

The Flower of Paradise: Substitution or Income Effect?

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Abstract

The aim of this paper is to evaluate the impact of a wage increase on Qat consumption for the Djiboutian mail household head using a static framework. In particular, by using a system of simultaneous equations with Qat consumption and Wage as endogenous variables, the paper estimates whether a wage increase will affect Qat consumption. Our findings suggest that the impact of wage on Qat consumption is positive and significant. Given the realistic assumption that the Qat is a time intensive commodity, this means that income effect (generate by a wage increase) will prevail on the substitution effect.

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*Emerald image
it sweetens my heart
making my state of mind and my days so pleasant.
Qat is everything that one could
wish for; it brings good and drives evil away.
The good-in-heart have written
the name of Allah in its leaves.
Qat unveils the mystery of Allah. (Yemeni poem XVI century).*

1. Introduction

Some of the first analysis of addictive behaviour can be found in Becker and Stigler (1977) and Becker and Murphy (1988), who systematically develop a model of addictive behaviour in an inter-temporal framework. They define addiction in a broad sense: “...people get addicted not only to alcohol, cocaine and cigarettes but also to work, eating, music, television, their standard of living, other people, religion and many other activities...”. The main results of the paper show how addictive consumption affects inter-temporal behaviour and claim that addictions, even strong ones, are usually rational in the sense of involving forward-looking maximization with stable preferences.

The purpose of the following paper is to evaluate the impact of drug consumption on the allocation of time using a static analysis. Drug use does not affect only the way in which people trade-off present and future consumption, but it affects also the way people respond to changes in the value of time (i.e. wages) in a static framework. The analysis is carried out by means of the theoretical model developed by Becker in an earlier paper (Becker, 1965) and by using 1996 data for the African society of Djibouti. In the Horn of Africa the consumption of Qat (a substance similar to amphetamine) is an expensive habit of the male

population. Qat is perceived as a desirable good by the consumers but it is also a private bad because harmful to the personal health. By using the (realistic) assumption that Qat is a time intensive commodity, we want to investigate if there is a positive or negative dependence of drug use on wage. The paper is organized as follows. Section 2 describes the consumption of Qat in Djibouti, section 3 presents the theoretical model, section 4 describes the data, section 5 presents the econometric model and the results. Section 6 reports the main conclusions.

2. Qat in Djibouti

The name Qat comes from the plant *Catha Edulis* Forskal, a plant growing at 1500-2000 meters of altitude. Mountains of Ethiopia and South Arabia fit particularly well the climatic conditions necessary for this plant to grow and survive. To keep intact their properties, Qat leaves have to be consumed in maximum three days after they are taken away from the crops. Qat consumption in this region has a long history. The first available written reference dates back to 1237. In this period its stimulant effects are well known, and it is believed to be a plant of unordinary properties.

The increased consumption of Qat in the last century has been subject of concern, and many studies have been undertaken by the WHO to sensitize medical environments. To characterize the strong social and cultural impact of this kind of consumption in Djibouti, sociologists often use the word "social plague". Qat consumption is prevalently a male habit that heavy affects household budget. The life of a Qat chewer plays around the so-called Qat parties held in the afternoon until dusk. Qat sales start in the early afternoon

when an airplane coming from Ethiopia arrives bringing daily 12 tons of Qat. Streets become empty for many hours during afternoon and the city “falls asleep”. Thus, Qat consumption is a really widespread and pervasive phenomenon. Moreover, the commerce of Qat is one of the most consistent sources of fiscal revenue for the Government (it constitutes on average between 9% and 15% of import taxes). The proportion of these taxes is very high if we consider that the Djiboutian economy is very poor in tradable natural resources. The high proportion of resources allocated to Qat is at the expenses of basic household expenditures like food and education.

