WORKING PAPERS

Universitat Jaume I

An experimental study on the effects of co-payment in public services

Economics Department

Aurora García Gallego
Nikolaos Georgantzís
Gianandrea Staffiero
Tarek Jaber-López

2013 / 03

Castellón (Spain)

An experimental study on the effects of co-payment in public services

Aurora García Gallego
LEE-Universitat Jaume I
Department of Economics
mgarcia@eco.uji.es

Nikolaos Georgantzís
LEE-U. Jaume I, GLOBE-U. de Granada
Department of Economics
BELIS- Murat Sertel Center, Bilgi University
ngeorgantzis@ugr.es

Gianandrea Staffiero
Center for Research in Economics
and Health (CRES)
gstaffiero@yahoo.es

Tarek Jaber-López
LEE-Universitat Jaume I
Department of Economics
jaber@eco.uji.es

2013 / 03

Abstract

We analyze the effect of imposing a charge for the individual appropriation of common resources. In our design, withdrawing the maximum amount is the dominant strategy for every player, but the resulting equilibrium is socially inefficient. We find that the presence of a price, small enough to leave intact the trade-off between individual incentives and collective welfare, is not effective in reducing appropriation among players who have previously played without it. On one hand, the upward trend in the average extraction of common funds continues after the introduction of a price. On the other hand, the presence of a price does decrease withdrawals, in comparison with a baseline treatment without any charge, as long as it is imposed from the outset. Our design sheds light on the conditions for the effectiveness of co-payment in curbing the over-consumption of public resources, most notably in the realm of healthcare.

Keywords: Common-Pool Resources, Co-Payment, Public Goods, Consumer Choice
JEL classification: C91, C92, H41, I11, I18

An experimental study on the effects of co-payment in public services[1]

Aurora García-Gallego

LEE and Economics Department, Universitat Jaume I, Spain

Nikolaos Georgantzis

GLOBE – Universidad de Granada & LEE, Universitat Jaume I, Spain

Gianandrea Staffiero

CRES – Center for Research in Economics and Health, U. Pompeu Fabra, Spain

Tarek Jaber López

Laboratorio de Economía Experimental (LEE), Universitat Jaume I, Spain

Abstract

We analyze the effect of imposing a charge for the individual appropriation of common resources. In our design, withdrawing the maximum amount is the dominant strategy for every player, but the resulting equilibrium is socially inefficient. We find that the presence of a price, small enough to leave intact the trade-off between individual incentives and collective welfare, is not effective in reducing appropriation among players who have previously played without it. On one hand, the upward trend in the average extraction of common funds continues after the introduction of a price. On the other hand, the presence of a price does decrease withdrawals, in comparison with a baseline treatment without any charge, as long as it is imposed from the outset. Our design sheds light on the conditions for the effectiveness of co-payment in curbing the over-consumption of public resources, most notably in the realm of healthcare.

Keywords: Common-Pool Resources, Co-Payment, Public Goods, Consumer Choice

JEL Classification: C91, C92, H41, I11, I18

[*] The authors want to acknowledge financial support by the *Spanish Ministry of Economics* & *Prospective* (project ECO 2011-23634), *Fundación Bancaixa-U. Jaume I* (project P1-1B2010-17) and *Junta de Andalucía* (P07-SEJ-03155).

1. Introduction

In this paper we propose an experimental investigation of the effect of imposing a price for the subtraction of resources from a common fund. Our evidence sheds light on some relevant aspects related to the effectiveness of co-payments in curbing the over-consumption problem, most notably in healthcare services.

We represent over-consumption by means of a "common-pool resource" game, where the individual benefits from the appropriation of resources are positive but lower than the social cost of providing those resources. In other words, individual appropriation is detrimental to social welfare. In this context, our main question is: does the introduction of a *small* co-payment reduce individual extraction levels, thereby increasing efficiency and social welfare? The limited magnitude of the "price" per unit extracted allows the detection of effects in a context where the basic trade-off between individual and collective incentives remains intact. Can the focus on the price and/or the sheer "pain of paying" help maintain a high level of common resources? On the opposite side, could a "crowding-out" effect arise, whereby potentially social-minded subjects feel legitimated by the price to extract *more* of a common resource?

The present policy context in Europe is characterized by the quest for reductions in public spending. There are instances where the co-payments are introduced for services that were previously given for free or where the exemption from co-payment is removed. This entails a direct effect of a transfer from users to the public administration, hence more revenues, but the goal is also to reduce the over-consumption of public resources. As we focus on this second aspect, we explore the appropriation of resources following the introduction of co-payments in comparison with *i)* a situation where the co-payment is not introduced and *ii)* a situation where co-payment has always existed, i.e. the resource was never available for free. The first comparison relates to many dilemmas currently faced by European policy-makers in contexts of socialized healthcare. The second comparison serves multiple purposes. On one hand, we observe the effect of the introduction of co-payment as a novelty compared with a game always played under the same rules. On the other, it isolates the effect of the habit to consume the good for free. Our evidence also provides insights on whether co-payment would be more effective for new goods and services that were never publicly available free of charge.

