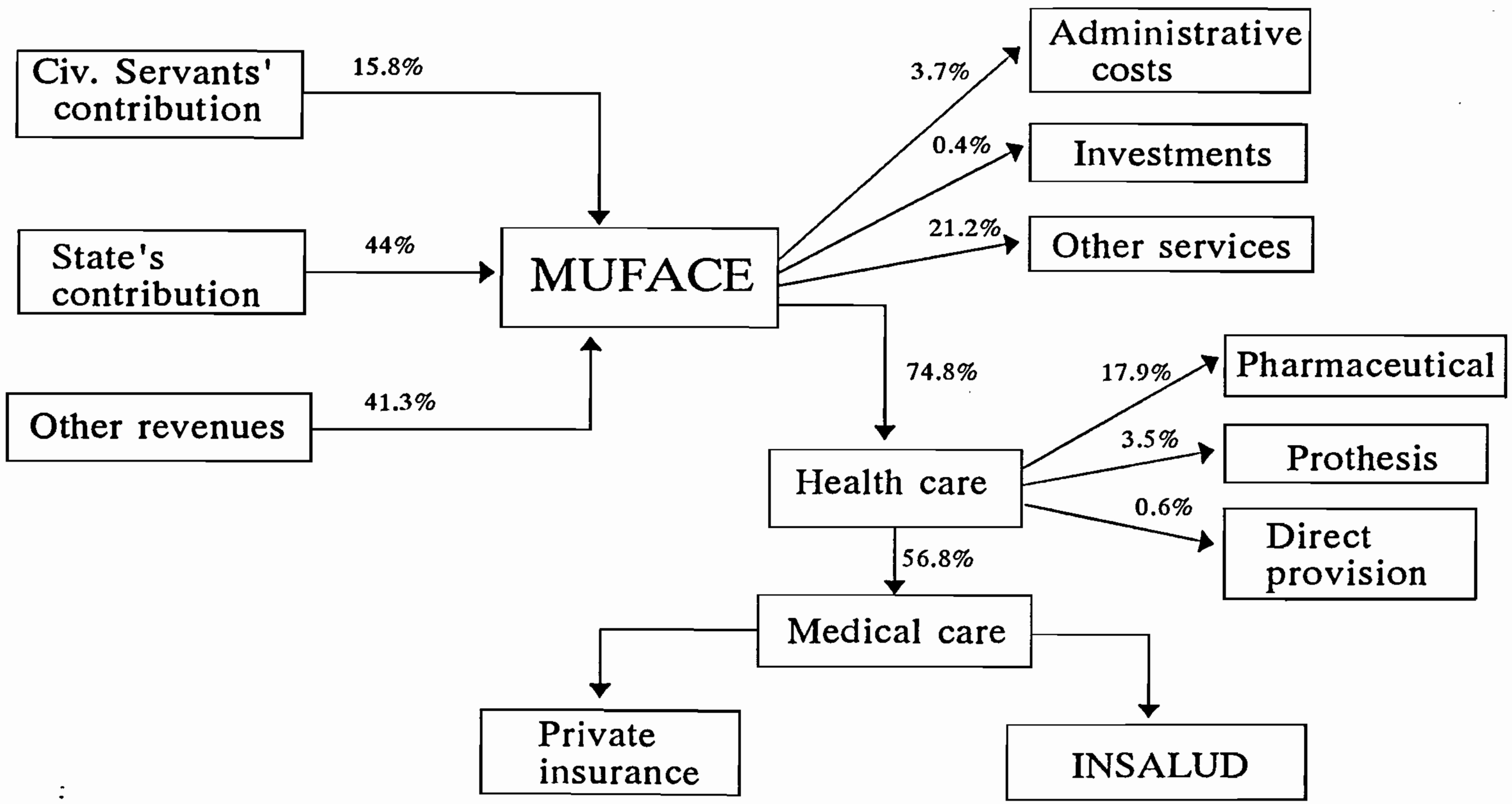


Figure 1b: MUFACE Financial flows



Source: DGAPS (1994)

FIGURE 2: PROPORTION OF ENROLEES CHOOSING A PRIVATE CARRIER OVER THOSE CHOOSING INSALUD.

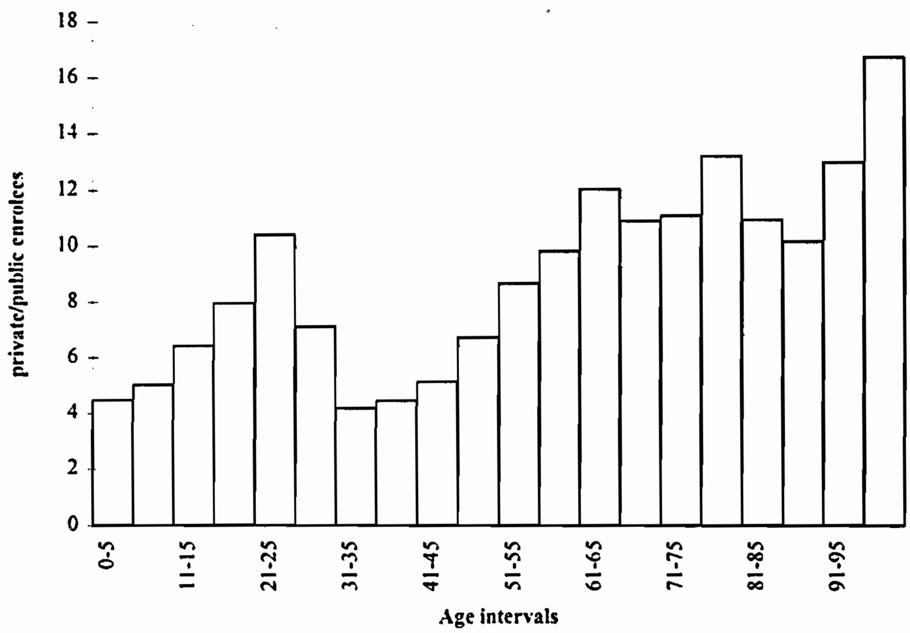


FIGURE 3 : Asymmetric map with vertices for Y* and PROV*.

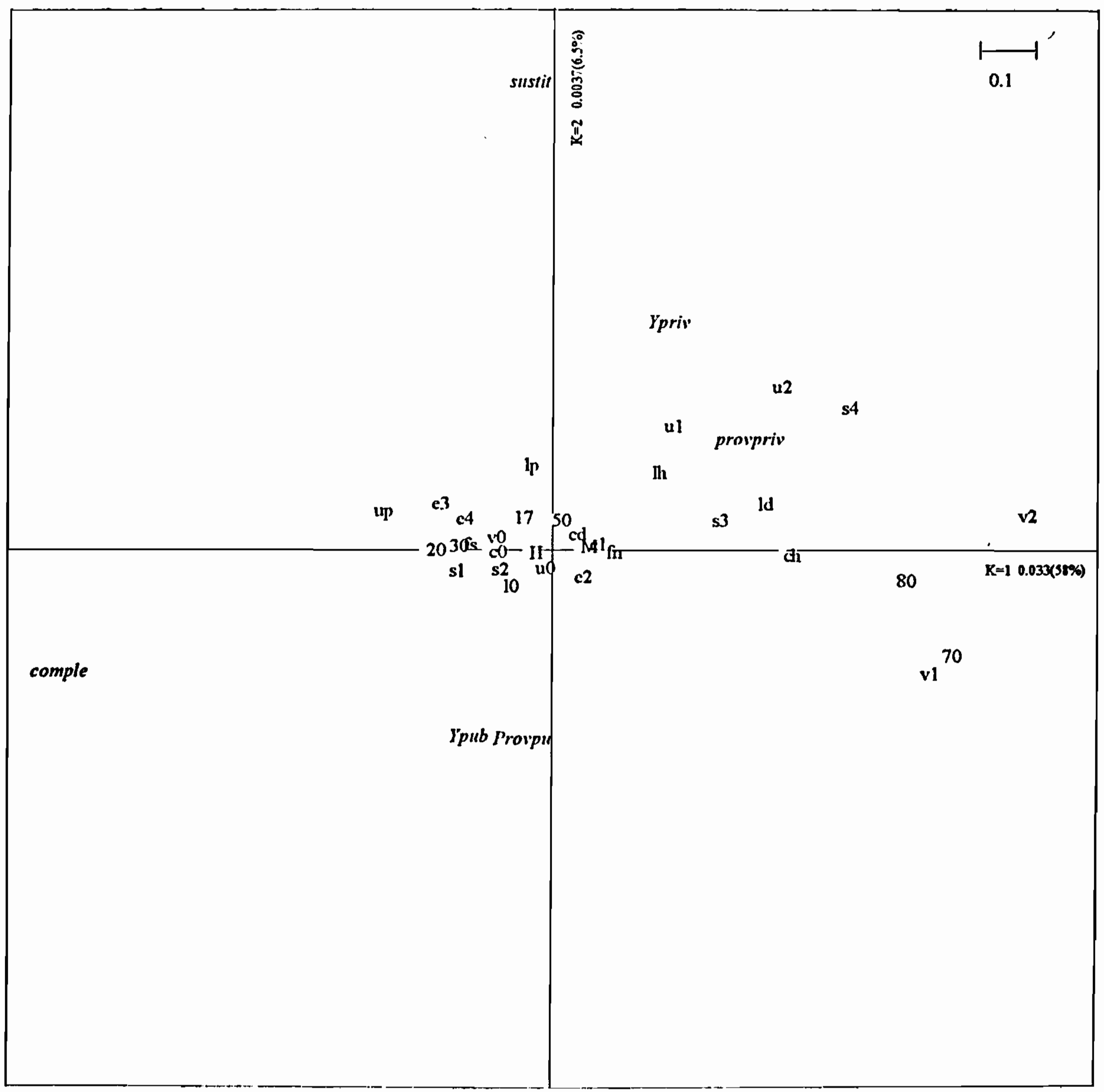


FIGURE 4 : Biplot axis for the choice of carrier.