In the following, we discuss the question of addiction related to Qat consumption. In medical terms, the notion is that true addiction is signalled by the experience of physical withdrawal symptoms when the drug is withheld from the habitual user. A concomitant idea is “tolerance”, the notion meaning that as the body becomes accustomed, a continuously increasing need is felt for more of a substance, with consequent driven seeking to procure the needed fixes. Then, this leads to continually greater neglect of ordinary behaviours in favour of drug experience and further drug seeking. In 1956 a group of experts of the WHO defined seven categories of drug dependence, and among them Qat type is a self-defining category. It contains Cathinone, a substance that seems to have a high stimulant capacity and produces effects similar to those of amphetamines (though it is structurally different); it increases heart rate, locomotor activity and oxygen consumption. Some studies report withdrawal symptom and tolerance associated with Qat consumption (Nancini et al.), but, as reported by Weir (1980), a serious defect of these studies is that there is no mention of any monitoring of a control group of non-chewers in identical conditions. In 1974-76 an important major research project on Qat consumption was carried

out in Yemen under the direction of John Kennedy. The possible stimulant and addictive properties of Qat were investigated “to assess the major effects of this institutionalized drug upon the social life, economics and health of Yemeni people” (Kennedy et al. 1980). The results show that Qat does not produce withdrawal symptom, even if the author points out that a mild form of physiological dependence does result from extremely heavy use. With regard to the question of tolerance, the results do not seem to be uncontroversial.

Other authors (such as Weir, 1980) stress the importance of analyzing Qat consumption in a broader perspective. Even if the medical question of addiction does not seem to be completely uncontroversial, it is widely recognized that social and economic factors are of primary importance in determining individual consumption levels, and account for individual differences in the consumption of Qat: “...if the pleasurable and addictive properties of a drug are known to be powerful, considerable weight can be placed on medical, physical explanations for its consumption. But in the case of weak substance such as Qat, we must lean more heavily on social explanations for its popularity and expense...Obviously Yemeni chew Qat socially because of its stimulant effects...but high expenditure on Qat and its increasing popularity are better understood if they are seen more as a reflection of the value Yemeni place on the social effects of being Qat consumer” (Weir, 1980). These aspects strongly characterize the consumption of Qat also in Djibouti, and they will be used to support the assumptions stated in the theoretical model.

2. The Theoretical Model

A wide range of medical, sociological and psychological literature deals with the problems of addictive¹ consumption, mainly alcohol and drugs. But why do people consume some kind of “goods”? Maybe, it could seem “inappropriate” to analyse this problems from an economic point of view, but we believe that the insights provided by other disciplines can give useful suggestions to understand the economics of “addiction” in general sense, and its relevant implications for observed economic behaviours.

Psychologists, in particular, describe a wide range of reasons inducing people to develop an addictive behaviour despite its negative health effects. A common element of analysis is based essentially on the idea that drug and alcohol consumption can give pleasure, provide “help” in facing daily problems, ease the communication and the interaction among people and within the community in which one lives (Salvini et al. 1998, 2002). The medical term toxicophilia, in particular, indicates a class of behaviours organized and intentionally finalized to reach the mental and physical status induced by the use and abuse of substances.

As described in the previous session, the “social” aspect of drug consumption is very strong in the case of Qat. As reported by Kennedy (1987) “...the meaning of chewing Qat is that it gives the chewer a meaning, a sense of his or her own identity in rapidly changing world over which he or she has little or no control...The modern Yemeni has a need to identify himself in a positive way” .

¹ Note that here I am using the term “addiction” how it is perceived in the common sense without any specific reference to medical characterization that will be introduced later in the paper.

Thus, in a very simple way, we could say that Qat consumers “feel” what we define a *utility gap* (γ) deriving from the need to be part of a society where this kind of consumption represents a very important mean of social integration. Thus, the utility function of an individual can be represented in the following way:

$$U^i = U(Z_1 \dots Z_N; \gamma)$$

where $Z_i, i=1 \dots N$ is a consumption good with $U_{z_i} > 0$, $U_{z_i z_i} < 0$. Note that γ is not directly observable from a economic point of view, but when this utility gap reaches some individual threshold level, we could observe some changes in the consumption pattern. Through Qat consumption (and in general other drugs) the individual replaces the utility gap with a new D good that directly enter the utility function and provides subjective satisfaction through a drug experience (this is what is called *euphoria* in Stigler and Becker’s terms (1977)). In fact, the first experimental effects of Qat are a gradually developing mild euphoria, alertness, and feeling of contentment, confidences, and gregariousness². Thus, by consuming Qat people attempts to reach a state of general well being. However, the euphoric state can be followed by a state of confusion, misperception of time and space and hallucinations.