2. Background

Co-payment in healthcare refers to the imposition on patients of a part of the cost of services. User charges are imposed on primary care visits, on specialized care and on the purchase of pharmaceuticals. In European countries there are wide variations in terms of amounts, calculation methods (percentages, fixed fees etc.) and with regards to which healthcare services are subject to co-payments.[2]

[2] For a survey on the differences across European systems, see Espin and Rovira (2007) See also the comparison with US and Canada systems in Mas et al. (2011).

The rationale of co-payment is twofold. First, it *might* improve the financial situation of the payer. In the European context of socialized medicine, this argument makes co-payment look unfair, as it implies a transfer from those who need more care to the rest of the population. Furthermore, as patients may be unable to distinguish the actual benefits, they could reduce the use of effective and ineffective healthcare in similar proportion, as shown in the famous RAND experiment in the U.S. (Manning and Newhouse, 1987). Furthermore, Gemmill et al. (2008) argue that user charges do not curb long-term healthcare expenditure, when negative impact on health and subsequent needs are taken into account (hence the use of the word "*might*" above).

The second purpose consists in reducing the excessive use of resources. Standard economic theory points out that rational and selfish people use free services up to the point that they provide some benefits, albeit small. As social welfare would be maximized if resources were consumed up to the point that marginal benefits (usually assumed to be decreasing) equal the marginal costs of providing them,[3] individual incentives lead to over-consumption. Co-payments can contribute towards a better alignment of individual and social incentives, thereby ameliorating the over-consumption problem.

The impact of co-payment on equity and efficiency could be worsened by the lack of information on the patients' side. Ways to tackle the potential negative impacts are based on the assessment of the value of care by third party payers, as in Pauly and Blavin's (2008) value-based insurance design, and in Drummond and Towse's (2011) value-based pricing for pharmaceuticals.

In our design we observe whether co-payment can enhance efficiency once the imperfect information problem is removed, as our experimental subjects know perfectly both their own benefit from appropriating public resources and the cost this implies for the group they belong to. The size of co-payment is small, so that choices respond to the typical trade-off between individual and collective benefits.[4]

In this context, the introduction of a "price" in order to take away common resources may modify behavior. As a positive price is obviously higher than zero, if the usage of resources is a "normal" good, the demand effect should be negative. The presence of a price may also be focal, an aspect that may reinforce the negative effect of the "pain of paying". This phenomenon, pointed out by Prelec and Loewenstein (1998), consists in the fact that the act of paying diminishes the pleasure of consuming a good. This explains why, for instance, lots of people prefer flat-rate payment schemes as opposed to pay-per-units when acquiring Internet or telephone services, even if they may end up spending more.

[3] Here we refer to a Benthamian function, where social welfare is the sum of individual welfare levels. Other formulations, such as the Rawlsian, put a higher weight on the welfare of the worst-off.

[4] A recent example of a fairly small contribution can be found in the euro-per-prescription that has been recently introduced by the government of the Autonomous Community of Catalonia, in Spain. This co-payment (with a ceiling on individual expenditure) is an extra payment added to the already existing user charges for pharmaceuticals established at by the Spanish government, and has been challenged at the "Tribunal Constitucional" court as a violation of the rules established in the Spanish constitution on equal access to medicines.

The crowding-out effect moves towards the opposite direction. As described in Frey and Oberholzer-Gee (1997), it arises whenever people are, in principle, willing to cooperate and take choices that are not necessarily in line with their own interest but, when confronted with a price, become more “selfish”. In our specific design, it may happen that, in absence of any price, some people do not use public resources if they know that the collective cost is higher than their individual benefits. On the other hand, the presence of a price or a co-payment indicates that the individual can “legitimately” compare her own benefit with the amount she would have to spend to appropriate public resources. In other words, the focus may shift from the collective cost to the individual price, as the element to be gauged against the individual benefit.[5] In this case, the extraction of resources would increase.

3. Experimental design, procedures and predictions

The experiment took place during the first week of July 2012 at the Laboratory of Experimental Economics (LEE) of the University Jaume I, located in Castellón, Spain. A total of 125 students participated, 35 in the “Baseline”(B) treatment, 30 in the “Copay”(C) treatment, and 60 subjects in what we will refer to as the “Baseline+Copay”(BC) treatment. Presentations and instructions given to the students made no use of the word “co-payment”.[6] All sessions were programmed in z-Tree (Fischbacher, 2007).

