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Working Paper n° 09–03

April 2009
Physicians’ working practices: target income, altruistic objectives or a maximization problem?

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April 27, 2009

Abstract

In traditional literature, a number of authors posit that physicians, like a consumer or a firm, adopt maximization behavior, while others claim that they are motivated by the attainment of a target income. These three approaches may seem contradictory, yet the present study aims to show that they are in fact complementary.

This paper aims to highlight the overlapping of these approaches by using a theoretical model - the agent model. From this model, we deduce the income effect, the individualistic substitution effect, the monopolistic effect and their respective elasticities to detect target income behavior. We develop also two theoretical models of leisure and income renouncement to determine the priority which the physician gives to consumption and leisure.

Unlike other models, our results show that about 20\% of physicians prefer to reach an altruistic objective rather than a leisure or an target income. These last result implies a ranking of target priorities.

Moreover, we observe that the Slutsky relation cannot be used to determine individualistic substitution, monopolistic substitution and income effects exactly when leisure is an inferior good. Nor can we confirm the adoption of a target income behavior when income and monopolistic elasticities are negative.
Renouncement models indicate that between 60% and 67% of GPs have a clear consumption priority and that they accept a renouncement of their leisure in order to maintain their current level of income.

Our results demonstrate that it would be necessary to introduce monopolistic power of physicians and their altruistic priority to test inducement demand.

1 Introduction

In traditional literature, a number of authors posit that physicians, like a consumer or a firm, adopt maximization behavior, while others claim that they are motivated by the attainment of a target income. (Scott, 2000) These three approaches may seem contradictory, yet the present study aims to show that they are in fact complementary.

This paper aims to highlight the overlapping of these approaches by using a theoretical model - the agent model. It will determine the priority which a physician gives to consumption, leisure and leisure altruism.

To understand why physicians want to attain a target income, a leisure target or a leisure altruism target, we must first determine why a physician has a preference for one good over another. In effect, if the physician gives a high priority to consumption or to leisure, this could explain his target income or target leisure behavior respectively.

No study in health economics to date has suggested that physicians give priority to leisure or leisure altruism. The seminal studies on target objectives endeavor to highlight a target income behavior (McGuire, Pauly, 1991; Rizzo, Blumenthal, 1994; Scoot, 2000; Sweeney, 1982).

Moreover, the definition of target income used in these studies is rather vague. According to the McGuire and Pauly definition, target income behavior is observed when physicians want to attain a fixed net income. (McGuire, Pauly, 1991). In contrast, Rizzo and Blumenthal define it as an adequate annual net income from professional activities which physicians consider to receive considering their career stage. (Rizzo, Blumenthal, 1994)

There is no consensus on these definitions, hence the controversy surrounding target income. McGuire and Pauly advance that it is difficult to explain why some physicians would pursue a target income in the first place, difficult to explain how targets are set and difficult to explain the evident differences in target across individuals. (McGuire, Pauly, 1991)
To answer these questions and to determine if physicians want to attain a target income and why, it is necessary to define target income behavior as a strong consumption priority and verify that physicians do not have other strong priorities like leisure or leisure altruism.

To determine the priority which a physician gives to leisure, income and leisure altruism, we use three methodologies. In the first, we deduce the income effect, the individualistic substitution effect, the monopolistic effect and their respective elasticities to detect target income behavior (McGuire, Pauly, 1991; Rizzo, Blumenthal, 1994). To obtain these effects and elasticities, we have developed a general agent model which assumes that an agent can affect all the prices on the market through his endowment. This general model allows us to derive the classical microeconomic consumer and firm models.

It also allows us to deduce one model in particular – the agent model – which helps clarify the working practices of physicians (Desquins, Holly, Rochaix, 2007). This model supposes that an agent can affect the price of his labor and that he has monopolistic power. It allows us to determine the income effect, the individualistic substitution effect, the monopolistic substitution effect and their respective elasticities, and to ascertain whether physicians display target income behavior or not. According to McGuire and Pauly, powerful income effects reveal a target income behavior. (McGuire, Pauly, 1991; Rizzo, Blumenthal, 1994).

Nevertheless, in the case of the agent model, neither positive income elasticity nor positive monopolistic elasticity reveal a target income behavior if physicians experience utility from labor.

Given that target income behavior is difficult to identify when the physician is an altruistic agent, we propose a second methodology. It involves the development of two theoretical models of leisure and income renouncement to determine the priority which the physician gives to consumption and leisure.

The leisure renouncement model assumes that physicians can have a utility to renounce his leisure in order to maintain his level of income. In contrast, the income non-renouncement model assumes that the physician prefers to renounce his leisure in order to achieve this objective. These models allow us to determine whether consumption is the priority using other variables, namely leisure and leisure renouncement.

To verify if our hypotheses are realistic and relevant, we apply our models to a database of French general physicians. We use Ordinary Least Squares to estimate
the agent and renouncement models and subsequently to deduce the individualistic substitution effect, the monopolistic substitution effect, the income effect and their respective elasticities.

To estimate the empirical target income model, we use Ordinary Least Squares, Probit and Three Stages Least Squares. We also perform the Haussman test to verify whether the Three Stages Least Squares is more relevant than Ordinary Least Squares when estimating professional training activities.

According to the agent model, 74.5% of physicians consider leisure as a normal good and 24.5% as an inferior good. These results indicate that the nature of the leisure good varies across general physicians.

The inferior nature of leisure could explain why 20% of GPs experience disutility from this good and why they adopt altruistic or strategic behaviors to satisfy market demands. We can conclude that this group does not seek to attain a target income but rather strives to satisfy market demand since less work would mean more income.

Unlike other models, we observe that some physicians prefer to reach an altruistic objective rather than a leisure or an target income. This last result implies a ranking of target priorities. Put simply, a physician can prefer to reach an altruistic objective over attaining an target income. Here, these two targets would be complementary.

Moreover, we observe that the Slutsky relation cannot be used to determine individualistic substitution, monopolistic substitution and income effects exactly when leisure is an inferior good. Nor can we confirm the adoption of a target income behavior when income and monopolistic elasticities are negative.

Nevertheless, we can deduce this behavior from renouncement models. They indicate that between 60% and 67% of GPs have a clear consumption priority and that they accept a renouncement of their leisure in order to maintain their current level of income. According to these models, only 23% attain their leisure target.

These models also indicate that the utility of labor reflects an altruistic leisure objective among GPs. In effect, according to the leisure renouncement model, about 18% have a utility for the non-renouncement of leisure. This group also experiences utility from labor. They agree to meet market demands because they are altruistic agents but at the same time they do not want to renounce their leisure. They insert the utility function of their patients in their own utility function via leisure.

The present paper is structured as follows. Section 2 presents agent model with a perfect monopoly power. Section 3 presents agent model with monopolistic power and
the determination of the individualistic substitution effect, the monopolistic substitution effect and the income effects, as well as their respective elasticities. In Section 4, we develop two renouncement models. In Section 5, we present the French institutional context. In Section 6, we describe the data and variables used in the empirical analysis. Section 7 sets out the econometric methodology. In Section 8, we present the empirical results and a discussion. Section 9 summarizes the findings.

2 Agent model and targets

Agent model has to object to explain the behavior of an agent. This agent can be a consumer, a firm, an entity as a government, an association,..... More precisely, this model assumes that the agent can have several objectives and that he can introduce utility of others agent in his own utility function.

Unlike to classical firm models, agent model assumes that a firm does not want only to maximize its profits but that it can have others objectives like to increase utility of others agents (to respect the environment, to introduce a quality norm to stay on the market, etc..... )

Utility of others agents traduces partially psychological characteristics of the agent. If the utility of agent increases whereas the utility of others agent increases, therefore, the agent is an altruistic individual. If the utility of agent is not affected by the utility of others agents, then, the agent is an individualistic entity. If the utility of agent increases whereas the utility of others agents decreases, then, the agent is a perverse individual.

This model introduces both a monopolistic power and psychological behaviors like altruism or perverseness.

2.1 Agent model with a perfect monopolistic power

2.1.1 General model

The monopolistic agent model assumes a market with \( m \) agents, \( n \) goods \( x_1, x_2, \ldots, x_n \) and \( n \) prices \( P_1, P_2, \ldots, P_n \). Like existing microeconomic models, this model presupposes that goods can induce negative externalities and then lead to negative prices. But, unlike to these models, it assumes that goods can affect simultaneously positively and negatively utility of the agents because these agents may feel both individualism
and altruism.

Therefore, according this model, an agent maximizes his utility function $U \left[ x_1, x_2, \ldots, x_n, U_\Omega (x_1, x_2, \ldots) \right]$ subject to his budget constraint, while his endowment $x_1, x_2, \ldots, x_n$ can affect the prices $P_1, P_2, \ldots, P_n$ on the market.

$$
\begin{align*}
\max_{(x_1, \ldots, x_n) \in D} U^* [x_1, \ldots, x_n, U_\Omega (x_1, \ldots, x_n)] &= U_i^* (x_1, \ldots, x_n) \cdot U_\Omega (x_1, \ldots, x_n) \\
D : R &= P_1 x_1 + \ldots + P_n x_n \\
\end{align*}
$$

When we replace the prices $P_1, P_2, \ldots, P_n$ in the budget constraint, it becomes:

$$
R = f_1 (x_1) \cdot x_1 + \ldots + f_n (x_n) \cdot x_n
$$

The marginal rate of substitution can be deduced from this optimization problem:

$$
\begin{align*}
\frac{\partial U[x_1, \ldots, x_n, U_\Omega (x_1, \ldots, x_n)]}{\partial x_1} &= \frac{\partial f_1 (x_1)}{\partial x_1} \cdot x_1 + f_1 (x_1) \\
\frac{\partial U[x_1, \ldots, x_n, U_\Omega (x_1, \ldots, x_n)]}{\partial x_n} &= \frac{\partial f_n (x_n)}{\partial x_n} \cdot x_n + f_n (x_n)
\end{align*}
$$

The optimal quantity of $x_n^*$ is:
\[ R - f_1(x_1) \cdot \left( (f_n(x_n) \cdot x_n) - \frac{\partial U[x_1, \ldots, x_n, U(x_1, \ldots, x_n)]}{\partial x_1} - f_1(x_1) \right) - \ldots \]

\[ - f_{n-1}(x_{n-1}) \cdot \left( (f_n(x_n) \cdot x_n) - \frac{\partial U[x_1, \ldots, x_n, U(x_1, \ldots, x_n)]}{\partial x_n} - f_n(x_n) \right) + \ldots + f_n(x_n) \]

And the optimal quantity of \( x_1^*, \ldots, x_{n-1}^* \) are:

\[ x_1^* = \frac{\left( \frac{\partial f_n(x_n)}{\partial x_n} \cdot x_n + f_n(x_n) \right) \cdot \left( \frac{\partial U[x_1, \ldots, x_n, U(x_1, \ldots, x_n)]}{\partial x_1} \right) - f_1(x_1)}{\partial f_1(x_1) \partial x_1} \]

\[ : \]

\[ x_{n-1}^* = \frac{\left( \frac{\partial f_n(x_n)}{\partial x_n} \cdot x_n + f_n(x_n) \right) \cdot \left( \frac{\partial U[x_1, \ldots, x_n, U(x_1, \ldots, x_n)]}{\partial x_n} \right) - f_n(x_n)}{\partial f_{n-1}(x_{n-1}) \partial x_{n-1}} \]

This monopolistic agent model, which is in effect a generalized consumer model, could be used to explain the behavior of a consumer with a partial monopolistic power, a firm, a planner, (like a government or a hospital), for example.

