The Effect of Co-insurance on Outpatient Consumption of Drugs

Mario Martínez-Jiménez [1], Pilar García-Gómez[2], Jaume Puig-Junoy[3]

[1]Department of Health Research, Lancaster University
[2]Erasmus School of Economics (EUR)
[3]Department of Economics and Business (UPF)

XXXIX Spanish Health Economics Association Conference, Albacete, 12-14 June 2019

Background

- Medication expenditure accounted between **6.6 %** and **28.8 %** of health spending in OECD countries in 2017 *(OECD,2017)*.
- Spain was the **second** European country with the **highest number of drug users** in 2010 *(Richards, 2010)*.
- To increase the extent of **co-insurance** has been one of the most **common measures** in order to control public health spending between 2008 and 2011 *(López-Valcárcel et al., 2016)*.

- Impact of the co-insurance in the Spanish NHS on the consumption of medicines:
  - **decreased** the total number prescriptions *(Puig-Junoy et al., 2014)*.
  - reduction on the number of DDDs explained more by the **exclusion of some drugs** from provision than to the cost-charing increase *(Hernández-Izquierdo et al., 2019)*.

- Mixed empirical evidence from other settings about the effect of cost-sharing on the consumption of prescription drugs.

Motivation

- Identify the effects of **changes in co-insurance schemes** on the **propensity to consume medicines** through exploiting a *survey database (ESCA)*.
- Examine if a change in pharmaceutical cost-sharing rate caused a **substitution effect** between the propensities to consume **prescribed** and **over-the counter drugs**.
- Approach the **consequences on health** of changes in co-insurance schemes through analyzing the heterogeneous impacts by **seven therapeutic groups of drugs**.

Aim of the paper

To assess the effect of **the Royal Decree Law 16/2012** on the **propensity to consume medicines** and **testing the heterogeneity** of the effects by **therapeutic groups** in a Spanish region, Catalonia.

Policy Background: The Royal Decree Law 16/2012

Population group	Regional level: Euro per prescription from 23/06/2012 to 15/01/2013 with an annual upper limit	Central government co-insurance until to September 2012	Changes in drug co-insurance rates at a national level from October 2012	Central government co-insurance with annual limit from October 2012
Non-contributory and disability pensions	No	0 %	0 %	NA
Pensioners Income €100,000	Yes		10 %	Yes
Pensioners Income > €100,000	Yes		60 %	Yes
Unemployed without benefits	Yes	40 %	0 %	NA
Working population Income ≤ €18,000	Yes		40 %	No
Working population €18,000 <Income ≤ €100,000	Yes		50 %	No
Working population Income>€100,000	Yes		60 %	No

[1] In the case of low co-insurance drugs, all users with a positive co-insurance rate as of July 2012 pay 10 %, with a maximum aunt per prescription. Until June 2012, only active workers and their beneficiaries paid this 10 %, with a maximum amount per prescription. Y income, NA not applicable as these groups did not face co-insurance as of October 2012.

Data

- Dataset used was the years 2010-2014 of the **Catalan Health survey (ESCA)**, which is a **cross-sectional** population-based face-to-face *survey* and it is collected *twice per year*.
- Individuals aged *over 20 years* have been analyzed.
- Representative sample of **8,840 interviewee**.
- Highly individualised information related to: (i) *personal characteristics*, such as professional status and household monthly incomes; (ii) *health* and *the use of health care services*; and (iii) the number of consumption **prescribed** and **over-the-counter medicines**, and by the **therapeutic types**.

Study Design

- We define **one control** and **three intervention** groups:

% of patient contribution to cost-sharing pharmaceutical price			
	Before 2012-II	**After 2012-II**	**Characteristics**
Control group: Low-income working population	40 %	40 %	Income $\leq$ €18,000
Intervention group 1: Middle-income working population	40 %	50 %	€18,000 $\prec$ Income $\leq$ €100,000
Intervention group 2: Low/middle-income pensioners	0 %	10 %	Income $\leq$ €100,000
Intervention group 3: Unemployed without benefits	40 %	0 %	Unemployed without benefits

- We make *three assumptions/restrictions*:
  - We drop the students and house-maker observations.
  - We restrict our dataset for those aged over 20 years.
  - We consider the household monthly incomes to be the best possible proxy of the individual yearly income.

Outcome Variables

- **Consumption of prescription drugs:** measured as individual have consumed any type of *prescribed drugs* during the last two days.
- **Consumption of over-the-counter drugs:** measured as individual have consumed medicines by *own initiative* or *advised by the pharmacist* during the last two days
- **Consumption of seven therapeutic types of prescribed drugs:** 1. Alimentary and metabolism system, 2. Cardiovascular system, 3. Genito-urinary and sex hormones, 4. Anti-infective, 5. Mental disorders, 6. Sensory organs, and 7. Other types of drugs: Dermatological, Musculoskeletal system, and Respiratory. *(WHO Anatomic Therapeutic Chemical)*

$\Rightarrow$ All outcome variables are **binary** that take the numeric value 1 if an individual has consumed drugs and 0 otherwise.

