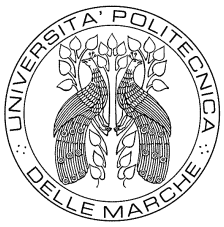

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Advertising Has Got You On The Run

Well-Being, Consumption and Leisure in a GE model

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Abstract

This paper presents a general equilibrium model where firms producing the consumption good in an oligopolistic market purchase advertising in order to increase their market shares. The model aims to evaluate the general equilibrium consequences of such a behaviour. It analyses the effects of a taxation of advertising on demand for the final good, on working time and on individual well-being. We conclude that, unless the direct effects of advertising on utility are strong, a positive tax rate on advertising raises leisure, reduces consumption and increases well-being.

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1 Motivations and Literature Background

The literature on relative consumption has highlighted that people can consume too much because of their desire of "keeping up with the Jones" (Gali, 1994). Positive externalities (when "jealousy" prevails on "admiration") imply that the laissez faire equilibrium consumption level is greater the optimum one (Dupor and Wen-Fang, 2003; Pintea, 2010). Actually, the empirical evidence suggests that life satisfaction and individual well-being do not increase with economic growth in high-income Countries[1]. More in general, the economic activities measured by GDP and individuals' well-being seem to be strongly related in the first phases of economic development while they become independent in the recent decades in the industrialized countries. When a certain level of consumption is reached, individuals could search for higher levels of consumption if they care of what the others do.

A different theoretical explanation for over-consumption and over-work is based on the influence of firms marketing policies on individual preferences and behavior. In this literature, advertising is often seen as a firms' tool to increase sales by changing individual preferences, as in Benhabib and Bisin (2002) that consider manipulation of preferences by monopolistic firms through advertising. According to their view, firms create new false needs. As a consequence consumer spending rises to the point where consumers enter a "work and spend cycle" and reduces the time devoted to leisure activities. They conclude that "Such patterns of behavior, characterized as the "work and spend cycle" and the "commodification of leisure", reduces consumers' overall welfare when welfare is evaluated according to the consumers' ex-ante preferences, that is before advertising takes place". Golden (2009) by analyzing the economic, social-psychological, organizational and

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[1]For a recent paper on relative consumption see Kenneth J. Arrow and Partha S, Dasgupta (2009)

institutional forces that determine the individuals' working time, highlights that "advertising and promotional efforts lead workers to develop a taste for products that once were considered a luxury or amenity into a necessary" and conclude that overwork may be contrasted by curbs on advertising.

Even if preferences are not supposed to be affected by advertising, firms might strategically overinvest in advertising to deter entry, so that in the economy there might be too much advertising (Krahmer, 2006), but they can also invest in advertising in order to increase their market share. The latter hypothesis concerning firms behavior is the base of the model we will present in the next section.

However, another important role for advertising has been analyzed in the economic literature considering "Advertising as information". In this case, advertising activities raise utility because they increase the amount of information available to consumers. Nelson (1974) states that "the self-interest of consumers to respond to advertising only if it increased their utility guarantee that highly advertised products will provide higher utility to the consumer". Other relevant papers on this research field are the ones proposed by Gary-Bobo et al. (1991) and by Ekelund et al. (1995).

An empirical investigation of a positive relation between advertising and working time is provided by Cowling et al. (2011). Their paper concludes that the evidence of a higher working time in the US with respect to EU can be, at least in part, be explained by firms advertising policies: "advertising may raise the desired amount of marketed goods and services for which workers find it necessary to work long hours." Another paper that analyses empirically the effects of advertising on consumption in Italy is due to Marattin (2008). The Author concludes his econometric analysis by stating that "advertising had a positive and significant effect on consumption". Similar results are obtained by Jung and Seldon (1995).