² Qat consumers seem to consider it as a real “good” because of its stimulating properties, and do not take into account the negative effects on their health. The habit of chewing Qat causes insomnia, anorexia, and constipation. Qat consumers are more susceptible to the contraction of venereal diseases, heart diseases, tuberculosis and others. Qat consumption is also associated with high tobacco consumption: during their meeting, Qat users usually smoke 1-2 packages of cigarettes.

We assume that the Z goods and the “drug experience” good D enter the utility function through a productive process that uses as inputs time and market goods. As Becker points out “...a more intuitive assumption is that time and goods enter into the production of commodities which directly provide utility. These commodities cannot be purchased in the marketplace but are produced as well as consumed by households using market purchases, own time and various environmental inputs. These commodities include children, prestige and esteem, health, altruism, envy and pleasures of the sense...” (Becker, 1981).

In the present framework we ignore the consumption capital aspects of drug consumption which allows establishing a relationship between past and current consumption. This is an important limitation of the following analysis that can be in part justified by the data available that are not adequate to estimate a dynamic model, and in part by the nature of the drug experience associated with Qat. As described in previous session, the “social dimension” of addiction is very strong in the case of Qat, and the *social interpretation* of the associated ambiguous physical experience makes it possible to derive pleasure from this activity.

The individual optimisation process can be described as follows:

$$\max U = U(Z_1 \dots Z_N, D) \quad (1)$$

subject to

$$\begin{aligned} Z_i &= z(x_i, T_{Z_i}) \\ D &= d(Q, T_D) \end{aligned} \quad (2)$$

$$T = \left(\sum_{i=1}^n T_{Z_i} + T_D \right) + T_w = T_c + T_w \quad (3)$$

$$\sum_i p_{xi}x_i + p_qQ = m + wT_w \quad (4)$$

where equation (3) represents the time constraint describing how the total time is divided between consumption time, i.e. the time spent in producing the goods directly entering the utility function ($\sum_{i=1}^N T_{Z_i} + T_D = T_c$), and time spent at work. The first constraint describes how the input vector of market goods x_i ($i=1, \dots, N$), Qat (Q) and the vector of time inputs T_j ($j=i, D$ with $i=1, \dots, N$) are used in the production of the Z_i and D goods. The last one is the usual budget constraint that distinguishes between labor and non-labor income (m).

We assume production functions homogenous of first degree with

$$\frac{\partial Z_i}{\partial T_{Z_i}} > 0, \frac{\partial Z_i}{\partial x_i} > 0, \frac{\partial D}{\partial T_D} > 0, \frac{\partial D}{\partial Q} > 0,$$

and specify $T_D = tQ$, where t is the amount of time necessary to *chew* one unit of Qat.

We can combine the time, budget and technological constraint in a more compact form:

$$\sum_i (p_{xi}x_i + wT_{Z_i}) + (p_q + wt)Q = wT + m. \quad (5)$$

The LHS of equation (5) represents the full expenditure and $\pi_D = p_q + wt$ is the full price of the D good. Thus, the full price is composed by two distinct elements, the out-of pocket

(or direct) price p_q for the input bought on the market, and the time or indirect price $w t$, which expresses the cost of time in terms of foregone earnings involved in the production of the drug experience. Thus, the full income (RHS of equation 2) is given by the sum of the money income achievable if all the time available were devoted to work and the non-labor income. The total, or full, budget constraint describes how the full income is spent on the commodities either directly, through the expenditures on market goods, or indirectly through the forgoing of income, i.e. by using time at consumption rather than at work.

