DRUGS OR RUGS?

AN ANALYSIS OF MARKETING AND PRICING STRATEGIES OF ON LINE PHARMACIES

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ABSTRACT

Internet and e-commerce have deeply changed society, the economy, and the world of health care. The web offers opportunities to improve health, but it may also represent a big health hazard given its nature of a basically unregulated market with very low consumer protection. In this paper we analyse marketing and pricing strategies of online pharmacies (OP). Our analysis shows that OPs uses strategies that would be more suitable for a commodity market than for drugs. These strategies differentiate for variety (brand or generic), quality, quantity, and by target group. OPs are well aware that the vacuum in the legislation allows them to reach a target of consumers that normally pharmacies cannot reach, as those who would like to use the drug without consulting a physician (or, even worse, against physicians advice). In this case, they usually charge a higher price, reassure the users by minimizing on the side effects, and induce them to bulk purchase through sensible price discounts.
This analysis suggests that the selling of drugs via the internet can turn into a "public health risk", as it has been pointed out by the U.S. Food and Drug Administration.

INTRODUCTION

Internet and e-commerce have deeply changed society, the economy, and the world of health care, not without ethical and legal consequences. Information about health care is widespread, and a considerable number of patients use regularly this instrument before consulting a physician, and during treatment. The web increases the opportunity for patients to acquire information that may be used either to form an opinion on their health status or to reduce anxiety (Barigozzi and Levaggi, 2007; 2008). A US survey found that 64% of online population had searched for health information at least once in the previous 12 months, and a European survey found 71% of Internet users had accessed it for health purposes (Andreassen et al.2007, Hesse et al. 2005). "Drugs" (requiring prescription or over the counter) was the fifth health topic searched for in the Internet, in 37% of cases (Fox, 2006).

Internet has also increased the opportunity for patients to purchase drugs on line (Gallagher 2000). In the nineties, several pharmacies have begun to operate over the internet selling drugs without virtually no control, even for those active principles requiring a prescription. According to the US Food and Drugs Administration (FDA) there are at least 400 web sites that both dispense and offer a prescribing service and that half of these sites are located outside the US. As reported on the FDA website, it has been estimated that the number of websites selling prescription drugs may now be closer to 1,000. The number of websites, however, fluctuates from day to day, and seems to be growing (FDA 2008a).

It is very difficult estimate the number of people buying online, the volume of drugs traded and the economic extent of this business. A survey conducted in the US by means of telephone interviews found that 4% of Americans had ever purchased prescription drugs on the Internet (Fox 2004). Back in 2000 the National Association of Boards of Pharmacy estimated that total sales of prescription-only medicines on the Internet in the USA was $100 million, with an increase of all pharmaceutical sale up esteemed to $1 billion by 2003 [Lorman 2000].

Moreover, the web has not geographical barriers and its global dimension makes it difficult to control virtual pharmacies since there is not an international legislation aimed to rule this complex issue (Fung et al 2004; Henney 2001; Castronova 2006; Makinen et al 2005; Crawford 2003; Bernath 2003; Brand 2007). The rise of an unregulated global market of drugs may increase the risk of the spread of counterfeit medicines, coming from States where drug production is not submitted to the same quality control as in US, Canada and Europe (Veronin 2004). The World Health Organization has declared that "medicines purchased over the Internet from sites that conceal their physical address are counterfeit in over 50% of cases" (WHO 2006). In addition, many online pharmacies offers to the consumer drugs without medical prescription and this can expose people to the risks associated to the intake of inappropriate drugs and can harm the patient-doctor relationship, transforming patients into consumers (Lineberry 2004; Bostwick 2007). In fact, the prescription requirement aims to safeguard patients from risks associated with unnecessary drugs, and it gives responsibility for cost/benefits assessment to the doctor, the professional who has the knowledge to make this decision.

This outstanding development of online pharmacies is related to the controversial theme of direct-to-consumer advertising (DTCA) of prescription drugs, where proponents highlight the potentials in terms of patient empowerment, while opponents claim that DTCA distorts the patient-doctor relationship, generating demand without evidence of health benefits (Gilbody 2005; Almasi 2006). Indeed, in the last years the patient has increased his/her involvement in the decision making process regard his/her health, a process that in the past was totally devolved to the physician with a general concern about the effect of such strategy on patients' health (Donohue 2007).

In a world where even the concept of health has changed, shifting from the absence of diseases to well-being and wellness, promoting strategies for pharmaceutical products may be aimed to create demand of drugs, generating consumers/patients. This is a very serious hazard that the sale of drugs through internet may exacerbate. The sale online of drugs is open to everybody who has an Internet access and online pharmacies sell all type of drugs, included prescription drugs.

To our knowledge, the only costs analysis of online drugs was performed in the U.S., in a comparison between traditional pharmacies and OPs which found no convenience in buying online, both in year 1999 and in 2006 (Bloom and Iannacone, 2006 and 1999).

In our study we investigate the economical features of online selling of drugs, analysing marketing and pricing strategies by online pharmacies, for some “marker drugs” that were chosen either because of their high intrinsic risk if used inappropriately or because of their widespread diffusion. To our knowledge, this is the first study which study the relationship between the OPs features and the pricing patterns. Marketing and price strategies are studied using descriptive and econometric tools.