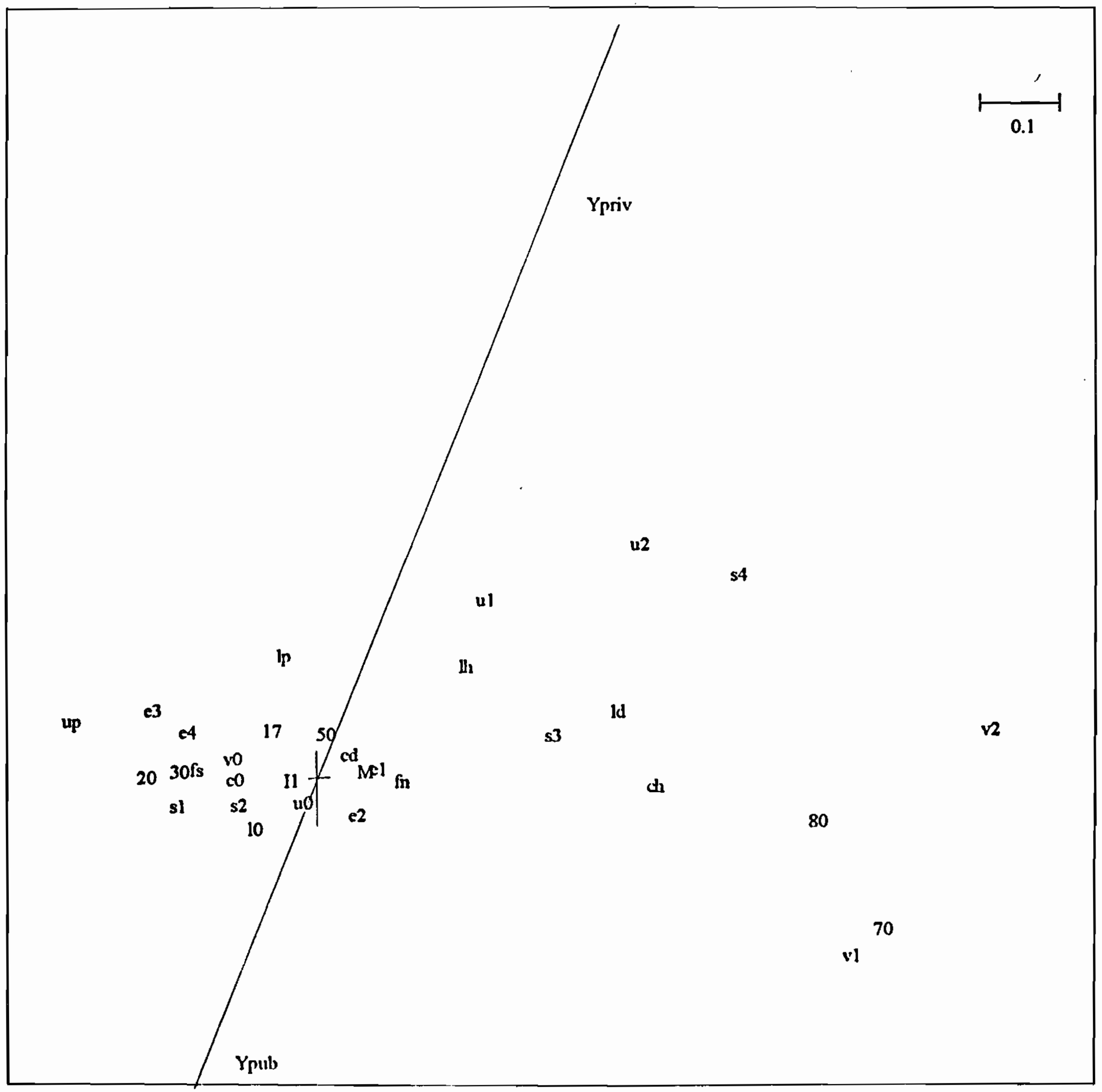


FIGURE 5 : Biplot map with supplementary categories.

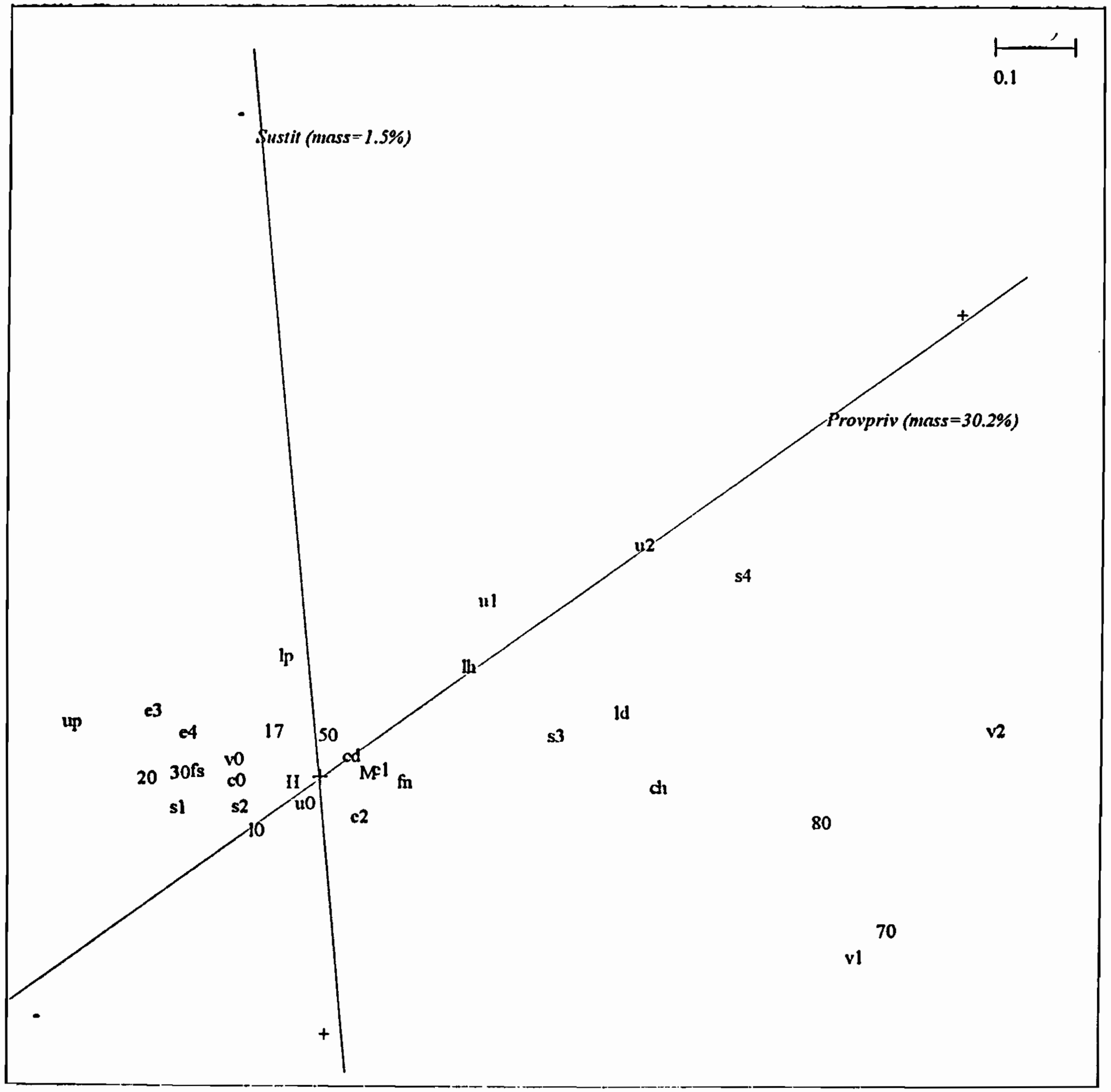


FIGURE 6 : Observed distances from Ypriv average splitted into distances due to PROVpv and SUSTIT.