If there is no relation between quantities and price, we end up with a classical consumer model once again. From this model, we can also find, under certain conditions, the classical firm model.
2.2 Particular cases: Classical consumer models and firms with or without monopolistic power

Classical consumer models are particular cases of agent model. We can find it again when the quantity of goods cannot affect their prices, and therefore when

\[
P_1 \neq f_1(x_1) \\
P_2 \neq f_2(x_2) \\
\vdots \\
P_n \neq f_n(x_n)
\]

In this last case, there is pure and perfect competition on the market and we find the same equilibrium than a classical consumer model.

We now apply this model to explain the working practices of physicians and to develop the agent model. In this model, we assume that the labor supply of physicians is a rare resource on the market and that the physician himself therefore has a monopolistic power.

3 Agent model with monopolistic power

Traditional labor supply models introduce solely agents’ labor efforts in their utility functions and assume then that they can have only disutility for labor. Nevertheless, there exists some cases where agents could have interest to realize labor efforts without being pay in return. First, when agents want to develop, expand or save a market in order to maintain their profitable activities. Second, when some agents are altruistic individuals and introduce utility of others agents in their utility functions. In these two last cases, agents could want to work at a loss and to stay rational individuals.

We will now present agent model which explain agent’s labor supply whereas he introduces principal’s utility in his utility function. Like traditional labor supply models, we assume that an agent can choose his labor supply \( h \) according to a supply price of labor and that this labor supply reduces his utility \( U_m^* (C, h) \). (Varian, 2003)

\[
\frac{\partial U_m^* (C, h)}{\partial h} < 0
\]  

But, unlike classical labor supply models, we assume that he can affect his supply
price of labor and introduce principal(s)’ utility $U_p(h)$ in his utility function $U_m$ through his labor supply. More precisely, we assume that this agent could be an altruistic individual through of his labor supply. In effect, agent’s time of expertise $h$ increases principal(s)’utility(ies).

$$\frac{\partial U_p(h)}{\partial h} > 0$$ (9)

Traditionally, altruism is a function of the quality of helping (utility of the representative principal), and of the quantity of helping the number of principals who are being helped. (De Jaegher, Jegers) In our agent model, the quality and the quantity of helping is a function of agent’s labor supply.

We could assume that his (their) utility(ies) is (are) not always increasing with labor supply when the principal(s) overconsume(s) the quantity of agent’s labor supply and must pay a co-paiement\(^1\).

The agent maximises therefore his utility $U^*(C, h, U_p(h))$ subject to his budget constraint, while still being able to affect the price of his labor supply $g(h)$ and $c(h)$.

$$\max_{(C,h)\in D} U^*(C, h, U_p(h)) = U^*_m(C, h) . U_p(h)$$ (10)

where $h$ represents labor supply, $g(h)$ and $c(h)$, the hourly benefit rate and the hourly cost rate of his labor supply respectively, $C$, the consumptions, $M$, others source of income, $P$, the price of consumption and $t(h)$, the marginal tax rate according to labor supply, the hourly benefit rate, hourly costs associated to his practice, and the number of members in the agent’s household.

One part of the hourly benefit rate $g(h)$ and the hourly cost rate $c(h)$ is determined by the market while the other part is determined by the agent through $h$.

From this optimisation problem, we can deduce the implicit solution of the quantity of labor supply that optimises the budget constraint $h^F$:

$$h^F = -\left[\frac{g(h^F, M) - c(h^F, M) - t(h^F, M)}{\partial [g(h^F, M) - c(h^F, M) - t(h^F, M)] / \partial h^F}\right]$$ (11)

Define $w(h, M) = g(h, M) - c(h, M) - t(h, M)$ and introduce the elasticity of

\(^1\)The utility of principal, $U_p$, could be modelled as $U_p = (h^* - h)^2 - ph$ where $h^*$ represents the optimal labor supply of agent, $h$, labor supply of agent and $p$ the co-paiement that he must pay. The co-paiement reduces principal’s utility.
$w(h, M)$ with respect to $h$ as $\varepsilon_{w(h, M)/h}$:

$$
\varepsilon_{w(h, M)/h} = \frac{\partial (g (h, M) - c (h, M) - t(h, M))}{\partial h} \cdot \frac{h}{g (h, M) - c (h, M) - t(h, M)}
$$

(12)

When the physician maximises his utility, this elasticity $\varepsilon_{g(c) - t(h)/h}$ is:

$$
\begin{align*}
&\left[ \frac{\partial U^*_m (C, h)}{\partial C} \cdot [g (h, M) - c (h, M) - t(h, M)] \right] \varepsilon_{w(h, M)/h} + \\
&\left[ \frac{\partial U^*_m (C, h)}{\partial h} U_p (h) + U^*_m (C, h) \frac{\partial U^*_p (h)}{\partial h} \right] \cdot P + 1 = 0
\end{align*}
$$

(13) (14) (15)

If the agent does not introduce principal’s utility in his utility function and $U_p (h) = 1$, therefore elasticity $\varepsilon_D$ becomes:

$$
\begin{align*}
&\left[ \frac{\partial U^*_m (C, h)}{\partial C} \cdot [g (h, M) - c (h, M) - t(h, M)] \right] \varepsilon_{w(h, M)/h} + \\
&\left[ \frac{\partial U^*_m (C, h)}{\partial h} \right] \cdot P + 1 = 0
\end{align*}
$$

(16)

Elasticity explained by the altruism of agent is therefore:

$$
\varepsilon_{w(h, M)/h} - \varepsilon_{w(h, M)/h} = \frac{\left[ U_p (h) + U^*_m (C, h) \frac{\partial U^*_p (h)}{\partial h} \right] \cdot P}{\left[ \frac{\partial U^*_m (C, h)}{\partial C} \cdot [g (h, M) - c (h, M) - t(h, M)] \right]}
$$

We now see the agent model when there exists a linear relation between labor price and labor supply.

### 3.1 Linear relation between price and labor supply

In this model, we assume that the relations between labor prices (hourly benefit rate $g (h, M)$ and hourly cost rate $c(h, M)$) and labor supply $h$ are linear. We assume also that agent’s utility depends on an utility subsituable function because we consider that
time and consumption are substituables goods. The agent model therefore becomes:

\[
\begin{align*}
\max_{(C, h) \in D} U^*(C, h) &= U_m(C, h) U_p(h) = C^\delta h^\kappa h^\theta \\
D : [g(h, M) - c(h, M) - t(h, M)] \times h + M &= PC \\
U_p(h) &= h^\theta \\
\frac{\partial U_p(h)}{\partial h} &> 0 \\
g(h, M) &= \bar{a} + \bar{\beta} h + \bar{\gamma} M \\
c(h, M) &= a + \beta h + \gamma M \\
\varphi &= \kappa + \theta \\
\kappa &< 0, \quad \theta > 0
\end{align*}
\]

(17)

According to this model, the agent can have a disutility for labor \( \kappa < 0 \), and in this same time an utility for it \( \theta > 0 \). This utility is implied by the principals’ utility, \( U_p(h) \) which depends on the labor supply of the agent \( h \). If this agent is an individualistic agent, therefore \( |\kappa| < \theta \). But if this agent is an altruistic individual therefore \( |\kappa| > \theta \).

Before deriving the substitution and income effects and understanding why in some cases we cannot deduce them, we shall represent graphically several cases derived from the agent model as a function of the sign of \( \beta \) and \( \bar{a} + \bar{\gamma}M - a - \gamma M \).

If \( \beta > 0 \) and \( \bar{a} + \bar{\gamma}M - a - \gamma M > 0 \), then the hourly net remuneration rate would increase with the labor supply, and the budget constraint first decreases and then increases in \( h \).

If \( \beta > 0 \) and \( \bar{a} + \bar{\gamma}M - a - \gamma M < 0 \), the budget constraint first decreases and then increases in \( h \).
If $\beta < 0$ and $\bar{\tau} + \gamma M - a - \gamma M < 0$, then the budget constraint increases initially, but decreases once it has crossed a certain threshold.

If $\beta < 0$ and $\bar{\tau} + \gamma M - a - \gamma M > 0$, then the budget constraint increases initially, but decreases once it has crossed a certain threshold. In this last case, we observe that the optimal quantities can be negative.
This scenario may appear improbable, yet it could be realistic if one of the goods implies negative externalities and a negative price. This model could be used in public economics.