METHODS

The study was conducted in May 2007 by the University of Brescia, as a collaboration between the Institute of Hygiene, Epidemiology and Public Health and the Department of Economics . We have investigated the selling characteristics of four active ingredients which we selected as “marker drugs” because of their high intrinsic risk if used without medical control. The risk may derive from an excessive dosage or because of the interactions with other medications the patient has been prescribed.Two of them are active on the nervous system: amitriptyline (an old generation antidepressant) and fluoxetine (a new generation antidepressant). Sildenafil is the most famous and sold active principle in the erectile disfunction therapy and tramadol is an atypical opioid painkiller. For each active principle we have searched their availability on the a sample of 100 online pharmacies (OP) selected with “Google” searching engine using as keywords the following combinations: “online pharmacies”, “online drugstore”, “drugs online” and “medicines online”. We analysed their general characteristics using an ad hoc Codebook, according to the Content Analysis method (Riffe 2005) and for each pharmacy we recorded the characteristics that were relevant for our analysis.

One of the most controversial areas for e-commerce is which legislations should be applied to these transactions. For this reason, it was investigated if the OPs declared a physical location, (state,

town, street and number) or if their presented themselves only as virtual interface. We have recorded data on the type of drug sold (brand or generic) and on the declared shipping location. The first variable should capture the market segment chosen by the on-line pharmacy while the second may be interpreted as a proxy of the production site, and therefore of the quality of the product.[1] To analyse the type of patient targeted by on-line pharmacies we investigated their prescription requirements. The drugs we are investigating should be prescription only; the decision to by-pass such requirement can be interpret as a market strategy to reach a group of patients that for several reasons do not want to use the appropriate protocol.

We analyze and recorded their marketing strategies to promote the sale of drugs, through several selling arguments (opportunity to buy drugs on-line, bulk discounts, bonuses for fidelization). Finally, an analysis of the declared side effects was conducted analysing whether the OPs declared at least one side effect; if so, the number of reported side effects was assessed.

Most on-line pharmacies quote several prices for the same active principle, which varies according to the quantity and other characteristic of the offer. In our analysis if a OP was selling different quantities of the same drug we recorded each single offer; in order to compare prices, we selected a specific concentration for each active principle and evaluated the unit cost of the tablet for each offer. In this way, we have obtained a complete dataset that for each offer records the following characteristics[2]:

- Unit price - p
- Quantity offered – q

<u>Characteristic of the drug</u>

- BR: generic (0); brand (1)
- SH: shipped from US/Canada/Europe (0); elsewhere/not declared (RW, rest of the world) (1)

<u>Characteristic of the pharmacy</u>

[1] According to the most recent literature on the matter, the majority of counterfeit medicines are produced in developing countries such as China, India, Russia and Philippines (EASSM 2008).

[2] A description of the variables is shown in table A1 in the Appendix

- PH: Physical (1) – Virtual (2)
- LR: Declared physical location in US/Canada/Europe (0); RW- not declared (1)

Target of patients

- PR: Sold without prescription (0); with prescription (1)

Selling arguments[3]

- list of collateral effects
- free trial of other drugs
- type of selling arguments

The analysis of the marketing strategies of OP has been performed using a descriptive and analytical approach aimed at assessing differences in the selling arguments according to the type of pharmacy, the drug sold and the targeted consumer. The data were analyzed using STATA Software [4].

Pricing strategies have been analysed using a model that relies on the literature on hedonic price estimation (Oczowsky, 2001) using SHAZAM Software [5]. Although the theoretical background is different [6], the econometric approach to the estimation is very similar since we want to study which variables are important in price formation using a dataset with a relevant number of dummy variables.

RESULTS

The OPs sample: general features and marketing strategies

In the sample of 100 OP, 19 of them ask for a medical prescription to complete the order (prescription online pharmacies, PR), while 81 of them do not require a prescription (non-

[3] Given the varieties of the selling arguments, it has not been possible to create specific binary variables for the latter category which has been used only in the descriptive analysis.

[4] STATA Statistical Software Release 8.0, 2003; Stata Corporation, College Station, Texas

[5] SHAZAM User Reference Manual, Version 10, North West Econometrics 2004.

[6] The aim of that literature is to study the willingness to pay of the consumer for specific characteristics of the product, while in our case we want to study the pricing and marketing strategies of on-line pharmacies

prescription online pharmacies, NPR). The main differences between PRs and NPRs are shown in table 1.

The OPs having only a virtual interface are 56; among the 44 OPs that gave full details on their physical location (state, town, street and number), 26 (59.1%) declare to be located in the United States and Canada, 14 (31.8%) in Europe and 4 elsewhere (9.1%).

The physical location is declared in 73.7% of PR, compared with 37.0% of NPR with a statistically significant difference (Fisher exact test: P= .005).

Only 41 OPs declare their shipment location: 18 OPs (43.9%) in Asia, 11 in the United States (26.8%), 5 in Europe (12.2%), 3 in Canada 3 (7.3%) 4 in others (9.8%).

