Financial incentives and pharmaceutical prices: The Colombian case

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"At a time when money is tight, my advice to countries is this: before looking for places to cut spending on health care, look first for opportunities to improve efficiency"
Dr. Chan, Director of the World Health Organization.

Abstract

The Colombian health care system is a competitive insurance market with a standardized health benefit package (POS). Insurance companies (EPSs) must pay for all services and pharmaceuticals included in the health benefit package and in exchange are given a yearly risk-adjusted capitation payment. This article studies the effect on pharmaceutical prices of two natural experiments that change the financial incentives of insurance companies. We perform a difference in difference analysis that compares pharmaceuticals affected by two policies to those that are not across time, and find that including a pharmaceutical in the POS reduces its price by 14% and that reference pricing, which sets a reimbursement cap for pharmaceuticals not included in the POS, reduces the price by 26%. These results speak to the debate over the role of financial incentives the Colombian health care system and more generally provide evidence of how financial incentives can be used to curb health care costs.

1 Introduction

Health expenditure (both in per capita terms and as a share of GDP) has had an upward trend in almost every country in the world in the last 20 years[1]. Pharmaceuticals account for almost a fifth of health expenditure in most OECD countries and this share will likely increase in the future (Brekke, Dalen, & Strøm, 2012). Due to the nature of medical care the general social consensus is that a market base solution for medicine is intolerable (Arrow, 1963). However, in order to cope with the increasing cost of health expenditures countries often introduce competition and financial incentives to curb costs but whenever this is done it is with a high degree of regulation (Cutler, 2002). Understanding the effect of different policies is essential to determine an optimal regulatory framework for health care[2]. In this article I evaluate the effect of financial incentives on pharmaceutical prices.

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[1]From 1995 to 2012, among those countries with World Development Indicators data the average increase in per capita spending (in 2005 PPP adjusted USD) was over 180%, while the average increase in health expenditure as a share of GDP was over 20%.

[2]For example, Porter and Teisberg (2004) argue that redefining competition in the US health care system is essential to reduce costs and improve outcomes

Since 1993 every Colombian is entitled to a comprehensive health benefit package, known as the *Plan Obligatorio de Salud*(POS). The system is a competitive health insurance market were individuals choose an insurer, known as *Entidad Promotora de Salud* (EPS). This insurer is committed to provide all the services included in the POS and in exchange it gets paid (by the government) an ex ante a yearly risk adjusted capitation payment known as *Unidad de Pago por Capitacion* (UPC). In order to maximize profits EPSs negotiate low prices with providers; however, given that the price and the benefit package is determined by the government, competition among insurance companies for users is through quality (Giedion & Uribe, 2009). The tension between these two factors is often a matter of controversy and critics of the system argue, without evidence, that the financial incentives in the system lead to low quality health care without curbing costs(Webster, 2012). To the best of my knowledge this article is the first one to provide empirical evidence of the effect of financial incentives in the Colombian health care system on prices (the effects on quality remain unstudied).

Besides paying for the drugs and services included in the POS, EPSs are often forced by law to cover services and pharmaceuticals outside of the POS, but whenever this happens they get reimbursed by the government for whatever expenses they had. Thus the EPSs are indifferent to the price of pharmaceuticals outside of the POS. Reimbursements grew from 0.1 to 2.4 trillion pesos between 2005 and 2010. In 2011, in an effort to reduce the price of pharmaceuticals excluded from the POS (and thus reimbursements), the government introduce reference pricing, which sets a reimbursement cap, for some pharmaceuticals and updated the POS. In this article I evaluate the effect of both policies (reference pricing and inclusion in the POS) on prices by doing a difference in difference analysis that compares pharmaceutics affected by each policy to those not affected before and after the policy is implemented. I find that on average the price of pharmaceuticals exposed to reference pricing drops by 24%, while introducing a pharmaceutical on the POS reduces its price by 14%.

