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Do Higher-Priced Generic Medicines Enjoy a Competitive Advantage Under Reference Pricing?

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Abstract

Background: In many countries with generic reference pricing, generic producers and distributors compete by means of undisclosed discounts offered to pharmacies in order to reduce acquisition costs and to induce them to dispense their generic to patients in preference over others.

Objective: The objective of this article is to test the hypothesis that under prevailing reference pricing systems for generic medicines, those medicines sold at a higher consumer price may enjoy a competitive advantage.

Method: Real transaction prices for 179 generic medicines acquired by pharmacies in Spain have been used to calculate the discount rate on acquisition versus reimbursed costs to pharmacies. Two empirical hypotheses are tested: the discount rate at which pharmacies acquire generic medicines is higher for those pharmaceutical presentations for which there are more generic competitors; and, the discount rate at which pharmacies acquire generic medicines is higher for those pharmaceutical forms for which the consumer price has declined less in relation to the consumer price of the brand drug before generic entry (higher-priced generic medicines).

Results: An average discount rate of 39.3% on acquisition versus reimbursed costs to pharmacies has been observed. The magnitude of the discount positively depends on the number of competitors in the market. The higher the ratio of the consumer price of the generic to that of the brand drug prior to generic entry (i.e. the smaller the price reduction of the generic in relation to the brand drug), the larger the discount rate.

Conclusions: Under reference pricing there is intense price competition among generic firms in the form of unusually high discounts to pharmacies on official ex-factory prices reimbursed to pharmacies. However, this effect is highly distorting because it favours those medicines with a higher relative price in relation to the brand price before generic entry.

Key points for decision makers

- Price competition among generic firms under the Spanish reference pricing system adopts the form of large discounts on the NHS reimbursed acquisition cost, holding down the price paid by pharmacies
- These large discounts persist even after their prohibition by law, observing an average discount rate of 39.3% on acquisition versus reimbursed cost to pharmacies
- The adverse effect of this policy is to give more expensive generics the competitive advantage of being in a position to offer larger discounts to pharmacies

Introduction

Despite the importance of policies encouraging the use of generics in pharmaceutical markets, there are still very few studies that have analysed the functioning of competition between generic firms,[1] whereas the economic literature has concentrated much more on competition between brand drugs and generics. The aim of this article is to analyse the impact of reference pricing systems on price competition between generic medicines.

Reference pricing is a system whereby a buying agent/insurer decides on a single maximum reimbursement price for a group of equivalent medicines, and then the user/patient pays the difference if the chosen medicine is more expensive.[2] Since the early 1990s, reference pricing policies have been adopted increasingly in many countries, especially in Europe.[3-5] However, in practice, reference pricing systems differ greatly in details and scope: product coverage (equivalence criteria), fixing the maximum reimbursement rate, existence of avoidable copayment, updating frequency, etc. Reference pricing is a reimbursement policy and, at the same time, when there is almost a single buying agent it also represents an indirect price regulation policy.

In many countries, the application of reference pricing systems to generic medicines has been related to a redistribution of income between producers and distributors caused by the appearance of strong ex-factory price competition in the form of discounts to pharmacies as a consequence of the substitution power granted to them by the system, as long as the consumer price is no higher than the reference price, whereas price competition hardly ever reaches the consumer price.[6,7] The magnitude of the competitive discounts to pharmacies on the official price seen in these studies presents notably high values: 20–70% in France;[8] up to just over 60% in the UK.[9] The magnitude of the discounts as estimated in these studies is indicative that, under a reference pricing-type maximum reimbursement system, price competition reduces the acquisition price for pharmacies (ex-factory price or wholesale price) much more than the consumer price. In this way, consumer prices settle around the reference level, lacking incentives to go any lower, and generic producers and distributors compete by means of undisclosed discounts offered to pharmacies in order to reduce acquisition costs and to induce them to dispense their generic to patients in preference over others. Thus, these discounts result from the difference between the reimbursement received by pharmacies in compensation for the cost of the generic at the ex-factory price and the real acquisition cost of the medicine for the pharmacies. The greater the difference between these two magnitudes, the greater the incentive for pharmacies to acquire the generic offered by the producer with the lowest cost. This is possible because in many countries pharmacies are reimbursed by the public insurer the full official ex-factory price, assuming that this is the true acquisition cost for them, that is, assuming that pharmacies do not receive discounts on the official ex-factory price. Although price discounts appear as the main initiative offered to pharmacies for selecting one drug over another, other initiatives such as training or cross-discounts on non-prescription drug prices cannot be ruled out.