Model Specification

We apply a quasi-experimental **Difference-in-Difference (DiD)** method:

$$Y_{it} = \beta_0 + \beta_1 IG_{it} + \beta_2 IG_{it} * P_t + \beta_3 D_t + \theta X_{it} + \varepsilon_i \quad (1)$$

	Meaning
Y_{it}	Binary variable for prescribed, OTC, or any of the 7 types of therapeutic drugs
IG_{it}	Dummy variable that identifies the intervention group
$IG_{it} * P_t$	Interaction between intervention group and a dummy for being in the post-treated period
D_t	Time effect where t is each cross-section period
X_{it}	Set of explanatory variables: gender, age, social status and educational attainment

- We estimate *Equation (1)* for each outcome variables separately, *with* and *without* explanatory variables, and using *robust standard errors*.
- All estimations are adjusted by **sampling weights** that indicate the weight to be attached to each observation.
- β_2 is the estimate of interest *(DiD estimator)*.
- We estimate a **Linear Probability Model (LPM)**, as well as,
  - $\Rightarrow$ a **Non-linear logistic model** giving evidence that the linear model fits fine because of the reported Average Marginal Effects (AMEs) are similar to those estimated coefficients from the LPM.

Common Trends Assumption

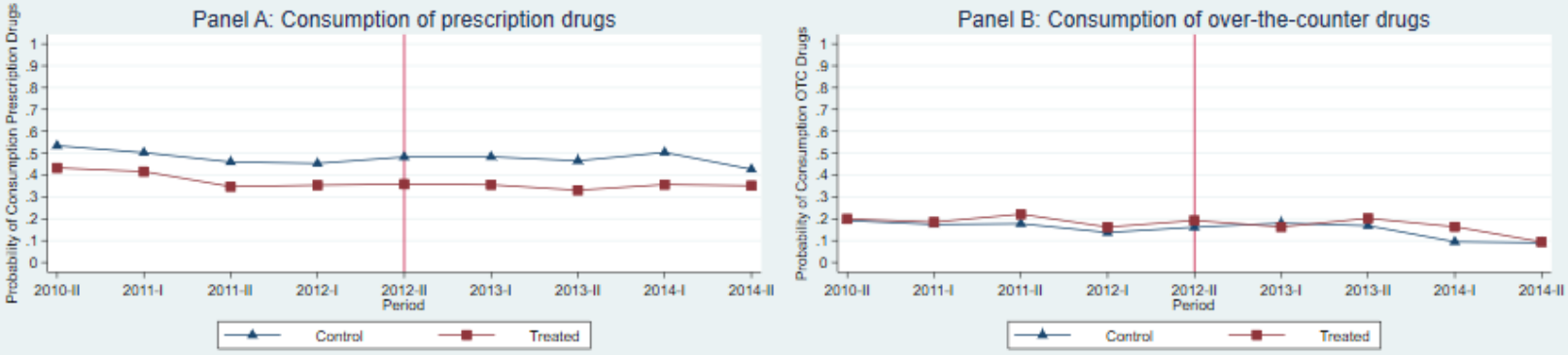
- The key identifying assumption in DiD models is that *the treatment units have similar trends to the control units in the absence of reform's intervention.*

- We analyse its plausibility for each intervention group both (i) **graphically** and (ii) **statistically**.

$$Y_{it} = \beta_0 + \beta_1 IG_{it} + \beta_2 IG_{it} * P_t + \beta_3 IG_{it} * PeriodPre2012_t + \beta_3 D_t + \theta X_{it} + \varepsilon_i \quad (2)$$