Similar policies have been studied in other contexts, but never in a developing country framework. For example, Brekke, Holmas, and Straume (2011) studies the effect of reference pricing in Norway and finds that it reduces the price of generic and brand drugs by over 20% and Duggan and Scott Morton (2010) studies the effect of Medicare Part D, in which the government subsidizes participation in private prescription drug plans, and finds a reduction of about 20% in pharmaceutical prices.

These results speak to the debate over the role of financial incentives the Colombian health care system and more generally provide evidence of how financial incentives can be used to curb health care costs. However, future research must follow in at least three areas in order to understand the effect pf these policies in health care. Specifically, future research should study the effect of these policies on the demand for pharmaceuticals, on the prescribing behavior of providers, on the health outcomes of patients and the distribution of health care expenditure.

The article is organized as follows. This introduction constitutes the first section. The second section presents an overview of the health care system in Colombia. Section 3 presents the data used in the study, the empirical strategy used to identify the effects of the policy on prices and the results of the analysis. Finally, section 4 concludes.

2 The Colombian Health Care System

Before 1993 only 24% of the population in Colombia had some form of health insurance, with significant inequality as 47% of the highest quantile of income had health insurance but less than 5% of the lowest quantile did. This translated into high inequality in the access to medical services as over 33% of the poorest quantile did not receive medical attention when sick in 1992 but this number was only 7% for the highest quantile of income (Gaviria, 2013). Law 100 of 1993 set to change this by introducing a universal health insurance scheme.

Since 1993 every Colombian is entitled to a comprehensive health benefit package (known as *Plan Obligatorio de Salud* or POS) . Individuals belong to one of two regimes according to their income. Those with higher income belong to the contributory regime, while individuals with lower income belong to the subsidized regime. The former is financed with a payroll tax, while the latter is financed through central government expenditure and part of the payroll taxes paid by individuals in the contributory regime. Originally, the health packages for the contributory and the subsidized regime where different but their pharmaceutical coverage was the same by 2006 and the Constitutional Court ruled that both packages should be unified by 2013.

The system is a competitive health insurance market were individuals in both systems get to pick their insurance company, legally called *Entidades Promotoras de Salud* (EPS). The insurances companies are committed to provide all the services included in the POS. In exchange, the insurer gets paid ex ante a yearly risk adjusted capitation payment known as *Unidad de Pago por Capitacion* or UPC[3]. As of 2013 there were 24 and 48 insurance companies in the contributory and the subsidize regime respectably. Since EPSs are the residual claimants of any difference between the UPC and their expenditures they have every incentive to negotiate low prices with providers. However, given that the price and the benefit package is determined by the government, competition among insurance companies for users is through quality (Giedion & Uribe, 2009). The tension between the financial incentives and quality is often a matter of controversy and some critics believe that financial incentives lead to lower quality without reducing costs(Webster, 2012).

If users want to access a pharmaceutical or a service not covered by the POS without having to pay for it, they can go use the judicial system and force the state to cover their medical expenses. Accessing health through courts is not uncommon in low/middle income countries; however, in a survey study by Hogerzeil, Samson, Casanovas, and Rahmani-Ocora (2006) Colombia accounted for more than half of the cases across 12 countries. Courts can force EPSs to provide pharmaceuticals or services that are not includes in the POS whenever they consider it necessary in order protect the fundamental rights of patients. For example, sex change surgery is not included in the POS but in the past users have appeal to courts, arguing that such exclusion from the POS is against the right to express oneself, and the courts have ordered that the EPS provide such surgeries[4]. This is an extreme case and more often users argue that the exclusion of some service or pharmaceutical is putting their lives at risk. If the court rules in favor of the user then the EPS must pay for the service/pharmaceutical and is reimbursement by the government.