From this optimisation problem, we can deduce the implicit solution of the quantity of labor supply that optimises the budget constraint $h^F$:

$$h^F = -\frac{\alpha - a - t(h)}{2 \left[ \beta - \beta - \frac{\partial u(h)}{\partial h} \right]} \quad (18)$$

We can also deduce the solution of the quantity of labor supply which optimises agent utility $h^*$:

$$h^* = \left( \pm \sqrt{\left[ 2 \left[ g^* (h, M) - c^* (h, M) - t^* (h, M) \right] \right]^2 - 4 \left[ \frac{\delta^*}{\varphi^*} \left( \frac{\partial g(h, M)}{\partial h} - \frac{\partial c(h, M)}{\partial h} - \frac{\partial t(h, M)}{\partial h} \right) \right] \cdot [M]} \right)$$

$$2 \left[ \frac{\delta^*}{\varphi^*} \left( \frac{\partial g(h, M)}{\partial h} - \frac{\partial c(h, M)}{\partial h} - \frac{\partial t(h, M)}{\partial h} \right) \right] \quad (19)$$

When the physician maximises his utility, the ratio between the two exponents of consumption $\delta$ and labor supply $\varphi$ is given by:

$$\frac{\delta^*}{\varphi} = -\frac{[g(h, M) - c(h, M) - t(h, M) \cdot h + M]}{[h \cdot (\beta - \beta) + [g(h, M) - c(h, M) - t(h, M)]]} \cdot \frac{1}{h} \quad (20)$$

This ratio enables us to determine the agent's trade-off between leisure, labor sup-
ply altruism and consumption. If \( \frac{\delta}{\varphi} < -1 \), then the agent has a preference for the consumption good \( C \), whereas if \( \frac{\delta}{\varphi} \in ]-1; 0[ \), the agent has a preference for the leisure good. If \( \frac{\delta}{\varphi} \to \infty \), agent’s utility depends only of consumption. If \( \frac{\delta}{\varphi} = 0 \), agent’s utility depends only of labor supply. If \( \frac{\delta}{\varphi} > 0 \), the agent has a preference for the labor supply \( h \).

The elasticity \( \varepsilon_{w(h,M)}/h \) is:

\[
\varepsilon_{w(h,M)/h} = \left( \beta - \beta - \frac{\partial t(h^*)}{\partial h^*} \right) \cdot \frac{h^*}{\alpha + \beta h^* + \gamma M - a - \beta h^* - \gamma M - t(h^*)}
\] (21)

We now develop classical microeconomic models from agent model.

### 3.2 Particular cases: Classical labor supply models and firms with or without monopolistic power

From this agent model, we can deduce classical microeconomic models like traditional labor supply or firm models.

#### 3.2.1 Classical labor supply models without monopolistic power

If \( \overline{\beta} = 0 \) and \( \underline{\beta} = 0 \), then the agent has a classical labor supply and when the physician optimises his utility function, the ratio between the two exponents of the Cobb-Douglas function is:

\[
\frac{\delta^*}{\varphi} = -1 - \frac{M}{[a^* - a^* + \gamma^* M - \gamma^* M - t^*(h)] \cdot h^*}
\] (22)

The ratio \( \frac{\delta}{\varphi} \) between the exponents of the Cobb-Douglas function allows us to determine the preferences of the agent for labor supply, \( h \) or for the consumption good, \( C \). If \( \frac{\delta}{\varphi} < -1 \), then the agent has a preference for the consumption good \( C \), whereas if \( \frac{\delta}{\varphi} \in ]-1; 0[ \), the agent has a preference for the leisure good. If \( \frac{\delta}{\varphi} > 0 \), the agent has a preference for the labor supply \( h \). If \( \frac{\delta}{\varphi} \to \infty \), agent’s utility depends only of consumption. If \( \frac{\delta}{\varphi} \to 0 \), agent’s utility depends only of labor supply.

From this model, we can also deduce the solution of the quantity of labor supply which optimises agent utility \( h^* \):

\[
h^* = -\frac{M}{[a^* - a^* + \gamma^* M - \gamma^* M - t^*(h)] \left( 1 + \frac{\delta^*}{\varphi} \right)}
\] (23)
where \( h^* \) represents the quantity of labor supply that optimises physician utility.

### 3.2.2 Firms with or without monopolistic power

Classical firm models can be also deduced from agent model. To verify is the agent behave as a firm, we must verify that his marginal benefit is always greater or equal than his marginal cost. In this particularly case, labor is both an input and an output.

Several kinds of competition can exist on the market. If \( \beta = 0 \) and \( \alpha = 0 \), then the agent is a firm and there is pure and perfect competition on the market. At equilibrium, he observes therefore

\[
g(h, M) = c(h, M) + t(h, M) \tag{24}
\]

\[
\alpha + \gamma M = a + \gamma M + t(h, M) \tag{25}
\]

If \( \beta \neq 0 \) and \( \alpha \neq 0 \), then he is a firm with monopolistic power. At equilibrium, the agent observes then

\[
g(h, M) + \frac{\partial g(h, M)}{\partial h} h = c(h, M) + \frac{\partial c(h, M)}{\partial h} h + t(h, M) + \frac{\partial t(h)}{\partial h} h \tag{26}
\]

If \( \beta \neq 0 \) and \( \alpha = 0 \), then he is a firm with partial monopolistic power and observes therefore

\[
g(h, M) + \frac{\partial g(h, M)}{\partial h} h = a + t(h, M) \tag{27}
\]

If \( \beta = 0 \) or \( \alpha \neq 0 \), then he is a firm with partial monopolistic power and observes therefore

\[
\alpha = c(h, M) + \frac{\partial c(h, M)}{\partial h} h + t(h, M) + \frac{\partial t(h)}{\partial h} h \tag{28}
\]

If \( \beta \neq 0 \) and \( \alpha \neq 0 \), then the physician is a firm with monopolistic power and the elasticity \( \varepsilon_{w(h, M)/h} \) is:

\[
\varepsilon_{w(h, M)/h} = \frac{h}{(\alpha + \beta h) - (a + \beta h) - t(h, M)}
\]
3.2.3 Mathematical conditions to find an optimum

The optimisation problem can be solved using the Lagrange multiplier method:

\[ L = C^\delta h^\varphi + \lambda \left[ \left( (\alpha + (\beta + \gamma) M) - (\alpha + \beta h + \gamma M) \right) h + M - PC \right] \]  

(29)

In our model, we assume that the solution to the optimisation problem is a maximum. Consequently, we assume that the determinant of this matrix is positive:\(^{2}\):

\[
\begin{vmatrix}
\varphi (\varphi - 1) C^\delta h^{\varphi - 2} + 2 (\beta - \beta) \lambda & \varphi \delta C^{\delta - 1} h^{\varphi - 1} & -\alpha - 2 (\beta - \beta) h \\
\varphi \delta C^{\delta - 1} h^{\varphi - 1} & \delta (\delta - 1) C^{\delta - 2} h^\varphi & -P \\
-\alpha - 2 (\beta - \beta) h & -P & 0 \\
\end{vmatrix} > 0
\]

3.3 Substitution, monopolistic substitution and income effects derived from the agent model

To deduce the priority which a physician gives to leisure, consumption and leisure altruism, we must determine from our agent model the individualistic substitution effect, the monopolistic substitution effect and the income effect.

To deduce these effects, we now use the function of demand \( h^* \) (eq. 10). To derive the individualistic total effect \( ITE \) after a variation of \( \tilde{w} \), we deduce two partial derivate of labor supply as a function of optimal labor supply \( h^* \):

\[
\frac{\partial h^*}{\partial \tilde{w}} = ITE_{\tilde{w}}
\]

(30)

This individualistic total effect \( ITE \) can be also written as:

\[
ITE_{\tilde{w}} = \frac{-\left(1 + \frac{\varphi}{\varphi} + \gamma M\right) + \sqrt{\left(1 + \frac{\varphi}{\varphi} + \gamma M\right)^2 - 4 \left(1 + \frac{\varphi}{\varphi} + \gamma M\right) \times \lambda}}{\left(1 + \frac{\varphi}{\varphi} + \gamma M\right) \times \lambda}
\]

if \( \varphi < 0 \),

\(^{2}\)In other words, we assume that our solutions respect:

\[
2 \left[ \varphi \delta C^{\delta - 1} h^{\varphi - 1} \right] [\lambda] \left[ -\alpha - 2 (\beta - \beta) h \right] \\
- \left[ -\alpha - 2 (\beta - \beta) h \right] [\delta (\delta - 1) C^{\delta - 2} h] \left[ -\alpha - 2 (\beta - \beta) h \right] \\
- [\lambda] [\varphi (\varphi - 1) C^\delta h^{\varphi - 2} + 2 (\beta - \beta) \lambda] > 0
\]
or

\[ ITE_{\tilde{w}} = \frac{-((1+\frac{\delta}{\varphi})*(\tilde{w}+\gamma M)) - \sqrt{\left(((1+\frac{\delta}{\varphi})*(\tilde{w}+\gamma M))^2 - (4*(1+(2*\frac{\delta}{\varphi}))*\beta*\gamma M)\right)}}{(1+(2*\frac{\delta}{\varphi}))*\beta} \]

if \( \frac{\delta}{\varphi} > 0 \).

To derive the income effect \((IE)\) after a variation of \(M\), we deduce two partial derivatives of labor supply as a function of other incomes \(M\) and as a function of the sign of ratio \(\frac{\delta}{\varphi}\):

\[ \frac{\partial h^*}{\partial M} \cdot h^* = IE \]  

The income effect \(IE\) is:

\[ IE = \frac{-((1+\frac{\delta}{\varphi})*(\tilde{w}+\gamma M)) - \sqrt{\left(((1+\frac{\delta}{\varphi})*(\tilde{w}+\gamma M))^2 - (4*(1+(2*\frac{\delta}{\varphi}))*\beta*\gamma M)\right)}}{(1+(2*\frac{\delta}{\varphi}))*\beta} \cdot h^* \]

if \( \frac{\delta}{\varphi} < 0 \),
or

\[ IE = \frac{-((1+\frac{\delta}{\varphi})*(\tilde{w}+\gamma M)) - \sqrt{\left(((1+\frac{\delta}{\varphi})*(\tilde{w}+\gamma M))^2 - (4*(1+(2*\frac{\delta}{\varphi}))*\beta*\gamma M)\right)}}{(1+(2*\frac{\delta}{\varphi}))*\beta} \cdot h^* \]

if \( \frac{\delta}{\varphi} > 0 \).

We can now deduce the individualistic substitution effect \((ISE)\) from the individualistic total effect \((ITE_{\tilde{w}})\) and the income effect \((IE)\):

\[ ISE = ITE_{\tilde{w}} - IE \]

We can also derive a monopolistic substitution effect \((MSE_\beta)\). To do so, we first derive leisure as a function of \(\beta\) to determine the monopolistic total effect \((MTE_\beta)\).

\[ \frac{\partial L^*}{\partial \beta} = MTE_\beta \]

We can also write it as:

\[ d \left( \frac{-((1+\frac{\delta}{\varphi})*(\tilde{w}+\gamma M)) - \sqrt{\left(((1+\frac{\delta}{\varphi})*(\tilde{w}+\gamma M))^2 - (4*(1+(2*\frac{\delta}{\varphi}))*\beta*\gamma M)\right)}}{(1+(2*\frac{\delta}{\varphi}))*\beta} \right) \]

\[ MTE_\beta = \frac{d}{d\beta} \]

17
where $\frac{\delta}{\varphi} < 0$, or

$$
MTE_{\beta} = \frac{d\left(-\frac{(1+\frac{\varphi}{\delta})\gamma M_0}{\frac{\varphi}{\delta} M_0} - \sqrt{\frac{(1+\frac{\delta}{\varphi})\gamma M_0}{\frac{\varphi}{\delta} M_0}^2 - \frac{(1+\frac{\varphi}{\delta})\gamma M_0}{\frac{\varphi}{\delta} M_0} + \frac{\gamma M_0}{\frac{\varphi}{\delta} M_0}}\right)}{d\beta}
$$

where $\frac{\delta}{\varphi} > 0$.