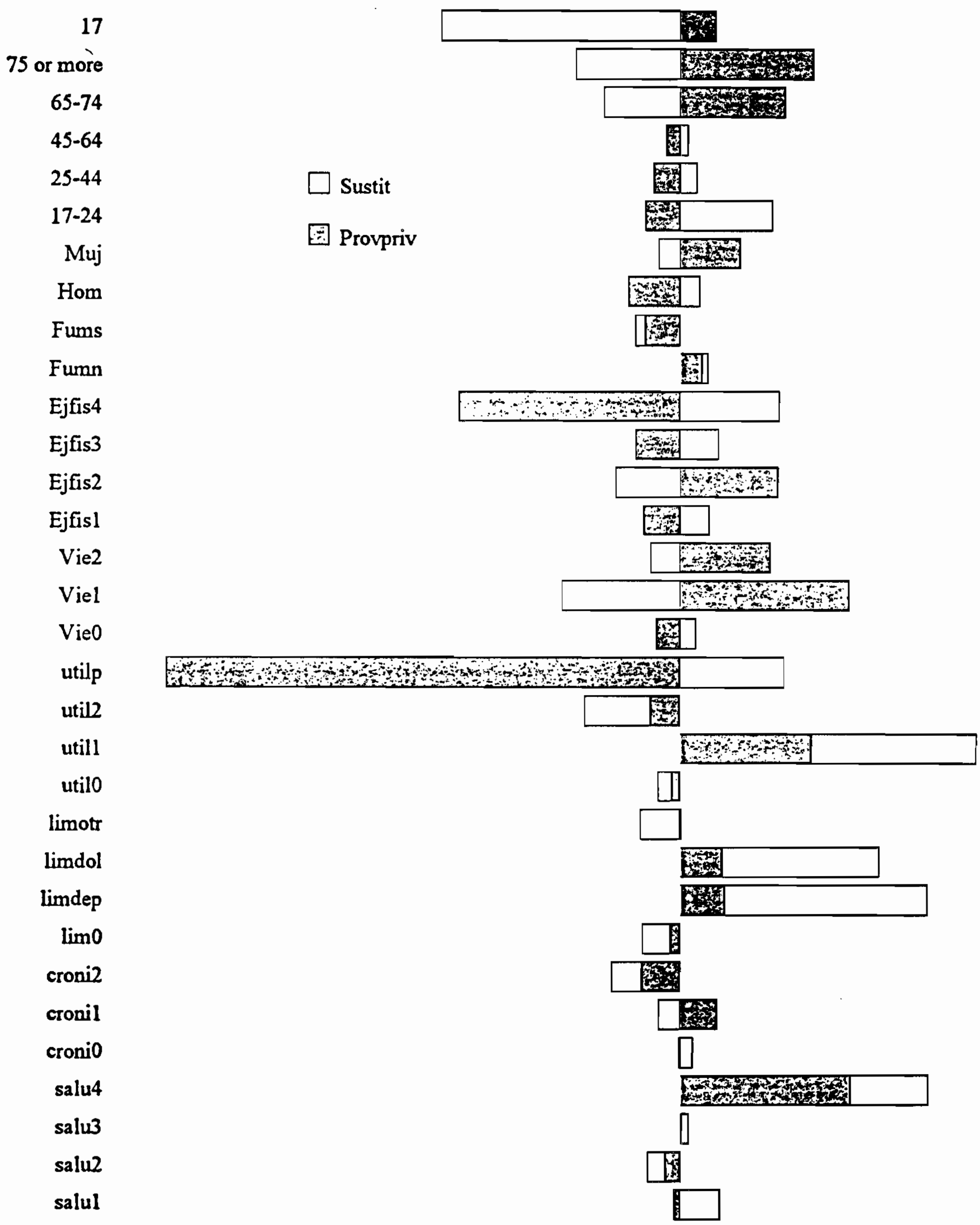


FIGURE 7 : Biplot map with supplementary categories.

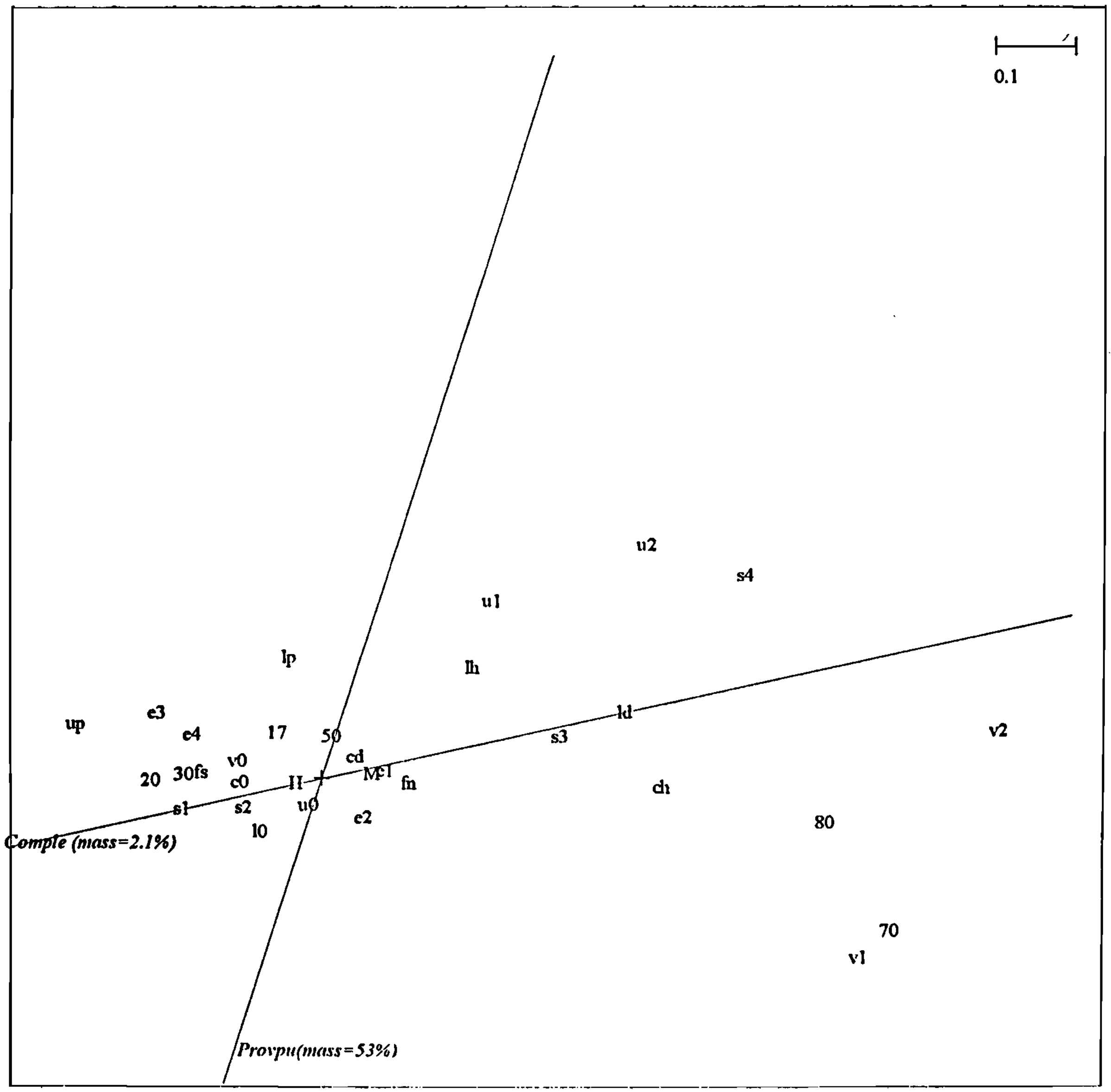


TABLE 1: RESULTS OF A PROBIT REGRESSION ON THE CHOICE OF INSALUD (PUBLIC) VS. A PRIVATE PROVIDER IN MUFACE.