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It has been observed in other markets that generic price-cap regulation also leads to a levelling off of generic prices at a higher level than would occur in the absence of this regulation.[10] The effect of this policy is price convergence at the highest regulated level and a smaller price reduction as new competitors entered the market. Then, similar to what has occurred with generic reference pricing, price competition tends to adopt the form of discounts to pharmacies, as in Ontario where the government plans to eliminate the practice of discounts paid to pharmacies by manufacturers by 2014, raising dispensing fees at the same time.[11]

Generic producers have incentives to offer discounts to pharmacies below the official ex-factory price accepted by the insurer as the reimbursed acquisition cost to compete for a larger market share rather than reducing the consumer price, as pharmacies capture 100% of this private discount, yet only the percentage corresponding to the mark-up (usually regulated) on the consumer price.

The Spanish pharmaceutical market is the seventh in the world in terms of sales volume. The majority of generic producers are independent from original drug companies. The drug distribution system is organized mainly by wholesalers, chiefly made up of cooperatives of pharmacists. Therefore, drug distribution is highly concentrated in the hands of pharmacists. Pharmacy retailers are independently authorized agents, and unlike other European countries enjoy in Spain a markedly protective regulation that disallows competition at the distribution level.

The reference pricing system applied to generics in this market by the tax funded National Health System (NHS), which finances 80% of medicine sales, precludes the patient from paying the difference between the consumer price and the reference price. The Spanish reference price system is different from the system applied in other countries in the sense that it works as a maximum price system for those drugs included in the homogeneous groups (therefore, consumers do not have the option of paying the difference between the reference price and the price of the drug).[12] In fact, Spanish regulation is nearly equivalent to a price cap for subsidized medicines. In 2006, Spanish legislation (Law 29/2006) expressly prohibited discounts for pharmacies except discounts for prompt payment and volume discounts.[12] However, high 'outlaw' discounts on the official generic ex-factory price paid by pharmacies have remained in practice, apparently justified as volume and prompt payment discounts.[13]

The main contribution of this article is to test whether, when reference pricing is applied, the marketing of a generic medicine with a higher consumer and ex-factory price in relative terms, i.e. one that is priced more closely to the price of the brand drug before patent expiration, actually becomes a competitive advantage (more scope to offer discounts to pharmacies and a larger mark-up for the pharmacist because pharmacies are reimbursed the full official ex-factory price). This hypothesis is tested with the Spanish market in generic medicines, to which a reference pricing system is applied.

Data and Method

For the purpose of this article, I define the *consumer price* as the amount reimbursed by the NHS to pharmacies for outpatient prescribed drugs. In order to be subsidized the consumer price cannot exceed the centrally regulated *reference price* (price cap). In 2008, the reference price was calculated as the average of the three lowest costs per day of treatment for each form of administration of an active ingredient. Reference prices should be revised annually, but this has been sometimes delayed. Since 2008, generics cannot have a higher price than the reference price.

The consumer price reimbursed by the NHS to pharmacies includes the reimbursed acquisition cost paid by pharmacies to producers, the regulated margin of wholesalers and pharmacies, and taxes. The *reimbursed acquisition cost* is not the *true acquisition cost* paid by pharmacies to producers but the *official maximum ex-factory price*. This ex-factory price is a regulated price centrally established. Then, the consumer price reimbursed by the NHS is formed by adding to this official ex-factory price a proportional, and also regulated, margin for wholesaler and pharmacy services, plus taxes.

The commercial margin of pharmacies is strictly regulated and calculated as a fixed proportion of the consumer price (27.9% in 2008) for prices not

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exceeding a maximum price (€91.63), and as a fixed reimbursed amount per prescription (€38.37) for medicines above that maximum price.