We can now deduce the monopolistic substitution effect ($MSE$) from the monopolistic total effect ($MTE_{\beta}$) and the income effect ($IE$):

$$MSE = MTE_{\beta} - IE$$

(36)

Income and substitution effects are represented in the graphs below. We presume that the sign of $\alpha$ is positive, $\beta$ negative and $\gamma$ positive to illustrate our example. Nevertheless, other cases could be presented as a function of the sign of $\alpha$, $\beta$ and $\gamma$.

\[ISE : \ h_A \to h_{B'} \quad \text{with income effect} \quad IE : h_{B'} \to h_B \]

\[ISE = \frac{\partial h^*}{\partial \bar{w}} - \frac{\partial h^*}{\partial M} \cdot h^* \quad \text{with income effect} \quad IE = \frac{\partial h^*}{\partial M} \cdot h^* \]
ISE : \( h_A \rightarrow h_{B'} \)  
\( ISE = \frac{\partial h^*}{\partial \beta} - \frac{\partial h^*}{\partial M} \cdot h^* \)  
with income effect  
\( \frac{\partial h^*}{\partial M} \cdot h^* = IE \)
To determine substitution and income effects, we use both the Slutsky relation and the Hicks method. However, in our particular case, the budget constraint is not linear.
Two substitution effects can be therefore deduced: an individualistic substitution effect from a variation of $\hat{w}$ and a monopolistic substitution effect from a variation in the monopolistic power of the physician $\beta$. The income effect is the same in both. The Slutsky relation assumes that purchasing power is held constant whereas the Hicks method assumes that utility is held constant.

If we apply the Slutsky relation, a variation of $\hat{w}$ implies that the budget constraint A pivots out from $P$. (Fig. 1) The new optimum is then $h_B$ on $B$. The total hourly net remuneration rate effect is $h_A$ to $h_B$. To deduce the individualistic substitution effect from the Slutsky method, we adjust the monetary income of the consumer, so that he can just afford the original consumption bundle. To deduce income effect from the Slutsky method, we insert a budget constraint parallel to the new budget constraint which passes through the point $h_A$. The new optimum is $h_{B'}$ on $B'$. The individualistic substitution effect is deduced from $h_A$ and $h_{B'}$. The remainder of the total price effect is the income effect and therefore $h_{B'}$ to $h_B$.

Using the Slutsky method, a monopolistic substitution effect can be also deduced from the monopolistic power of the physician, $\beta$, (Fig. 2). A variation in monopolistic power $\beta$ implies that the budget constraint increases out from $P$. As in the previous case, the new optimum is then $h_B$ on $B$. The total hourly net remuneration rate effect is $h_A$ to $h_B$. The monopolistic substitution effect is deduced from $h_A$ and $h_{B'}$. The remainder of the total price effect is identical.

If we apply the Hicks method, a variation of $\hat{w}$ implies that the budget constraint A pivots out from $h^w$. (Fig. 3) The new optimum is then $h_B$ on $B$. The total hourly net remuneration rate effect is $h_A$ to $h_B$. To deduce the substitution effect from the Hicks method, we insert a budget constraint that is parallel to the old budget constraint and tangent to the old indifference curve $h_{B'}$. The new optimum is $h_{B'}$ on $B'$. The substitution effect is deduced from $h_A$ and $h_{B'}$. The remainder of the total price effect is the income effect and therefore $h_{B'}$ to $h_B$.

A monopolistic substitution effect can be also deduced from this method. (Fig. 4) The monopolistic substitution effect is deduced from $h_A$ and $h_{B'}$.

The sign of these effects allows us to determine the nature of the leisure good, i.e. whether it is normal or inferior. However, they do not allow us to distinguish whether a normal good constitutes a luxury, hence the following presentation of price and income elasticities.
3.4 Price elasticities and income elasticity from the agent model

From our agent model, we can deduce individualistic elasticity, monopolistic elasticity and income elasticity. The formulation of individualistic elasticity, $\rho_{\bar{w}}$, is:

$$\rho_{\bar{w}} = \frac{\partial h^*}{\partial \bar{w}} \cdot \frac{\bar{w}}{h^*} = TE_{\bar{w}} \cdot \frac{\bar{w}}{h^*} \quad (37)$$

Monopolistic elasticity, $\rho_{\beta}$, is:

$$\rho_{\beta} = \frac{\partial h^*}{\partial \beta} \cdot \frac{\beta}{h^*} = TE_{\beta} \cdot \frac{\beta}{h^*} \quad (38)$$

and income elasticity, $\rho_{M}$, is:

$$\rho_{M} = \frac{\partial h^*}{\partial M} \cdot \frac{M}{h^*} = \frac{IE}{h^*} \cdot \frac{M}{h^*} \quad (39)$$

These elasticities give us more information about the nature of the labor good. More precisely, if income elasticity is less than 0, labor is an inferior good, if this elasticity is between 0 and 1, labor is a normal good and if this elasticity is more than 1, labor becomes a luxury good.

To determine if the physician wishes to reach a target income we apply the McGuire and Pauly approach.

3.5 Agent model and the validation of the target income hypothesis

If we apply the McGuire and Pauly approach to the agent model then we assume that the income of the agent $R$ depends on individualistic price $\bar{w}$, monopolistic price $\beta$, labor supply $h$ and others income $M$:

$$\bar{w}h + \beta h^2 + M = R \quad (40)$$

with $\bar{w} > 0$ and $\beta > 0$.

If we assume that others income $M$ increase and that the agent wants to maintain a target income, his labor therefore should likewise decrease. We should also observe this decrease when $\beta$ rises.
Nevertheless, income elasticities cannot reveal target income behavior when the agent has an utility for labor. In effect, when the agent is an altruistic agent, then a variation of other incomes are a sign of an altruistic target rather than an target income.

If income elasticity is negative and if the agent has a disutility for labor, we can conclude that he wants partly to maintain his current level of income. Yet, if this elasticity is negative and the physician experiences utility from labor, he consequently reduces his altruism.

The McGuire and Pauly approach does not allow us to deduce an target income when the agent is an altruistic agent. Moreover, negative income elasticity assumes that he has attained this target. However, an agent may strive to reach a target income without actually attaining it. Finally, when the other incomes of the agent are equal to zero, then income elasticity is equal to zero. Nevertheless, this income effect can be positive or negative. This means that income elasticity cannot detect a target income behavior when other incomes are equal to zero.

To complete the approach of these authors, we shall develop two theoretical models: leisure and income renouncement.

4 Renouncement model

The leisure renouncement model assumes that the agent can derive a utility from renouncing leisure. Leisure renouncement is the quantity of leisure that an agent more
or less wants to consume but which he renounces to maintain his income. The income renouncement model presupposes that the agent may have a disutility from consumption renouncement. These two models must be in direct opposition to determine more precisely the priorities which the agent has set himself.

4.1 Leisure renouncement model

This model assumes that an agent maximizes his utility \( U(C, \tilde{h}) \) subject to his budget constraint, whereas his labor supply and his other income can affect the price of his labor supply, \( w \). We assume that the relation between the price of labor supply \( w \) and labor supply \( h \) is linear.

\[
\begin{align*}
\max_{(C, \tilde{h}) \in D} U^* \left( C, \tilde{h} \right) &= U^*_m \left( C, \tilde{h} \right) = C^{\delta} \tilde{h}^\eta \\
D : [g(h, M) - c(h, M) - t(h, M)] \times h + M &= PC \\
h &= \tilde{h} + \tilde{h}
\end{align*}
\] (41)

where \( \tilde{h} \) represents leisure renouncement, i.e. leisure that agent more or less wants, \( \tilde{h} \), target labor, \( h \), labor supply, \( C \), consumption, \( M \) other sources of income, and \( P \) the price of consumption. One part of the hourly benefit rate \( g(h) \) and the hourly cost rate \( c(h) \) is determined by the market while the other part is determined by the agent through \( h \).

In our model, leisure renouncement can be negative. In effect, we assume that the agent may want to supply more labor.

When the agent maximizes his utility, the ratio between the two exponents of consumption and leisure renouncement is given by:

\[
\frac{\delta}{\eta} = \frac{1}{\tilde{h}} \cdot \frac{wh + M}{\alpha + 2\beta h + 2\beta \tilde{h} + \gamma M}
\] (42)

This ratio enables us to determine whether the agent has a utility for leisure renouncement. If \( \frac{\delta}{\eta} > 1 \), then the agent has a preference for the consumption good \( C \), whereas if \( \frac{\delta}{\eta} \in [0, 1] \), the agent has a preference for leisure renouncement. If \( \frac{\delta}{\eta} \to \infty \), the agent derives no utility for leisure renouncement. If \( \frac{\delta}{\eta} < 0 \), the agent experiences disutility from leisure renouncement.

If the sign of \( \frac{\delta}{\eta} \) is positive, we can conclude that the agent has a preference for income since he derives a utility from renouncing his leisure.
4.2 Leisure target model

This model assumes that an agent maximizes his utility \( U(C, \bar{L}) \) subject to his budget constraint, whereas his labor supply and his other income can affect the price of his labor supply, \( w \). We assume that the relation between the price of labor supply \( w \) and labor supply \( h \) is linear.

\[
\begin{align*}
\max_{(C, \bar{L}) \in D} U^* (C, \bar{L}) &= U^*_m (C, \bar{L}) = C^\delta \bar{L}^\tau \\
D : [g(h, M) - c(h, M) - t(h, M)] \times h + M &= PC \\
h &= N - \bar{L} + \bar{\bar{h}}
\end{align*}
\]  

(43)

where \( \bar{\bar{h}} \) represents leisure renouncement, i.e. leisure that agent more or less wants, \( \bar{L} \), target leisure, \( h \), labor supply, \( C \), consumption, \( M \) other sources of income, and \( P \) the price of consumption. \( N \) is the time endowment of a physician over one year. One part of the hourly benefit rate \( g(h) \) and the hourly cost rate \( c(h) \) is determined by the market while the other part is determined by the agent through \( h \).