The literature presented above has rarely considered a general equilibrium framework where oligopolistic firms advertise in order to increase their market share. In our paper, we deal with this issue by considering individuals and firms behavior. Individuals maximize their utility that depends on consumption and leisure. It can also depend positively on advertising via information mechanism. Firms produce the final good consumed by individuals in an oligopolistic setting where an optimal level of advertising is chosen in order to maximize profits.

We demonstrate that policies oriented to reduce advertising have effects on aggregate consumption, leisure and well-being. More specifically, advertising is an endogenous optimal behavior of firms competing to earn market shares. But individual well-being could be halted by such activities.

Our main results show that in a world where the direct effects of advertising on utility are not strong, it exists a level of taxation on advertising (whose returns are redistributed to the individuals) which maximizes individual utility as well as firms profits.

2 Shifting Choices toward Consumption through Advertising in a GE model

The model depicts a world where:

1. utility depends on consumption of the final good and leisure and can also depend directly on advertising;
2. two sectors coexist in the economy; one sector produces the final good, and the other advertising;
3. the sector producing the final good is oligopolistic, the sector producing advertising is perfectly competitive;
4. in the final good sector firms have market power and fix the price level as a mark-up on marginal costs.
5. once the price level is defined, advertising is used by firms in the final good industry in order to gain market share;
6. each of the two firms assumes that the advertising level of its competitor is constant (Cournot hypothesis referred to advertising).

Given these hypotheses, advertising can have effect on total demand and, as shown in the next sections, through changes in relative prices, it has an indirect effect on the optimal level of consumption and leisure, pushing individuals against leisure.

2.1 Consumers and Advertising

Individuals' well-being is represented by the utility function U and depends positively on the level of consumption Y, on advertising (X) and on the time devoted to leisure.

Given that time devoted to leisure is equal to the difference between the total time - set to 1 - and the working hours H, the utility function[2] that we will use takes the following form:

$$U = [A(X)Y]^{\theta} + (1 - H) \tag{1}$$

where we define $A(X)$ as the *informational content of advertising*, the one that directly generates utility, and we assume $\frac{dA}{dX} \geq 0$ (and $\frac{d^2A}{dX^2} \leq 0$), so that advertising can affect positively the individual utility if the sign $>$ holds.

Individuals face a standard budget constraint. Their spending in consumption ($p \cdot Y$) is equal to earnings from work ($w \cdot Y$) plus other incomes

[2]We prefer to assume an explicit utility function because our aim is to solve the model in a general equilibrium framework. The specific chosen form of the utility function gives rise to a constant elasticity demand function, so that it strongly simplifies the analysis.

V, which, as we will see, in general equilibrium includes both firms profits and, eventually, tax revenues:

$$Y = \frac{w}{p}H + \frac{1}{p}V \tag{2}$$

Given the utility function in 1 and the budget constraint in 2, the demand function for goods and the supply function of labor can be easily computed[3]:

$$Y = [A(X)]^{\frac{\theta}{1-\theta}} \left(\frac{\theta w}{p}\right)^{\frac{1}{1-\theta}} \tag{3}$$

$$H = \theta^{\frac{1}{1-\theta}} \left(A(X)\frac{w}{p}\right)^{\frac{\theta}{1-\theta}} - \frac{V}{w} \tag{4}$$

Note that, *ceteris paribus*, with the utility function of equation 1, every increase in non labour income positively affects leisure and not consumption whereas a rise in the real wage increases both consumption and labour supply. Given the above hypothesis, and unless $\frac{dA}{dX} = 0$, the utility function (and therefore individual well being) depends positively on the advertising because of its informational content.

2.2 Firms, Advertising and Market Shares

We assume that the final good Y is produced by two firms whose production is defined y_i, for $i = 1, 2$, which use labour, h_{y_i}, as the only input[4]. The two firms decide the price level in an oligopolistic setting (as assumed in point 2 of page 3) .