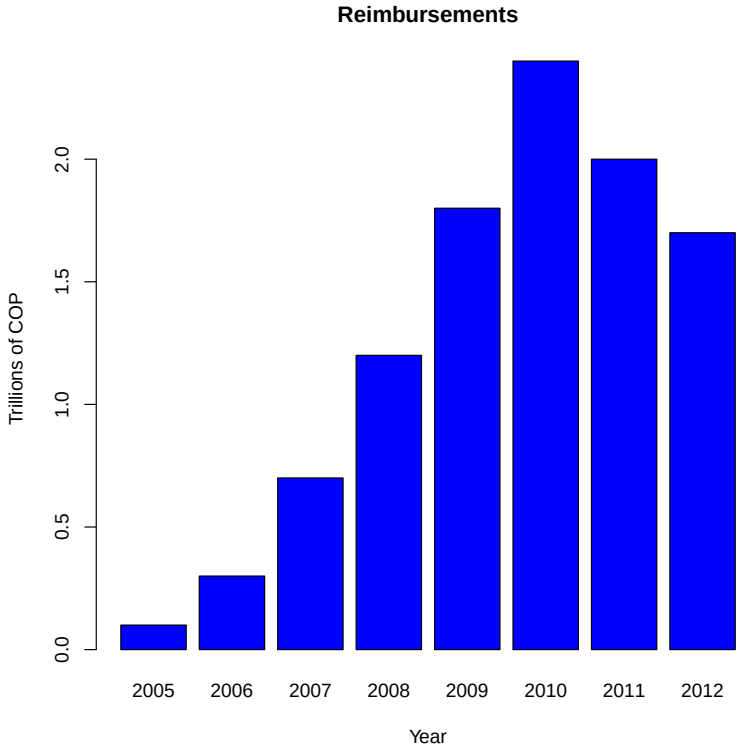
Additionally, health providers often argue that they need to perform a procedure or prescribe a pharmaceutical that is not included in the POS to effectively treat a patient. In this cases the EPS, the provider and the user (usually a representative of users of the EPS) form a committee and decide whether the proce-

[3]There is also an expost redistribution of resources based on the prevalence of renal chronic disease per insurer.
[4]For example, sentences T-876 Corte Constitucional (2012a) and T-918 Corte Constitucional (2012b)

dure/pharmaceutical is truly needed or no. If this committee, known as *Comite Tecnico Cientifico* (Technical and Scientific Committee) or CTC decides that the procedure/pharmaceutics is necessary, then the EPS pays the provider for it and is reimbursement by the government.

Figure 1 shows the evolution of reimbursements to EPSs for services they had to provide by either court or CTC mandates. In January of 2011 the reimbursements drove the health system to a financial crisis and the government had to declared a "social emergency" because it ran out of money to pay for the citizens health care[5]. In 2011, in an effort to reduce the price of pharmaceuticals excluded from the POS (and thus reimbursements), the government introduce reference pricing, which sets a reimbursement cap, for some pharmaceuticals and updated the POS. The reference prices are set by the Ministry of Health based on the prices of pharmaceuticals in other countries in the region; however, it is unclear what the exact methodology used to determine the reference price is.

Figure 1: Reimbursements to insurance companies for services outside of the POS



Notice that the inclusion of a pharmaceutical in the POS results in EPSs profits directly affected by the pharmaceutical's price and reference pricing results in EPSs incurring in a financial loss if they have to pay a price higher than the reimbursement cap. Using variation in the coverage of the POS and the introduction of reference pricing we study the effect of financial incentives on pharmaceutical prices. The next section explains the data used in this study as well as the empirical strategy used to identify the effects of the policies

[5] A few months later The Constitutional Court, in its sentence C-216 of 2011, declared the state of emergency unconstitutional.

and the results from the analysis.

3 Empirical Analysis

This article uses information from the *Sistema de Informacion de Precios de Medicamentos* (SISMED). The SISMED is a government effort to collect pharmaceutical prices from pharmaceutical laboratories, importers and EPSs. However, several studies, including some from government agencies, have pointed that the information is unreliable in several cases (Vacca, Acosta, & Rodriguez, 2011; Departamento Nacional de Planeacion, 2012; Zapata, Bernal, Castillo, & Garzon, 2012). Furthermore, pharmaceutics often come in and out of the sample giving an unbalance panel. With this caveats in mind, I use the SISMED information from 2007 to 2013[6]. The data for 2006 is not used as it cover less than 2% of the total number of the registered pharmaceuticals in the INVIMA[7], while coverage is over 60% after 2007 (see table 1).