When the agent maximizes his utility, the ratio between the two exponents of consumption and leisure renouncement is given by:

\[
\frac{\delta}{\tau} = \frac{1}{\bar{L}} \cdot \frac{wh + M}{\alpha + 2\beta N - 2\beta \bar{L} - 2\beta \bar{\bar{h}} + \gamma M}
\]  

(44)

This ratio enables us to determine whether the agent has a utility for target leisure. If \( \frac{\delta}{\tau} > 1 \), then the agent has a preference for the consumption good \( C \), whereas if \( \frac{\delta}{\tau} \in [0, 1] \), the agent has a preference for target leisure. If \( \frac{\delta}{\tau} \rightarrow \infty \), the agent derives no utility for target leisure. If \( \frac{\delta}{\tau} < 0 \), the agent experiences disutility from target leisure.

4.3 Income non-renouncement model

This model has to object to determine the level of income which the agent does not want to renounce. This level is determined from his leisure renouncement, \( \bar{\bar{L}} \). It has to object in order to show that the physician places a priority on income.

To deduce the level of income which the agent does not want to renounce \( \nabla \), we
deduce the labor income $\bar{w}(N - \bar{L})$ that he would observe if he worked $\bar{L}$:

$$\begin{align*}
\nabla &= w^* h^* - \bar{w} \bar{h} \\
\text{with } w^* &= \alpha + \beta h^* + \gamma M \\
\text{and } \bar{w} &= \alpha + \beta \bar{h} + \gamma M
\end{align*}$$ (45)

If $\nabla > 0$, we can conclude that the agent gives priority to income.

To verify the priority which the physicians gives to leisure and consumption and to determine the nature of the leisure good, we shall perform empirical estimations based on a database of French general physicians.

The agent and renouncement models could explain the labor supply of French GPs. To verify our hypothesis, we will now present the French institutional context.

5 The French institutional context

The French institutional context allows to GPs to determine their labor supply, $h$, the number of their consultations, their home visits and theirs expenses. But, they cannot determine the price of these consultations, it is the government who set these prices. Overall GPs apply these prices, except those who have not signed a work convention with the government. (Sector 2)
One part of the honoraries is therefore determined by the physician (nb of consultations, nb of home visits) while the other part is determined by the government (consultation price, home visits price).

\[
\text{honoraries} = \text{nb of consultations} \times \text{consult. price} + \text{nb of home visits} \times \text{home visit price}
\]

Similarly, one part of the hourly benefit rate of GPs, \(W\), is explained by the physician (\(h, \text{nb of consultations}, \text{nb of home visits}\)) whereas the other part is explained by the government (consultation price, home visits price).

\[
W = \frac{\text{nb of consultations} \times \text{consult. price} + \text{nb of home visits} \times \text{home visit price}}{h}
\]

Nevertheless, the hourly cost rate \(Ch\) are only determined by the physician (\(h, \text{expenses}\))

\[
Ch = \frac{\text{expenses}}{h}
\]

The price of GPs’ labor, \(w\), is therefore explained by the physician (\(h, \text{nb of consultations}, \text{nb of home visits}, \text{expenses}\)) and by the government (consultation price, home visits price, \(T(h, W, Ch, \text{expenses}, \text{household size})\)).

\[
w = W - \left( \frac{\text{expenses} + h \times T(h, W, Ch, \text{expenses}, \text{household size})}{h} \right)
\]

This institutional system of remuneration induces a heterogeneity among the hourly remuneration of GPs. A physician can decide to examine five patients during an hour and receives then 100 euros whereas an other physician can decide to examine ten patients during an hour and receives 200 euros. The hourly benefits of the second physician are more higher than the first.

But an other factor explains this heterogeneity: the monopolistic power of the GPs. In France, this monopolistic power is induced by a numerus clausus (which allows to control the density of GPs) and by the low price of the visits. This low price is explained by the high contribution of the social security to the payment of the visits.

Given that the price of visits is low, that the number of GPs is limited and that the physician can choose his labor supply, there exist then a strong demand for GPs labor supply. This strong demand induces therefore a monopolistic power and GPs
can choose the number of patients that they want examine during an hour.

If a GP increases his labor supply on the market, he reduces then the price of his labor supply since he responds to the demand of care. Therefore, the agent model could explain activity of GP in the French institutional context.

We now apply these models to an empirical database in order to determine the priorities of each physician. If our empirical model is relevant, we should observe that the majority of physicians have a consumption priority rather than a leisure or a leisure altruism priority.

6 Data

The estimations are based on the previous representative sample of 600 physicians (practicing in the Provence-Alpes-Côte d’Azur region) sampled according to age, sex and urban size. These 600 physicians were contacted by telephone. However, only 317 out of 600 answered all questions. For each physician we have personal information (sex, age, number of household members), professional information (sector 1, group practice, secretariat), the quality of their training (number of training sessions, number of reviews), the characteristics of their patients (percentage of patients that enjoy universal health insurance cover, percentage of exonerated patients), their professional environment (medical density) and their practice (number of visits, labor supply).
7 Econometric application

To determine the coefficient of the ratio $\delta/\varphi$ (eq.20), we have estimated the hourly benefit rate $g(h)$ (eq. 17) and the hourly cost rate $c(h)$ (eq. 17), for the entire sample using seemingly unrelated regression. In the following, we presents the results of seemingly unrelated regression of hourly benefit rate and hourly cost rate. (Zellner, 1962) Seemingly unrelated regression is best method of estimation since we have verified that labor supply is not an endogeneous variable. We have also verified that none explanatory variables is endogeneous. Moreover we have not detected a selection bias.

7.1 Hourly benefit rate and Hourly cost rate

To determine whether physicians act as price-making firms, and whether they can affect the price of their labor, we estimated their hourly benefit rate and hourly cost rate using seemingly unrelated regression. In this estimation, hourly benefit rate $g(h)$ and hourly cost rate $c(h)$ are the endogeneous variables and labor supply is an exogeneous variable, $h$.

$$
\begin{align*}
  g(h) &= \alpha_f + \beta h + \rho_f X + \psi_f Y + u_f \\
  c(h) &= \alpha_f + \beta h + \phi_f X + \omega_f Z + v_f
\end{align*}
$$

(46)

The results of these estimations are reported in Table 9. We observe that labor supply significantly reduces hourly benefit rate (-0.007) and hourly cost rate (-0.003). Therefore, we can conclude that physicians have monopolistic power. We can also conclude that classical labor supply model cannot be used to explain activity of French
physicians and cannot be applied to evaluate the real trade-off of physicians between leisure and consumption.

In the next section, we shall review the results of these estimations.

8 Results and discussion

In the following, we present the results of ordinary least squares estimations of the hourly net remuneration rate of physicians. This estimation allows us to compute individualistic substitution, monopolistic substitution and income effects developed in the Agent model. It allows also us to determine individualistic elasticity, monopolistic elasticity and income elasticity and the empirical results of the two renouncement models.

8.1 Agent model

8.1.1 Individualistic substitution, monopolistic substitution and income effects from Agent model

Individualistic substitution effect (ISE), monopolistic substitution effect (MSE) and income effect (IE) are determined respectively from the equations eq. 34, eq. 36 and eq. 32,33.

According to our results, 74.5% of physicians have a negative income effect and a negative individualistic substitution effect. 24.5% of physicians have a positive income effect and a positive individualistic substitution effect.

Therefore, we can conclude that 74.5% of physicians consider leisure as a normal good and 24.5% as an inferior good. The nature of the leisure good could explain why they observe a utility for labor and why some are altruistic agents. All who consider leisure as a normal good have a utility for it, while those who consider it as an inferior good have a disutility. About 32% of those who consider leisure as an inferior good have a utility for leisure and 68% have a disutility.
However, according to our model, 17% of these physicians are altruistic individuals who prefer satisfying the needs of the market rather than attaining an income or a leisure target. They therefore have an altruistic target, because if they worked less, they could have a higher income.

8.2 Elasticities from agent model

Individualistic elasticity, $\rho_{\bar{w}}$, monopolistic elasticity, $\rho_{\beta}$, and income elasticity, $\rho_{M}$, are determined respectively from the equations eq.37, eq.38 and eq.39.

In Table 1, a negative income elasticity is observed in 50% of physicians. 30% have an income elasticity equal to zero because their other incomes are equal to zero. A further 19% observe a positive income elasticity of less than 1.

<table>
<thead>
<tr>
<th>Table 1: Income elasticities</th>
<th>Nb</th>
<th>Percent.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative Income elasticity</td>
<td>159</td>
<td>50.16</td>
</tr>
<tr>
<td>Nul Income elasticity</td>
<td>98</td>
<td>30.91</td>
</tr>
<tr>
<td>Positive Income elasticity less than 1</td>
<td>60</td>
<td>18.93</td>
</tr>
</tbody>
</table>

These results are particularly interesting since classical literature considers leisure as a luxury good, yet none of the physicians in our sample observes an income elasticity of more than 1.
Table 2: Individualistic and monopolistic elasticities

<table>
<thead>
<tr>
<th></th>
<th>Nb</th>
<th>Percent.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative Individualistic elasticity</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Positive Individualistic elasticity</td>
<td>317</td>
<td>100</td>
</tr>
<tr>
<td>Negative Monopolistic elasticity</td>
<td>259</td>
<td>81.70</td>
</tr>
<tr>
<td>Nul Income elasticity</td>
<td>39</td>
<td>12.30</td>
</tr>
<tr>
<td>Positive Monopolistic elasticity</td>
<td>19</td>
<td>6.00</td>
</tr>
<tr>
<td>N</td>
<td>317</td>
<td></td>
</tr>
</tbody>
</table>

Individualistic and monopolistic elasticities have the opposite effect on labor. From Table 2, we observe that individualistic elasticity is positive whereas monopolistic elasticity is negative. Therefore, when the individualistic remuneration rate \( \hat{w} \) rises by one unit, the physicians increase their quantity of labor supply (and his leisure decreases). When the monopolistic power rate \( \beta \) increases, the physicians decrease their quantity of labor supply (and increase their leisure).

In Table 11, the average income elasticity is close to -0.5 and the average monopolistic elasticity is about -0.736. These averages do not reach -1. As a result, according to McGuire and Pauly, the majority of these physicians do not display classic income behavior.