Selling arguments used by OPs to promote their product comprise privacy issues, service and drug quality statements, price offers and the suggestion that you can get drug avoiding a doctor visit.

For privacy issues, the OPs deal with the use of personal data (92% of OPs) and discreet packaging (59% of OPs).

The quality of the service is assured through short delivery times (90%), on line tracking of the state of the orders (76%), and testimonials by people who had already bought online (33%). Statements about drug quality are found in 89% of OPs, and reassurance that buying on the web is legal in 31% of OPs.

As per sales arguments, 89% of OPs encourage bulk purchases, 64% of OPs advertise the lower prices in comparison with “bricks and mortar” pharmacies, 62% propose fidelity bonuses, 40% offer free delivery, and 9% advise buying specific drugs together with the selected ones, because of special discounts offered or because the two drugs are usually bought in association.

Among NPRs, 73% of them suggest that is not necessary to undergo a doctor’s examination, avoiding embarrassment and waste of time.

The differences in selling arguments between NPR and PR relates discreet packaging (69.1% versus 15.8%, Fisher exact test, P < .001), bulk discount (93.8% versus 68.4%, p=0.006), bonuses for

repeated purchases (69.1% versus 31.6%, *P* = .004), free delivery (34.6% versus 63.2%, *P* = .03), and online order checking (82.7% versus 47.4%, *P* = .003).

Amitriptyline is sold in 72% of OP, fluoxetine in 82%, sildenafil in 92% and tramadol in 75%. There are not statistically significant differences in the availability of these drugs between PR and NPR, with the exception of amitriptyline that is more available in PR (NPR 67.9%, PR 100.0%, p=0.003).

About 25% of OPs records no side effects for these drugs.. comparing PRs and NPRs, a statistical difference was found only for sildenafil, for which NPR declared more frequently at least one side effect (p=0.03).

We analysed the distribution of the number of side effect declared for each drug in PRs and NPRs. The number of declared side effects was significantly higher in NPRs than in PRs for fluoxetine and amitriptyline, whereas for sildenafil was significantly higher in PRs than in NPRs.

Table 1: Percentage and statistical significance of the main characteristics of PRs and NPRs.

	PRs (n=19)	**NPRs (n=81)**	***P* (Fisher exact test)**
Declaration of physical location	73.7%	37.0%	.05
Selling arguments: declaration	%	%	
- *Safe use of personal data*	100.0	90.1	n.s.
- *Discrete packaging*	15.8	**69.1**	<.001
- *Short delivery times*	84.2	91.4	n.s.
- *Online ordering checking*	47.4	**82.7**	.003
- *Testimonials*	15.3	37.0	n.s.
- *Drug quality*	78.5	91.4	n.s.
- *Reassurance that buying online is legal*	26.3	32.1	n.s.
- *Lower price the more you buy*	68.4	**93.8**	.006
- *Lower price than in the traditional pharm.*	57.9	65.4	n.s.
- *Affiliation programme*	31.6	**69.1**	.004
- *Free delivery*	**63.2**	34.6	.03
- *Advise to buy an other drug*	5.3	9.9	n.s.
- *Suggestion that you get prescription drugs without prescription*	/	72.8	/
Number of OPs selling each drug	%	%	
- *Amitriptyline*	**100**	67.9	.003
- *Fluoxetine*	94.7	86.4	n.s.
- *Sildenafil*	94.7	96.3	n.s.
- *Tramadol*	89.5	81.5	n.s.

Number of side effects declared*	Median	Median	
- *Amitriptyline*	49	**61**	.005
- *Fluoxetine*	25	**41**	.007
- *Sildenafil*	**21**	11	.008
- *Tramdol*	14	22	n.s.

* Calculated only in the OPs which declared side effects
n.s.: not statistically significant

Pricing strategies

Pricing strategies have been analysed using a model that relies on the literature on hedonic price estimation (Oczowsky, 2001). On line pharmacies may differentiate their pricing strategies in two different directions: the type of drug to be sold (whether a brand or a generic) and prescription requirement. Which strategy they use is a matter of empirical investigation; for this reason the model to be estimated is written as:

$$p = a + b_1 q + b_2 q^2 + c_1 PR + c_2 BR + b_3 SH + c_4 LR + c_5 PH$$
$$+ d_1 PR * BR + d_2 SH * BR + d_3 LR * BR + d_4 PH * BR + d_5 q * BR + d_6 q^2 * BR$$
$$+ d_1 PR * BR + e_2 SH * PR + e_3 LR * PR + e_4 PH * PR + e_5 q * PR + d_6 q^2 * PR$$

A complete list of the variable used is presented in table A1. The coefficients denoted with *c* are the so called shift dummies: they represent an increase in price determined by the presence of a specific characteristic. The coefficient d and e are instead slope dummies and they are aimed at capture combined effects among the different factors. Finally, q enters in the function also as the square of the quantity sold to check for nonlinear effects

Following Steiner (2004),. Schamel and Anderson (2003) and Landon and Smith (1997) we used the Reset test to compare a linear with a log-linear form and have concluded that the log-linear form should be preferred to a simple linear one. (see table A2). Only for tramadol the difference between a linear and a log linear formulation is not significant. In this case we have preferred the log specification for homogeneity with the other drugs we have examined. To determine the predominant strategies of the OP in selling the drug we have performed an F test on the shift dummy variables (see table A3). In this case, the test shows that brand dummy variables are always significant while for prescription there is a clear difference between sildeanfil and the other drugs.