	ALL VARIABLES N= 1699			SIGNIFICANT VARIABLES ONLY N1= 1699		
VARIABLES	coef.	s.e.	Mg. prob.	coef.	s.e.	Mg. prob.
Intercept	-0,107	(0,17)	0,46	0,033	(0,10)	0,487
[Sample mean probability:]			0,443			0,444
ON POTENTIAL HEALTH CARE NEEDS:(Yes=1 and No=0)						
Any newborn in the family?	-0,25	(0,20)	-0,099			
Any fertile woman in the fam.?	0,04	(0,08)	0,016			
Any retired person in the fam.?	-0,07	(0,05)	-0,028			
Any disabled memeber of the fam.?	-0,1	(0,17)	-0,039			
Perceived general living status, as compared to last year's:						
1. The same	0,09	(0,10)	0,036			
2.Worse	0,02	(0,12)	0,008			
3. Better (reference)						
ON THE SUPPLIED OPTIONS:						
Anybody covered by both MUFACE and the Gral. regime of the Soc.Sec.?	-1,96 **	(0,23)	-0,774	-1,93 **	(0,23)	-0,763
Anybody paying a complementary private insurance policy, additional to the Social Security?	0,19	(0,13)	0,075			
Autonomous Communities (region) of residence:						
1. Andalucía (reference)	**					
2. Aragón	-0,16	(0,16)	-0,063	-0,19	(0,15)	-0,076
3. Asturias	0,62 *	(0,32)	0,245	0,621 *	(0,32)	0,245
4.Baleares	-0,19	(0,25)	-0,075	-0,19	(0,24)	-0,075
5. Canarias	0,32 *	(0,18)	0,126	-0,329 *	(0,18)	0,130
6. Cantabria	1,13 **	(0,35)	0,446	1,169 **	(0,35)	0,462
7. Cast. La Mancha	0,003	(0,10)	0,001	0,035	(0,11)	0,014
8. Cast. León	-0,28 *	(0,15)	-0,111	-0,24 *	(0,14)	-0,095
9. Cataluña	0,35 **	(0,16)	0,138	0,378 **	(0,15)	0,149
10. Co. Valenciana	-0,03	(0,15)	-0,012	-0,03	(0,15)	-0,011
11. Extremadura	-0,28 *	(0,17)	-0,111	-0,21	(0,17)	-0,084
12. Galicia	-0,18	(0,13)	-0,071	-0,17	(0,13)	-0,057
13. Madrid	0,83 **	(0,20)	0,328	0,758 **	(0,19)	0,299
14. Murcia	0,54 **	(0,22)	0,213	0,519 **	(0,22)	0,205
15. Navarra	-0,6 **	(0,26)	-0,237	-0,61 **	(0,26)	-0,241
16. País Vasco	-0,07	(0,17)	-0,028	-0,03	(0,17)	-0,012
17. La Rioja	0,14	(0,25)	0,055	0,206	(0,25)	0,081
18. Ceuta y Melilla	-0,13	(0,21)	-0,051	-0,03	(0,19)	-0,010
Town size						
1. up to 10.000	0,23	(0,16)	0,091			
2. 10.001-50.000	0,089	(0,14)	0,035			
3.50.001-100.000	0,2	(0,16)	0,079			
4.100001-500.000	0,1	(0,14)	0,039			
5.more than 500.000 (refer.)						
INCOME AND EDUCATION:						
Income quartiles:	**					
1. Quartile 4 (upper level)	-0,04	(0,10)	-0,016	-0,01	(0,09)	-0,004
2. Quartile 3	-0,12	(0,09)	-0,047	-0,08	(0,09)	-0,033
3. Quartile 2	-0,25 **	(0,09)	-0,099	-0,23 **	(0,09)	-0,092
4. Quartile 4 (lowest : refer.)						
Education:						
EGB (elementary) or less (reference)						
COU (High School)	-0,03	(0,09)	-0,012			
Bachelor (undergraduate studies)	-0,08	(0,09)	-0,032			
Graduate or more	0,14	(0,10)	0,055			
Density function at sample mean			0,395			0,395
Min. Log likelihood values (d.f.)		-1067.52	(1663)		-1075,25	(1677)
%Choice of public prov. correctly predicted			48,21			48,47
%Choice of private prov. correctly predicted			73,72			72,41
Global % of choices correctly predicted			61,98			61,39

** $p<0.05$
* $p<0.10$

TABLE 2: Absolute (and relative) frequencies of insurance coverage resulting from the NSH.

OPTIONS	C Member of Soc.Sec. Gral.Reg	D paying private policy	C+D	nor C nor D	TOTAL
A MUFACE enrollee choosing INSALUD	88 (16.2%)	10 (1.8%)	10 (1.8%)	435 (80.2%)	543 (100%)
B MUFACE enrollee choosing a Private carriers	105 (26.6%)	8 (2%)	1 (1%)	281 (71.1%)	395 (100%)
MUFACE "double enrollee" choosing both **A+B**	5 (27.8%)	0 (0%)	0 (0%)	13 (72.2%)	18 (100%)
TOTAL MUFACE enrollees	198 (20.7%)	18 (1.9%)	11 (1.1%)	729 (76.3%)	956 (100%)
nor A nor B (non MUFACE enrollees)	18,399 (91.5%)	338 (1.7%)	1,056 (5.3%)	312 (1.5%)	20,105 (100%)
TOTAL SAMPLED	18,597 (88.3%)	356 (1.7%)	1,067 (5.1%)	1,041 (4.9%)	21,061 (100%)

Table 3: Variables PROV* and Y* on types of insurance coverage.

VARIABLES		TABLE 2 CATEGORIES	SAMPLED FREQUENCIES	
Y*	PROV*		abs.	relat.
YPUB	*PROVPU*	A A+C	523	54.7
	COMPLE	A+D A+D+C	20	2.1
YPRIV	*PROVPV*	B B+D	289	30.2
	SUSTIT	B+A B+A+C B+A+D B+A+C+D B+C	124	13
Total			956	100

TABLE 4 : RESULTS OF A PROBIT REGRESSION ON THE CHOICE OF INSALUD (PUBLIC) VS. A PRIVATE PROVIDER IN MUFACE (NSH data).

VARIABLES	FIRST REGRESSION N= 927			SECOND REGRESSION N= 927		
	coef.	s.e.	Mg. prob.	coef.	s.e.	Mg. prob.
Intercept	-0,2273	(0,25)	0,41	-0,096	(0,26)	0,462
[Sample mean probability:]			0,552			0,556
ON PERCEIVED HEALTH STATUS:						
Feeling very well (salu1)	0,257	(0,24)	0,102	0,259	(0,24)	0,102
Feeling well (salu2)	0,345 *	(0,20)	0,136	0,354 *	(0,21)	0,140
Feeling so-so (salu3)	0,321	(0,20)	0,127	0,353 *	(0,21)	0,139
Feeling bad or very bad (salu4)						
ON DIAGNOZED CHRONIC CONDITIONS:						
None (croni0)						
Heart, hypertension, colesterol (croni1)	0,046	(0,13)	0,018	0,077	(0,13)	0,030
Diabetes, asthma, bronchitis, ulcer, alergies,...(croni2)	0,077	(0,13)	0,030	0,114	(0,13)	0,045
ON MAIN ACTIVITIY LIMITATIONS:						
None (lim0)	*					
Depression, nerves, poor sleeping (limdep)	-0,274	(0,17)	-0,108	-0,243	(0,18)	-0,096
Mild pbl: headache, flu, period pain, fattigue,... (limdol)	-0,296 *	(0,17)	-0,117	-0,261	(0,18)	-0,103
Heart, stomach, blood pressure, liver, joints, lung,...(limotr)	0,072	(0,13)	0,028	0,087	(0,13)	0,034
ON HEALTH CARE SERVICES UTILIZATION:						
1 oupatient visit or none (util0)	**			**		
1 short inpateint stay or 2 or more outpatient visits (util1)	-0,414 **	(0,16)	-0,164	-0,481 **	(0,17)	-0,190
1 long or 2 (or more) short inpatient stays (util2)	0,154	(0,27)	0,061	0,173	(0,27)	0,068
Hospitalization due to birth (utilp)	0,7	(0,63)	0,277	0,73	(0,66)	0,288
ON ELDERLY MOBILITY:						
Under 65 or full mobility (vie0)						
Elder needing little or no help (vie1)	-0,302	(0,42)	-0,119	-0,396	(0,43)	-0,156
Elder dependent on help (vie2)	-0,204	(0,45)	-0,081	-0,272	(0,45)	-0,107
ON SPORT PRACTICES (IN LEISURE TIME):						
None (ejfis1)						
Occasionally (ejfis2)	-0,101	(0,10)	-0,040	-0,116	(0,10)	-0,046
regularly (ejfis3)	-0,025	(0,14)	-0,010	-0,036	(0,14)	-0,014
Seriously (ejfis4)	0,109	(0,20)	0,043	0,153	(0,20)	0,060
ON SMOKING HABITS:						
Smokes occasionally or usually						
Never	-0,07	(0,09)	-0,028	-0,073	(0,09)	-0,029
ON SEX:						
Man (hom)	0,107	(0,09)	0,042	0,118	(0,09)	0,047
Woman (muj)						
ON AGE:						
17	0,423	(0,30)	0,167	0,357	(0,30)	0,141
18-24						
25-44	0,079	(0,14)	0,031	0,048	(0,14)	0,019
45-64	0,15	(0,15)	0,059	0,079	(0,15)	0,031
65-74	0,417	(0,45)	0,165	0,404	(0,45)	0,160
75 or more	0,277	(0,39)	0,110	0,249	(0,39)	0,098
ON DOUBLE COVERAGE:						
1. Having access to INSALUD outside MUFACE				-0,496 **	(0,10)	-0,196
2. Having access to a private carrier outside MUFACE				0,661 **	(0,27)	0,261
Density function at sample mean			0,395			0,395
Min. Log likelihood values		-599.488			-584.912	
%Choice of public prov. correctly predicted		80,99			75,29	
%Choice of private prov. correctly predicted		27,43			39,40	
Global % of choices correctly predicted		57,82			59,76	