The question which now emerges is whether income or monopolistic elasticity can be used alone to determine a target income behavior or if other elements could explain this behavior, such as the inferior nature of the leisure good or a strong priority for the consumption good.

Moreover, we cannot use the income effect, the individualistic substitution effect or the monopolistic effect to detect target income behavior, since the Slutsky relation assumes that leisure must be a normal good.

To complete this approach, we shall now present the results of the renouncement models.

### 8.3 Renouncement models

#### 8.3.1 Leisure renouncement model

To determine the ratio between consumption and leisure renouncement \( \frac{\delta}{\eta} \), we use eq. 42. This ratio indicates that more than half of the physicians in our sample, 59%, have a utility to renounce leisure. Nevertheless, these physicians prefer consumption rather
than leisure renouncement. We can conclude that they have an target income.

<table>
<thead>
<tr>
<th></th>
<th>Nb</th>
<th>Percent.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disutility for leisure renouncement (negative ratio)</td>
<td>56</td>
<td>17.67</td>
</tr>
<tr>
<td>Leisure target (leisure renouncement=0)</td>
<td>74</td>
<td>23.34</td>
</tr>
<tr>
<td>Utility for leisure renouncement (ratio&gt;1)</td>
<td>187</td>
<td>58.99</td>
</tr>
<tr>
<td>N</td>
<td>317</td>
<td></td>
</tr>
</tbody>
</table>

About 23% have achieved their leisure target, while 18% have a disutility to renounce leisure. This is the same group which experiences a utility from labor. They agree to satisfy market demands because they are altruistic agents but they are unwilling to renounce their leisure.

Physicians who have a disutility for leisure renouncement work more than other physicians. Unsurprisingly, they observe a lower net remuneration rate.

8.3.2 Leisure target model

To determine the ratio between consumption and leisure target \( \frac{c}{\tau} \), we use eq.?? This ratio indicates that half of the physicians in our sample, 47%, have a preference for consumption good. It indicates also that 32% have a preference for leisure target. Nevertheless, certain of these physicians observe an utility for leisure renouncement because they renounce to their leisure target.
Table 4: Leisure target

<table>
<thead>
<tr>
<th>Disutility for Leisure target (ratio&lt;0)</th>
<th>Nb</th>
<th>Percent.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preference for Leisure target (0&lt;ratio&lt;1)</td>
<td>103</td>
<td>32.49</td>
</tr>
<tr>
<td>Preference for the consumption good (ratio&gt;1)</td>
<td>150</td>
<td>47.32</td>
</tr>
<tr>
<td>N</td>
<td>317</td>
<td></td>
</tr>
</tbody>
</table>

About 20% have a disutility for leisure target.

As the previous case, physicians who have a disutility for leisure target work more than other physicians and they observe a lower net remuneration rate.

8.3.3 Income non-renouncement model

To determine the level of income which the physician does not want to renounce we apply eq. 45. According this equation, about 67% of physicians do not want to renounce a share of their income in order to increase their leisure satisfaction. This group has a clear consumption priority and we can deduce, therefore, that they display target income behavior.

This result is relatively similar to that of the previous model. It could allow us to deduce the determinants of this income non-renouncement, but this is not the objective of the present paper.
### Table 5: Income non-renouncement

<table>
<thead>
<tr>
<th>Income renouncement</th>
<th>Nb</th>
<th>Percent.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Income renouncement</td>
<td>30</td>
<td>9.46</td>
</tr>
<tr>
<td>No income renouncement (leisure renouncement=0)</td>
<td>74</td>
<td>23.34</td>
</tr>
<tr>
<td>Income non renouncement</td>
<td>213</td>
<td>67.19</td>
</tr>
</tbody>
</table>

| N                  | 317 |

9 Conclusion

In this paper, we develop a general agent model with perfect monopolistic power, from which we deduce a specific case to explain the working practices of physicians, namely the agent model. This model explains the overlapping between the maximization behaviors of physicians and their target behaviors. In effect, the agent model implies three targets, a consumption target (or target income), a leisure target and an altruistic leisure target in contrast to most authors who assume that physicians want to attain an target income.

To limit the controversy on target income, we define target income behavior as a strong consumption priority. To determine if a physician has a strong consumption priority we use the agent model and the associated elasticities. We also developed two renouncement models.

The next step involves an estimation of all these theoretical models to detect if physicians adopt target behaviors.

According to agent model estimations, the nature of the leisure good varies across physicians. In effect, 74.5% consider leisure as a normal good and 25.5% as an inferior good. No-one considers leisure as a luxury good.

The inferior nature of leisure explains why 20% of physicians can experience a utility for labor and why they subsequently adopt altruistic or strategic behaviors. They accept to respond to market demands because they are altruistic agents but they remain unwilling to renounce their leisure.

Moreover, the inferior nature of the leisure good could explain why physicians have a consumption and an altruistic labor priority. This altruistic priority can be linked to a consumption priority and therefore to target income behavior. Nevertheless, when a physician has an altruistic objective we cannot interpret either the substitution and income effects or their respective associated elasticities.

To detect target income behavior, we cannot use agent model, but we must use the
renouncement models. According to these models, about 60% of physicians display target income behavior.

Unlike traditional models, agent model demonstrates that altruism would be a rational behavior. Our results demonstrate also that monopolistic power of physician and their altruistic priority should be introduce in the theoretical models to test demand inducement. In effect, all the test of demand inducement assumes that physicians are not altruistic agent and they have not monopolistic power. Whereas they should introduce them to verify whether the relation between variation of supply care and medical density could be explained by altruism and not only by demand inducement.

The development of both the agent model and the general consumer model with perfect monopolistic power could be applied to other economic areas such as public economics, labor economics, and macroeconomics......
References


Acknowledgements

We gratefully acknowledge comments and suggestions from Didier Laussel, Randall P. Ellis, Rafael Lalivé, Pascal St-Amour, Jean Imbs, Lise Rochaix, Maxime de Marin de Montmarin and Tarik Yalcin.

Funding support from Conseil Régional Provence-Alpes-Côte d’Azur is gratefully acknowledged as is data support from ORS PACA (Pierre Verger, Alain Paraponaris, Camélia Protopopescu) and URML PACA (Jean-Claude Gourheux, Remy Sebbah).

The views expressed in this paper as well as any remaining errors are the responsibility of the authors.
Appendices 1a

\[
\max_{(C,h) \in D} \ U^* (C,h) = U^*_m (C,h) U_p (h) \\
D = \{ C, h : \ g(h,M) .h - c(h,M) .h - t(h,M) .h + M = PC \}
\]  

(47)

\[
\mathcal{L} = U^*_m (C,h) U_p (h) + \lambda \left[ g(h,M) .h - c(h,M) .h - t(h,M) .h + M - PC \right]
\]  

(48)

\[
\frac{\partial \mathcal{L}}{\partial h} = \frac{\partial U^*_m (C,h)}{\partial h} U_p (h) + U^*_m (C,h) \frac{\partial U_p (h)}{\partial h} + \lambda \left[ \left\langle \frac{\partial g(h,M)}{\partial h} .h - \frac{\partial c(h,M)}{\partial h} .h - \frac{\partial t(h,M)}{\partial h} .h \right\rangle \\
+ \left( g(h,M) - c(h,M) - t(h,M) \right) \right]
\]  

(49)

\[
= 0
\]

(50)

\[
\frac{\partial \mathcal{L}}{\partial C} = \frac{\partial U^*_m (C,h)}{\partial C} + \lambda (-P) = 0
\]  

(51)

(49) \lambda = - \frac{\frac{\partial U^*_m (C,h)}{\partial h} U_p (h) + U^*_m (C,h) \frac{\partial U_p (h)}{\partial h}}{\left\langle \frac{\partial g(h,M)}{\partial h} .h - \frac{\partial c(h,M)}{\partial h} .h - \frac{\partial t(h,M)}{\partial h} .h \right\rangle + \left( g(h,M) - c(h,M) - t(h,M) \right)}
\]

(52)

(51) \lambda = \frac{\partial U^*_m (C,h)}{\partial C} \frac{1}{P}
\]

(53)
\[- \left[ \frac{\partial U_m^* (C, h)}{\partial h} U_p (h) + U_m^* (C, h) \frac{\partial U_p (h)}{\partial h} \right] . P \]

\[= \frac{\partial U_m^* (C, h)}{\partial C} \left[ \left( \frac{\partial g(h, M)}{\partial h} , h - \frac{\partial c(h, M)}{\partial h} , h - \frac{\partial t(h, M)}{\partial h} , h \right) \right] \]

\[- \left[ \frac{\partial U_m^* (C, h)}{\partial h} U_p (h) + U_m^* (C, h) \frac{\partial U_p (h)}{\partial h} \right] . P \]

\[= \frac{\partial U_m^* (C, h)}{\partial h} \left[ \left( \frac{\partial g(h, M) - c(h, M) - t(h, M)}{\partial h} , h \right) \right] \]

\[- \frac{\partial U_m^* (C, h)}{\partial C} \left( g(h, M) - c(h, M) - t(h, M) \right) \]

\[= \frac{\partial (g(h, M) - c(h, M) - t(h, M))}{\partial h} \cdot \frac{h}{g(h, M) - c(h, M) - t(h, M)} + 1 \]

\[= 0 \]

\[\varepsilon_{w(h,M)/h} = \frac{\partial (g(h, M) - c(h, M))}{\partial h} \cdot \frac{h}{g(h, M) - c(h, M) - t(h, M)} \]

\[\varepsilon_{w(h,M)/h} = - \left[ \frac{\partial U_m^* (C, h)}{\partial h} U_p (h) + U_m^* (C, h) \frac{\partial U_p (h)}{\partial h} \right] . P \]

\[\varepsilon_{w(h,M)/h} = - \frac{\partial U_m^* (C, h)}{\partial h} \left( g(h, M) - c(h, M) - t(h, M) \right) - 1 \]
Appendices 1b

\[
\max_{(C,h) \in D} U^*(C, h) = U^*_m(C, h) U_p(h) = C^\delta h^\phi h^\theta = C^\delta h^\phi
\]

\[
D = \{C, h : g(h, M), h - c(h, M), h - t(h, M), h + M = PC\}
\]

\[
U^*_m(C, h) U_p(h) = C^\delta h^\phi h^\theta = C^\delta h^\phi \quad \text{with} \quad \phi + \theta = \varphi
\]

