Do first impressions lead to misperceptions?

Biased perceptions of movie price changes and their effects on cinema demand

Sara Suárez Fernández
Juan Prieto Rodríguez
María José Pérez Villadóniga

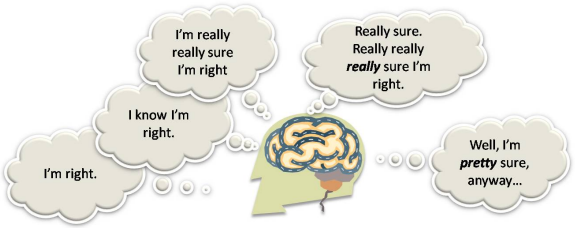
Universidad de Oviedo

Introduction (I)
Aim

To bring light on whether self-declared price perceptions can be determined by psychological bias and the impact level that these perceptions, when erroneous, may have on the observed behavior.

- We study the impact of some price changes, triggered by an increase in the VAT supported by cinema, on the self-declared price perceptions and their effects on the demand.
- We observe that, after four years, average price of cinema was back to its initial level throughout a combination of a higher VAT rate, specific price promotions and some small price cuts.
- However, self-declared perceptions of high prices increased significantly among all socio-economic groups.
- We explore how this combination of price misperceptions and price stability affected actual demand.

Introduction (II)
Cognitive biases



A cognitive bias refers to the systematic pattern of deviation from norm or rationality in judgment:

- **Anchoring or focalism bias** (Tversky and Kahnemann, 1974), human tendency to anchor first-sight information, to rely too much on the first piece of information presented to make the following decisions.
- **Conservatism bias** (Edwards, 1968) in belief revision, in which individuals over-weight the prior information and under-weight the new evidence when they revising their beliefs.
- **Bandwagon effect:** the rate of approval of some belief increases as it is already accepted by others, the probability of individual adoption increasing with respect to the proportion who have already done so.
- **The illusory truth effect:** general tendency to believe information to be truth when stated repeatedly, what makes it appear more likely to be realistic (Lynn, Goldstein and Toppino, 1977).

Empirical analysis: Data (I)

Database: the survey

We use two successive waves of the Cultural Habits and Practices Survey conducted by the Education and Culture Ministry of Spain, 2010-2011 (14,468 obs) and 2014-2015 (15,152 obs).

Our proxy for individual's perceptions is their **declared reasons of non-attendance**, which reveals their view of participation constraints.

- *'Within the last three months, which is the main reason why you have not attended more frequently to the cinema?'*

	2010-2011	2014-2015
Main declared reason of non-attendance	Price: 27.5 per cent	Price: 56.5 per cent
Average cinema attendance (all sample)	1.10 times / last 3 months	1.09 times / last 3 months
Average cinema attendance (non-zeros)	3.34 times / last 3 months	2.85 times / last 3 months

Empirical analysis: Data (II)

The case of cinema in Spain

Ticket prices and box office trends:

In 2012 (the middle of both waves of the survey) Spain had tax actualizations: a general VAT increase and a swap in the goods that compose reduced-tax category.

This change seemed to provoke a strong risen of ticket prices:

- VAT increase from 8% to 21% for cinema tickets.

Cinema attendance

Year	Spectators	Price
2010	101.6	6.52 €
2011	98.34	6.47 €
2012	94.16	6.52 €
2013	78.69	6.43 €
2014	87.99	5.89 €
2015	96.14	5.98 €

Spectators in millions.

AVERAGE price:
box office / spectators

Empirical analysis: Data (III)

Theoretical impact implications

After the impact of the VAT change, the average price and the demand recovered (indeed, average prices dropped). However, ticket prices are not exactly the same as before, since the standard deviation increased.

Although the AVERAGE price in 2010-11 is lower than in 2014-15:

- Exhibitors and distributors designed new commercial strategies including price differentiation policies, therefore...
- People with **high price elasticity** were able to search ways to avoid paying the standard ticket price through promotions, offers and discounts, adapting to cheaper hours or days in order to adjust their demand with cinema's supply.
- People with **inelastic demand** pay the standard higher prices because they cannot adjust their demand to any kind of option for going to the cinema with lower ticket cost.