For this reason, for sildenafil two separate regressions have been performed for generic and brand active principles. For the other active principles, the complete model has been used. Stepwise regression procedure (forward and backward) have been used to determine the relevant explanatory variables. The results are presented in table A4 in the appendix; to improve their interpretation we have presented in table one the effects of the binary variables (Halvorsen and Palmquist 1980; Landon and Smith 1997) and in figure 1 to 4 the estimated price-quantity schedule.

In this section we present an overview of the principal results of our model and an in depth analysis of the pricing strategy of each active principle. The main results can be summarized as follows:

- The preliminary analysis[7] on the functional form has shown that firms uses mixed marketing strategies (brand and prescription) in selling their drugs with the exception of sildenafil. In this case there is clear-cut strategy for brand and generic drug. Firms that sell brand always require a prescription, for selling generic the strategy is more sophisticated.
- the prescription has a value on the market. The consumer that wants to buy a drug without prescription has to pay a higher price, unless the active principle is generic sildenafil. In the latter case, the consumer will pay a higher price if he has a prescription.
- the unit cost of the active principle decreases with quantity; this may be due to decreasing marginal cost, but it may also suggest a strong demand inducement effect (Evans, 1973; Dranove, 1988) For some active principles the firm differentiates the discount according to the type of consumer (with or without prescription) or the type sold (generic or brand). This result is in line with what observed in the analysis of the selling arguments where specific forms of demand inducement include offering “try packages” for other drugs, advising the combined use of several active principles (saying something like “people that bought this drug often order this one as well”)
- active principles that do not originate from US/Europe/Canada because the drug is shipped from elsewhere, costs less. The shipping origin may be related to the quality of the drug

[7] See table A2 and A3 in Appendix

sold. In some countries the quality standard for producing active principles are quite slack; it is then possible to produce a drug at a lower price, but of a poor quality (EASSM 2008).

Table 2: Effects of binary variables on the price (UD$)[8]

	Amtriplytine	Fluoextine	Tramadol	Sildenafil	
				Generic	Brand
Base price	0.97	2.25	1.63	4.52	24.53
Brand	0.62	1.89	1.24		
With Prescription generic	-0.70	-0.89	-0.49	0.42	
With Prescription brand	-0.70	-0.75	-0.49		
Shipping from RW	-0.49	-0.37			-0.25
Shipping from RW with prescription	-0.27				
Shipping from RW brand			-0.23		
Virtual pharmacy –Generic	0.28	1.23			
Virtual pharmacy -Brand	0.11				
Real pharmacy- RW	0.18			-0.14	

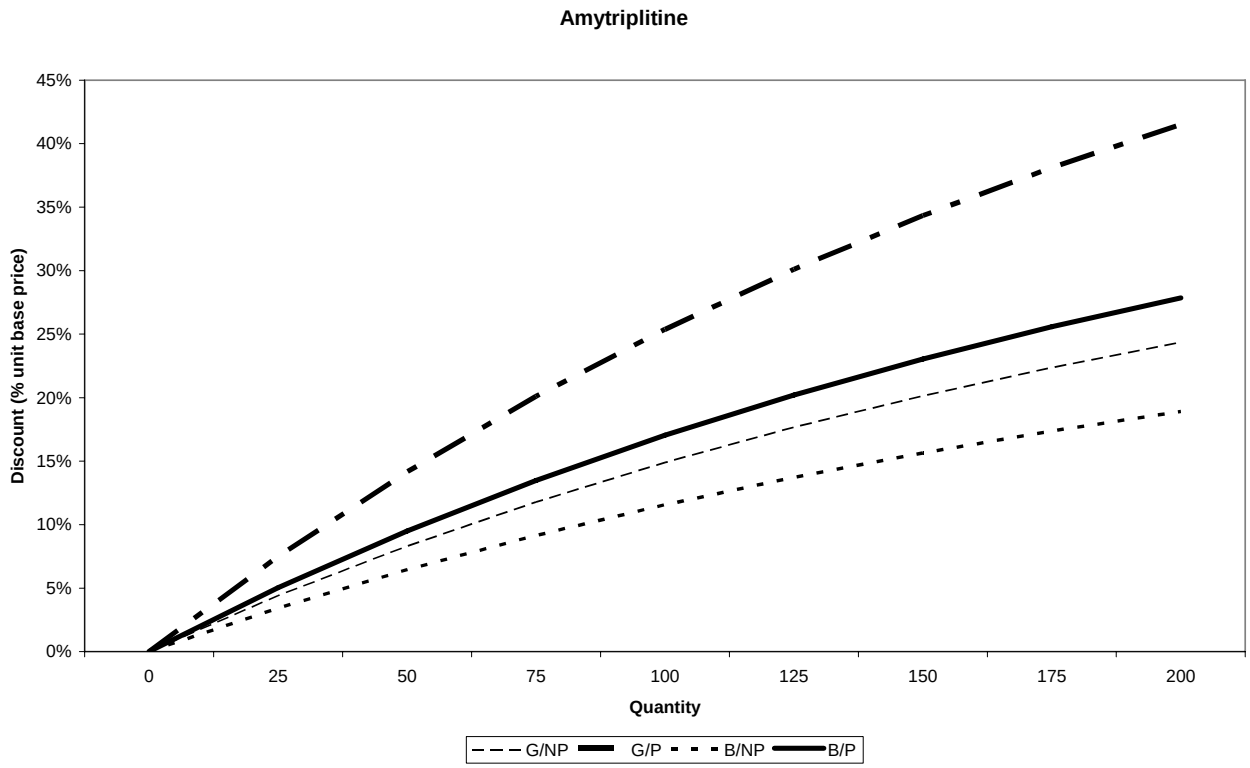
Notes:
Base price is the average price of a tablet containing generic active principle sold without prescription by a pharmacy that has its legal residence in US/CAN/EUR and ships the product from one of these locations, but sildenafil brand which is sold only with prescription.
RW is "rest of the world", meaning everywhere not in US/CAN/EUR or in place not declared.