Table 1:

Year	2006	2007	2008	2009	2010	2011	2012	2013
Proportion	0.01	0.74	0.62	0.60	0.74	1.00	0.92	1.00

Proportion of registered pharmaceuticals with any information in the SISMED database. *Source:* SISMED and INVIMA. *Calculations:* Author.

The SISMED reports five different prices. The average price at which pharmaceutical companies sell to EPSs and to pharmacies, the average price at which wholesalers sell to EPSs and to pharmacies, and finally the price at which EPSs report buying pharmaceuticals. The price variable used in this article is the average price at which pharmaceutical companies sell to EPSs. I do not use wholesaler prices since many EPSs are vertically integrated and own a wholesaler making the wholesaler price irrelevant. Since pharmacies should not be affected by the policy as they are unrelated to insurance companies I use their price information for placebo tests.

The unit of observation is a pharmaceutical, which is a chemical compound sold by a particular company. Thus ibuprofen might show up several times in the database, for example under Advil®, Motrin®, and Ibuprofeno MK®. As many pharmaceuticals come in different presentations the price used in all of the analysis is the weighted average by units sold of the price per unit of product across presentations. More formally we have that

$$SP = \frac{Price}{Units \times (\text{Quantity per unit})}$$
$$AP = \frac{\sum_{p \in P} (\text{SP})_p \times (\text{Quantity Sold})_p}{\sum_p (\text{Quantity Sold})_p},$$

where P is the set of presentations, SP is the standardized price (price per unit of product) for a particular presentation and AP is the average price across presentations. Table 2 shows how to calculate the SP for

[6] I hope I can get access to higher quality data in the future
[7] The equivalent of the US FDA.

each presentation of Ibuprofeno MK®, which comes in 7 different presentations. The average price in this hypothetical example would be 0.1583.

Table 2:

Type	Units	Quantity per unit	Units	Quantity Sold	Price	Standardized Price
Tablets	100	400	mg	5	5000	0.125
Tablets	50	600	mg	15	4500	0.150
Tablets	50	800	mg	35	5500	0.138
Dragees	12	200	mg	20	500	0.208
Dragees	24	200	mg	10	800	0.167
Dragees	32	200	mg	7	1000	0.156
Dragees	60	200	mg	2	1500	0.125

Different presentations for Ibuprofeno MK® and their standardized price. *Source:* INVIMA. *Calculations:* Author.

The database contains 20,095 unique pharmaceuticals, with a total of 60,537 presentations. However, out of the 20,095 pharmaceuticals only 10,465 have information on prices (at which pharmaceutical companies sell to EPSs) at some point in time and furthermore only 2,366 have information for all years. Each pharmaceutical is associated with at least one Anatomical Therapeutic Chemical (ATC) code, which classifies pharmaceuticals according to "the organ or system on which they act and their therapeutic, pharmacological and chemical properties" (there are 1,407 different ATC codes in the database). Pharmaceuticals can also be categorized by pharmacological subgroups using the 2nd, 3rd and 4th levels of the ATC code. Pharmaceuticals within the same subgroup have the same active components and are used to treat the same disease. In total there are 269 pharmacological subgroups in the sample. For more information see `http://www.whocc.no/atc/structure_and_principles/`.