Those who pay less are those who attend cinema more frequently (attending low cost functions), and they are more conscious of the importance of avoiding regular prices.

Empirical analysis: Method (I)
Two-stage model

Stage I: To test the existence of cognitive biases, we conducted a Probit to model the individual declared boundary of price as the main constraint for cultural participation **before and after tax changes**.

$$\text{na\_price}_{2010} = \text{f}(\text{Creg}, \text{Csoc}, \text{Cedu}, \text{Clab}, \text{i}_{\text{cine}}, \text{na\_price}_{\text{others}}) | (\text{y}_{2010=1})$$

$$\text{na\_price}_{2014} = \text{f}(\text{Creg}, \text{Csoc}, \text{Cedu}, \text{Clab}, \text{i}_{\text{cine}}, \text{na\_price}_{\text{others}}) | (\text{y}_{2014=1})$$

Through the comparison of the predictions of each probit, we aim to identify the effect that the VAT increase (plus the media coverage,….) played upon consumers' subjective perception of the price as a boundary for cinema attendance.

Empirical analysis: Method (II)
Two-stage model

I. We get predictions from the 2014 probit for the people in that sample

II. We get a predicted value for the same people (2014 sample) using 2010 probit estimates to measure what would have happened in 2014-15 if Cultural VAT hadn't changed.

III. We calculated the difference between predictions with 2014-15 and predictions for 2010-11 scenery for 2014-15 individuals.

This allows us to proxy the VAT effect

Since average prices remained stable, significant changes between these predictions could be a signal of the existence of bias in the perceptions-generating process.

Results (I)
Probit results

Cognitive bias will be stronger among those people with a large change between 2014 and 2010 estimated effects.

- For instance:
  - We observe an increase in the estimated constant term, therefore there was a general increase in the probability of declaring prices as the main reason not to attend cinema from 2010 to 2014 (general cognitive bias: bandwagon effect?)
  - There was no gender effect in 2010, however, in 2014 it is more likely that a male declare price as his main constraint comparison with a female peer.
  - The older the individual is, the higher his probability of price-declaration, and this effect is also being reinforced with age.
  - Unlike it happened in 2010, house size in 2014 turned out to be a relevant variable: the higher number of family members, the lower individual propensity to price-reason declaration.

VARIABLES	2010	2014
Man	-0.007	0.052**
	(0.027)	(0.025)
Age	-0.019***	0.005
	(0.005)	(0.005)
Sq Age	-0.004	-0.027***
	(0.005)	(0.005)
Secondary	0.058	0.033
	(0.037)	(0.035)
Vocational	0.034	0.095**
	(0.048)	(0.045)
University	-0.171***	-0.130***
	(0.050)	(0.044)
Employed	-0.020	0.102
	(0.136)	(0.129)
Unemployed	0.298**	0.446***
	(0.138)	(0.131)
Retired	0.145	0.115
	(0.143)	(0.134)
Disabled	0.150	-0.230
	(0.211)	(0.178)
Student	0.066	0.387***
	(0.142)	(0.138)
House work	0.025	0.155
	(0.141)	(0.135)
House size	0.009	-0.025**
	(0.011)	(0.011)
Without family on charge	-0.015	0.004
	(0.034)	(0.032)
Children on charge	0.126***	0.072**
	(0.037)	(0.036)
Young children on charge	-0.282***	-0.169***
	(0.042)	(0.039)
Cinema interest	0.049***	0.054***
	(0.005)	(0.005)
Price declaration propensity	0.220***	0.247***
	(0.008)	(0.006)
PCA LEC MUS AUD	-0.007	-0.005
	(0.024)	(0.022)
PCA LEC MUS AUD SQ	-0.006	0.005
	(0.006)	(0.005)
PCA Reading	0.021	0.009
	(0.018)	(0.015)
PCA Reading Sq	0.003	-0.005
	(0.006)	(0.005)
PCA ORD TAB INT	-0.001	-0.011
	(0.020)	(0.017)
PCA ORD TAB INT SQ	-0.029*	0.007
	(0.017)	(0.015)
Constant	-0.823***	-0.737***
	(0.213)	(0.183)
Log likelihood	-6,932.67	-7,768.87
LR Chi2 (44)	3,164.12	5,216.47
Pseudo R2	0.1858	0.2513
AIC	13,955.34	15,627.74
BIC	14,296.48	15,970.91
Observations	14,486	15,154
Regional Dummies	YES	YES