Amitriptyline

For this active principle on line pharmacies uses a mixed strategy for price formation. Given the risk for health care that may derive from an inappropriate use of this active principle, the mark up to sell the drug without prescription is rather important and depends on the type of drug that is sold. Drugs shipped from RW costs less, but the price differential reduces if the consumer has a prescription. The characteristic of the online pharmacy, in particular whether they are simply a virtual interface, affects the price, but in this case the price differential depends on the type of drug sold.

[8] Halvorsen and Palmquist (1980) and Landon and Smith (1997) explain how to interpret the coefficient of the dummy variable in terms of price. The presence of the factor represented by the dummy variable is equal to $g = exp(c) - 1$ where c is the estimated coefficient. When two dummies interact (for example having a prescription and selling a brand) the effect will be equal to $g = exp(c+d) - 1$.

Figure 1: Discount for bulk purchase: Amitriptyline



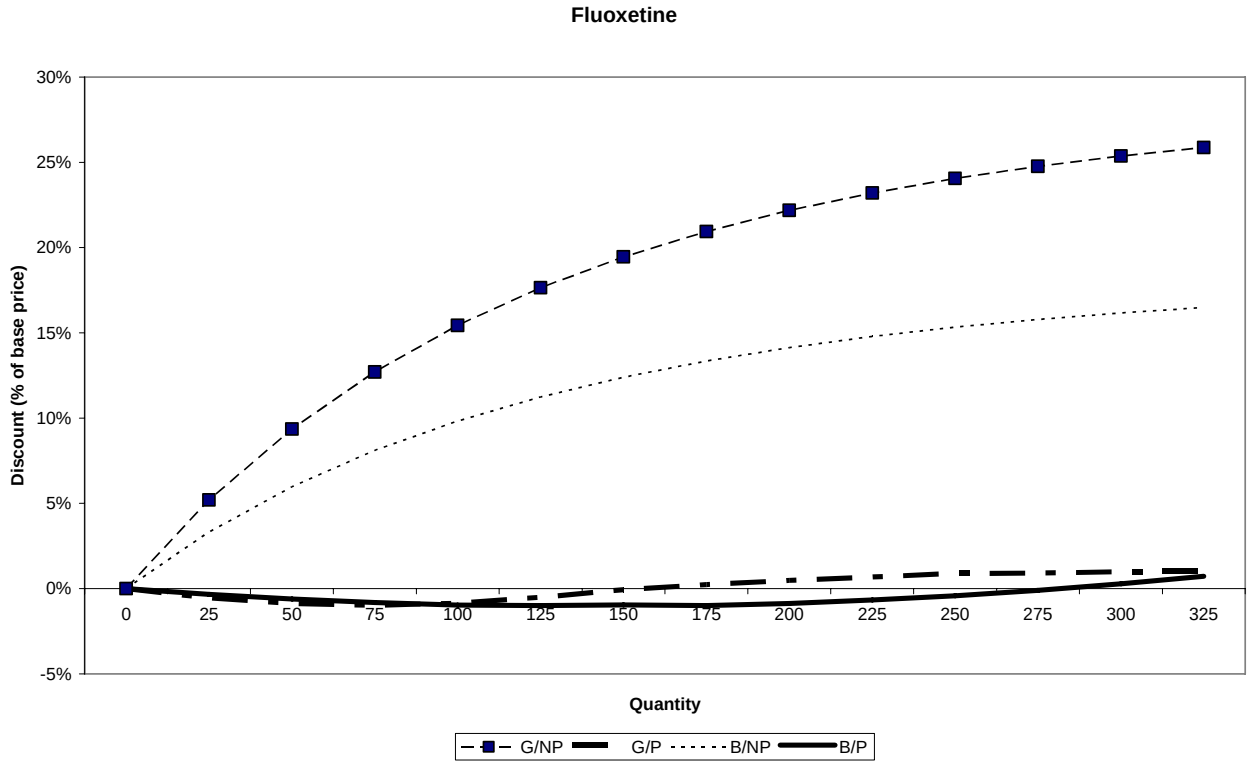
As per the demand inducement, the discount offered by pharmacies on line is presented in figure 1. The price discount is greater for generic than brand and the scheme is more generous for drugs sold with prescription, For amitriptyline, the strategy of OP's seems to be oriented towards inducing the average patient to get the prescription. This policy is quite reasonable since the drug has a rather low cost, but a relevant number of side effects when it is not used appropriately.