\[
\mathcal{L} = C^\delta h^\varphi + \lambda_1 [g(h, M), h - c(h, M), h - t(h, M), h + M - PC]
\]

\[
\frac{\partial \mathcal{L}}{\partial h} = \varphi C^\delta h^{\varphi - 1} + \lambda_1 \left[ \left( \frac{\partial g(h, M)}{\partial h} h - \frac{\partial c(h, M)}{\partial h} h - \frac{\partial t(h, M)}{\partial h} h \right) + \left( g(h, M) - c(h, M) - t(h, M) \right) \right] = 0
\]

\[
\frac{\partial \mathcal{L}}{\partial C} = \delta C^{\delta - 1} h^\varphi + \lambda_1 (-P) = 0
\]

\[
(63) \lambda = - \frac{\varphi C^\delta h^{\varphi - 1}}{\left( \frac{\partial g(h, M)}{\partial h} h - \frac{\partial c(h, M)}{\partial h} h - \frac{\partial t(h, M)}{\partial h} h \right) + \left( g(h, M) - c(h, M) - t(h, M) \right)}
\]

\[
(64) \lambda = \frac{\delta C^{\delta - 1} h^\varphi}{P}
\]
\[ -\varphi C^h h^{\varphi-1} \cdot P \]
\[ = \delta C^{h-1} h^{\varphi} \left[ \left( \frac{\partial g(h,M)}{\partial h} \cdot h - \frac{\partial c(h,M)}{\partial h} \cdot h - \frac{\partial t(h,M)}{\partial h} \cdot h \right) + [g(h,M) - c(h,M) - t(h,M)] \right] \]
\[ = \frac{\varphi C^h h^{\varphi-1}}{\delta C^{h-1} h^{\varphi}} \]
\[ = \frac{1}{P} \left[ \left( \frac{\partial g(h,M)}{\partial h} \cdot h - \frac{\partial c(h,M)}{\partial h} \cdot h - \frac{\partial t(h,M)}{\partial h} \cdot h \right) + [g(h,M) - c(h,M) - t(h,M)] \right] \]
\[ = \frac{\varphi C}{\delta h} = \frac{1}{P} \left[ \left( \frac{\partial g(h,M)}{\partial h} \cdot h - \frac{\partial c(h,M)}{\partial h} \cdot h - \frac{\partial t(h,M)}{\partial h} \cdot h \right) + [g(h,M) - c(h,M) - t(h,M)] \right] \]
\[ PC = -h_\varphi \left[ \left( \frac{\partial g(h,M)}{\partial h} \cdot h - \frac{\partial c(h,M)}{\partial h} \cdot h - \frac{\partial t(h,M)}{\partial h} \cdot h \right) + [g(h,M) - c(h,M) - t(h,M)] \right] \]
\[ = \frac{h^2}{P} \left[ \frac{\varphi}{\delta} \left( \frac{\partial g(h,M)}{\partial h} - \frac{\partial c(h,M)}{\partial h} - \frac{\partial t(h,M)}{\partial h} \right) \right] + h \left[ 1 + \frac{\varphi}{\delta} \right] \cdot (g(h,M) - c(h,M) - t(h,M)) + [M] \]
\[ = 0 \]
\[ \frac{\delta}{\varphi} = -\frac{\frac{1}{h} \left[ g(h,M) - c(h,M) - t(h,M) \right] \cdot h + M}{\left( \frac{\partial g(h,M)}{\partial h} - \frac{\partial c(h,M)}{\partial h} - \frac{\partial t(h,M)}{\partial h} \right) + [g(h,M) - c(h,M) - t(h,M)]} \cdot \frac{1}{h} \]
\[ (75) \]

\[
[g(h, M) - c(h, M) - t(h, M)] . h + M = -h \frac{\delta}{\varphi} \left[ \left( \frac{\partial g(h, M)}{\partial h} . h - \frac{\partial c(h, M)}{\partial h} . h - \frac{\partial t(h, M)}{\partial h} . h \right) + [g(h, M) - c(h, M) - t(h, M)] \right]
\]

\[
[\delta C^\phi h^\phi \cdot (g(h, M) - c(h, M))] . \left[ \frac{\partial (g(h, M) - c(h, M))}{\partial h} . \frac{h}{g(h, M) - c(h, M) - t(h, M)} \right] + [\varphi C^\phi h^\phi - 1] . P
\]

\[ = 0 \]

\[
\varepsilon_{\omega(h, M)/h} = \frac{\partial (g(h, M) - c(h, M) - t(h, M))}{\partial h} . \frac{h}{g(h, M) - c(h, M) - t(h, M)}
\]

\[ = -[\varphi C^\phi h^\phi - 1] . P \]

\[ \frac{\delta}{\varphi} . \left( \frac{\partial g(h, M)}{\partial h} - \frac{\partial c(h, M)}{\partial h} - \frac{\partial t(h, M)}{\partial h} \right) \]

\[ + h . \left[ \left( 1 + \frac{\delta}{\varphi} \right) . (\bar{a} + \gamma M - a - \gamma M - t(h, M)) \right] + [M] \]

\[ = 0 \]

\[
\begin{align*}
&= \left( - \left[ \left( 1 + \frac{\delta}{\varphi} \right) . (\bar{a} + \gamma M - a - \gamma M - t(h, M)) \right] + \\
&\sqrt{\left[ \left( 1 + \frac{\delta}{\varphi} \right) . (\bar{a} + \gamma M - a + \gamma M - t(h, M)) \right]^2 - 4 \left( \frac{\delta}{\varphi} . (\bar{b} - \beta) + \left( 1 + \frac{\delta}{\varphi} \right) . (\bar{b} - \beta) \right) . M} \right) \\
&\frac{\delta}{\varphi} . (\bar{b} - \beta) + \left( 1 + \frac{\delta}{\varphi} \right) . (\bar{b} - \beta)
\end{align*}
\]

44
and

\[
\varepsilon_{w(h, M)/h}^* = \left( \bar{\beta} - \beta - \frac{\partial t(h^*, M)}{\partial h^*} \right) \cdot \frac{h^*}{\bar{a} + \bar{\beta}h^* + \bar{\gamma}M - \bar{a} - \bar{\beta}h^* - \bar{\gamma}M - t(h^*, M)}
\]  

(79)
Appendices 1c

Total Monopolistic Substitution Effect:

\[ MTE_\beta = \frac{d \left( \frac{-((1+ \frac{\delta}{\varphi})*(\bar{\omega}+\gamma M)) + \sqrt{\left((1+ \frac{\delta}{\varphi})*(\bar{\omega}+\gamma M)\right)^2 - (4*(1+(2*\frac{\delta}{\varphi}))*\beta \* M)}}{(1+(2*\frac{\delta}{\varphi})*\beta)} \right)}{d\beta} \]

if \( \frac{\delta}{\varphi} < 0 \)

\[ = -\left( \frac{(1 + \frac{\delta}{\varphi})^2 \cdot (\bar{\omega}^2 + M^2 \gamma^2 + 2M\bar{\omega}\gamma) + M \beta \left(-2 - 4 \frac{\delta}{\varphi}\right)}{\beta^2 \left(2 \frac{\delta}{\varphi} + 1\right)} \right) \]

\[ \times \left( \frac{\left(1 + \frac{\delta}{\varphi}\right) \cdot (\bar{\omega} + M\gamma)}{\beta^2 \cdot (2 \frac{\delta}{\varphi} + 1)} \right) \]

with \( \bar{\omega} = a - t(h, M) \) and \( (\bar{\beta} - \beta) = \beta \)

\[ MTE_\beta = \frac{d \left( \frac{-((1+ \frac{\delta}{\varphi})*(\bar{\omega}+\gamma M)) - \sqrt{\left((1+ \frac{\delta}{\varphi})*(\bar{\omega}+\gamma M)\right)^2 - (4*(1+(2*\frac{\delta}{\varphi}))*\beta \* M)}}{(1+(2*\frac{\delta}{\varphi})*\beta)} \right)}{d\beta} \]

if \( \frac{\delta}{\varphi} > 0 \)

\[ = \left( \frac{(1 + \frac{\delta}{\varphi})^2 \cdot (\bar{\omega}^2 + M^2 \gamma^2 + 2M\bar{\omega}\gamma) + M \beta \left(-2 - 4 \frac{\delta}{\varphi}\right)}{\beta^2 \left(2 \frac{\delta}{\varphi} + 1\right)} \right) \]

\[ \times \left( \frac{\left(1 + \frac{\delta}{\varphi}\right) \cdot (\bar{\omega} + M\gamma)}{\beta^2 \cdot (2 \frac{\delta}{\varphi} + 1)} \right) \]

with \( \bar{\omega} = a - t(h, M) \) and \( (\bar{\beta} - \beta) = \beta \)
Individualistic substitution effect:

\[
ITE_{\hat{w}} = \frac{d \left( -\left( (1 + \frac{\delta}{\varphi}) \ast (\hat{w} + \gamma M) + \sqrt{\left( (1 + \frac{\delta}{\varphi}) \ast (\hat{w} + \gamma M) \right)^2 - (4 \ast (1 + (2 \ast \frac{\delta}{\varphi})) \ast \beta \ast M) \right) \right)}{d \hat{w}} \text{ if } \frac{\delta}{\varphi} < 0
\]

\[
= \frac{\left( \frac{\delta}{\varphi} + 1 \right)}{\beta \left( 2 \frac{\delta}{\varphi} + 1 \right)} \left( \frac{\left( 1 + \frac{\delta}{\varphi} \right) \ast (\hat{w} + \gamma M)}{\sqrt{\left( (1 + \frac{\delta}{\varphi}) \ast (\hat{w} + \gamma M) \right)^2 - (4 \ast \left( 1 + \left( 2 \ast \frac{\delta}{\varphi} \right) \right) \ast \beta \ast M)}} - 1 \right)
\]

with \( \hat{w} = \pi - a - t(h, M) \) and \( (\bar{\beta} - \beta) = \beta \)

\[
ITE_{\hat{w}} = \frac{d \left( -\left( (1 + \frac{\delta}{\varphi}) \ast (\hat{w} + \gamma M) + \sqrt{\left( (1 + \frac{\delta}{\varphi}) \ast (\hat{w} + \gamma M) \right)^2 - (4 \ast (1 + (2 \ast \frac{\delta}{\varphi})) \ast \beta \ast M) \right) \right)}{d \hat{w}} \text{ if } \frac{\delta}{\varphi} > 0
\]

\[
= -\frac{\left( \frac{\delta}{\varphi} + 1 \right)}{\beta \left( 2 \frac{\delta}{\varphi} + 1 \right)} \left( \frac{\left( 1 + \frac{\delta}{\varphi} \right) \ast (\hat{w} + \gamma M)}{\sqrt{\left( (1 + \frac{\delta}{\varphi}) \ast (\hat{w} + \gamma M) \right)^2 - (4 \ast \left( 1 + \left( 2 \ast \frac{\delta}{\varphi} \right) \right) \ast \beta \ast M)}} + 1 \right)
\]

with \( \hat{w} = \pi - a - t(h, M) \) and \( (\bar{\beta} - \beta) = \beta \)