In order to avoid any doomsday effect, subjects did *not* know *ex ante* the total number of rounds (30 in each session). At the beginning of each round, they were divided in groups of 5 subjects each. No subject was informed about the identity of her fellow group members. Subjects *did* know that, after each round, they would be randomly re-matched and that, at the end of the experiment, they would be paid according to the payoff achieved in a single round, randomly selected.[7] Before the beginning of the experiment, their comprehension of the rules was checked with easy questions on deriving payoffs from possible combinations of choices among group members.[8]

In treatment B, at the beginning of each round every group is assigned a common fund worth 100 euro. Each one of the 5 group members has the option of withdrawing an integer amount between 0 and 10 euro. Each euro withdrawn passes to her private fund and reduces the common fund by 2 euro. At the end of each round, what remains of the common fund is equally shared among the 5 members. Therefore, the payoff of a group member is calculated as the sum of her private fund and 20% of the amount left in the common fund. For example, calling X_i the amount extracted by player i from the common fund, player 1 payoff in any given round equals:

[5] Gneezy and Rustichini (2000) show an illuminating example of this effect. In their field experiment, the establishment of fines for parents arriving late to pick up children *reduced* punctuality. Some parents who used to be on time started to see fines as “prices”, so that being late was not *per se* wrong anymore.
[6] See the Appendix.
[7] The random selection of a single round as the basis for payment implies the removal of history effects, whereby a player would perceive herself as rich or poor depending on her results in previous rounds.
[8] The control questions are included at the end of the instructions page.

$$\text{Payoff}(B)_1 = X_1 + 1/5\,(100 - 2X_1 - 2X_2 - 2X_3 - 2X_4 - 2X_5)$$ [9]

At the end of each round, each subject is informed just about her own payoffs, but not about the payoffs of the other members of her group.

In this context, the payoff-maximizing strategy for each player is to withdraw the maximum amount permitted, i.e. 10 euro, as each euro taken away from the common fund only reduces her share by 2/5, i.e. 0.4 euro.[10] Assuming rationality and selfishness, in the Nash equilibrium each group member withdraws 10 euro, so that nothing is left in the common fund and each subject gets a payoff of 10 euro in each round.[11] Clearly, the Nash equilibrium is not Pareto efficient. In particular, if all members refrain from extracting resources from the common fund, they enjoy a payoff of 20 euro each, i.e. twice as much as the one obtained in the Nash equilibrium.

In the C treatment, for each euro withdrawn from the common pool, the subject has to pay 0.1 euro. All the co-payments enter the common fund and are redistributed among group members. Therefore, player 1's payoff is calculated as:

$$\text{Payoff}(C)_1 = X_1 - 0.1\,X_1 + 1/5\,[(100 - 2X_1 - 2X_2 - 2X_3 - 2X_4 - 2X_5) + 0.1\cdot(X_1 + X_2 + X_3 + X_4 + X_5)]$$ [12]

It is easy to see that the payoff-maximizing strategy for each subject still consists in withdrawing 10 euro. The Nash equilibrium strategy profile is the same as in treatment B, while the payoff per subject is still 10 euro per round. In the case where no subject withdraws anything from the common fund, each subject gets a 20 euro payoff like in the baseline treatment.

Finally, in the BC treatment, the first 15 rounds are played with the same rules as in the baseline. Before round 16, all subjects are informed that during the rest of the session they will have to pay 0.1 euro per each euro *withdrawn*, and that all those payments enter the common fund, precisely as in the C treatment.

4. Results

Figure 1 shows the evolution of average individual withdrawals in the three treatments. The line in the middle points out the division between the first 15 rounds and rounds 16-30, where copayment is introduced in the BC treatment.