Fluoxetine

For this active principle the selling strategy, although mixed, is more oriented towards a differentiation between the type of consumer the offer is addressed. If they have prescription, they pay less, but the price differential is higher for generic than brand. The shipping origin is important while other characteristic of the pharmacy seems to be marginal. For fluoxetine, firms offers a discount only to the patients that do not have a prescription as shown in figure 2. This means that for this active principle the firms the higher price charged for not having a prescription is a sort of

fixed cost and that the price differential reduces if the consumer buys a considerable number of tablets.

Figure 2: Discount for bulk purchase: Fluoextine



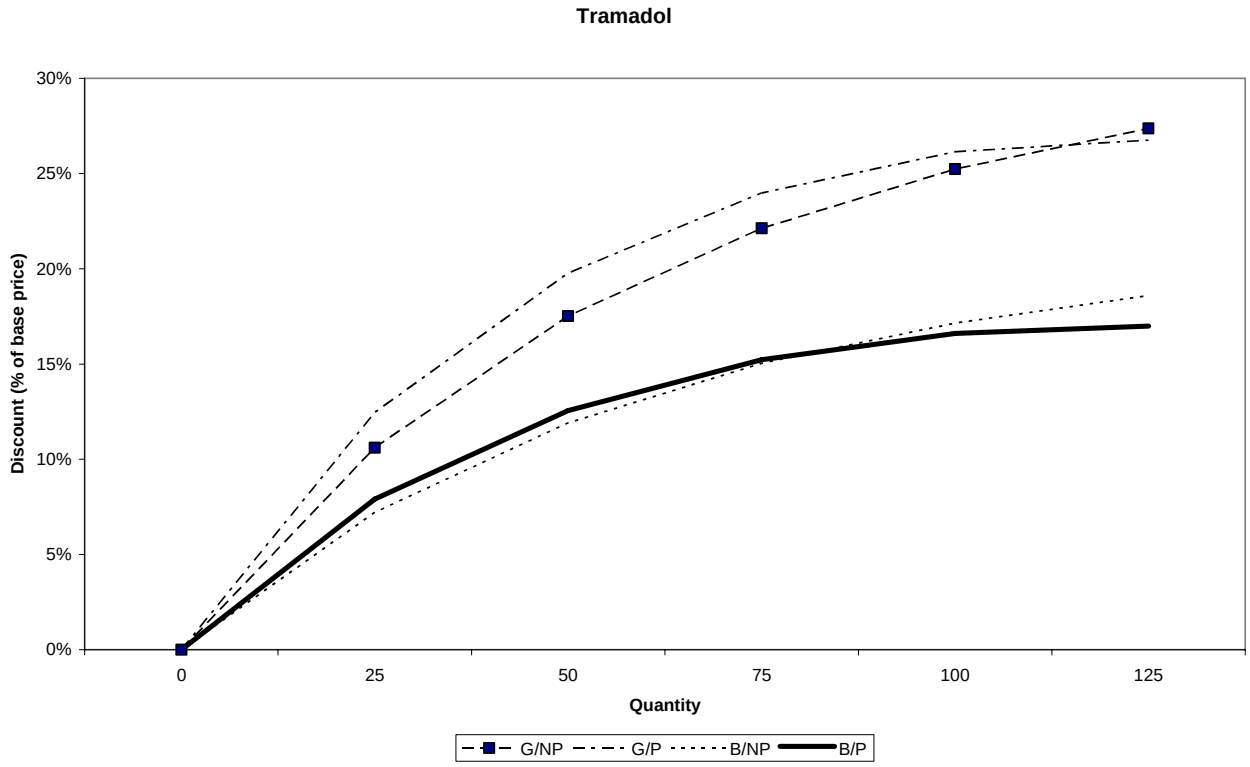
In fact, they charge a relatively higher price (about 80 cent more per tablet), but they offer up to 25% discount for large quantities. As for Amitriptyline, the discount is bigger for generic drugs.

Tramadol

The pricing strategy for selling Tramadol is a very simple mixed strategy. Firms charge a lower price for generic drugs and to patients having a prescription. The only significant difference in the pricing strategy for brand and drug is represented by a lower price (23 cents) offered by firms shipping from RW to the consumers of brand drugs. The discount offered for bulk purchase is significant, but in the case of Tramadol it is relatively bigger for customers having a prescription for offers up to 100 tablets; after this point the pattern is similar to the one observed for other drugs. It is interesting to note that for Tramadol the offers are more concentrated. They range from 10 to 300

tables, a fourth of what observed for Fluoextine, where the maximum number of tablets offered is 1200.