In a first stage, firms decide the output price. Assuming that marginal cost of firms depends on the production function $y_i = \alpha h_{y_i}$ for $i = 1, 2$, given w the cost of the labour input, firms' profits are given by:

$$\pi_i^Y = p[Y(y_i)]y_i - \frac{w}{\alpha}y_i - \rho x_i \qquad for \quad i = 1, 2 \tag{5}$$

Marginal revenue of each of the two firm can be written:

$$MR_i^Y = \left[\frac{\epsilon_{Y,y} + \epsilon(p)}{\epsilon(p)}\right] p(Y)$$

where $\epsilon(p)$ is the demand elasticity to price and $\epsilon_{Y,y}$ is the expected elasticity of total production to firm i decisions, and depend on the other firms behaviour. Given that $\epsilon_{Y,y} = 1$ in collusion and $\epsilon_{Y,y} = 0$ in the Bertrand model, in general $0 \leq \epsilon_{Y,y} \leq 1$ must hold. We assume that both $\epsilon(p)$ and $\epsilon_{Y,y}$ are assumed to be given at the some level for all firms.

[3] As a consequence of the gross substitution theorem, there must exist a unique interior equilibrium for Y.

[4] We use the subscript y_i to indicate that we refer to the final good industry.

Considering that given equation 3 $\epsilon(p) = \epsilon = -\frac{1}{1-\theta}$ must hold, we can define the markup over marginal cost as follows:

$$z = \frac{1}{1-(1-\theta)\epsilon_{Y,y}} \tag{6}$$

thus $z = \frac{1}{\theta}$ in collusion and $z = 1$ with Bertand competion.

We finally obtain the price level:

$$p = z\frac{w}{\alpha} \tag{7}$$

Using equation 2, considering that in equilibrium the total demand equal to the total output, we obtain:

$$Y = A(X)^{\frac{\theta}{1-\theta}} \left(\frac{\theta\alpha}{z}\right)^{\frac{1}{1-\theta}} \tag{8}$$

so that it depends positively on advertising.

Following the assumption 4 of 3, the share in total output of firm i depends on its relative advertising level. We assume that this relationship takes the form[5]:

$$y_i = \frac{x_i + \frac{1}{2}}{X+1} Y \qquad i = 1;2 \tag{9}$$

with $X = x_1 + x_2$ being total advertising.

This assumption implies that $y_i = y_j$ if $x_i = x_j$. Hence, each firm sells half of the demand for the final goods when they advertise the same their products and in particular when both of them decide not to advertise at all.

We must now define a specific function for the *informational content of advertising*, $A(X)$. We choose an increasing and concave function:

$$A(X) = (X+1)^{\delta} = (x_1 + x_2 + 1)^{\delta} \tag{10}$$

where $\delta \leq 0 \leq 1$ is the constant elasticity of the *informational content of advertising* to X. If $\delta = 0$, individual well being is not affected by advertising. Higher δ implies a higher positive effect of advertising on utility.

The profit function for firm i can be now written:

$$\pi_i^Y = w(z-1)\left(\frac{\theta\alpha^{\theta}}{z}\right)^{\frac{1}{1-\theta}} \left(x_i + \frac{1}{2}\right)(x_i + x_j + 1)^{\frac{\theta(1-\delta)-1}{1-\theta}} - \rho x_i \quad i = 1;2 \tag{11}$$

[5]If advertising reach its goal of correctly informing consumers on the quality of the product, consumer should choose the more advertised product, as in Nelson, 1974: " Advertising increases the probability of a consumer's remembering the name of the brand". The product market shares of firm 1 can therefore be dependant, for example, on the number of consumer that have seen the advertising of firm 1 as the last advertising on the total number of consumer.

and depends solely on its own advertising x_i, because the firm i assume that x_j is held constant.

From equation 11 advertising with Bertrand competion on the good market is not feasible since $z > 1$ is required to have non-negative profits.

In order to simplify the notation[6] and given that we are not especially interested in the demand elasticity, we assume $\theta = \frac{1}{2}$.