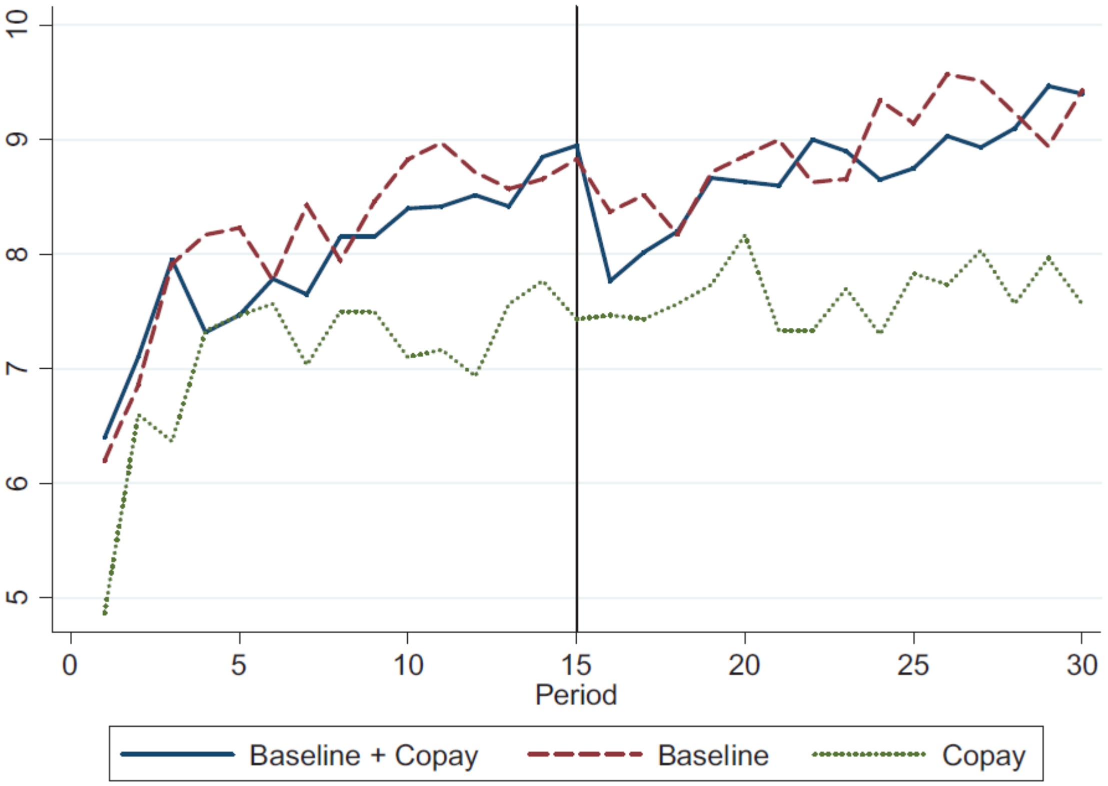
[9] Rather than the non-linear design usually employed in common-pool resource games, we used the linear structure typical of public good games. We believe that linearity ensures that participants can grasp the rules of the game and compute the effects of their choices on outcomes, although quadratic forms allow the incorporation of the increasing marginal costs that may be part of the real life over-consumption problem.

[10] The value 0.4 is also consistent with the marginal rates of substitution between public and private goods used in most public good experiments (see Ledyard, 1995).

[11] Hence in any round that is randomly selected as the basis for the actual payment.

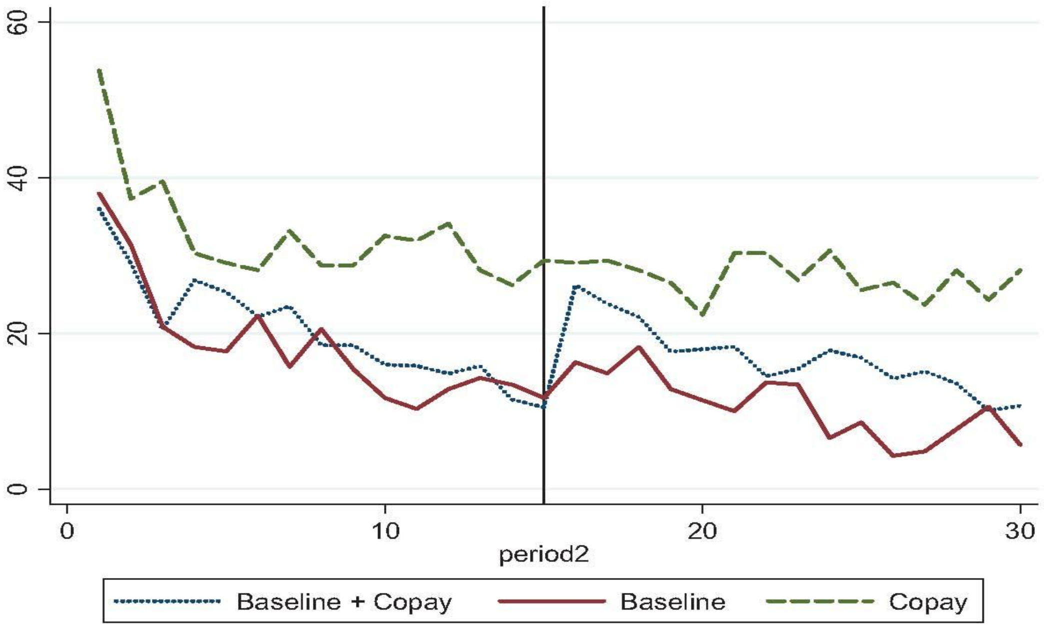
[12] Obvious simplifications (e.g. 0.9 X_1 instead of X_1 - 0.1 X_1) are omitted. As in the instructions, the payment is isolated from the other parts of payoff calculations. This mirrors the fact that in the minds of real-life users, co-payments cannot be subtracted to benefits from healthcare services as the latter cannot be easily quantified in monetary terms.

Figure 1: Evolution of average extraction, by treatment



Considering that in this experiment the cooperative choice consists in refraining from withdrawing funds from the common pool, it is immediate to observe that the pattern during the first rounds mirrors the one typically observed in public good games (Ledyard, 1995), where cooperation decays. In fact, if we look at Figure 2 below, we observe that the corresponding evolution of the common fund is decreasing in the corresponding rounds.