Income effect:

\[
IE = \frac{d \left( -\left( (1 + \frac{\delta}{\varphi}) \ast (\hat{w} + \gamma M) + \sqrt{\left( (1 + \frac{\delta}{\varphi}) \ast (\hat{w} + \gamma M) \right)^2 - (4 \ast (1 + (2 \ast \frac{\delta}{\varphi})) \ast \beta \ast M) \right) \right)}{d M} \text{ if } \frac{\delta}{\varphi} < 0
\]

\[
= \frac{1}{\beta \left( 2 \frac{\delta}{\varphi} + 1 \right)} \cdot h \left( \frac{(1 + \frac{\delta}{\varphi})^2 \cdot (\hat{w} \gamma + M \gamma)^2 - 4 \frac{\delta}{\varphi} \beta - 2 \beta}{\sqrt{\left( (1 + \frac{\delta}{\varphi}) \ast (\hat{w} + \gamma M) \right)^2 - (4 \ast \left( 1 + \left( 2 \ast \frac{\delta}{\varphi} \right) \right) \ast \beta \ast M)}} - \left( \gamma + \frac{\delta}{\varphi} \gamma \right) \right)
\]
with \( \hat{w} = \bar{a} - a - t(h, M) \) and \( (\overline{\beta} - \beta) = \beta \)

\[
IE = \frac{d \left( -\left(1 + \frac{\delta}{\varphi}\right) * (\hat{w} + \gamma M) - \sqrt{\left(1 + \frac{\delta}{\varphi}\right) * (\hat{w} + \gamma M)^2 - \left(4 * (1 + \frac{\delta}{\varphi}) * \beta * M\right)} \right)}{dM} \quad \text{if } \frac{\delta}{\varphi} > 0
\]

\[
= -\frac{1}{\beta \left( \frac{2\delta}{\varphi} + 1 \right)} \cdot h \cdot \left( \left(1 + \frac{\delta}{\varphi}\right) \cdot (\hat{w} \gamma + M \gamma^2) - 4 \frac{\delta}{\varphi} \beta - 2\beta \right) \left( \frac{1}{2} \right) + \left( \gamma + \frac{\delta}{\varphi} \gamma \right)
\]

with \( \hat{w} = \bar{a} - a - t(h, M) \) and \( (\overline{\beta} - \beta) = \beta \)
## Table 6: Summary statistics

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<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Std. Dev.</th>
</tr>
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<tbody>
<tr>
<td><strong>GPs’ characteristics</strong></td>
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<td></td>
</tr>
<tr>
<td>Woman</td>
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<td>Age</td>
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<td><strong>GPs’ practice characteristics</strong></td>
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Table 7: Summary statistics

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<tr>
<th>Variable</th>
<th>Mean</th>
<th>Std. Dev.</th>
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<td><strong>GPs’ Professional training activities</strong></td>
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<td><strong>GPs’ department</strong></td>
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</tr>
<tr>
<td>Rural area</td>
<td>0.344</td>
<td></td>
</tr>
<tr>
<td><strong>GPs’ Competition environment</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GPs density</td>
<td>147.684</td>
<td>57.289</td>
</tr>
<tr>
<td>Specialist physician density</td>
<td>161.699</td>
<td>134.205</td>
</tr>
<tr>
<td>Herfindhal index</td>
<td>0.112</td>
<td>0.202</td>
</tr>
<tr>
<td>Honoraries of others physicians</td>
<td>94524.179</td>
<td>18364.258</td>
</tr>
<tr>
<td>Market shares of others physicians</td>
<td>139.965</td>
<td>97.939</td>
</tr>
<tr>
<td>Difference of honoraries between the physician and his colleagues</td>
<td>-3281.333</td>
<td>41543.558</td>
</tr>
<tr>
<td><strong>N</strong></td>
<td>317</td>
<td></td>
</tr>
</tbody>
</table>
Table 8: Seemingly unrelated regression

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>(Std. Err.)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hourly benefit rate</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>GPs’ characteristics</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>-0.197†</td>
<td>(0.105)</td>
</tr>
<tr>
<td>Woman</td>
<td>-12.216**</td>
<td>(1.854)</td>
</tr>
<tr>
<td>Others income</td>
<td>0.000**</td>
<td>(0.000)</td>
</tr>
<tr>
<td><strong>GPs’ practice characteristics</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age of installation</td>
<td>0.151†</td>
<td>(0.080)</td>
</tr>
<tr>
<td>Sector 1</td>
<td>-4.754*</td>
<td>(1.961)</td>
</tr>
<tr>
<td>Secrétaire</td>
<td>6.644**</td>
<td>(1.412)</td>
</tr>
<tr>
<td>Pharmaceutical laboratories formation hours</td>
<td>0.080*</td>
<td>(0.038)</td>
</tr>
<tr>
<td>Therapeutical trial</td>
<td>1.909*</td>
<td>(0.871)</td>
</tr>
<tr>
<td><strong>GPs’ activity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Labor supply</td>
<td>-0.007**</td>
<td>(0.001)</td>
</tr>
<tr>
<td><strong>Physicians’ clientele</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Part of exonerated patients</td>
<td>0.281**</td>
<td>(0.065)</td>
</tr>
<tr>
<td>Part of patients 0-16</td>
<td>0.732**</td>
<td>(0.161)</td>
</tr>
<tr>
<td>Part of patients 59-69</td>
<td>0.550†</td>
<td>(0.310)</td>
</tr>
<tr>
<td>Part of patients 70</td>
<td>-0.297*</td>
<td>(0.137)</td>
</tr>
<tr>
<td><strong>GPs’ department</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alpes de Hautes Provence</td>
<td>-4.474</td>
<td>(4.283)</td>
</tr>
<tr>
<td>Hautes Alpes</td>
<td>0.007</td>
<td>(3.597)</td>
</tr>
<tr>
<td>Alpes Maritimes</td>
<td>4.439*</td>
<td>(2.077)</td>
</tr>
<tr>
<td>Var</td>
<td>6.655**</td>
<td>(2.072)</td>
</tr>
<tr>
<td>Vaucluse</td>
<td>1.413</td>
<td>(2.449)</td>
</tr>
<tr>
<td>Intercept</td>
<td>38.211**</td>
<td>(7.287)</td>
</tr>
</tbody>
</table>

Significance levels: †: 10%  *: 5%  **: 1%
Table 9: Seemingly unrelated regression

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>(Std. Err.)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hourly cost rate</strong></td>
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<td></td>
</tr>
<tr>
<td><strong>GPs’ characteristics</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Woman</td>
<td>-4.001**</td>
<td>(1.097)</td>
</tr>
<tr>
<td><strong>GPs’ practice characteristics</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sector 1</td>
<td>-4.347**</td>
<td>(1.171)</td>
</tr>
<tr>
<td>Practice purchase</td>
<td>0.852</td>
<td>(0.519)</td>
</tr>
<tr>
<td>Secretera</td>
<td>4.283**</td>
<td>(0.846)</td>
</tr>
<tr>
<td><strong>GPs’ activity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Labor supply</td>
<td>-0.003**</td>
<td>(0.001)</td>
</tr>
<tr>
<td><strong>Physicians’ clientele</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Part of exonerated patients</td>
<td>0.106**</td>
<td>(0.039)</td>
</tr>
<tr>
<td>Part of patients</td>
<td>0.294**</td>
<td>(0.096)</td>
</tr>
<tr>
<td>Part of of patients 59-69</td>
<td>0.370*</td>
<td>(0.184)</td>
</tr>
<tr>
<td>Part of patients 70 +</td>
<td>-0.229**</td>
<td>(0.082)</td>
</tr>
<tr>
<td><strong>GPs’ department</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alpes de Hautes Provence</td>
<td>-3.090</td>
<td>(2.566)</td>
</tr>
<tr>
<td>Hautes Alpes</td>
<td>-1.369</td>
<td>(2.160)</td>
</tr>
<tr>
<td>Alpes Maritimes</td>
<td>2.571*</td>
<td>(1.243)</td>
</tr>
<tr>
<td>Var</td>
<td>2.905*</td>
<td>(1.235)</td>
</tr>
<tr>
<td>Vaucluse</td>
<td>0.133</td>
<td>(1.460)</td>
</tr>
<tr>
<td>Intercept</td>
<td>16.796**</td>
<td>(3.487)</td>
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<tr>
<td><strong>N</strong></td>
<td></td>
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</tr>
<tr>
<td>Log-likelihood</td>
<td>-2144.952</td>
<td></td>
</tr>
</tbody>
</table>

Significance levels:  † : 10%  * : 5%  ** : 1%

Table 10: Substitution, monopolistic substitution and income effects

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Std. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Income effect</td>
<td>-95.962</td>
<td>252.202</td>
</tr>
<tr>
<td>Total Individualistic Effect (TIE)</td>
<td>264.578</td>
<td>236.181</td>
</tr>
<tr>
<td>Individualistic Substitution Effect (ISE)</td>
<td>360.54</td>
<td>443.767</td>
</tr>
<tr>
<td>Total Monopolistic Effect (TME)</td>
<td>466757.84</td>
<td>1296873.453</td>
</tr>
<tr>
<td>Monopolistic Substitution Effect (MSE)</td>
<td>466853.8</td>
<td>1297012.163</td>
</tr>
<tr>
<td><strong>N</strong></td>
<td></td>
<td>317</td>
</tr>
</tbody>
</table>

52
<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Std. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monopolistic Elasticity</td>
<td>-0.736</td>
<td>2.563</td>
</tr>
<tr>
<td>Income Elasticity</td>
<td>-0.481</td>
<td>2.426</td>
</tr>
<tr>
<td>Individualistic Elasticity</td>
<td>3.12</td>
<td>5.171</td>
</tr>
</tbody>
</table>

| N                         | 317   |