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Results (II)
Probit: between groups

We calculate the t-tests of difference of means comparing average increments on the price as the main restriction by groups.

- The influence of 2014 conditions is greater for males, highly educated and employed individuals.
- On the contrary, it is less important for people with primary education, students and youths under 30 years old.

T-test results

	Groups	Obs	Mean	t
Gender	Woman	7,770	0.174 (0.001)	-12.16 ***
	Man	7,384	0.192 (0.001)	
Primary studies	Primary	2,789	0.137 (0.002)	-28.51 ***
	Higher	12,365	0.193 (0.001)	
University level	University	2,941	0.210 (0.002)	17.36 ***
	Lower	12,213	0.176 (0.001)	
Students	Student	1,401	0.172 (0.002)	-4.39 ***
	No student	13,753	0.184 (0.001)	
Employed	Employed	6,784	0.215 (0.001)	39.95 ***
	Other	8,370	0.156 (0.001)	
Youths <30	Youth	2,767	0.165 (0.001)	-11.07 ***
	Older	12,387	0.187 (0.001)	
Elder >65	Elder	3,320	0.112 (0.002)	-52.89 ***
	Younger	11,834	0.203 (0.001)	

Standard errors in parentheses
*** p<0,01, ** p<0,05, * p<0,1

Empirical analysis: Method (III)
Two-stage model

Stage II: To study whether changes in price perceptions impacted on behavior, we conducted a ZINB model.

- It deals with the unobserved heterogeneity of each individual's preferences and the excess of zeros within the dependent variable (a great proportion of the population did not assist to the cinema in the last three months).

ZINB models have two components:

- the zero inflation regression
- the count regression equation

$$Y_{CINE} = f(Creg, Csoc, Cedu, Clab, PCA, predict2010, VATeffect)$$

Results (III)
ZINB

In spite of the general concern about high prices, the real change of the effective demand for cinema does not display any excessive variation between 2010 and 2014.

- Two ideas may underlie: the recovery of the first impact and the rational behavior notwithstanding individuals' declarations.
- When comparing the two models, AIC and BIC information criteria improve with the inclusion of both Probit 2010 predictions and 2014-2010 difference.
- In fact, the constant term of the first model loses its significance in favor of the new variables, showing the noteworthy influence they have upon the model.

People with higher propensity to see prices as a problem demand more cinema.

Moreover, those with an estimated larger change also demand more cinema.

- Recency bias: to evaluate something based on recent results and make incorrect conclusions that lead to wrong decisions.