Then, the acquisition cost reimbursed to pharmacies for generics, which is equal to the official maximum ex-factory price, is not the true price paid by pharmacies to generic producers but a simple fixed proportion of the observed consumer price: the NHS reimbursed official acquisition cost is nearly proportional to the consumer price, around 64% of the consumer price including taxes in 2008.[14]

I also define the discount rate at which pharmacies acquire generic medicines as the proportion that represents the difference between NHS-reimbursed cost (equal to the official maximum ex-factory price) and the true acquisition cost paid by pharmacies to producers. An illustrative numerical example with real data is presented in table I.

In this highly regulated and subsidized context, the amount of the reimbursed acquisition cost paid by the NHS to pharmacies for generic medicines depends on the degree and speed of reduction of the regulated consumer price after generic entry, which may be influenced by the regulated price cap. Notwithstanding, the true price paid by pharmacies to generic producers relies on the intensity of price competition among generic producers. Then, the discount rate represents a useful relative measure of the discrepancy between true and reimbursed acquisition costs, and it is a measure of pharmacy surplus above the allowed regulated commercial margin (see also table I).

In this section, I describe the data, hypothesis and estimation procedure used to investigate the relationship between discount rates on reimbursed acquisition costs for generic medicines and price competition between generic firms under reference pricing in Spain. The data are unique in that they represent real transaction acquisition prices between generic firms and pharmacies.

Data and Sources

The outcome variable of this article is the discount rate for generic medicines purchased by pharmacies under the reference pricing system in Spain.

The discount rate is calculated for all pharmaceutical forms of each of the eight active ingredients with the largest sales volume in the NHS (excluding combinations of active ingredients), and for which there are generics on the market. In this article, a pharmaceutical form is defined as a product with the same active ingredient, dosage, route of administration (i.e. oral, intravenous, etc.), form of presentation (i.e. tablets, capsules, etc.) and pack size (number of units).

The time period under study is from January to July 2008, and calculations are made using the average of the observations taken during that period. For purposes of comparison, I use data on the discount rate observed in January 2005, prior to the law that prohibits discounts, taken from a previous study.[15]

The information used in this article is taken from the price lists offered to pharmacies by four nationwide wholesalers and six generic firms. These price lists were provided anonymously and confidentially by several pharmacies and wholesale distributors.

Table I. A numerical example of two of the highest priced generics with real data (July 2008 values)

Medicine	Amlodipine 10 mg 30 tablets	Fluoxetine 20 mg sol. 140 mL
Generic consumer price (1)	€14.01	€5.86
Official maximum ex-factory price (2)	€8.97	€3.75
True acquisition cost by pharmacies (3)	€4.49	€3.00
Discount rate [(2) – (3)]/(2)	50%	20%
Pharmacy surplus above the regulated commercial margin (2) – (3)	€4.48	€0.75
Consumer brand price before patent expiry (4)	€26.39	€27.70
Ratio of the generic consumer price to the brand price before patent expiry (1)/(4)	0.53	0.21

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Reimbursed acquisition prices are those official prices published as Nomenclator Digitalis by the Spanish Minister of Health and Consumption (www.msc.es). I analysed ten price lists and obtained information on the acquisition cost for pharmacies of 33 pharmaceutical forms and 175 generic medicines, corresponding to eight active ingredients. According to the information provided, price lists used in this paper were valid in all regions of Spain. Also, in this article, we define a generic medicine as a pharmaceutical form marketed by a specific generic firm.

The eight active ingredients selected in this paper were among the ten biggest generic markets in Spain according to volume of sales in 2008 monetary units. The prescriptions of these active ingredients accounted for more than 12% of the number of total prescriptions covered by the public insurance system in 2006.[16]

Hypothesis and Estimation Model

Following the conclusions of a previous survey on the impact of pharmaceutical price regulation on generic price competition[17] and the evidence on US generic price dynamics,[1] in this article the following two main empirical hypotheses are tested.