** $p<0.05$

* $p<0.10$

TABLE 5 : Contingency table with active and supplementary variables.

	salu1	salu2	salu3	salu4	croni0	croni1	croni2	lim0	limdep	limdel	limotr	udl0	udl1	udl2	udlp	vie0	vie1	vie2
salu1	105.36	0	0	0	89.808	6.88	8.672	89.378	3.013	6.744	6.225	95.259	8.982	1.119	0	99.411	5.591	0.358
salu2	0	551.842	0	0	403.925	75.234	72.683	417.601	26.325	34.963	72.953	503.936	29.988	12.505	5.413	505.272	41.565	5.005
salu3	0	0	182.09	0	84.296	51.255	46.539	76.917	24.853	13.135	67.185	151.807	25.483	4.8	0	125.395	32.421	24.274
salu4	0	0	0	54.449	20.584	24.543	9.322	9.224	14.813	6.785	23.627	33.732	11.542	9.175	0	35.589	9.215	9.645
croni0					598.613	0	0	408.9	45.931	42.746	101.036	531.358	49.008	14.531	3.716	551.847	34.829	11.937
croni1					0	157.912	0	89.43	17.395	10.942	40.145	130.131	18.063	9.718	0	95.491	42.385	20.036
croni2					0	0	137.216	94.79	5.678	7.939	28.809	123.245	8.924	3.35	1.697	118.329	11.578	7.309
lim0								593.12	0	0	0	565.273	20.739	4.212	2.896	524.778	50.547	17.795
limdep								0	69.004	0	0	53.611	11.615	3.778	0	48.372	13.208	7.424
limdel								0	0	61.627	0	47.015	11.453	2.03	1.129	55.244	2.772	3.611
limotr								0	0	0	169.99	118.835	32.188	17.579	1.388	137.273	22.265	10.452
udl0												784.734	0	0	0	676.925	78.122	29.687
udl1												0	75.995	0	0	63.382	6.156	6.457
udl2												0	0	27.599	0	19.947	4.514	3.138
udlp												0	0	0	5.413	5.413	0	0
vie0																765.667	0	0
vie1																0	88.792	0
vie2																0	0	39.282

																		Supplementary columns			
	cjfis1	cjfis2	cjfis3	cjfis4	fama	famu	hom	muj	17-24	25-44	45-64	65-74	75 e+	eda17	ypriv	ypubl	Sum	comple	prevpu	prevpriv	smdt
salu1	38.329	40.881	17.095	9.055	64.01	41.35	70.33	35.03	16.307	48.063	27.946	2.12	6.991	3.933	49.308	56.052	105.36	1.419	54.633	31.354	17.954
salu2	238.252	205.998	72.676	34.916	328.119	223.723	294.75	257.092	85.804	242.85	152.854	36.162	19.649	14.523	236.994	314.848	551.842	15.199	299.649	161.348	75.646
salu3	88.783	64.655	22.598	6.054	120.484	61.606	91.436	90.654	15.084	39.699	65.456	25.891	31.487	4.473	82.623	99.467	182.09	2.292	97.175	54.999	27.624
salu4	33.513	14.197	4.026	2.713	43.783	10.666	21.103	33.346	0.506	10.662	23.071	11.115	7.745	1.35	32.371	22.078	54.449	0.182	21.896	21.864	10.507
croni0	263.134	213.987	87.739	33.753	346.515	252.098	325.104	273.509	98.917	271.358	164.328	30.744	22.134	11.132	272.983	325.63	598.613	16.331	309.299	180.211	92.772
croni1	74.355	68.995	7.458	7.104	118.502	39.41	79.661	78.251	0.712	26.272	60.889	33.644	32.403	3.992	72.276	85.636	157.912	1.411	84.225	51.071	21.205
croni2	61.388	42.749	21.198	11.881	91.379	45.837	72.854	64.362	18.072	43.644	44.11	10.9	11.335	9.155	56.037	81.179	137.216	1.35	79.829	38.283	17.754
lim0	264.854	222.14	72.432	33.694	360.999	232.121	325.397	267.723	86.783	234.143	179.076	40.596	37.902	14.62	252.927	340.193	593.12	15.459	324.734	175.399	77.528
limdep	34.393	30.606	4.005	0	54.958	14.046	22.635	46.369	7.005	10.492	29.746	10.719	9.913	1.129	40.985	28.019	69.004	0	28.019	22.624	18.361
limdel	28.294	11.465	16.236	5.632	39.086	22.541	36.976	24.651	12.752	28.836	9.625	3.436	2.947	4.031	34.857	26.77	61.627	0.536	26.234	20.116	14.741
limotr	71.336	61.52	23.722	13.412	101.353	68.637	92.611	77.379	11.161	67.803	50.88	20.537	15.11	4.499	72.527	97.463	169.99	3.097	94.366	51.426	21.101
udl0	347.319	289.944	99.852	47.619	482.746	301.988	417.902	366.832	106.95	306.66	229.44	62.871	55.884	22.929	342.021	442.713	784.734	14.844	427.869	232.95	109.071
udl1	35.9	28.461	8.867	2.767	53.526	22.469	42.127	33.868	8.018	24.144	31.22	8.999	3.614	0	47.315	28.68	75.995	3.844	24.836	28.771	18.544
udl2	11.758	6.41	7.079	2.352	18.611	8.988	17.59	10.009	2.733	5.057	8.667	3.418	6.374	1.35	10.831	16.768	27.599	0.404	16.364	7.844	2.987
udlp	3.9	0.916	0.597	0	1.513	3.9	0	5.413	0	5.413	0	0	0	0	1.129	4.284	5.413	0	4.284	0	1.129
vie0	327.931	269.788	115.622	52.326	443.019	322.648	412.318	353.349	117.701	341.274	269.327	0	13.086	24.279	339.857	425.81	765.667	19.092	406.718	220.102	119.755
vie1	43.002	44.605	0.773	0.412	76.905	11.887	45.717	43.075	0	0	0	57.019	31.773	0	42.418	46.374	88.792	0	46.374	35.538	6.88
vie2	27.944	11.338	0	0	36.472	2.81	19.584	19.698	0	0	0	18.269	21.013	0	19.021	20.261	39.282	0	20.261	13.925	5.096
cjfis1	398.877	0	0	0	248.412	150.465	186.537	212.34	43.32	157.93	117.434	38.049	37.625	4.519	177.221	221.656	398.877	6.578	215.078	111.655	65.566
cjfis2	0	325.731	0	0	205.329	120.402	184.356	141.375	31.941	104.989	118.012	36.415	24.452	9.922	152.449	173.282	325.731	10.76	162.522	116.875	35.574
cjfis3	0	0	116.395	0	64.476	51.919	70.163	46.232	32.709	55.782	19.21	0.412	2.627	5.655	51.773	64.622	116.395	0.404	64.218	32.012	19.761
cjfis4	0	0	0	52.738	38.179	14.559	36.563	16.175	9.731	22.573	14.671	0.412	1.168	4.183	19.853	32.885	52.738	1.35	31.535	9.023	10.83
fama					556.396	0	270.929	285.467	65.367	171.226	180.919	65.377	52.817	20.69	258.795	297.601	556.396	4.533	293.068	174.844	83.951
famu					0	337.345	206.69	130.655	52.334	170.048	88.408	9.911	13.055	3.589	142.501	194.844	337.345	14.559	180.285	94.721	47.78
hom							477.619	0	65.484	197.76	131.422	31.185	42.491	9.277	205.146	272.473	477.619	10.302	262.171	129.324	75.822
muj							0	416.122	52.217	143.514	137.905	44.103	23.381	15.002	196.15	219.972	416.122	8.79	211.182	140.241	55.909
17-24									117.701	0	0	0	0	0	56.776	60.925	117.701	6.358	54.567	33.07	23.706
25-44									0	341.274	0	0	0	0	150.976	190.298	341.274	5.163	185.135	97.323	53.653
45-64									0	0	269.327	0	0	0	119.85	149.477	269.327	6.221	143.256	78.963	40.887
65-74									0	0	0	75.288	0	0	35.041	40.247	75.288	0	40.247	27.348	7.693
75 e+									0	0	0	0	65.872	0	30.658	35.214	65.872	1.35	33.864	25.025	5.633
eda17									0	0	0	0	0	24.279	7.995	16.284	24.279	0	16.284	7.836	0.159
ypriv															401.296	0	401.296	0	0	269.565	131.731
ypubl															0	492.445	492.445	19.092	473.353	0	0
Sum																	8937.41				

TABLE 6: Inertia and Ci-square decomposition.