First order conditions from equation 11 gives firm i reaction function:

$$\frac{2\rho}{w\alpha\frac{z-1}{4z^2}} = (1 + 2x_j + \delta(1 + 2x_i))\,(1 + x_i + x_j)^{\delta-2}$$

Considering the reaction function of firm j, it is straightforward to show that equilibrium exists only if $x_i = x_j$, so that the two firms in equilibrium behave symmetrically. In this case, $z = 2$ when firms collude on good market and $z = \frac{4}{3}$ if they engage in Cournot competition.

From the above equation we can therefore solve in $x_i = x_j \equiv x$:

$$x = \frac{1}{2}\left[\left(\alpha w \frac{1+\delta}{8\rho}\frac{z-1}{z^2}\right)^{\frac{1}{1-\delta}} - 1\right] \tag{12}$$

which gives an inverse relationship between the amount of advertising and its cost (ρ) and a non-negative relation with the monopolistic degree power, z, implying a higher level of advertising in sectors characterized by higher mark-up and lower price competition between firms.

The profit obtained by each of the two firms can be computed by substituting the x obtained in equation 12 into equation 11, after the substitution of $\theta = \frac{1}{2}$.

$$\pi_i^Y = \pi_j^Y = \left((2x+1)\frac{1-\delta}{1+\delta} + 1\right)\frac{\rho}{2} \tag{13}$$

2.3 The Advertising sector

We assume that the advertising sector is perfectly competitive and based on a linear production function equal for all firms (whose index is omitted) $x = \alpha h_x$. Revenue in the advertising sector can be taxed by the Government with a tax rate t. Profits for each firm can therefore be written: $\pi^x = \rho(1-t)x - \frac{w}{\alpha}x$

Because of firms entry, profits must be zero:

$$\rho = \frac{w}{\alpha(1-t)} \tag{14}$$

We can now substitute equation 14 in equations 12 and 13 and compute the State tax revenue, that is defined as:

$$G = 2\rho t x = \frac{2twx}{\alpha(1-t)} \tag{15}$$

[6] And without loosing in generality, because the model with $0 < \theta < 1$, $\theta \neq \frac{1}{2}$ behave exactly in the same way as the simplified one (the demonstration is available on demand).

and, assuming that the tax revenue is redistributed to individuals together with firms profits, we obtain that non labour income of individuals (the V variable of equation 2) must be equal to the sum of the profits of the final good sector[7] plus the tax revenue from the advertising sector:

$$V = 2\pi + G = \frac{2w}{\alpha(1-t)}\left[\left(\frac{1-\delta}{1+\delta} + t\right)x + \frac{1}{1+\delta}\right] \tag{16}$$

That represents the relationship between non labour income and advertising taxation[8].

2.4 General equilibrium and welfare

Once the equilibrium value of ρ (see equation 14) has been substituted, the output of the advertising industry is given by twice the one defined in equation 12:

$$X(t) = 2x = \left(\frac{\alpha^2}{8}\frac{z-1}{z^2}(1+\delta)(1-t)\right)^{\frac{1}{1-\delta}} - 1 \tag{17}$$

That is the key equation of the model.

Without taxation, in order to have a positive optimal amount of advertising, $\alpha > 2z\sqrt{\frac{2}{(z-1)(1+\delta)}}$ must hold. Taxation makes more binding this condition. If labour productivity is sufficiently high, this condition can be respected even if $\delta = 0$, so that even in the case of no direct effects of advertising on utility. In that case, firms choose a positive amount of advertising even if advertising does not affect utility. In what follow, we will assume that the previous condition is respected

Note that $X(t)$ depends negatively on t, the tax rate on advertising and positively on z, (since $1 < z \leq 2$), the firms market power, and on δ, which indicates the direct effect of advertising on well being.