Hypothesis 1 (H1): the discount rate at which pharmacies acquire generic medicines is higher for those pharmaceutical presentations for which there are more generic competitors.

Hypothesis 2 (H2): the discount rate at which pharmacies acquire generic medicines is higher for those pharmaceutical forms for which the consumer price has declined less in relation to the consumer price of the brand drug before generic entry (higher-priced generic medicines).

These hypotheses are tested for a sample that includes all pharmaceutical forms of the eight active ingredients included in the study (n = 175) by estimating an empirical econometric model, which can be derived from a cooperative game model by Nash, similar to the one previously used to analyse the effect of competition on discounts applied to purchases of anti-infective drugs in a US hospital.[18]

Consequently, I estimate the following cross-section equation with the discount rate for the generic medicine i of the active ingredient j (also called chemical or molecular entities in the literature) sold by firm m as the primary regressor of interest:

$$\mathrm{DISCOUNT}_{ijm} = \alpha + \beta_1\ \mathrm{GENERIC}_{ij} + \beta_2\ \mathrm{RATIO}_{ijm} + \beta_3\ \mathrm{DDD}_{ij} + \beta_{4j}\ \mathrm{ACTIVE}_j + \epsilon_{ijm} \qquad \text{(Eq. 1)}$$

where $\mathrm{GENERIC}_{ij}$ is the number of generic firms selling medicine i with the active ingredient j, RATIO_{ij} is the ratio of the generic consumer price to the brand price before generic entry for the same pharmaceutical form, DDD_{ij} is the number of daily defined doses of active ingredient j contained in generic medicine i, and ACTIVE_j are active ingredient fixed effects.

The number of firms that market the same pharmaceutical form (GENERIC rivals) represents the degree of competition that exists for the market share within each pharmaceutical form. Following similar US results,[1] Moreno-Torres et al.[19] also showed that the number of entrants in each generic medicine in the Spanish market depends positively on revenues as a measure of market size. As many studies have reported that, in the absence of price regulation, generic prices decline as the number of generic firms increases,[1] I would expect the coefficient on the number of firms β_1 to be significantly positive, as more competition may reduce true acquisition costs, which may result in increased discount rates (H1). Following a previous paper on US generic pricing,[1] the Spanish process of approval takes the timing of entry decisions since the application out of the hands of individual firms, at least for the first group of applicants, so that the number of firms at any point in time is not determined by the current price (many firms choose independently and simultaneously whether to enter each market when the patent or the protection period expires, despite entry being sequential because of the regulatory lag between the application and the entry and price approval). Then, the effect of the number of firms on the current discount rate can be estimated.

In this explanatory model of the observed variability in the discount rate, the second explanatory variable, RATIO, is included with the aim of observing the influence of higher or lower consumer price, in terms of the proportion in which the consumer price of the generic medicine has already decreased in relation to the consumer price of the

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brand drug before generic entry. I predict that coefficient β_2 on the price ratio should be positive, as higher relative consumer prices offer the opportunity for pharmacies to obtain higher discount rates (H2). The RATIO variable is not considered as endogenous in this simplified model given that consumer prices are highly regulated and only changed infrequently.

The number of DDD_{ij} in each pharmaceutical form seeks to capture the influence of the amount of active ingredient in relation to the discount rate. If a monotonic price strategy is adopted by generic firms, then the price will be more or less proportionate to the number of DDDs in each generic medicine, but if a flat price strategy prevails, then all packages containing different numbers of DDDs of the same active ingredient will have more or less the same price.[20,21] In a competitive market, assuming that differences in dosage costs may be important, it could be expected that generic firms will not adopt a flat price strategy, but probably neither will they adopt a price that is strictly proportional to the dosage of the active ingredient. However, the reference prices adopted by the Spanish regulator are proportional to the number of DDDs contained in each package. Therefore, I could expect higher discount rates for larger packages of the same active ingredient, assuming that total cost per package does not increase proportionally to the number of DDDs; and consequently, I expect coefficient β_3 on the number of DDDs to be positive.

Lastly, the dummy variables for active ingredient are intended to capture differential effects in the marginal cost between active ingredients.