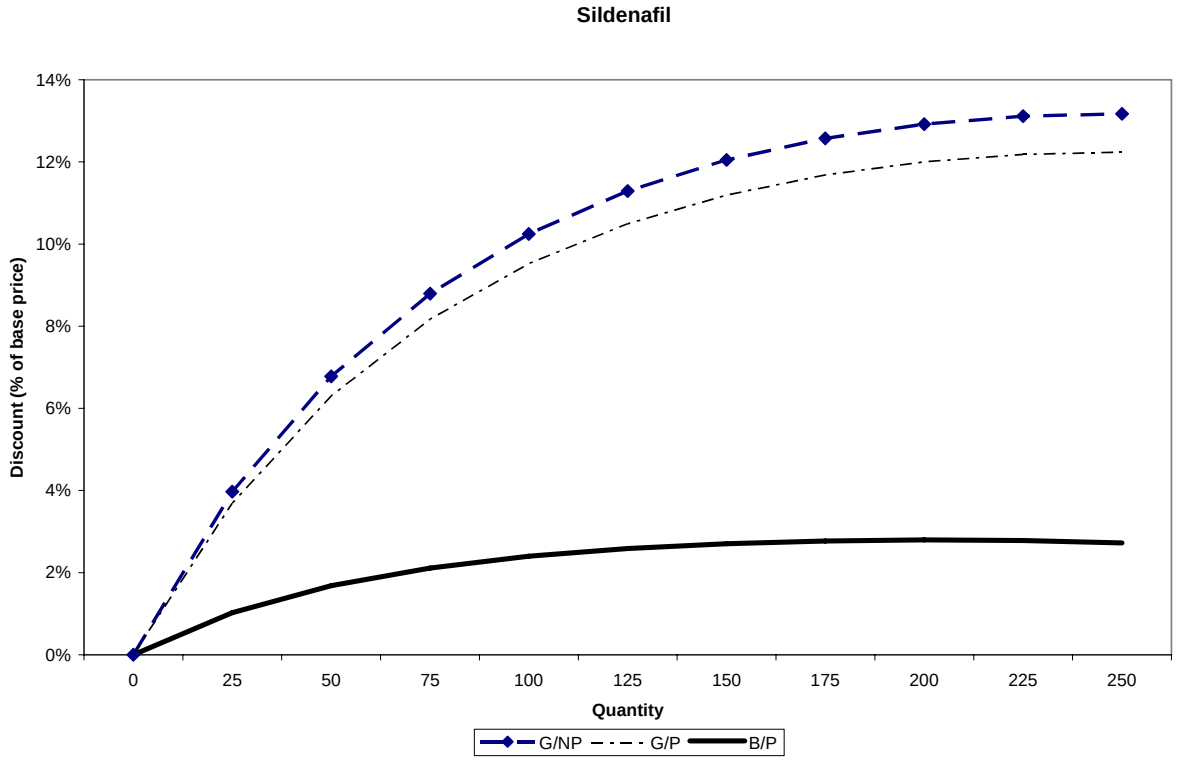
Figure 3: Discount for bulk purchase: Tramadol



Sildenafil

For sildenafil the selling strategy is rather different from those we have described so far. OP discriminate their strategy according to the type of drug sold. For brand they always require a prescription and the bulk discount is rather limited (2,5%) as maximum. For generic, the strategy is opposite: OP promotes the sale without a prescription by making patients pay a higher amount (about 21 cent per tablet) if they have a prescription and by granting a significant discount if the quantity bought is large.

Figure 4: Discount for bulk purchase: Sildenafil



DISCUSSION AND CONCLUSIONS

The analysis presented in the previous section shows that OPs have a precise and sometimes rather sophisticated strategy for selling their products, very similar to those that may be observed in the market for other commodities. The uncertainty about the legislation to apply to internet transaction coupled with the lack of transparency that e-commerce may allow, opens to OPs a florid market which is reflected in their strategies. This strategies differentiate for varitety (brand or generic), quality, quantity and - what is more worrying from the point of view of the regulator - by the type of consumer. OPs are open to sell a product without prescription, but the consumer will have to pay an extra. OP however interprets it as sort of fixed cost: through an accurate policy of bulk discount the pharmacy quotes the same unit price for selling an high (depending on the active principle considered) quantity without a prescription or a much lower quantity with a prescription.

For the most popular active principle (sildenafil), the use of the generic variety is promoted by offering a lower price to those patients that do not have a prescription. The pharmacies proposing

such offers often declare a limited amounts of side effects and promote bulk purchase. In this way they induce the consumer to think that the product sold is a drug that will improve his/her lifestyle without many side effects. Such behaviour should worry regulators because it means that OP induce demand through their pricing strategies.

Furthermore, the elderly of the near future will be today's adults, a population quite confident and friendly with internet and e-commerce. Since the elderly are those who use drugs most, we can expect a spread the potential market reached by OPs Information and health services are already freely available on the web and an increasing number of patients use such instrument. The web may offer opportunities to improve health care, but it may also represent a big health hazard.