Axes K	MCA: Results from the indicator matrix Z: Singular Values	Principal Inertias	Chi-Squares	Percentage of inertia	MCA: Results from the Burt matrix B: Singular Values	Principal Inertias	Percentage of inertia	ADJUSTED MCA: Singular Values	Principal Inertias	Percentage of inertia
1	0.5140	0.2642	2871.11	11.01%	0.2642	0.0698	23.93%	0.1825	0.0333	57.96%
2	0.3935	0.1548	1682.34	6.45%	0.1548	0.0240	8.21%	0.0609	0.0037	6.46%
3	0.3704	0.1372	1490.48	5.72%	0.1372	0.0188	6.45%	0.0413	0.0017	2.97%
4	0.3586	0.1286	1397.10	5.36%	0.1286	0.0165	5.67%	0.0317	0.0010	1.75%
5	0.3532	0.1247	1355.48	5.20%	0.1247	0.0156	5.33%	0.0275	0.0008	1.32%
6	0.3513	0.1234	1341.10	5.14%	0.1234	0.0152	5.22%	0.0260	0.0007	1.18%
7	0.3482	0.1213	1317.50	5.05%	0.1213	0.0147	5.04%	0.0236	0.0006	0.97%
TOTAL		2.4000	26078.60			0.2918			0.0575	

(Degrees of Freedom = 1089)

TABLE 7: Summary statistics and coordinates.

	SUMMARY STATISTICS			PROFILE COORDINATES						STANDARD COORDINATES	
				Indicator matrix coord		Burt Matrix coords.		Adjusted MCA coords.			
	Quality	Mass (* 1,000)	Contributio to inertia (*1,000)	K=1	K=2	K=1	K=2	K=1	K=2	K=1	K=2
salu1	0.0470	11.79	36.76	-0.5388	-0.2479	-0.2770	-0.0975	-0.1913	-0.0384		
salu2	0.2516	61.75	15.94	-0.3149	-0.2382	-0.1619	-0.0937	-0.1118	-0.0369		
salu3	0.2043	20.37	33.18	0.8206	0.3539	0.4218	0.1392	0.2913	0.0548		
salu4	0.3336	6.09	39.13	1.4897	1.7098	0.7657	0.6728	0.5289	0.2646		
croni0	0.2254	66.98	13.76	-0.3325	-0.0236	-0.1709	-0.0093	-0.1181	-0.0036		
croni1	0.3044	17.67	34.31	1.1889	-0.0701	0.6111	-0.0276	0.4221	-0.0108		
croni2	0.0073	15.35	35.27	0.0823	0.1835	0.0423	0.0722	0.0292	0.0284		
lim0	0.5072	66.36	14.02	-0.2537	-0.4390	-0.1304	-0.1727	-0.0901	-0.0679		
limdep	0.1196	7.72	38.45	1.0589	0.5555	0.5443	0.2186	0.3759	0.0860		
limdol	0.0793	6.90	38.79	-0.1492	1.0239	-0.0767	0.4029	-0.0530	0.1585		
limotr	0.2663	19.02	33.74	0.5093	0.9351	0.2618	0.3679	0.1808	0.1447		
util0	0.3957	87.80	5.08	-0.0885	-0.2171	-0.0455	-0.0854	-0.0314	-0.0336		
util1	0.2374	8.50	38.12	0.5701	1.4933	0.2930	0.5876	0.2024	0.2311		
util2	0.1640	3.09	40.38	1.1298	1.9675	0.5807	0.7742	0.4011	0.3045		
utilp	0.0066	0.61	41.41	-0.9270	0.4730	-0.4765	0.1861	-0.3291	0.0732		
vie0	0.8435	85.67	5.97	-0.3434	0.1523	-0.1765	0.0599	-0.1219	0.0236		
vie1	0.6438	9.94	37.53	1.8984	-1.4942	0.9758	-0.5879	0.6740	-0.2313		
vie2	0.2729	4.40	39.84	2.4016	0.4093	1.2345	0.1611	0.8527	0.0634		
ejfis1	0.0225	44.63	23.07	0.1598	0.0494	0.0821	0.0194	0.0567	0.0076		
ejfis2	0.0668	36.45	26.48	0.1120	-0.3225	0.0576	-0.1269	0.0398	-0.0499		
ejfis3	0.1070	13.02	36.24	-0.6313	0.5620	-0.3245	0.2211	-0.2241	0.0870		
ejfis4	0.0251	5.90	39.21	-0.5066	0.3785	-0.2604	0.1489	-0.1799	0.0586		
fumm	0.1317	62.26	15.73	0.2804	-0.0347	0.1441	-0.0137	0.0995	-0.0054		
fums	0.1317	37.75	25.94	-0.4625	0.0573	-0.2377	0.0225	-0.1642	0.0089		
hom	0.0192	53.44	19.40	-0.1241	-0.0360	-0.0638	-0.0142	-0.0441	-0.0056		
muj	0.0192	46.56	22.27	0.1424	0.0413	0.0732	0.0162	0.0506	0.0064		
17-24	0.0658	13.17	36.18	-0.6585	-0.0058	-0.3385	-0.0023	-0.2338	-0.0009		
25-44	0.1805	38.19	25.76	-0.5388	0.0426	-0.2770	0.0168	-0.1913	0.0066		
45-64	0.0555	30.14	29.11	-0.0067	0.3587	-0.0034	0.1411	-0.0024	0.0555		
65-74	0.5206	8.42	38.16	2.0101	-1.2722	1.0333	-0.5006	0.7137	-0.1969		
75 o+	0.2607	7.37	38.60	1.7726	-0.3664	0.9112	-0.1442	0.6293	-0.0567		
eda17	0.0054	2.72	40.54	-0.2025	0.3898	-0.1041	0.1534	-0.0719	0.0603		
ypriv	0.0292	44.90	22.96	0.0886	0.1674	0.0455	0.0659	0.0315	0.0259	0.1724	0.4255
ypubl	0.0292	55.10	18.71	-0.0722	-0.1364	-0.0371	-0.0537	-0.0256	-0.0211	-0.1405	-0.3467
Supplementary Column Coordinates:											
tip1	0.0162			-0.0088	-0.1451	-0.0171	-0.5490	-0.0031	-0.0225	-0.0171	-0.3687
tip2	0.0130			0.1612	0.0709	0.3136	0.2683	0.0572	0.0110	0.3136	0.1802
tip3	0.0208			-0.0377	0.3461	-0.0733	1.3098	-0.0134	0.0536	-0.0733	0.8795
tip4	0.0087			-0.2655	-0.1078	-0.5166	-0.4081	-0.0943	-0.0167	-0.5166	-0.2741
tip5	0.0016			-0.3105	0.2506	-0.6041	0.9485	-0.1103	0.0388	-0.6041	0.6369
tip6	0.0026			-0.2324	0.5852	-0.4521	2.2149	-0.0825	0.0906	-0.4521	1.4873
tip7	0.0066			-0.6489	-0.3804	-1.2624	-1.4397	-0.2304	-0.0589	-1.2624	-0.9668
tip8	0.0007			-0.8364	-0.3131	-1.6271	-1.1851	-0.2969	-0.0485	-1.6271	-0.7958
dobpub	0.0148			-0.1538	0.1402	-0.2992	0.5306	-0.0546	0.0217	-0.2992	0.3563
no-pub	0.0148			0.0526	-0.0479	0.1023	-0.1813	0.0187	-0.0074	0.1023	-0.1218
dobpriv	0.0060			-0.4443	0.0571	-0.8643	0.2162	-0.1577	0.0088	-0.8643	0.1452
no-priv	0.0060			0.0132	-0.0017	0.0256	-0.0064	0.0047	-0.0003	0.0256	-0.0043
comple	0.0055			-0.4927	-0.0890	-0.9584	-0.3368	-0.1749	-0.0138	-0.9584	-0.2262
provpu	0.0250			-0.0552	-0.1383	-0.1075	-0.5235	-0.0196	-0.0214	-0.1075	-0.3516
provpv	0.0130			0.1527	0.0821	0.2970	0.3106	0.0542	0.0127	0.2970	0.2086
sustit	0.0205			-0.0426	0.3420	-0.0828	1.2945	-0.0151	0.0529	-0.0828	0.8693

TABLE 8: Scalar distances in absolute terms.