Empirical Results

Table II presents the average, maximum and minimum discount rates observed for the 33 pharmaceutical forms of the eight active ingredients included in the study. The average discount rate for all 33 pharmaceutical forms is 39.3%, ranging from 53.8% for pravastatin to 30.8% for fluoxetine. The maximum discount ranges from 70% for simvastatin to 50% for five active ingredients. However, a notable variability in the average percentage discount is observed for forms of the same active ingredient, especially for enalapril, ibuprofen and fluoxetine. Thus, for example, in the case of fluoxetine, this discount ranges from 14% to 47.5%. This variability between forms of the same active ingredient is considerably smaller for omeprazole, simvastatin, pravastatin and paroxetine.

Table III compares the average discount rate by active ingredient in January 2005 and in the period February to July 2008, i.e. before and after the application of Law 29/2006. The average discount rate for the most sold pharmaceutical form of the six active ingredients included in a previous study[15] and in the present study is 33% for 2005, and slightly higher 38.3% for 2008. The magnitude of the discount rate increased for four of the six active ingredients despite the foreseeable reduction of the consumer price between the two periods as a consequence of the increase in the number of generic rivals;[22] for the other two active ingredients (fluoxetine and paroxetine), a slight reduction is observed.

Table IV presents the estimation results of the explanatory model of variability in the discount rate for 175 presentations of the pharmaceutical forms of the active ingredients included in the study. The results in table IV correspond to the ordinary least squares estimate; the heteroskedasticity test rejects the null hypothesis of homoskedasticity, and so heteroskedasticity-robust standard errors are used.

Leaving aside the dummy variables, indicative of differences in the percentage discount that are systematically associated with a particular active ingredient, the two main significant variables that explain the observed variability in the discounts are the number of firms and the ratio of the consumer price of the generic in 2008 to the consumer price of the brand product before the entry of the first generic. The variable representing number of DDDs is not significant and its coefficient is close to zero.

The variable that influences the magnitude of the discount rate with most statistical significance is the number of firms that compete by marketing the same presentation of the active ingredient. Thus, an increase of one firm competing for a presentation translates as an increase in the discount of 0.48 percentage points on average. This situation clearly indicates that the magnitude of the

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Table II. Discount rates (%) for all pharmaceutical forms of each active ingredient

Active ingredient	Presentation	Average discount	Maximum discount	Minimum discount
Omeprazole	20 mg/14 cap	35.5	50	10
	20 mg/28 cap	35.5	50	10
	40 mg/14 cap	37.6	50	25
	40 mg/28 cap	36.4	50	15
	Total	**35.7**	**50**	**10**
Amlodipine	5 mg/28 tab	50.0	50	50
	5 mg/30 tab	41.4	50	25
	10 mg/14 tab	50.0	50	50
	10 mg/30 tab	42.5	50	25
	Total	**43.3**	**50**	**25**
Enalapril	5 mg/10 tab	50.0	50	50
	5 mg/60 tab	33.5	50	0
	20 mg/28 tab	42.4	58	15
	20 mg/28 tab HCTZ	48.5	58	33
	Total	**42.0**	**58**	**0**
Simvastatin	10 mg/28 tab	47.8	70	10
	20 mg/28 tab	50.0	70	25
	40 mg/28 tab	50.0	70	25
	Total	**49.3**	**70**	**10**
Pravastatin	10 mg/28 tab	51.9	60	25
	20 mg/28 tab	54.7	60	50
	40 mg/28 tab	54.7	60	25
	Total	**53.8**	**60**	**25**
Ibuprofen	5% gel/30 grams	40.0	40	40
	100 mg/200 mL	35.3	50	25
	400 mg/20 tab	50.0	50	50
	400 mg/30 tab	36.6	50	25
	600 mg/40 sachets	33.0	33	33
	600 mg/40 tab	40.7	50	25
	Total	**39.2**	**50**	**25**
Fluoxetine	20 mg/14 cap	47.5	50	35
	20 mg/14 tab	14.0	20	10
	20 mg/28 cap	33.3	50	10
	20 mg/28 tab	18.3	30	10
	20 mg/60 cap	32.4	50	10
	20 mg/140 mL	18.8	25	15
	Total	**30.8**	**50**	**10**
Paroxetine	20 mg/14 tab	25.5	50	10
	20 mg/28 tab	27.9	50	10
	20 mg/56 tab	27.3	50	10
	Total	**27.0**	**50**	**10**
Total		**39.3**	**70**	**0**

cap = capsules; **HCTZ** = hydrochlorothiazide; **tab** = tablets.

