# Web Appendix for:

Medicare Part D: Are Insurers Gaming the Low Income Subsidy Design?

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## 1) Data

The dataset was assembled from data made publicly available by CMS (Center for Medicare and Medicaid Services). In particular, data on enrollment (in June, for the years 2006-2011) at plan level (both total and for LIS enrollees) was downloaded from:

`http://www.cms.gov/Research-Statistics-Data-and-Systems/`
`Statistics-Trends-and-Reports/MCRAdvPartDEnrolData/index.html`.

The *Crosswalk Files* available from the same web site were used to link plans through the years. Premiums and plan financial characteristics are from the *Premium Files*:

`http://www.cms.gov/Medicare/Prescription-Drug-Coverage/`
`PrescriptionDrugCovGenIn/index.html`.

Plans formulary and pharmacy network are from the FRF (*Formulary Reference Files*):

`https://www.cms.gov/PrescriptionDrugCovContra/03_RxContracting_`
`FormularyGuidance.asp`

Demographic characteristics for the 34 geographic regions that are used in the regressions presented in this Web Appendix (see Table A.4 and A.5) are the only ancillary data source and were obtained from:

`https://usa.ipums.org/usa/`.

A guide on how to replicate the dataset is reported in the "Dataset_and_DoFiles" folder posted on the web site of the *American Economic Review*.

# 2) Robustness Checks and Additional Results

This section briefly describes the robustness checks regarding the market-level analysis that are presented in the tables that follow.

- Table A.2 illustrates the results of the placebo analysis. The first column indicates the instrument used for the IV analysis. The top row reports the baseline 2SLS estimates from Table 8, where the instrument is: $\text{MA-PD}_{2006}$*$\text{Post}_{2009}$. The following two blocks report the estimates obtained when the instrument is constructed by replacing the dummy equal to 1 for the years from 2009 onward ($Post_{2009}$) either with the dummy for 2008 onward ($Post_{2008}$) or with the dummy for 2010 onward ($Post_{2010}$). These estimates are the ones commented regarding the first robustness check presented in the main text.

- Table A.3 presents two alternative sets of instruments. For the results in the first row, four instruments are created by taking the product of the MA-PD share in 2006 with year dummies (one for each of the years 2007-2010). These estimates are nearly identical to the 2SLS obtained with a single instrument and presented in Table 8. Moreover, the LIML estimates closely follow the 2SLS estimates. The second set of results is obtained by replacing the penetration of the MA-PD in 2006 with the penetration of the pre existing Medicare Advantage in 2003, or 2004, or 2005. Since Medicare Advantage was introduced in 2003, these are all the years in which Medicare Advantage existed prior to the introduction of Medicare D. Table A.3 estimates are the ones commented regarding the second robustness check presented in the main text.

- Table A.4 and Table A.5 present respectively OLS and IV regressions that complement those reported in Table 8 by expanding the set of covariates considered. Columns [1] to [4] include demographic variables, columns [5] to [9] formulary variables and columns [10] to [14] include market concentration variables. Following Dafny et. al. (2012), I consider one period lagged market concentration measures, but contemporaneous demographic and formulary characteristics. As regards the demographic variables, some weak evidence of a negative effect of the median number of years of schooling

(Med. Schooling) is found. The effect of the average household income (expressed in $100,000s) and the average population age, as well as that of other demographic characteristics not reported, is not significant. As regards the formulary variables, I consider three variables in addition to the average number of active ingredients included in the models of Table 8, they are: the percentage of active ingredients offered out of the 100 most active ingredients (Top Drugs), the percentage of these top active ingredients that are assigned to tier 1 or 2 and the percentage of these top active ingredients for which usage restrictions are imposed. The estimates support the statements in the paper about the lack of clear evidence on the association of these variables with premium growth. The last set of estimates concerns measures of market concentration. The models in column [10]-[11] exclude the lagged HHI and replace it with a C4 index given by the sum of the market shares of the four largest insurers. Columns [11]-[12] add a second C4 index given by the sum of the LIS market shares of the four largest insurers. These estimates confirm that $wLIS4$ is the concentration measure more clearly associated with premium growth. Table A.5 is the IV counterpart of Table A.4. The estimates in this table are the ones commented regarding the third robustness check presented in the main text.