From the first order conditions of the consumer's optimization problem we get³:

$$\frac{\partial U}{\partial Z_i} = \lambda \pi_{Z_i} \quad i=1, \dots, N \quad (7)$$

$$\frac{\partial U}{\partial D} = \lambda \pi_D, \quad (8)$$

which implies:

$$MRS_{DZ_i} = \frac{\pi_D}{\pi_{Z_i}} = \frac{p_q \frac{dQ}{dD} + w \frac{tdQ}{dD}}{p_{xi} \frac{dx_i}{dZ_i} + w \frac{dT_{Z_i}}{dZ_i}}. \quad (9)$$

³ Maximizing the utility function, subject to the full income constraint, using the fact that the production functions are homogeneous of the first degree gives:

$$\frac{\partial U}{\partial Z_i} = \lambda \left[p_{xi} \frac{dx_i}{dZ_i} + w \frac{dT_{Z_i}}{dZ_i} \right] = \lambda \pi_{Z_i}$$

$$\frac{\partial U}{\partial D} = \lambda \left[p_q \frac{dQ}{dD} + w \frac{dT_D}{dD} \right] = \lambda \left[p_q \frac{dQ}{dD} + w \frac{tdQ}{dD} \right] = \lambda \pi_D,$$

where λ is the Lagrange multiplier and the full prices π_{Z_i}, π_D are determined by the market good and time inputs requirement necessary to the production of one unit of the Z_i and D goods.

Thus, using this approach, we can distinguish the different commodities based on their intrinsic degree of time and good intensity⁴ to investigate the effect of an increase in the wage. As described in the previous session, Qat consumers spend a large fraction of their time in chewing Qat with friends. Men meet usually in the afternoon at the so-called Qat parties to spend together many hours until dusk. Thus, we can reasonably assume that the production of the typical Djiboutian drug experience is a relatively time intensive activity. This can be formalized as follows:

Assumption 1. Time intensity:
$$\frac{w}{p_q} \frac{dT_D}{dQ} > \frac{w}{p_{x_i}} \frac{dT_{x_i}}{dx_i}$$

This means that if we look at two hypothetical isoquants of production for the D and Z_i good, we have more time (in real terms) embodied in the production of the drug experience than in the production of other goods. Note that if we assume that the drug experience provides direct satisfaction, we cannot directly measure the amount of euphoria produced. What we can observe is the use of the (input) Qat. However, given the above specified production function of D , we can determine a one to one correspondence between the use of Qat in the production of D and the good D . This is equivalent to say that the Qat users identify and directly associate the output of the productive process (D) with the input, so that by stating that the production of euphoria is a time intensive activity is equivalent to

⁴ Becker (1965) defines the relative marginal importance of time as $\frac{t_i}{\pi_i}$.

say that Qat consumption is a time intensive activity. In psychological-technical terms, this could be viewed from a “behavioural” perspective, which considers the repeated use of substances as behaviour determined by the perception of the physiological alterations produced by the substance itself. Moreover, the fact that the person associates a positive meaning to these perceptions has a function of “reinforcement” on the use or abuse (Turchi, 2002).

Given the role Qat plays as *social aggregator* in the life of the typical male Djiboutian community, we could reasonably say that this kind of consumption generates a cultural or social form of dependence.

Assumption 2. Addiction: *Qat does not generate addiction in the strict medical sense but generates a form of “social” dependence.*

Given the nature of this kind of consumption it is therefore interesting to investigate the effects of this institutionalised stimulant on the scheduling and content of social activities, the structure of economic life and even the perception of reality.

The first step in this paper is to analyse the consumption of Qat in the theoretical framework developed above. Given the assumption of time intensity, we want to analyse

the effect of an increase in the value of time, represented by an increase in wages. From equation (9) we have⁵:

$$\frac{w}{p_q} \frac{dT_D}{dQ} > \frac{w}{p_{x_i}} \frac{dT_{x_i}}{dx_i} \Rightarrow \frac{\partial \left(\frac{\pi_D}{\pi_{Z_i}} \right)}{\partial w} > 0. \quad (10)$$

Thus, an increase in wages determines a relatively large increase in the full price of the relatively more intensive commodity D . The importance of considering the full price becomes here evident, because it allows distinguishing goods in terms of the amount of time necessary to their production. An increase in the wage will determine therefore two effects.