		ESTIMATED SCALAR PRODUCT					
		ACTIVE VARIABLES		SUPPLEMENTARY VARIABLES			
		MUFACE		PROVIDERS			
VARIABLES	CATEGORIES	PUBLIC	PRIVATE	COMPLEM	PUBLIC	PRIVATE	SUBSTIT
Perceived health status	salu1	2.21	-2.21	0.41	1.80	-1.96	0.73
	salu2	1.67	-1.57	0.25	1.32	-1.23	0.61
	salu3	-3.30	3.30	-0.62	-2.68	2.95	-1.06
	salu4	-9.15	9.15	-1.21	-7.94	6.40	-4.04
Chronic conditions	croni0	0.98	-0.98	0.24	0.74	-1.08	0.19
	croni1	-3.06	3.06	-0.86	-2.20	3.71	-0.38
	croni2	-0.77	0.77	-0.07	-0.70	0.44	-0.40
Limitations due to health	lim0	1.99	-1.99	0.22	1.78	-1.23	0.98
	limdep	-4.55	4.55	-0.81	-3.74	3.91	-1.56
	limdol	-2.62	2.62	0.03	-2.65	0.52	-1.97
	limotr	-4.16	4.16	-0.44	-3.72	2.53	-2.08
Care utilization	util0	0.89	-0.89	0.08	0.80	-0.49	0.47
	util1	-5.98	5.98	-0.53	-5.46	3.27	-3.21
	util2	-8.92	8.92	-0.97	-7.95	5.51	-4.39
	utilp	1.15	-1.15	0.64	0.51	-2.49	-0.64
Elderly mobility	Vie0	0.49	-0.49	0.24	0.25	-0.94	-0.15
	Vie1	-0.80	0.80	-1.27	0.47	4.58	2.14
	Vie2	-7.81	7.81	-1.78	-6.03	8.04	-1.85
Sport habits	Sport1	-0.58	0.58	-0.12	-0.47	0.56	-0.17
	Sport2	0.65	-0.65	-0.06	0.70	0.04	0.59
	Sport3	0.07	-0.07	0.42	-0.34	-1.46	-0.84
	Sport4	0.27	-0.27	0.34	-0.07	-1.24	-0.53
Smoking	No	-0.67	0.67	-0.20	-0.47	0.86	-0.05
	Yes	1.10	-1.10	0.33	0.77	-1.42	0.09
Sexe	Men	0.45	-0.45	0.09	0.35	-0.43	0.13
	Women	-0.51	0.51	-0.11	-0.41	0.49	-0.14
Age	17-24	1.83	-1.83	0.48	1.35	-2.10	0.30
	25-44	1.35	-1.35	0.39	0.97	-1.67	0.15
	45-64	-1.04	1.04	-0.02	-1.02	0.33	-0.71
	65-74	-1.76	1.76	-1.37	-0.40	5.16	1.65
	75 or more	-3.79	3.79	-1.26	-2.53	5.28	-0.04
	17	-0.60	0.60	0.12	-0.71	-0.26	-0.69
Centroid or mass (*100)		55.1	44.9	2.1	5.3	30.2	14.7

		OBSERVED DISTANCES					
		ACTIVE VARIABLES		SUPPLEMENTARY VARIABLES			
		MUFACE		PROVIDERS			
VARIABLES	CATEGORIES	PUBLIC	PRIVATE	COMPLEM	PUBLIC	PRIVATE	SUBSTIT
Perceived health status	salu1	-1.90	1.90	-0.79	-1.11	-0.40	2.30
	salu2	1.95	-1.95	0.61	1.34	-0.92	-1.03
	salu3	-0.47	0.47	-0.88	0.41	0.04	0.43
	salu4	-14.55	14.55	-1.81	-12.75	10.00	4.56
Chronic conditions	croni0	-0.70	0.70	0.59	-1.29	-0.06	0.76
	croni1	-0.87	0.87	-1.25	0.38	2.18	-1.31
	croni2	4.06	-4.06	-1.16	5.22	-2.26	-1.80
Limitations due to health	lim0	2.26	-2.26	0.47	1.79	-0.59	-1.67
	limdep	-14.50	14.50	-2.14	-12.36	2.63	11.87
	limdol	-11.66	11.66	-1.27	-10.39	2.48	9.18
	limotr	2.23	-2.23	-0.32	2.55	0.09	-2.33
Care utilization	util0	1.32	-1.32	-0.25	1.56	-0.47	-0.84
	util1	-17.36	17.36	2.92	-20.28	7.70	9.66
	util2	5.66	-5.66	-0.68	6.33	-1.74	-3.92
	utilp	24.04	-24.04	-2.14	26.18	-30.16	6.12
Elderly mobility	Vie0	0.51	-0.51	0.35	0.16	-1.41	0.90
	Vie1	-2.87	2.87	-2.14	-0.73	9.86	-6.99
	Vie2	-3.52	3.52	-2.14	-1.38	5.29	-1.77
Sport habits	Sport1	0.47	-0.47	-0.49	0.96	-2.17	1.70
	Sport2	-1.90	1.90	1.16	-3.07	5.72	-3.82
	Sport3	0.42	-0.42	-1.79	2.21	-2.66	2.24
	Sport4	7.26	-7.26	0.42	6.84	-13.05	5.80
Smoking	No	-1.61	1.61	-1.33	-0.29	1.26	0.35
	Yes	2.66	-2.66	2.18	0.48	-2.08	-0.58
Sexe	Men	1.95	-1.95	0.02	1.93	-3.08	1.13
	Women	-2.24	2.24	-0.03	-2.21	3.54	-1.30
Age	17-24	-3.34	3.34	3.26	-6.60	-2.06	5.40
	25-44	0.66	-0.66	-0.63	1.29	-1.64	0.98
	45-64	0.40	-0.40	0.17	0.23	-0.84	0.44
	65-74	-1.64	1.64	-2.14	0.50	6.16	-4.52
	75 or more	-1.64	1.64	-0.09	-1.55	7.83	-6.19
	17	11.97	-11.97	-2.14	14.11	2.11	-14.09
Centroid or mass (*100)		55.1	44.9	2.1	5.3	30.2	14.7

		RESIDUALS					
		ACTIVE VARIABLES		SUPPLEMENTARY VARIABLES			
		MUFACE		PROVIDERS			
VARIABLES	CATEGORIES	PUBLIC	PRIVATE	COMPLEM	PUBLIC	PRIVATE	SUBSTIT
Perceived health status	salu1	-4.11	4.11	-1.20	-2.91	1.55	1.58
	salu2	0.38	-0.38	0.37	0.02	0.31	-1.64
	salu3	2.83	-2.83	-0.26	3.08	-2.91	1.49
	salu4	-5.40	5.40	-0.59	-4.81	3.59	8.59
Chronic conditions	croni0	-1.69	1.69	0.34	-2.03	1.03	0.57
	croni1	2.19	-2.19	-0.39	2.58	-1.53	-0.94
	croni2	4.83	-4.83	-1.08	5.91	-2.70	-1.40
Limitations due to health	lim0	0.26	-0.26	0.25	0.01	0.65	-2.65
	limdep	-9.94	9.94	-1.33	-8.61	-1.28	13.43
	limdol	-9.04	9.04	-1.30	-7.74	1.96	11.15
	limotr	6.40	-6.40	0.12	6.28	-2.44	-0.25
Care utilization	util0	0.43	-0.43	-0.33	0.76	0.02	-1.31
	util1	-11.38	11.38	3.45	-14.82	4.43	12.87
	util2	14.58	-14.58	0.29	14.28	-7.25	0.47
	utilp	22.89	-22.89	-2.78	25.67	-27.67	6.65
Elderly mobility	Vie0	0.02	-0.02	0.11	-0.10	-0.47	1.05
	Vie1	-2.07	2.07	-0.87	-1.20	5.28	-9.13
	Vie2	4.29	-4.29	-0.36	4.65	-2.75	0.09
Sport habits	Sport1	1.05	-1.05	-0.37	1.43	-2.72	1.86
	Sport2	-2.55	2.55	1.22	-3.77	5.68	-4.41
	Sport3	0.35	-0.35	-2.21	2.56	-1.20	3.08
	Sport4	6.98	-6.98	0.08	6.90	-11.81	6.33
Smoking	No	-0.95	0.95	-1.12	0.18	0.41	0.40
	Yes	1.56	-1.56	1.84	-0.29	-0.67	-0.66
Sexe	Men	1.50	-1.50	-0.08	1.58	-2.65	1.01
	Women	-1.72	1.72	0.08	-1.80	3.05	-1.16
Age	17-24	-5.16	5.16	2.78	-7.95	0.04	5.10
	25-44	-0.69	0.69	-1.02	0.32	0.03	0.83
	45-64	1.44	-1.44	0.19	1.25	-1.17	1.15
	65-74	0.12	-0.12	-0.77	0.89	1.01	-6.17
	75 or more	2.15	-2.15	1.17	0.97	2.56	-6.15
	17	12.57	-12.57	-2.26	14.82	2.38	-13.40
Centroid or mass (*100)		55.1	44.9	2.1	5.3	30.2	14.7

TABLE 9: Scalar distances as percentage of centroids.