Figure 2: Evolution of the common fund after extraction, by treatment



The standard explanation consists in the fact that some players are conditionally cooperative, so that they start imitating free-riders once they observe their behavior (see e.g. Keser and van Winden, 2000).

Result 1: Withdrawal levels present an increasing trend during the first 15 rounds of the game.

The non-parametric Spearman test, applied to the first half of the session, show that the increase in extraction levels is significant at 1% level in all three treatments (p = 0.000).

Moreover, a non-parametric Wilcoxon test[13] comparing individual withdrawal across rounds, show that withdrawal in round 15 is higher than in round 1 at 1% significance level in all treatments (z = 4.914 and p = 0.001 in treatment B, z = 3.359 and p = 0.0008 in treatment C, and z = 3.279 and p = 0.0000 treatment BC).

Another pattern of our data, already expected, is that no statistically significant difference can be observed between the treatments B and BC in the first 15 rounds, where rules are the same. BC participants do not know, in this phase, that rules are going to change in rounds 16-30.

More interestingly:

Result 2: There is *no single round* where we can observe a significant difference, at any conventional level, in the average withdrawal between treatments B and BC.

[13] All tests mentioned in this paper are two-tailed, as in principle differences could arise in both directions.

This result is checked with a non-parametric Mann-Whitney test round by round. Furthermore, one can immediately visualize in the figure the remarkable similarity between the two treatments. The only partial exception stems from the fact that withdrawals in round 16 in the BC are significantly lower (1% confidence level) than in round 15 (Wilcoxon test, $p = 0.0023$). This may be linked to the phenomenon of the "re-start effect" usually observed in public good games (Ledyard, 1995).

On the other hand, the difference between treatments B and BC is not significant even in round 16 and, especially, average withdrawals quickly converge again two rounds later and are practically equal in the last round (9.428 in B *vs.* 9.400 in BC). Computing the overall average in rounds 16 to 30, they are very close (8.94 in B *vs.* 8.74 in BC), with a small difference (only 0.2) that is precisely the same as in rounds 1 to 15 (8.17 and 7.97, respectively).[14]

This result is somehow surprising, as we could expect some impact from changing the rules of the game, especially considering what follows in result 3. This evidence, instead, shows that the introduction of the co-payment does not help curbing the inefficient appropriation of funds by group members or, at best, has a very short-lived effect.

The following result is obtained:

Result 3: Withdrawal levels are lower in treatment C than in the other two treatments.

Average extraction is lower in treatment C in all rounds, albeit not always at a statistically significant level, as shown by p values in Table 1.

Differences become *more* significant in the last rounds of the experiment. The significance level applying the Mann-Whitney test is 1% in round 30 in both comparisons (C *vs.* B and C *vs.* BC), and in all the last three rounds in C *vs.* BC, as shown in Table 1.

We further corroborate the robustness of the evidence of lower extraction in treatment C, by comparing with the Mann-Whitney test the individual average withdrawals in the last five rounds. In treatment C withdrawals are lower at a 5% significance level with respect to treatment B ($p = 0.024$) and to treatment BC ($p = 0.034$). Significance remains at 5% according to the same test over the last four, three and two rounds in comparison with treatment B, and actually increases in comparison with treatment BC to 1% over the last three and over the last two rounds (see Table 1).

This result is quite striking, as we could expect that if subjects "learn to defect," they should do so in all three treatments, hence differences across them would tend to vanish. On the contrary, they widen following clearly distinct paths highlighted in the following result.

Result 4: In treatments B and BC withdrawals present an increasing trend during the 16-30 rounds, while they do not increase significantly in treatment C as compared to the Baseline.

[14] When looking into the evolution of common funds, the results are slightly different, since co-payments enter in rounds 16 to 30 in treatment BC. However, differences remain non-significant at conventional levels.

In treatments B and BC, the Spearman test shows at 1% significance level that withdrawals increase with the round number over rounds 16-30 (*rho* = 0.91, *p* = 0.000 and *rho* = 0.80, *p* = 0.0004, respectively). In treatment C, the increase is not significant (*rho* = 0.31, *p* = 0.26).

Furthermore, in round 30 withdrawals are significantly higher than in round 16 according to the Wilcoxon test in the Baseline treatment at 5% level (*z* = 2.382 and *p* = 0.0172), and at 1% level in the BC (*z* = 3.565 and *p* = 0.0004). The difference is not significant in the C treatment (*z* = 0.056 and *p* = 0.9954). As a matter of fact, average withdrawals are virtually the same in round 16 (7.467) and in round 30 (7.567). Notice that extraction in round 30 is also higher than in round 15 in treatment BC (*p* = 0.0032). That is, the last round with co-payment features a higher extraction than the last round without it. On the other hand, there is no difference in treatment C between round 15 and 30 (*z* = 0.012 and *p* = 0.996).