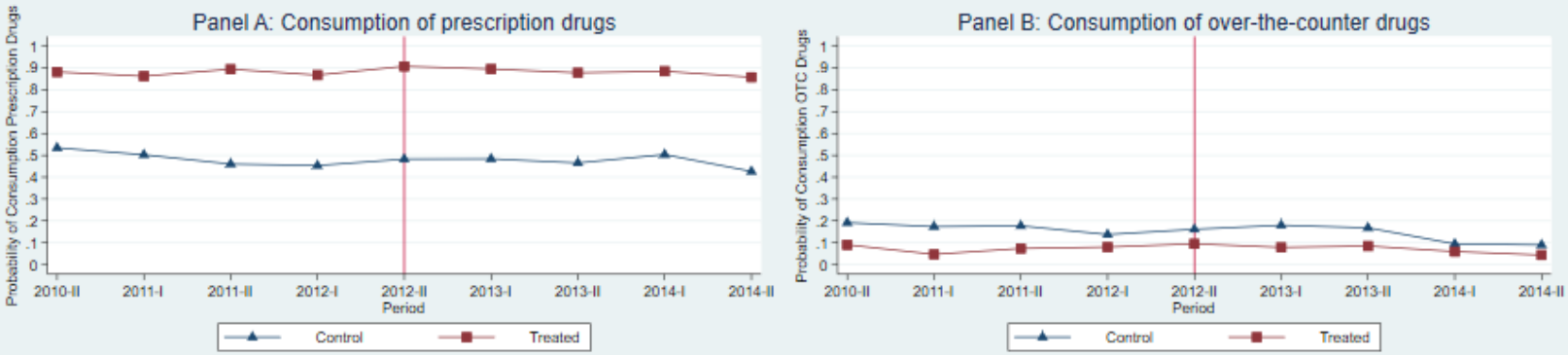
  $\Rightarrow$ The results provide evidence that the average proportions of drugs consumption of each intervention group before the 2012 reform do not follow different trends than our control group

Intervention Group 1: Middle-income working population



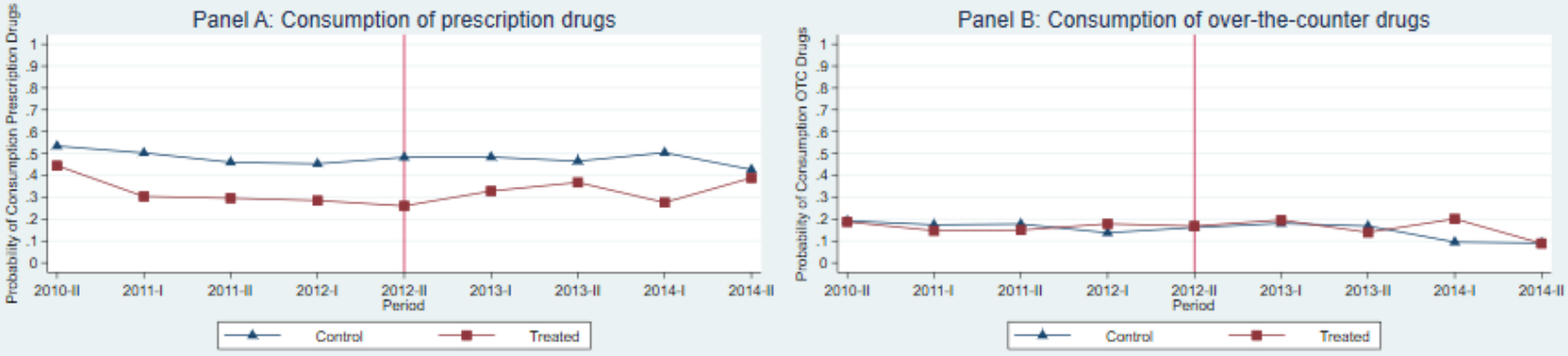
Control: population unaffected by the reform; Treated: population affected by the 2012 reform

Intervention Group 2: Low/middle income pensioners



Control: population unaffected by the reform; Treated: population affected by the 2012 reform

Intervention Group 3: Unemployed without benefits



Control: population unaffected by the reform; Treated: population affected by the 2012 reform

Impact on propensity to consume prescription drugs

PROPENSITY TO CONSUME PRESCRIPTION DRUGS						
	Middle-income workers	**Middle-income workers**	**Low/Midd.-income pensioners**	**Low/Midd.-income pensioners**	**Unemployed w/o benefits**	**Unemployed w/o benefits**
Co-insurance effects	-0.038	-0.044	0.013	0.015	0.031	0.019
	(0.028)	(0.027)	(0.028)	(0.027)	(0.042)	(0.042)
Time Period	x	x	x	x	x	x
Individual Controls		x		x	x	x
Adjusted R-squared	0.002	0.103	0.248	0.318	0.006	0.110
Observations	5,187	5,112	3,703	3,639	2,793	2,715

[1] Robust standard errors are in parentheses. Significance levels: ***p<0.01;** p<0.05; * p<0.1.
[2] Results are from Diff-in-Diff estimates from linear probability regression. All regressions include: gender/age groups dummies, educational level dummies and social class dummies.

Impact on propensity to consume over-the-counter drugs

PROPENSITY TO CONSUME OVER-THE-COUNTER DRUGS						
	Middle-income workers	**Middle-income workers**	**Low/Midd.-income pensioners**	**Low/Midd.-income pensioners**	**Unemployed w/o benefits**	**Unemployed w/o benefits**
Co-insurance effects	0.012	0.014	0.014	0.011	-0.014	-0.021
	(0.022)	(0.023)	(0.022)	(0.022)	(0.026)	(0.028)
Time Period	x	x	x	x	x	x
Individual Controls		x		x	x	x
Adjusted R-squared	0.008	0.024	0.027	0.051	0.007	0.024
Observations	5,187	5,112	3,703	3,639	2,793	2,715

[1] Robust standard errors are in parentheses. Significance levels: ***p<0.01;** p<0.05; * p<0.1.