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Table III. Discount rates (%) in 2005 and 2008 for the most sold pharmaceutical form of each active ingredient

Active ingredient	January 2005[a]	February to July 2008
Enalapril	35.0	42.4
Fluoxetine	36.4	33.5
Ibuprofen	24.6	40.7
Omeprazole	34.2	35.5
Paroxetine	33.3	27.9
Simvastatin	34.8	50.0
Total	**33.0**	**38.3**

a Author's compilation using the database from the study by Borrell and Merino-Castelló (2006).[15] Discount rates for amlodipine and pravastatin in 2005 are not available.

discount depends on the number of competitors in the market, which is a sign of price competition among generic producers. It confirms the hypothesis (H1) that the discount rate is higher for presentations with a larger number of generic competitors.

The results presented in table IV also indicate that the discount rate is higher for those pharmaceutical forms for which the consumer price has decreased least after generic entry in relation to the consumer price of the brand drug. In this way, the higher the ratio of the consumer price of the generic to that of the brand drug prior to generic entry (i.e. the smaller the price reduction of the generic in relation to the brand drug), the larger the discount rate. This means that when the consumer price of the generic falls notably below the initial price of the brand drug, then the discount rate also becomes smaller. Thus, a reduction of one percentage point in the ratio of the consumer price of the generic to the initial consumer price of the brand drug causes a reduction in the discount of 0.23 points. This confirms the hypothesis that the discount rate is higher for pharmaceutical forms whose consumer price has declined less in relation to the consumer price of the brand drug before generic entry (H2).

Alternative models considered, as explanatory variables, the consumer price in Euros of each generic medicine instead of the relative price ratio, and dummy variables for a firm in order to capture greater or lesser aggressiveness in its price discount policy. Those models give similar coefficients and statistical significance for β_1 and β_2 coefficients, and there are almost no changes in the remaining coefficients.

Discussion and Policy Implications

The results presented in the previous section provide evidence of unwanted effects associated with reference pricing systems that counteract the benefits of the competition derived from the entry of generics into the market and cast doubt on the suitability of the way this public drug reimbursement policy is being applied at present, not only in Spain but in the numerous countries that apply reference pricing.[4,5] The main contribution of this article to the literature on the impact of reference pricing is to show that the consequence of the application of this policy to generic medicines in Spain has been precisely to give to more expensive generics the competitive advantage of being in a position to offer larger discounts to pharmacies.

The high discounts offered to pharmacies do not only affect distribution of rents between manufacturer, pharmacies and the public insurer. Quite

Table IV. Determinants of discount rates variability

Variable	Description	Coefficient	Std. error
Generic	Number of firms marketing the same pharmaceutical form	0.485*	0.128
Ratio	Ratio of present consumer price of generic/consumer price before entry of first generic	23.067**	11.550
DDD	Number of defined daily doses	0.000	0.000
Constant		10.713**	4.610
Active1	Amlodipine	4.550	4.971
Active2	Enalapril	9.328	4.283
Active4	Omeprazole	4.516	5.489
Active5	Ibuprofen	–0.934	4.288
Active6	Paroxetine	–8.174	5.505
Active7	Pravastatin	19.092	4.423
Active8	Simvastatin	13.552	3.842
N		175	
Adjusted R^2		0.3259	
F		18.34	

* p = 0.01; ** p = 0.05.