As can be seen in panel A of table 3 the average number of presentations per pharmaceutical is just over 3 but there is a lot of variation across the data. Panel B shows some summary statistics for all pharmaceutics across years. The share of observations that are in the POS is 37%. There is a lot of variation in the number of pharmaceutics in the same pharmacological subgroup (or with the same ATC code), with some pharmaceutics facing no competition and others facing 555 (230) other pharmaceutics. If we restrict ourselves to pharmaceutics in the POS, we see that some pharmacological subgroups (or ATC codes) have no pharmaceutical in the POS, while others have 308 (156) pharmaceuticals that are covered by the POS. Panel C shows some summary statistic for ATC codes; it shows that on average there are over 5 pharmaceutical per ATC code and that about 23% of them are covered by the POS at any point in time, with great variation across codes. Finally, panel D mirrors panel C but using pharmacological subgroups instead of ATC codes and shows that there are over 24 pharmaceuticals on average per subgroup and that around 27% of them are covered by the POS at any point in time, with great variation across subgroups.

Table 3:

	N	Mean	St. Dev.	Min	Max
Panel A: Presentations					
No. of pharmaceutical presentation	20,095	3.013	3.071	1	54
Panel B: Pharmaceutics					
In the POS (=1 yes)	41,815	0.373	0.484	0	1
No. of pharmaceutics in the same pharmacological subgroup	41,815	147.126	113.370	1	556
No. of pharmaceutics in the same pharmacological subgroup in the POS	41,815	55.768	59.511	0	308
No. of pharmaceutics with the same ATC	41,815	34.835	36.631	1	231
No. of pharmaceutics with the same ATC in the POS	41,815	14.765	24.081	0	156
Panel C: ATC Codes					
Number of pharmaceutics per code/year	7,881	5.306	7.418	1	81
Proportion of pharmaceutics in the POS per code/year	7,881	0.236	0.380	0.000	1.000
Panel D: pharmacological subgroup					
Number of pharmaceutics per group/year	1,724	24.255	32.065	1	248
Proportion of pharmaceutics in the POS per group/year	1,724	0.277	0.304	0.000	1.000

Panel A shows summary statistics for pharmaceutical presentations across all years. Panel B shows summary statistics for pharmaceuticals across all years. Panel C shows summary statistics for ATC codes across all years and Panel D shows summary statistics for pharmacological subgroups across all years. *Source:* SISMED and INVIMA. *Calculations:* Author.

Table 4 shows how many pharmaceuticals, from the ones we observe prices for, are included in the standardized plan each year. The coverage of the database increases in later years and there is a large variation in the number of pharmaceutical included in the standardized plan; however, as both the denominator and the numerator are changing, it is hard to assess whether the POS is expanding or contracting. Finally, we see that the coverage of pharmaceuticals affected by reference pricing slightly increases over time.

Table 4:

	2007	2008	2009	2010	2011	2012	2013
No of pharmaceuticals	7,285	5,530	4,913	5,632	4,891	6,645	6,919
Included in the plan	2,797	2,086	1,822	2,051	1,768	2,450	2,612
Proportion	0.38	0.38	0.37	0.36	0.36	0.37	0.38
With RP	0	0	0	0	428	535	551
Proportion RP	0.00	0.00	0.00	0.00	0.09	0.08	0.08

Number of pharmaceuticals with price information each year and the proportion includes in the POS and subject to reference pricing. *Source:* SISMED and INVIMA. *Calculations:* Author.

A difference in difference model is used to estimate the effect of including a pharmaceutical in the POS on its price. More specifically, I estimate the following model

$$\log(Price)_{it} = \alpha POS_{it} + X_{it}\beta + \gamma_i + \gamma_t + \varepsilon_{it},$$

where, i denotes pharmaceuticals, t denotes years, $\log(Price)_{it}$ the logarithm of price, adjusted for inflation, for molecule i in time t, POS_{it} indicates whether pharmaceutical i was included in the POS at time t, X_{it} is a set of control variables for pharmaceutical i at time t, that mainly control for competition, γ_i and γ_t are pharmaceutical and time fix effects. α is the coefficient of interest and indicates by how much

does the price of a pharmaceutical changes if it is included in the POS, and its identified of pharmaceuticals that come in and out of the standardized plan. Table 5 show the results from estimating this model.