[2] Results are from Diff-in-Diff estimates from linear probability regression. All regressions include: gender/age groups dummies, educational level dummies and social class dummies.

Impact on propensity to consume prescription drugs by therapeutic groups

PROPENSITY TO CONSUME PRESCRIPTION DRUGS BY THERAPEUTIC GROUPS						
	Middle-income workers	Middle-income workers	Low/Midd.-income pensioners	Low/Midd.-income pensioners	Unemployed w/o benefits	Unemployed w/o benefits
PANEL 1: CONSUMPTION OF ALIMENTARY & METABOLISM DRUGS						
Co-insurance	-0.014	-0.015	0.019	0.017	0.027	0.017
effects	(0.017)	(0.016)	(0.030)	(0.030)	(0.024)	(0.028)
PANEL 2: CONSUMPTION OF CARDIOVASCULAR SYSTEM DRUGS						
Co-insurance	-0.015	-0.016	0.040	0.048	0.032	0.033
effects	(0.024)	(0.023)	(0.030)	(0.029)	(0.035)	(0.035)
PANEL 3: CONSUMPTION OF GENITO-URINARY & SEX HORMONES DRUGS						
Co-insurance	-0.013	-0.014	-0.002	-0.006	0.004	-0.002
effects	(0.011)	(0.011)	(0.009)	(0.008)	(0.015)	(0.016)
PANEL 4: CONSUMPTION OF ANTI-INFECTIVE DRUGS						
Co-insurance	0.003	0.002	0.011	0.012	0.004	0.001
effects	(0.009)	(0.010)	(0.016)	(0.017)	(0.016)	(0.016)
PANEL 5: CONSUMPTION OF MENTAL DISORDERS DRUGS						
Co-insurance	0.018	0.017	0.026	0.029	0.048**	0.049**
effects	(0.014)	(0.014)	(0.023)	(0.023)	(0.024)	(0.023)
PANEL 6: CONSUMPTION OF SENSORY ORGANS SYSTEM DRUGS						
Co-insurance	0.006	0.006	-0.035*	-0.036*	0.002	-0.005
effects	(0.008)	(0.009)	(0.017)	(0.021)	(0.012)	(0.013)
PANEL 7: CONSUMPTION OF OTHER THERAPEUTIC GROUPS OF PRESCRIPTION DRUGS						
Co-insurance	-0.028**	-0.030**	-0.014	-0.014	-0.016	-0.017
effects	(0.013)	(0.013)	(0.023)	(0.023)	(0.017)	(0.018)
Time Period	x	x	x	x	x	x
Individual Controls		x		x		x
Observations	5,187	5,112	3,703	3,639	2,793	2,715

Sensitivity Analyses

We perform **fifth sensitivity tests**:

1. *First Sensitivity Analysis:* Treatment and control groups used. Figure
2. *Second Sensitivity Analysis:* Controlling for yearly incomes variable.
3. *Third Sensitivity Analysis:* Isolating the impact from the Euro per prescription period.
4. *Fourth Sensitivity Analysis:* Dynamic effects of the co-insurance intervention.
5. *Fifth Sensitivity Analysis:* Controlling for health conditions variables.

Discussion

The main findings show that:

- The new co-insurance policy was **not effective** in changing the **propensity to consume drugs** for any of the three intervention groups.
- *No evidence of the substitution effects*.
- The new co-insurance schemes have **consequences on health** depending on the **therapeutic group**:
  1. A *huge decrease in the co-insurance* (from 40 % to free full coverage) leads to **increases** on the average propensity to consume drugs for **mental disorders**, including antidepressant and sleeping pills.
  2. An *increase of 10 percentage points in the co-insurance rate* (from 40 % to 50 %) leads to **decreases** on the average propensity to consume other therapeutic drugs, such as **dermatological** and **respiratory medicines**.
  3. Raising the co-insurance rate from free full coverage to 10 % leads to reduce the average propensity to consume sensory organs drugs (such as eye and ear related-drugs).

Further research

- Give more evidence on the impact of new co-insurance schemes by running **subsampled models** by **paediatric population** and **age groups**.
- Obtaining enough data to look at the *substitution effect* by **therapeutic groups**.
- Design similar model incorporating the **stockpiling effects**.

THANKS FOR YOUR ATTENTION

QUESTIONS?

m.martinezjimenez@lancaster.ac.uk

Trends of average probabilities of consumption drugs during the studied period by intervention groups.

Source: Own figures based on the Catalan Health Survey (ESCA) data from 2010 to 2014.

Back