A closer observation at the evolution shown in figure 1 shows that when a co-payment exists from the beginning, average extraction increases substantially in the first periods (namely from 4.867 in period 1 to 7.333 in period 4) and then oscillates around 7.5, with a minimum of 6.933 in round 12 and a peak of 8.167 in round 20. There is no evidence of an upward extraction trend.

In the other two treatments, B and BC, the increase is by no means limited to the first rounds and, in particular, goes on in the second part of the session (rounds 16-30). This difference is especially remarkable when comparing the two treatments, C and BC, where the rules are the same from round 16 onwards.

5. Discussion and conclusions

There is a lively debate on the pros and cons of introducing user charges for healthcare services, some of which had traditionally been given for free and financed by general taxation and social security contributions in most European countries.

The most appealing argument in favor of co-payment is based on the need to reduce over-consumption. In our design, we eliminate the issue of imperfect information on the patient's side, in order to see how subjects behave when they can easily perceive that *i)* their own payoffs increase in their appropriation of public resources and *ii)* societal costs are higher than their individual benefits from this appropriation.

Our evidence shows that the introduction of a price for each unit extracted from a common fund does not reduce withdrawals, when subjects have freely accessed the fund in the past. In fact, we observe that withdrawals follow an upward trend even after the introduction of co-payment, with the single exception of the round immediately after the regime change. In fact, extraction levels never differ significantly during the whole experiment with respect to the baseline treatment without co-payment, and they converge to almost identical values in the last round.

While we do not observe any negative demand effect, there is also no sign of a "crowding-out" of potential cooperation due to the presence of a price. Overall, in treatment BC we just find that, as the size of co-payment is small enough to keep intact the trade-off between individual and collective incentives, cooperation decays following a similar path as in the Baseline and, in general, with a trend akin to what is observed in most voluntary contribution mechanisms and public good experiments.

Extraction levels are lower in the treatment where co-payment exists from the outset and the rules are the same as in rounds 16-30 of the BC treatment. It is worth noticing that while one may expect convergence when the rules become identical in the two treatments, differences in withdrawals actually *increase* in rounds 16-30. While in BC, as well as in the B, the average extraction grows to reach more than 90% of the common fund in the final rounds, in treatment C it increases in the first rounds and then oscillates around 75%.

Overall, we can conclude that even a small co-payment that leaves intact the individual incentive to appropriate common funds can curb over-consumption *provided that it exists from the outset*. In this case, we do find a negative demand effect for private appropriation of common funds, despite the fact that payoff maximization would still drive towards the complete depletion of common resources.

Seeing the same issue from another point of view, the habit of playing *without* a price undermines the potential effectiveness of introducing a co-payment.

Our experimental design isolates the effect of co-payment in a context where subjects have complete information regarding the rules of the game and a trade-off exists between individual and collective incentives, where the former would lead towards full extraction of common funds.

We find that the introduction after 15 rounds of a small unitary price does not reduce the amount that group members withdraw from common resources, neither in comparison with the treatment where this price is never introduced nor with respect to the periods in which extraction was costless.

On the other hand, the same price does lead to lower extraction levels when it exists from the beginning of the session. Remarkably, extraction levels in the Copay treatment remain constant after the first few rounds until round 30, the last of the session. On the contrary, extraction increases steadily in the other two treatments, most notably in the last rounds of treatment BC where the price is introduced after round 15.

As said above, it appears that free extraction spoils the future effectiveness of a co-payment in reducing over-consumption.

Some caveats of our analysis are in order. First, we do not address the possibility that individual benefits are smaller than the co-payment imposed. Of course, in this case there is no trade-off: refraining from using public resources is individually optimal. Whether, for instance, over-consumption is so widespread that even a small co-payment (say, 1 euro per visit or, as in Catalonia since recently, per prescription) eliminates the trade-off is an empirical question beyond the scope of this paper.

Another important issue that we do not tackle here is whether co-payments entail the risk of *under-consumption*. It may happen that some people, especially the poor, refrain from using healthcare resources despite the fact that their benefits would more than compensate social costs of providing healthcare services. In this case not only would equity be hampered, but it may even happen that in the long run public expenditures could increase following, for instance, higher costs of hospital services due to worsening health conditions in the population.

Aspects that may limit the external validity of our findings relate directly to our design. For instance, as we aimed at simplicity, we have chosen a linear payoff function, despite the fact that societal costs of over-consumption may well be increasing rather than constant and marginal benefits could be decreasing. However, we think that our simple design is adequate for the analysis of behavior in a situation where users understand the key aspects of the trade-off between individual and collective interests.