		ESTIMATED SCALAR PRODUCT (% of the mass)						OBSERVED DISTANCES (% of the mass)						RESIDUALS					
		ACTIVE VARIABLES		SUPPLEMENTARY VARIABLES				ACTIVE VARIABLES		SUPPLEMENTARY VARIABLES				ACTIVE VARIABLES		SUPPLEMENTARY VARIABLES			
		MUFACE		PROVIDERS				MUFACE		PROVIDERS				MUFACE		PROVIDERS			
VARIABLES	CATEGORIES	PUBLIC	PRIVATE	COMPLEM	PUBLIC	PRIVATE	SUBSTIT	PUBLIC	PRIVATE	COMPLEM	PUBLIC	PRIVATE	SUBSTIT	PUBLIC	PRIVATE	COMPLEM	PUBLIC	PRIVATE	SUBSTIT
Perceived health status	salu1	4,02	-4,93	19,57	3,40	-6,47	4,93	-3,45	4,23	-37,77	-2,09	-1,33	15,65	-7,46	9,16	-57,34	-5,49	5,15	10,72
	salu2	2,85	-3,50	11,77	2,50	-4,08	4,14	3,55	-4,35	29,25	2,53	-3,05	-7,02	0,70	-0,86	17,48	0,03	1,03	-11,16
	salu3	-5,99	7,35	-29,72	-5,05	9,78	-7,19	-0,86	1,06	-41,97	0,77	0,15	2,93	5,13	-6,29	-12,25	5,82	-9,64	10,12
	salu4	-16,60	20,38	-57,75	-14,98	21,20	-27,46	-26,41	32,41	-85,99	-24,05	33,10	31,00	-9,81	12,03	-28,23	-9,07	11,90	58,46
Chronic conditions	croni0	1,78	-2,19	11,61	1,40	-3,58	1,30	-1,28	1,56	28,01	-2,44	-0,18	5,16	-3,06	3,75	16,39	-3,83	3,39	3,86
	croni1	-5,55	6,81	-40,98	-4,15	12,30	-2,56	-1,58	1,94	-59,36	0,71	7,22	-8,92	3,97	-4,88	-18,38	4,86	-5,07	-6,36
	croni2	-1,40	1,71	-3,51	-1,31	1,46	-2,72	7,37	-9,05	-55,05	9,84	-7,48	-12,25	8,77	-10,76	-51,55	11,16	-8,94	-9,54
Limitations due to health	lim0	3,62	-4,44	10,36	3,35	-4,09	6,67	4,10	-5,03	22,21	3,38	-1,95	-11,35	0,47	-0,58	11,85	0,02	2,14	-18,02
	limdep	-8,26	10,14	-38,70	-7,06	12,94	-10,61	-26,31	32,28	-101,90	-23,31	8,70	80,74	-18,05	22,15	-63,21	-16,25	-4,25	91,35
	limdol	-4,75	5,83	1,52	-5,00	1,73	-13,37	-21,16	25,97	-60,49	-19,61	8,22	62,45	-16,41	20,14	-62,01	-14,61	6,49	75,82
	limotr	-7,56	9,27	-21,00	-7,03	8,38	-14,12	4,06	-4,98	-15,15	4,82	0,31	-15,83	11,61	-14,25	5,85	11,84	-8,07	-1,71
Care utilization	util0	1,61	-1,97	3,84	1,52	-1,63	3,19	2,39	-2,93	-11,83	2,95	-1,57	-5,72	0,78	-0,96	-15,67	1,43	0,06	-8,91
	util1	-10,86	13,32	-25,09	-10,29	10,82	-21,83	-31,51	38,67	138,96	-38,26	25,49	65,73	-20,65	25,34	164,08	-27,97	14,68	87,55
	util2	-16,19	19,87	-46,19	-15,00	18,24	-29,87	10,26	-12,60	-32,20	11,95	-5,76	-26,65	26,46	-32,47	13,99	26,95	-24,00	3,23
	utilp	2,08	-2,56	30,46	0,96	-8,24	-3,65	43,63	-53,55	-101,90	49,40	-99,87	41,61	41,55	-50,99	-132,36	48,44	-91,63	45,26
Elderly mobility	Vie0	0,90	-1,10	11,36	0,48	-3,13	-1,04	0,93	-1,14	16,83	0,30	-4,68	6,13	0,04	-0,04	5,47	-0,18	-1,58	7,17
	Vie1	-1,45	1,78	-60,50	0,89	15,18	14,56	-5,21	6,40	-101,90	-1,38	32,66	-47,56	-3,76	4,62	-41,41	-2,27	17,48	-62,12
	Vie2	-14,17	17,39	-84,74	-11,38	26,61	-12,60	-6,39	7,84	-101,90	-2,61	17,51	-12,02	7,78	-9,55	-17,17	8,77	-9,10	0,58
Sport habits	Sport1	-1,06	1,30	-5,72	-0,88	1,84	-1,14	0,85	-1,05	-23,37	1,81	-7,18	11,55	1,91	-2,35	-17,66	2,69	-9,02	12,69
	Sport2	1,17	-1,44	-2,73	1,33	0,14	4,02	-3,45	4,24	55,40	-5,78	18,94	-25,98	-4,62	5,68	58,13	-7,11	18,80	-30,00
	Sport3	0,13	-0,18	19,89	-0,65	-4,84	-5,72	0,76	-0,93	-85,38	4,17	-8,80	15,22	0,63	-0,77	-105,28	4,82	-3,96	20,94
	Sport4	0,50	-0,61	16,22	-0,13	-4,12	-3,61	13,17	-16,16	19,99	12,90	-43,21	39,43	12,67	-15,55	3,77	13,02	-39,10	43,04
Smoking	No	-1,21	1,49	-9,60	-0,88	2,84	-0,36	-2,93	3,59	-63,11	-0.54	4,19	2,37	-1,72	2,10	-53,51	0,34	1,35	2,73
	Yes	2,00	-2,45	15,83	1,45	-4,69	0,59	4,82	-5,92	103,61	0,91	-6,89	-3,92	2,83	-3,47	87,78	-0,54	-2,21	-4,51
Sexe	Men	0,81	-1,00	4,43	0,67	-1,42	0,85	3,54	-4,34	0,81	3,64	-10,21	7,72	2,72	-3,34	-3,62	2,98	-8,79	6,87
	Women	-0,93	1,14	-5,09	-0,77	1,63	-0,98	-4,06	4,98	-1,32	-4,17	11,73	-8,87	-3,13	3,84	3,77	-3,40	10,09	-7,90
Age	17-24	3,31	-4,07	22,85	2,54	-6,95	2,02	-6,06	7,43	155,32	-12.45	-6,83	36,74	-9,37	11,50	132,47	-14,99	0,12	34,72
	25-44	2,46	-3,02	18,53	1,82	-5,54	1,01	1,20	-1,47	-29.86	2,43	-5,44	6,68	-1,26	1,54	-48,40	0,61	0,10	5,66
	45-64	-1,89	2,32	-1,05	-1,92	1,09	-4,82	0,73	-0,89	8,09	0,43	-2,79	3,00	2,62	-3,21	9,13	2,36	-3,87	7,62
	65-74	-3,20	3,92	-65,16	-0,75	17,07	11,24	-2,98	3,66	-101,90	0,94	20,41	-30,76	0,22	-0,27	-36,74	1,68	3,34	-42,00
	75 or more	-6,87	8,43	-60,16	-4,77	17,49	-0,28	-2,98	3,66	-4,31	-2,93	25,93	-42,10	3,89	-4,78	55,85	1,84	8,44	-41,82
	17	-1,08	1,33	5,63	-1,35	-0,88	-4,66	21,72	-26,66	-101,90	26,62	7,00	-95,82	22,81	-27,99	-107,54	27,97	7,88	-91,16

Table 10: Closer relationships between categories of PROV* and Y* and the rest of profiles.

REFERENCE VERTICES		CLOSER PROFILE POINTS
Y*	**PROV***	
YPUB	*PROVPU* *"Heavy users and births"*	Limotr util2 utilp croni2 17, 25-65 Hom
	COMPLE *"Healthy young"*	salu2 util1 fums ejfis2 18-24
YPRIV	*PROVPV* *"Elderly and women"*	salu3 croni1 vie1, vie2 fumn 65 or more Muj
	SUSTIT *"Healthy accidentally feeling bad"*	salu1, salu4 limdep, limdol util1 ejfis3, ejfis4 25-65 utilp Hom