On one side, by the substitution effect, an increase in the value of time will determine a shift away from the production of D (or equivalently from the consumption of Qat) time intensive commodity to the good intensive ones, since now the opportunity cost of spending time at Qat parties is higher. On the other side we have an income effect, which operates

⁵ Taking the derivative of (9) with respect to w we get:

$$\frac{\partial \left(\frac{\pi_D}{\pi_{Z_i}} \right)}{\partial w} = \frac{\partial}{\partial w} \left(\frac{p_q \frac{dQ}{dD} + w \frac{t dQ}{dD}}{p_{x_i} \frac{dx_i}{dZ_i} + w \frac{dT_{Z_i}}{dZ_i}} \right) = \frac{p_{x_i} \frac{dT_D}{dD} \frac{dx_i}{dZ_i} - p_q \frac{dQ}{dD} \frac{dT_{Z_i}}{dZ_i}}{\left[p_{x_i} \frac{dx_i}{dZ_i} + w \frac{dT_{Z_i}}{dZ_i} \right]^2} = \frac{p_{x_i} \frac{tdQ}{dD} \frac{dx_i}{dZ_i} - p_q \frac{dQ}{dD} \frac{dT_{Z_i}}{dZ_i}}{\left[p_{x_i} \frac{dx_i}{dZ_i} + w \frac{dT_{Z_i}}{dZ_i} \right]^2}$$

This implies that :

$$\text{sign} \frac{\partial \left(\frac{\pi_D}{\pi_{Z_i}} \right)}{\partial w} = \text{sign} \left(p_{x_i} t \frac{dx_i}{dZ_i} - p_q \frac{dT_{Z_i}}{dZ_i} \right).$$

Assumption 1 implies that this term is positive. In fact we have that

$$\left(p_{x_i} t \frac{dx_i}{dZ_i} - p_q \frac{dT_{Z_i}}{dZ_i} \right) > 0 \Leftrightarrow \frac{t}{p_q} > \frac{dx_i}{p_{x_i}} \Leftrightarrow \frac{dT_D}{dQ} > \frac{dx_i}{p_{x_i}} \text{ since } t = \frac{dT_D}{dQ}.$$

exactly in the opposite direction. The former would reduce Qat use, the second would increase it, and the total effect will depend on the relative strength of the two.

4. Data

The cross-section data set is the national household survey (*EDAM, Enquête auprès des ménages*) conducted in 1996 by the Statistics Department of Djibouti (DINAS) among the sedentary population. Four main groups represent the population: nomads, homeless, refugees and sedentary tribes, that is the group targeted by the EDAM. The survey was articulated in separate questionnaires for households and individuals. The survey sampled 15,701 individuals belonging to 2,380 families. About 65 percent of the households live in the city capital Djibouti, 16 percent in other towns and the remaining 17 percent in rural areas. Data on Qat use reports weekly consumption and the number of users in the household. Because Qat is perceived as a good rather than a bad, the consumption is revealed truthfully. For the purpose of the paper, we selected a subgroup of 1,787 male-headed households. Male household head are considered the representative consumers of Qat. Qat is in fact a male habit, while female think that husbands who uses Qat are unbearable and claim that they spend their earnings on the private consumption of Qat rather than satisfying the family needs. A 1984 survey of 498 households in Djibouti city (Republique de Djibouti, 1984) reported that 75 per cent of household heads consumed Qat every day. The selected subgroup is composed by Qat *users* and *non Qat users*, respectively the 56 and 44 percent of the sub-sample (Table 1). Inspection of Table 2 reveals that on average the largest household expenditure item is food, taking 45 percent of the budget. Qat

represents 10 percent of the total household expenditure, energy is 7 percent, education 2 percent, clothing 3 percent and health 2 percent. The comparison of the average budget between *Qateur* and non-*Qateur* Djiboutian households reveals that the Qat share reaches a level of 20 percent in *Qateur* households.