Such market is basically unregulated and offers very low consumer protection. For health care this a serious problem because in this market, more than for other commodities, the consumer is not able to detect the quality of the product sold. The analysis presented in this paper shows that OP's differentiate their strategies for active principles and target patients, but as a whole they act rougly in the same way, i.e. "rough sites" copycat the pricing strategies of the genuine one, so that price is not a quality indicator.

OPs can effect national health care systems, being potentially able to lead to unequal access to health care. The appearance of a "global free drugs market" could seriously endanger the inner equilibrium of the single states' public welfare and health systems, which is why the European Union's Court of Justice has stated that "*Article 30 EC may be relied on to justify a national prohibition on the sale by mail order of medicinal products which may be sold only in pharmacies in the Member State concerned in so far as the prohibition covers medicinal products subject to prescription. However, Article 30 EC cannot be relied on to justify an absolute prohibition on the sale by mail order of medicinal products which are not subject to prescription in the Member State concerned*" (EU 2003). The Court's sentence was issued in connection with the case of Doc Morris, a legal Dutch OP trading mostly in the Netherlands and Germany, which had been taken to the European Court of Justice by the regional court of Frankfurt after the accusation of illegal practice

by the German Association of Pharmacists who did not appreciate foreign competition in a trade regulated at a national level (Makinen 2005).

The main limitation of the present study is not having attempted to buy the drugs on offer, assessing their effective shipping to consumers. This is the next step we are going to perform.

The results found in this analysis regarding marketing and pricing strategies performed by OPs confirm the concern expressed by the FDA, which has defined OPs a “public health risk”, with huge potential effects both at the individual level and at the national health system one (FDA 2008b). Thus, it seems to be urgent an international regulation on this issue, aimed to prevent risks and control the phenomenon, both by increasing control and awareness of the risks associated with buying drugs on the Internet, implementing public health policies and reinforcing the trust-based relationship between patient and General Practitioner.

APPENDIX

A1: Definition of the main variables used

p	Unit price for a tablet of active principle. After selecting all the offers with the same
q	Number of tablets offered for a specific price
BR	Binary variable. It takes the value of 0 if the drug offered is generic and 1 if it is a brand
PR	Binary variable. It takes the value of 0 if the pharmacy do not requires a prescription and 1 if the prescription is required
SH	Binary variable. It takes the value of 0 if the pharmacy declares a shipping location form US/CANADA/EUROPE and 1 from elsewhere (RW)
PH	Binary variable. It takes the value of 0 if the pharmacy declares a physical location, 1 otherwise
LR	Binary variable. It takes the value of 0 if the pharmacy declares a physical location in US/CANADA/EUROPE and 1 from elsewhere (RW)
PH,LR	By combining the effects of those two variables it is possible to obtain the effect on price of the following three types of pharmacy a) legal residence in US/CANADA/EUROPE (LR=0; PH=0; b) legal residence in RW (PH=0,LR=1), c) virtual pharmacy(PH=1;LR=1)

A2: Test for the functional form on the complete regression

	COMPLETE REGRESSION	
Amitriptyline	Lin	Loglin
RESET	50.07**	2.23
R^2	0.635	0.797
Fluoxetine	Lin	Loglin
RESET	16.83**	2.39
R^2	0.577	0.721
Sildenafil	Lin	Loglin
RESET	87.11**	5.88
R^2	0.683	0,794
Tramadol	Lin	Loglin
RESET	5.64*	2.13
R^2	0.717	0.715

* $P< .05$
** $P< .01$

A3: Test for POOL

	F test (brand)	F test (prescription
Amitriptyline	10.16**	23.04**
Fluoxetine	24.78**	7.86**
Sildenafil	89.44**	3.65
Tramadol	19.24**	7.85**

* $P< .05$
** $P< .01$

Table A3: Estimation results.

	Fluoextina	Amtrip	Tramadolo	Sildenafil	
				Generic	Brand
Constant	1.183 (11.83)	0.677 (7.90)	0.967 (14.47)	1.708 (25.77)	3.24 (55.38)
Brand	1.062 (13.33)	0.481 (6.84)	0.807 (9.91)		
Prescription	-2.22 (9.65)	-1.20 (8.01)	-0.683 (5.38)	0.356 (5.46)	
B prescript	0.823 (4.92)				
Tablets	-0.753 (7.50)	-0.311 (6.32)	-1.38 (11.49)	-1,04 (9.18)	-1.94 (14.36)
P tablets	1.068 (4.24)				
B tablets					
$Tablet^2$	0.0570 (3.79)	0.025 (5.56)	0.290 (6.225)	0.209 (5.24)	0.326 (7.27)
B $Tablet^2$	0.0219 (2.42)				
P $tablets^2$	-0.137 (2.27)		0.277 (2.84)		
Shipping origin	-0.464 (5.77)	-0.682 (6.62)			-0.293 (4.72)
P shipping		0.373 (4.37)			
B shipping			-0.262 (2,87)		
Real/virtual pharmacy	0.801 (3.55)	0.248 (10.65)			
B real		-0.14 (6.82)			
Legal residence		-0.082		-0.156	

		(4.37)		(2.74)	
B residence					
N	296	232	290	220	321
R^2	0.684	0.778	0.701	0.555	0.787

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