The investigation on the effects of introducing a price to services previously offered free of charge is clearly relevant for policy-making, most notably in relation to healthcare. Our findings indicate that, in this case, the reliance on the focal effect of price and on the pain of paying *per se*, even if the quantity is low, does not appear justified. Over-consumption could be significantly reduced if indeed many people are actually using services for really minor problems or with a substantial co-payment amount, entailing the risks described above in relation to efficiency and, especially, equity.

On the other hand, our experimental data highlight the effectiveness of imposing a price to reduce excessive use of services that have *never* been provided for free. It appears that, in those cases, the presence of a co-payment does provide a meaningful indication to refrain from the full appropriation of a common resource.

Further research is needed to ensure the robustness of these findings, for instance, by varying the payoff parameters or the group size. Another research development worth undertaking consists in analyzing the interplay of co-payment with other factors such as income inequality and the launch of campaigns to make people aware of the social costs of funding healthcare services.

We believe that experiments can complement both theoretical advances and the collection of empirical evidence from the field in many aspects related to the economics of health. The possibility to isolate relevant aspects in the lab can help developing sound policy-making towards the sustainable provision of high-quality healthcare services.

References

Drummond, M. and Towse, A. (2011): “Is it time to reconsider the role of patient co-payments for pharmaceuticals in Europe?” *European Journal of Health Economics,* 13: 1-5.

Espin, J. and Rovira, J. (2007): “Analysis of differences and commonalities in pricing and reimbursement systems in Europe,” Final Report. Brussels: European Commission.

Fischbacher, U. (2007): “z-Tree: Zurich toolbox for ready-made economic experiments,” *Experimental Economics*, 10: 171-178.

Frey, B.S. and Oberholzer-Gee, F. (1997): “The cost of price incentives: An empirical analysis of motivation crowding-out,” *American Economic Review*, 87: 746-55.

Gemmill, M.C., Thomson, S. and Mossialos, E. (2008): “What impact do prescription charges have on efficiency and equity? Evidence from high-income countries,” *International Journal for Equity and Health*, 7:12.

Gneezy, U., and A. Rustichini (2000): “A fine is a price,” *Journal of Legal Studies*, 29: 1-18.

Keser, C. and van Winden, F. (2000): “Conditional cooperation and voluntary contribution to public goods,” *Scandinavian Journal of Economics*, 102: 23-39.

Ledyard, J. (1995), “Public goods: A survey of experimental research,” in: Kagel, J. and Roth, A. (eds.), The Handbook of Experimental Economics, Princeton University Press, 111-194.

Manning, W.G. and Newhouse, J.P. (1987): “Health insurance and the demand for medical care,” *American Economic Review*, 77: 251-257.

Mas, N., Cirera, L. and Viñolas, G. (2011): “Los sistemas de copago en Europa, Estados Unidos y Canadá: Implicaciones para el caso español,” Working Paper, IESE Business School.

Pauly, M.V. and Blavin, F.E. (2008): “Moral hazard in insurance, value-based cost sharing, and the benefits of blissful ignorance,” *Journal of Health Economics*, 27: 1407-1417.

Prelec, D. and Loewenstein, G. (1998): “The red and the black: Mental accounting of savings and debt,” *Marketing Science*, 17: 4-28.

Appendix 1

Table 1: Mann-Whitney tests: *z* (*p* values), highlighted when differences are significant at 10%(*), 5%(**) and 1%(***) levels.

Period	Baseline+Copay vs Baseline	Baseline + Copay vs Copay	Baseline vs Copay
1	0.256(0.798)	1.719(0.086)*	1.287(0.198)
2	0.344(0.731)	0.545(0.5855)	0.259(0.795)
3	-0.305(0.760)	1.876(0.061)*	1.727(0.084)*
4	-1.313(0.189)	-0.722(0.470)	0.241(0.810)
5	-1.498(0.134)	-0.283(0.777)	1.07(0.285)
6	0.049(0.961)	-0.132(0.895)	-0.133(0.894)
7	-1.02(0.308)	0.866(0.386)	1.644(0.100)
8	0.075(0.940)	0.658(0.510)	0.513(0.608)
9	-0.914(0.361)	0.275(0.784)	1.004(0.315)
10	-0.866(0.386)	1.718(0.086)*	2.234(0.025)**
11	-1.081(0.279)	1.232(0.218)	1.91(0.056)*
12	-0.084(0.933)	2.246(0.025)**	2.128(0.033)**
13	-0.359(0.7193)	0.484(0.628)	0.767(0.443)
14	0.255(0.799)	1.436(0.151)	1.109(0.267)
15	0.969(0.332)	2.194(0.028)**	1.303(0.193)
16	-0.475(0.635)	0.62(0.535)	1.041(0.298)
17	-0.497(0.619)	0.486(0.627)	0.846(0.398)
18	0.167(0.868)	0.573(0.567)	0.393(0.694)
19	0.509(0.611)	0.573(0.112)	1.027(0.304)
20	0.336(0.737)	0.852(0.394)	0.532(0.595)
21	-0.068(0.946)	2.55(0.011)**	2.541(0.011)**
22	0.73(0.465)	2.446(0.014)**	1.563(0.118)
23	0.092(0.927)	1.984(0.047)**	1.62(0.105)
24	-1.388(0.165)	1.44(0.15)	2.362(0.018)**
25	-0.888(0.374)	1.394(0.163)	1.912(0.056)*
26	-0.448(0.654)	2.486(0.013)**	2.75(0.006)***
27	-0.896(0.37)	1.246(0.213)	1.868(0.062)*
28	0.162(0.871)	2.921(0.003)***	2.468(0.014)**
29	0.349(0.727)	2.631(0.008)***	1.781(0.075)*
30	-0.031(0.975)	2.994(0.003)***	2.612(0.009)***
1-30	-0.687(0.492)	1.212(0.225)	1.515(0.130)
1-15	-0.572(0.567)	1.059(0.289)	1.385(0.166)
16-30	-0.388(0.698)	1.571(0.116)	1.803(0.071)*
26-30	-0.514(0.607)	2.614(0.030)**	2.251(0.024)**
27-30	-0.256(0.798)	2.402(0.016)**	2.258(0.023)**
28-30	0.373(0.709)	2.887(0.004)***	2.219(0.026)**
29-30	0.3(0.764)	2.676(0.007)***	1.98(0.048)**