5. Econometric Model and Results

The purpose of our paper is to evaluate whether an increase in the value of time reduces or increase the use of Qat. Thus, we want to estimate our drug function to evaluate the effect of male household head's wage on drug use. The first problem that arises in this context is that drug use and wages are simultaneously determined. As we want to see how wages affect drug consumption, it could be well the case that causality runs in both directions, i.e. also drug use affect wages. The detrimental physical and psychological effects of drug use suggest that wages should be affected by drug use. Another reason why a single equation model is inappropriate is due to the fact that there are unobservable characteristics that affect drug consumption and that could also affect wages. In the inter-temporal framework developed by Becker and Murphy, drug users are characterized as more impatient individuals, i.e. they have a higher rate of time preference. But this could also affect their earning profile, since impatient individuals are expected to choose a flatter experience–earning profile (Mincer, 1974). In the case of Qat, the (unobservable) social pressure leading to its “mass” consumption could affect the individual decision to work and also the individual choice of a particular earning profile compatible with such time intensive activity.

For these reasons we estimate a simultaneous system of equations with wages and drug use being jointly determined. The model that will be estimated in this paper is:

$$Q = \alpha_0 + \alpha_1 X_Q + \alpha_2 W + u_d \tag{11}$$

$$W = \beta_0 + \beta_1 X_w + \beta_2 Q + u_w$$

where X_Q is a set of explanatory variables in the Qat-drug equation. Qat use is considered a representative consumption of the male household but it is registered at household level. In some sense, this consumption can be considered as expression of the power of the household head within the household and therefore of his ability to divert resources toward the consumption of an exclusive good. Thus, we include both individual and household characteristics in the drug equation: household head's age, dummy if household head can read and make calculations, years of formal schooling completed, number of children 0-5 years old, number of children 6-18 years old, marital status, geographic dummies and weekly average household non-labor income (this includes, among others, financial revenues, pensions, subsidies and in particular transfers from friends and relatives abroad or in the country). The set of independent variables in the wage equation (X_w) includes household head's age, age square, dummy if household head can read and make calculations, years of schooling, dummy variables for location and sector of employment. To estimate the model we use a Two-Stage Least Squares (2SLS) procedure. As measure of drug consumption we use the (logarithm of) weekly Qat consumption in grams. Qat is bought on the market in bundles of different sizes (for example 100, 200 grams). The regular consumer buys daily 300 grams of Qat. The occasional consumer chews six 100

grams bundles each day of the weekend. The average weekly Qat consumption for the subsample of household males is 948 grams (or 1757 if only Qat consumers are considered). We first estimate a reduced form for the wage equation using the two step Heckman procedure (1976,1979) to take into account that wages are observed only for working household heads. The dependent variable used is the (logarithm of) weekly wage. This procedure allows getting consistent estimates and can be used as a part of the 2SLS procedure. As a benchmark, we estimate also a reduced form for the wage equation without the selectivity correction. To estimate the Qat consumption equation we use both standard Ordinary Least Squares (OLS) and a Tobit regression to take into account that a fraction of the household heads does not consume Qat. To address the identification issue of the system of structural equations we have to assume that there are some variables affecting wages that do not enter the drug use equation. The exclusion restriction on the drug function is that the dummies for the sector of employment (transportation and telecommunication, agriculture, fishery, services and industry sector) and household head age square have no direct effect on Qat use. We tested for over-identification restrictions and we found that these variables can be excluded from the drug use equation. The results of the estimates are reported in Table 3. They show that, in general, drug use is related to the age of the household head, its education level, the size of the household and his wage. The size of the household is an important factor: males in larger households spend more on Qat. When the household head is alphabetised he spends more on Qat. The fact that he can read and make calculations is not necessarily related to its level of education, and thus it does not mean that he is aware of the negative effects of Qat consumption but rather he could have some additional means to provide Qat for himself. Higher levels of education imply,

instead, that the household head consume significantly less Qat. For our purpose, regardless of the method used, the estimates show a positive and significant effect of wages on Qat consumption. Moreover, the marginal effect for the wage variable is approximately the same for all the econometric specifications (around 2). In terms of our model we can interpret this as evidence of the prevalence of the income effect over the substitution effect. Given the strong social and cultural dependence of most male household heads from this kind of consumption, an increase in the value of time is considered as an immediate way of having “more fun” instead than working more to take advantage of the increase in wage. Any kind of addiction, even social ones, is likely to make individuals more impatience, and this is going to affect not only their inter-temporal behaviour but also the way in which they make their choices at any given point in time. Given the assumption that Qat is a time intensive commodity, an increase in the value of time let Qat consumers feel “wealthier” and more willing to increase the consumption of a commodity representing a very important mean of social integration.