Table 5: Effect of including a pharmaceutical in the standardized health plan

	(1)	(2)	(3)
POS	-0.144**	-0.141**	-0.144**
	(0.0603)	(0.0586)	(0.0585)
Prop. Pharm. in therapeutical group in POS		-0.000791	
		(0.00344)	
Prop. Pharm. in ATC group in POS			-0.00159
			(0.00135)
Pharmaceutical and Year F.E.	Yes	Yes	Yes
Observations	41815	41747	40269

Clustered standard errors, by therapeutic group, in parenthesis
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The results from table 5 indicate that reference pricing reduces the price of pharmaceuticals by over 14%. This effect is not only statistically significant, but also robust to different specifications (controlling for different levels of competition among pharmaceuticals) and economically significant as it shows that the financial incentives set by the health care system do lead to lower health care costs, at least in the case of pharmaceuticals. Notice that standard errors are clustered at the therapeutic group to account for any interaction between the price of pharmaceutics that are close substitutes.

A similar exercise is done to estimate the effect of reference pricing on pharmaceutical prices. More specifically, I estimate the following model

$$\log(Price)_{it} = \alpha(RP_i \times Post2011_t) + X_{it}\beta + \gamma_i + \gamma_t + \varepsilon_{it},$$

where RP_i indicates whether pharmaceutical is affected by reference pricing after 2011 and $Post2011_t$ is a dummy variable that indicates whether t is greater or equal to 2011. All variables have the same meaning as before. Table 6 show the results from estimating this model.

Table 6: Effect of including a pharmaceutical in the standardized health plan

	(1)	(2)	(3)
RP x Post2011	-0.265***	-0.264***	-0.248***
	(0.0489)	(0.0491)	(0.0464)
Prop. Pharm. in therapeutical group in POS		-0.000836	
		(0.00342)	
Prop. Pharm. in ATC group in POS			-0.00151
			(0.00135)
Pharmaceutical and Year F.E.	Yes	Yes	Yes
Observations	41815	41747	40269

Clustered standard errors, by therapeutic group, in parenthesis
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The results from table 6 indicate that reference pricing reduces the price of pharmaceuticals by over 26%. It is interesting that the effect of reference pricing is larger than the effect of including a pharmaceutical in the standardized plan as the former policy only exposes insurance companies to prices above a giving limit, while the latter exposes them to all prices. However, taking into account that reference pricing was placed to reduce the increasing reimbursements either because of high volume or high price (compared to other countries in the region), it is natural that reference pricing had a large impact in prices.

In conclusion, financial incentives can be used to curb health care costs. In the Colombian case including a pharmaceutical in the POS and setting a reimbursement cap affect the incentives that insurance companies face and we see a reduction on pharmaceutical prices whenever their profits are at risk. In particular, I find that including a pharmaceutical in the POS results in a reduction of 14% in its price while exposing it to reference pricing results in a reduction of 26%. There results do not only speak to the debate in Colombia about the role of EPSs in the health care system, they also speak to the role of financial incentives in curbing health care costs around the world.

3.1 Threats to identification and event studies

The main threat to identification is that the parallel trends assumption is not met. Namely, that pharmaceuticals exposed to a policy experience a differential trend in prices prior to the policy compared to pharmaceuticals never exposed to the policy. This is particularly important if one takes into account that some of these policies where taken in order to cope with increasing prices which could potentially bias our estimates.

Figure 2 shows the median price for pharmaceuticals with without reference pricing after 2011 that have information for all periods. Price is normalized in 2007 to be equal to one. As can be seen pharmaceuticals have similar trends until 2010; however, the policy (reference pricing) start in 2011 (December 12th of 2010 to be exact).