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apart from distributional issues, this constitutes a clear limitation and distortion of competition affecting insurer and consumer welfare. This distortion and limitation of competition is different from that which can derive from the reduction in patients' ability to choose that may occur when pharmacies only offer the patient those generic medicines from which they obtain a larger mark-up. In fact, the current design of this policy, at least in the Spanish case studied here, amounts to a mitigable regulatory obstacle that prevents consumer prices of generics from converging rapidly to the marginal cost of production.

The existence of 'outlaw' discounts on the reimbursed acquisition costs represents, in itself, a normal form of competition in many markets that is presumed to work to the benefit of the final consumer. However, this is not so in the generic market. The 'discount game' is like a prisoner's dilemma:[23] producers and wholesalers cannot opt out of the game on an individual basis because they would lose market share, while a concerted agreement would go against competition rules; and furthermore, there are incentives for an agent to break the agreement. So from this point of view, rather than a competition problem, it is a problem of inefficient regulation. Therefore, the solution to the problem lies in the reduction or suppression of the unwanted effects of the rules fixing the reimbursement rate (reference pricing and similar systems) for generic medicines.

There are large potential savings both for the NHS and for patients, as the present system represents a high opportunity cost for the NHS, and there is no clear justification for the transformation of the revenue generated by competition into larger mark-ups for pharmacies, notwithstanding the need for the reform of the pharmacy payment system. The lack (or indeed absence) of interest shown to date in encouraging competition in generic prices through the cost containment and rationalization policies applied in Spain should not be a reason to forget that market forces can be very effective in favouring a more sustainable and efficient NHS, thus facilitating the financing of innovations with a good cost-effectiveness ratio.

It is necessary to adopt effective measures to encourage consumer price competition in this market, which would be much more useful than continuing to base the promotion policy for generic medicines on the direct regulation of their consumer price or indirect regulation though the maximum reimbursement rate. In this regard, it is of paramount interest for public decision makers to study and objectively analyse the potential impact of other measures for fomenting the generic market on the demand side, and also those alternative measures for encouraging price competition in generic markets in the compared system (competitive tendering; policies of substitution with the cheapest generic; reform and improvement of the reference pricing system; contracts between the insurer and producers; etc.).[24,25] The evidence on the impact of the experience of recent reforms adopted in Germany, Belgium, Holland, Norway and Sweden using some of these measures will offer a useful guide for highly price-regulated European countries, such as Spain, currently characterized by limited consumer price competition and the high discounts offered to pharmacy purchases.

The empirical results of this article are not without their limitations. The data presented refer to a small number of active ingredients, although they are those with the largest sales volume in the generic market. Furthermore, the data sample used here for discounts on the reimbursed acquisition costs refers to a limited time period and a limited number of wholesalers and generic producers, is partial, and does not cover all the firms that market pharmaceutical forms of the active ingredients analysed. Any generalization of the results of this study to the Spanish generic market as a whole, or to other active ingredients or time periods, should be approached with caution.

Conclusions

The empirical results of this article provide evidence that in the Spanish market of generic medicines under reference pricing there is strong price competition between generic firms in the form of large discounts on the NHS reimbursed acquisition cost, holding down prices paid by pharmacies. This situation indicates that the consumer price of generics presents rigidities that prevent it from converging to the marginal cost of production, and

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that at the same time the revenue generated by competition is being transferred to the benefit of increased pharmacy mark-ups.

The main empirical conclusions presented in this article show that large discount rates continue to exist despite their partial prohibition by law, and that the more competitors there are in the market, the larger these discounts become. The reference pricing system does not appear to curb price competition between generic firms, but it does constitute a barrier to this competition being rapidly transferred to the consumer or payer, as the higher the price of the generic medicine (i.e. the smaller the consumer price reduction of the generic in relation to the consumer price of the brand drug before patent expiration), the larger the discount offered by the producer to the pharmacy in order to induce the latter to dispense its product, thus giving it a competitive advantage.

Policy and pharmaceutical decision makers should consider alternatives to mitigate the shortcomings in consumer price competition stemming from generic reference pricing systems, such as policies aimed at monitoring competitive prices in order to reimburse real acquisition cost to pharmacies and/or more radical and market-oriented policies such as competitive tendering of public drug purchases.

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