6. Conclusions

The monetary emphasis placed on Qat consumption may be contrasted with Western attitudes toward drinking, smoking and other addictive behaviours which focus primarily on the quantity of cigarettes or drinks a person regularly consumes and secondary on the money cost. The preoccupation is more with the consumer’s physical or psychological susceptibility to these substances and less on how his consumption habits affect or reflect his economic circumstances. With Qat the emphasis is reversed. This is

because Djiboutian men know that each person's level of Qat consumption is related to his financial status more than his bodily or emotional needs, and so the more one can consume the more prestige he will be able to gain at social level. From the "male" point of view of Qat users, "...a man who spends modestly on food and a lot on Qat is not necessarily juggling his priorities between family sustenance on the one hand and selfish pleasure on the other. He may be opting for one prestige system rather than another, possibly because he cannot afford to compete in both...choosing either can be responsible and sensible decision because social and economic advancement may depend on it" (Weir, 1980). The purpose of this paper was to study how the consumption of a "socially" addictive good responds to changes in the value of time as represented by wages, in a model in which the Drug experience is produced by using both market and time inputs. Estimating a simultaneous system of equations with wage and Qat consumption as endogenous variables, our findings suggest that there is a clear relationship between Qat consumption and the wage level. In particular, the paper found that the last one positively and significantly affect the consumption of Qat. Given the realistic assumption that Qat is a time intensive commodity, this means that income effect (generated by a wage increase) will overcome the substitution effect.

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Table1. Mean and std. deviation adult household heads aged 16-64

Observations: 1787	Mean	Std Dev
Household head age	44.5	12.15
Household head schooling	3.28	4.67
% of alphabetized	51	0.5
% married	92	0.26
% employed	66	0.49
%living in the capital Djibouti	65	0.47
Weakly wage (Djiboutian currency)	11876	15477
Weakly non labor income(Djiboutian currency)	4210	25613
Weakly Qat consumption (grams)	968	1563
% Qateur	55	0.49

Source: author elaboration from EDAM data

**Table2. Weakly Household
Expenditure shares**

Food	0.45
Water	0.03
Education	0.02
Rent	0.18
Health	0.02
Clothing	0.03
Transportation	0.04
Energy	0.07
Qat	0.11
Cigarettes	0.01
Transfers	0.01
Others	0.03
obsrevations	1787

Source: author elaboration from
EDAM data.

Table3. Parameter Estimates from 2SLS Qat Consumption Equation

<i>Variable</i>	OLS	OLS ^a	Tobit ^a
<i>age</i>	-0.0424 (-2.52)*	-0.0201 (-1.67)***	-0.0427 (-1.94)**
<i>instruction</i>	-0.1297 (-2.16)*	-0.0776 (-1.78)***	-0.1561 (-1.99)**
<i>alphabetization</i>	0.4301 (1.12)	0.9016 (3.24)***	1.6686 (3.34)*
<i>children 0-5</i>	0.1338 (1.41)	0.1417 (1.89)***	0.2360 (1.76)***
<i>children 6-18</i>	0.0850 (1.42)	0.0600 (1.36)	0.0958 (1.21)
<i>married</i>	-0.3667 (-0.84)	0.0168 (0.05)	0.0502 (0.09)
<i>Djibouti</i>	0.1913 (0.39)	0.4304 (1.20)	0.8751 (1.32)
<i>urban</i>	0.3119 (0.80)	0.3651 (1.27)	0.8317 (1.55)
<i>ln_wage</i>	2.1130 (2.20)**	1.8975 (2.65)*	3.4105 ^b (2.62)*
<i>non labor income</i>	-0.0000 (-1.42)	-0.0000 (-1.58)	-0.0000 (-1.49)
F	5.50*	15.04*	χ^2 141.75*

Note: t- statistics in parenthesis.

*significant at 1%, ** significant at 5%, *** significant at 10%.

^a Selectivity corrected

^b Marginal effect=2.1801 and is statically significant at 1%