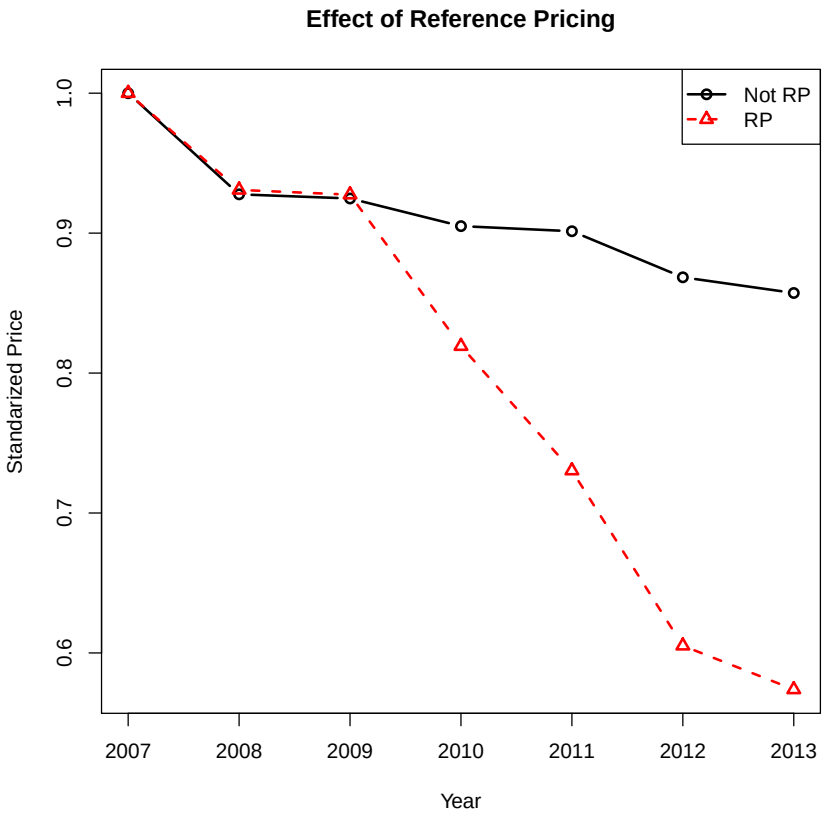


Figure 2: Median price for pharmaceuticals with without reference pricing after 2011 that have information for all periods. Price is normalized in 2007 to be equal to one. *Source:* SISMED and INVIMA. *Calculations:* Author.

More formally, we can estimate the following equation,

$$\log(Price)_{it} = \sum_{t=2007}^{2013} \alpha_t(RP_i \times Year_t) + X_{it}\beta + \gamma_i + \gamma_t + \varepsilon_{it},$$

where $Year_t$ is a dummy variable that takes the value of one whenever $Year_t = Year$. Table 7 show the results from estimating this equation, which confirms the intuition seen in figure 2 that prices change in 2010 for drugs exposed to reference pricing, a year before the policy was implemented. This is not only a threat to identification, it is also puzzling. Further research must follow to explain this phenomenon.

Table 7: Event study for reference pricing

	(1)
RPx2007	0.0736
	(0.0643)
RPx2008	0.0465
	(0.0762)
RPx2009	0.138***
	(0.0488)
RPx2011	-0.0950
	(0.0598)
RPx2012	-0.213***
	(0.0545)
RPx2013	-0.297***
	(0.0566)
Pharmaceutical and Year F.E.	Yes
Observations	41815

Clustered standard errors, by therapeutic group, in parenthesis
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The case for inclusion in the POS is more complicated as pharmaceuticals come in and out of the standardized health plan, and moreover some are included, then excluded and then included again. The next iteration of this article will assess if pharmaceuticals have parallel trends before entering or exiting the standardized health plan (POS), by estimating the following regression

$$Y_{ist} = \alpha_0 + \sum_{j=-3}^{3} \alpha_j Switch_i \left[\mathbf{1}(\tau_i + j = t) + \mathbf{1}(\lambda_i - j = t) \right] + X_{it}\beta + \gamma_i + \gamma_t + \varepsilon_{it}$$

where $Switch_i$ is equal to one if pharmaceutical i ever changes its POS status (comes in or out of the POS between 2007 and 2013), τ_i is the year pharmaceutical i enters the POS and λ_i is the year pharmaceutical i exits the POS. Notice that this captures how the price of pharmaceuticals that (exit) enter the POS behave in years before they are (excluded) included in the POS and in years after, capturing any difference in behavior before the inclusion (if any) and any change in prices attributed to inclusion in the POS. As mentioned before, these results are not included in this version of the article (due to a lack of time and uncertainty as to whether this is the right approach to test the parallel trends assumption).