Given equations 8 and 10 , output is given by:

$$Y(t) = 2y = \left(\frac{\alpha}{2z}\right)^2 (X(t)+1)^{\delta} \tag{18}$$

where $X(t)$ is defined in equation 17. $Y(t)$ depends positively on $X(t)$, so that it depends negatively on t[9].

[7] That is twice the profit defined in equation 13

[8] Note that, once we substitute equation 14 into equation 12, the former into equation 16, and we maximize V with respect to t, we obtain that the value of the tax rate that maximize non labour income is simply given by $\frac{1-\delta}{1+\delta}$.

[9] The relationship between the total output and firms' markup can be computed using equations 18 and 17. We obtain that $\frac{dY}{dz} > 0$ if $z < \frac{2}{2-\delta} < 2$. Therefore, it can be that advertising is higher and total production is lower in sectors with a higher markup.

We are therefore able to compute the optimal labour supply and leisure[10], substituting in equation 4 the equilibrium values of V as defined in equation 16 and $A(X) = (2x+1)^{\delta}$. The latter $(1 - H(t))$ is given by:

$$1 - H(t) = \frac{1}{\alpha}\left[1 + \alpha - \left(\frac{2}{(1+\delta)(z-1)(1-t)} + 1\right)(X(t)+1)\right] \qquad (19)$$

and (given that $X(t)$ depends negatively on t) it depends positively on t. Taxing advertising reduces the output both of the advertising sector and of the final good sector, so indirect that it must reduce labour supply.

We can finally define the well being of the representative individual by means of the utility function described in equation 1, by substituting $A(X) = (1 + X(t))^{\delta}$, $Y(t)$ and $1 - H(t)$.

Rearranging the result, we can write:

$$U(t) = \frac{1+\alpha}{\alpha} + \frac{\alpha(2z-1)}{z^2}\frac{[X(t)+1]^{\delta}}{4} - \frac{1}{\alpha}[X(t)+1] \qquad (20)$$

where $X(t)$ is defined in equation 17 and depends solely on exogenous variables.

From equation 20 we obtain that utility depends on t, the tax rate on advertising, only throughout the endogenous value of $X(t)$, so that $\frac{dU}{dt} = \frac{dU}{dX}\frac{dX}{dt}$.

The relationship between U and $X(t)$ is concave (because $\frac{d^2U}{dX^2} < 0$) and, given that the advertising level depends negatively on t, there should exist a given level of taxation that, throughout its effects on the level of advertising, maximizes individual well being.

We can compute this level of taxation by solving the equation $\frac{dU}{dt} = \frac{dU}{dX}\frac{dX}{dt} = 0$. For $X(t,z) > 0$, so that for positive value of advertising, we obtain the following solution for the maximizing utility tax rate:

$$t^* = \frac{1}{1+\delta}\left[1 - \delta\frac{3z-1}{z-1}\right] \qquad (21)$$

That gives a positive relationship between the tax rate that maximizes well-being (t^*) and firm's market power and a negative relationship between the tax rate and the elasticity of the *informational content of advertising*[11].

For $\delta = 0$, $t = 1$: if advertising does not produce direct effects on well-being, the optimal government policy is to forbid advertising[12].

[10]The labour market is the residual one and, according to the Walras law, it must be in equilibrium. We checked the equality between labour supply as defined in the texts and labour demand, given by $H^D = 2\frac{y+x}{\alpha}$ obtaining that the two are equal for every wage level, as expected.

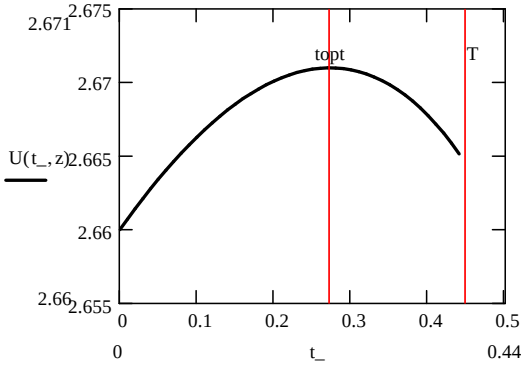
[11]t^* is obviously a second best solution, because we assume that firms market power in the final good market exists ($z > 1$).