Appendix 2

Instructions (translated from Spanish)[15]

Welcome to this experiment, thanks a lot for your participation.

From this moment, please turn off your mobile and you shall not communicate in any way with the other participants during the session. Please read these instructions carefully and raise your hand if you have any doubts. Your questions will be answered privately by one of the organizers of this experiment.

Your decisions during this experiment will let you earn an amount of money that will be paid in cash at the end of the session.

In each round, each participant will be assigned to a group of 5 members. None of the members will know the identity of the other members of the group. The group formation process will be carried out randomly and independently at the beginning of each round.

This session will consist of a series of rounds. These instructions are valid throughout all rounds. In case something changes during the session, you will be given specific instructions.

Decision-making

- At the beginning of each round, the group is given a common fund worth 100 euro.
- Each group member can withdraw from the common fund an integer between 0 and 10, to take in into his/her private fund. Each euro that is transferred to a private fund reduces the common fund in 2 euro.
- [Only for *co-payment*] For each unit you withdraw from the common fund, you have to pay 0.1 (a tenth of a euro). For example, if you withdraw 5 euro from the common fund, you have to pay 0.5 euro. This quantity is subtracted from your private fund and it goes to the common fund, which will be shared among the five members of the group.
- This decision is taken at each round simultaneously by each member of the group.
- Therefore, at the end of each round the quantity in the common fund will equal 100 minus the double of all the amounts withdrawn by group members plus one fifth of the amounts extracted by the five members of the group.

  Defining as X_1, X_2, X_3, X_4, X_5 the quantities withdrawn by the five members of the group, the common fund will be:

  $$\text{Common Fund} = 100 - 2X_1 - 2X_2 - 2X_3 - 2X_4 - 2X_5 + 0.1\cdot[X_1 + X_2 + X_3 + X_4 + X_5]$$

[15] For convenience, we only show the instructions of the Co-pay treatment. The instructions for the Baseline are the same except the parts making reference to the 0.1 euro that is paid and its impact on the common fund. The instructions for the Baseline+Copay are the same as in the Baseline. After round 15 an announcement is given that, from the following round, the subject has to pay 0.1 per unit and the amount collected enters the common fund.

- At the end of each round, the quantity left in the common fund will be shared equally among the five members of the group.
- Your outcome in the round will be equal to the sum of your private fund and a fifth of the quantity left in the common fund. For example, if you are member "1" your payoff will be:

$X_1 - 0.1 \cdot X_1 + 1/5\ [100 - 2X_1 - 2X_2 - 2X_3 - 2X_4 - 2X_5 + 0.1(X_1+X_2+X_3+X_4+X_5]$

- At the end of each round we will inform you about your payoff, indicating how much of it comes from your private fund, and how much from the common fund.

Payoffs

At the end of the session a random selection will pick the round that will determine your payoff in the experiment. The amount will be privately paid in cash at the end of the session.

QUESTIONS

1. If you withdraw €7 from the common fund, how much is the reduction in the common fund?
2. For each unit you withdraw from the common fund, how much does each group member lose assuming that the rest of the members do not withdraw? How much do you gain, considering the impact on your share of the common fund and on your private fund?
3. If each member withdraws €0 from the common fund, how much does each group member get at the end of the round?
4. If each member withdraws €5 from the common fund, how much does each group member get at the end of the round?
5. If each member withdraws €10 from the common fund, how much does each group member get at the end of the round?