3.2 Effect on pharmaceutical prices

This section does a placebo test that explores the effect of including a pharmaceutical in the POS and of reference pricing on the price at which pharmaceutical companies sell pharmaceuticals to pharmacies. Given that pharmacies are not connected to the insurance companies in anyway, these price they face should not be affected by either policy. However, table 8 shows the effect of both policies and in particular it breaks the effect of reference pricing by year. As can be seen, including a pharmaceutical in the POS has no effect on prices as expected but pharmaceuticals exposed to reference pricing see a decline in prices in 2010, a year before the policy started. These last results is puzzling but future work will explore the connection between the decline seen by pharmacies and by insurance companies in 2010 for pharmaceuticals exposed to reference pricing after 2011.

Table 8: Event study for reference pricing

	(1)
POS	-0.064
	(0.061)
RPx2008	-0.045
	(0.047)
RPx2009	-0.10
	(0.12)
RPx2010	-1.93***
	(0.24)
RPx2011	0.0016
	(0.076)
RPx2012	-0.059
	(0.076)
RPx2013	-0.13
	(0.080)
Pharmaceutical and Year F.E.	Yes
Observations	55898

Clustered standard errors, by therapeutic group, in parenthesis
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

4 Conclusions

The Colombian health care system is a competitive insurance market with a standardized health benefit package (POS). Insurance companies (EPSs) must pay for all services and pharmaceuticals included in the health benefit package and in exchange are given a yearly risk-adjusted capitation payment. In order to

maximize profits EPSs negotiate low prices with providers; however, given that the the price and the benefit package is determined by the government, competition among insurance companies for users is through quality (Giedion & Uribe, 2009). In this article I provide evidence that financial incentives do results in lower prices, at least for pharmaceuticals. This is the first article, to the best of my knowledge, that provides such evidence for Colombia.

In this article I study the effect on pharmaceutical prices of two natural experiments that change the financial incentives of insurance companies in the Colombian health care system. Using variation in the coverage of the standardized health benefit package I can evaluate the effect of including a pharmaceutical in the POS on its price. When insurance companies are forced to provide services or pharmaceuticals not included in the POS, by either a court or a CTC mandate, they get reimbursed by the government. The second experiment, exploits the decision of the government in late December of 2010 to set a maximum reimbursement amount for some pharmaceuticals based on the prices in other countries in Latin America.

We perform a difference in difference analysis that compares pharmaceuticals affected by the policies to those that are not across time, and find that including a pharmaceutical in the POS reduces its price by 14% and that reference pricing reduces the price by 26%. These results are align with findings in the literature that study similar policies (Brekke et al., 2011; Duggan & Scott Morton, 2010) and provide evidence on the debate of the role of EPSs in the Colombian health care system and more generally on the use of financial incentives to curb health care costs around the world.

However, future research must follow in at least three areas in order to understand the effect pf these policies in health care. First, we need to understand the the effect that these policies had on the demand for these pharmaceuticals in order to assess the effect on expenditure. Second, we must study on the prescribing behavior of providers. More specifically, given the change in financial incentives these policies had, this might results in insurance companies pressuring providers (specially wherever they have market power) to change their prescribing behavior.

Finally, we must study the effect of these policies on health outcomes and on the quality of care, in order to fully assess the effect that the financial incentives are having on health care. Another interesting line of research for future work is to study the distributional effect of these policies as the pharmaceuticals newly added to the POS and with reference pricing treat a given set of diseases which do not uniformly affect the population. Furthermore, access to pharmaceuticals not included in the POS through CTC and court mandates is concentrated in the highest quantiles of income (Gaviria, 2013), while the POS is the same regardless of income and thus the distributional effects of each of these policies might be very different.

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