[12]For $t = 1$, $X = -1$. This obviously contradict our hypotheses of a positive value of advertising. The optimal tax rate should be lower than 1 and it is the one that make X, ad defined in equation 12, equal to zero, precisely: $t_{MAX} = 1 - \frac{8z^2}{\alpha^2(1+\delta)(z-1)}$.

For $\delta > 0$, the optimal t can also be negative but, if $\delta < \frac{z-1}{3z-1}$ a positive improving well beeng level of taxation exists, $t^* > 0$.

These results, that are graphically shown with a simple numeric example in figure 1, that displays the individual utility with respect to taxation and both the optimal level of taxation ($t^* = topt$) and the maximum value of taxation, T, imply that an economic system where advertising is used by non competitive firms in order to gain market shares can reach an equilibrium with advertising overproduction that, in turn, increase consumption of the final good and reduce leisure in such a way that individual well being is reduced because of the strategic behaviour of firms.

Figure 1: Well-Being with respect to advertising taxation



parameters value: $\alpha = 7.5$; $\delta = 0.1$, $z = 1.5$

This result is more likely to apply in economic systems where labour productivity is high (actually, $\alpha > \frac{2z}{\sqrt{\delta(2z-1)}}$ is the condition for having $t_{max} > t^*$) and where the firms monopolistic power is strong. These two characteristics seems to apply better to more industrialized country[13].

3 Concluding remark

The theoretical model presented in the paper deals with economies characterized by a high level of labour productivity and by the existence of oligopolistic sectors where a few firms compete. Assuming that advertising is a tool used by firms in order to maximize profits, because it serves as a tool to gain market share, we showed that the optimal behavior of firms usually leads to an excessive usage of advertising especially in sector characterized by a strong firm monopolistic power. Even considering the possibility that

[13]Our results look very similar to the ones obtained by Robert J. Gary-Bobo and Philippe Michel, 1991, that conclude: "... even in approximately competitive economies, the informative advertising phenomenon cannot be observed".

advertising affects positively individual utility, we conclude that in the general equilibrium steady state, advertising usually harms consumers because it reduces their well-being by increasing their working time.

State intervention may therefore be required: we assume that the government taxes advertising and redistribute the tax revenue to individuals. Taxing advertising reduces both the output of the advertising sector and the output of the final product sector and raises prices. Working hours are always reduced and leisure raised because the price of leisure (the wage rate on the price level) decreases. Finally, advertising taxation increases the well-being of the representative individual[14].

Empirical analysis have shown that advertising pushes individual to work more hour and to consume more on the market, reducing their leisure (Cowling and Poolsombat (2007), Seldon, B.J. (1995) and also in Marattin, 2008). Our theoretical model reaches the same conclusions, but also affirms that working and consuming more usually leads to a reduction in well-being.

Even if theoretical explanations of these facts exists in the economic literature, in our knowledge no researches have been proposed with the aim of analyzing theoretically the overall effect of advertisement on individual well being in a general equilibrium model.

In sum: it can be that there exist policies that, by reducing the "involvement" of individual with respect to good acquired on the market, are able to reduce the overall consumption increasing the individual well-being. In our model, this happens because the time devoted to *leisure* increases. Especially in a world where advertising pushes relative prices toward a higher remuneration of working time, the taxation of advertising (and also of other product characteristics as packing) could be considered as a well-being improving policy.

[14]We obtained this results without referring to relative consumption. If we had assumed that utility were dependent on average consumption, our results would have been reinforced because of consumption externality. We preferred to not consider relative consumption in order to show that competition among firms based on advertising is sufficient to lead to over-consumption

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