VARIABLES	MODEL A		MODEL B	
	YCIN Count	Inflation	YCIN Count	Inflation
Year 2014-15	-0.165***	-0.451***	-0.284***	0.211*
	(0.030)	(0.064)	(0.064)	(0.124)
Man	-0.010	0.025	0.014	-0.047
	(0.026)	(0.062)	(0.026)	(0.064)
Age	-0.024***	0.045***	-0.025***	0.030**
	(0.007)	(0.015)	(0.007)	(0.015)
Sq Age	0.029***	0.022*	0.034***	0.014
	(0.008)	(0.012)	(0.008)	(0.013)
Secondary	0.209***	-0.700***	0.187***	-0.653***
	(0.058)	(0.084)	(0.058)	(0.086)
Vocational	0.215***	-1.264***	0.190***	-1.183***
	(0.066)	(0.113)	(0.066)	(0.116)
Universitary	0.370***	-2.036***	0.397***	-2.108***
	(0.063)	(0.111)	(0.063)	(0.114)
Employed	0.243*	0.066	0.290**	0.231
	(0.137)	(0.439)	(0.140)	(0.483)
Unemployed	0.119	0.581	0.069	1.160**
	(0.141)	(0.443)	(0.144)	(0.490)
Retired	0.234	0.361	0.261*	0.602
	(0.152)	(0.442)	(0.154)	(0.487)
Disabled	0.188	1.279**	0.230	1.298**
	(0.282)	(0.555)	(0.286)	(0.618)
Student	0.111	-3.234*	0.116	-1.875**
	(0.142)	(1.813)	(0.145)	(0.917)
House work	0.015	0.431	0.063	0.643
	(0.154)	(0.444)	(0.156)	(0.487)
House size	-0.029**	0.119***	-0.027**	0.122***
	(0.013)	(0.028)	(0.013)	(0.029)
Dependent	0.345***	-0.053	0.324***	-0.123
	(0.063)	(0.155)	(0.062)	(0.159)
Without chains	0.114**	0.196**	0.105**	0.169**
	(0.047)	(0.085)	(0.046)	(0.086)
Children chain	0.027	-0.169*	0.004	-0.125
	(0.046)	(0.096)	(0.047)	(0.096)
Strongly chained	-0.209***	0.083	-0.149***	-0.079
	(0.048)	(0.110)	(0.049)	(0.110)
PCA LECMUSAUD	0.018	-0.191***	0.014	-0.212***
	(0.021)	(0.052)	(0.021)	(0.054)
PCA LEC MUS AUD SQ	0.002	0.007	0.002	0.010*
	(0.002)	(0.006)	(0.002)	(0.006)
PCA Reading	0.033**	-0.228***	0.030*	-0.206***
	(0.017)	(0.039)	(0.017)	(0.039)
PCA Reading Sq	0.002	0.026*	0.003	0.024*
	(0.004)	(0.015)	(0.003)	(0.012)
PCA ORDTABINT	0.034*	-0.072*	0.031*	-0.105**
	(0.019)	(0.041)	(0.019)	(0.043)
PCA ORD TAB INT SQ	0.031**	-0.010	0.029*	-0.013
	(0.016)	(0.038)	(0.016)	(0.039)
Predict probit 2010			0.551***	-2.859***
			(0.101)	(0.308)
Diff 2014-2010			0.229	-2.638***
			(0.272)	(0.592)
Constant	0.496**	-1.866***	0.372	-1.067
	(0.224)	(0.658)	(0.228)	(0.679)
alpha	1.165***		1.178***	
	(0.038)		(0.037)	
Wald chi2(44,46)	517.24		549.95	
AIC	71740.72		71321.85	
BIC	72495.74		72110.06	
Observations	29,640		29,640	
Regional Dummies	YES		YES	

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Conclusions (I)

The differential effects are relevant due to cognitive biases and a higher dispersion among prices on supply...

It seems that consumers have changed their price perception influenced by media and real VAT increase:

Media exposition to the idea of 'high priced tickets'

+

Constant remind of avoiding standard price

Perceptions are not fully rationally, cognitive biases play an important role here...

Illusory truth effect + Bandwagon effect + Anchoring bias

However, at the end average prices were settle down to the initial level... If we were on a STANDARD RATIONAL MODEL, we might expect no differential effects for the average cinema attendance between 2010-11 and 2014-15.

Conclusions (II)

Since prices remained stable but price perceptions increased, this could be a signal of the existence of bias in the perceptions-generating process.

- We may expect also this kind of bias in the observed behavior, linked to the price misperceptions.

What we actually observed is a much more stable demand with results that, at the mean, fit better on the neoclassical economic model.

However, this average stability on the demand does not imply that the individual behaviors remained unchanged. In fact, we observed that the larger the rise in price perceptions, the larger the probability of being a cinema attendant.

- These people are more aware of the "official" prices and *work hard* to be eligible for the promotions
- The demand is comprised of high price elasticity individuals who search price reductions and those with inelastic demand who pay the standard ticket price.