- Table A.6 analyzes the effects of $wLIS4$ on two alternative measures of premium growth. The first measure considered is identical to *b.premium* with the only differences that: $(i)$ instead of using the basic premium it uses the portion of the premium paid by Medicare (i.e., the minimum between the basic premium and the LIPSA) and $(ii)$ the weights associated with each plan equal their share of LIS enrollees in $(j,t)$. Thus, while the *b.premium* measures the average premium, regardless of who pays it, this variable measures the average premium paid by Medicare.[1] I denote the variable in levels as *m.premium* and in log differences as $\Delta ln(m.premium)$. The second measure considered is again identical to *b.premium* with the only differences that: $(i)$ instead of

[1]With this variable I seek to capture the part of the premium of LIS enrollees for which Medicare pays. Medicare pays at most up to the LIPSA, thus if the basic premium is below LIPSA, Medicare pays it in full. Otherwise it pays an amount equal to the LIPSA. *m.premium* is the average (weighted by LIS enrollment) of what Medicare pays for each plan. As regards plans with a premium above LIPSA, they cannot enroll randomly assigned LIS enrollees (with the exception due to the "de minims" policy), but they do enroll part of the LIS receivers that have opted out of the program.

using the basic premium it uses the total premium and (*ii*) the weights associated with each plan equal their share of regular enrollees in $(j, t)$. Thus, this variable measures the average total premium paid by regular enrollees. I denote the variable in levels as *r.premium* and in log differences as $\Delta ln(r.premium)$. Therefore, $\Delta ln(m.premium)$, considers only the premium that Medicare pays, while $\Delta ln(r.premium)$, considers the total (i.e., basic plus enhanced components) premium paid by regular enrollees. The main finding is that there is a difference between the effect of $wLIS4$ on these two measures of premiums. While the coefficients for the Medicare paid premium are larger than those estimated for the basic premium and always significant at the 1% level, for the regular enrollees total premium the estimate is smaller in size and never significant at the 5% level. These results seem to suggest that LIS distortions are particularly harmful for the part of the program cost faced directly by Medicare. The lack of a clear effect on the total premium faced by regular enrollees suggests that insurers pricing strategies might be able to exploit the endogeneity of the LIS by specifically targeting the LIS enrollees population. However, since the regulation forbids plans open only to one type of enrollees, targeting is imperfect and so regular enrollees are also likely to suffer from the LIS distortion. For instance, this could happen if regular enrollees were to enroll more frequently in basic plans absent LIS manipulations, but they do not so because of the high premium of basic plans driven by the LIS distortion.

- Table A.7 present additional results involving a different measure of premium manipulability. In particular, I use the classification of the seven insurers into those responsive and non responsive to the LIS. Summing all the LIPSA weights of the basic PDPs offers by the 5 firms responsive to the LIS and repeating the OLS regressions of Table 8 with this variable replacing $wLIS4$, I find weak evidence of a positive association with the basic premium growth. The estimated coefficient is significant (at the 10% level), but only when time trends are not included in the specification. In contrast, the same estimates repeated for the two firms unresponsive to the LIS, Coventry and Humana, show that the effect is never statistically significant and has a smaller magnitude than that estimated for the other group of firms. These results are consistent with the presence of a positive effect on premium growth of the LIPSA weights concentration. However, they are based on a classification of insurers that is rather coarse given the difficulty of listing all the possible LIS manipulation strategies and to judge their distortive effects.

- Table A.8 repeats the OLS and IV analysis presented in the text using basic bids instead of basic premiums. This analysis is interesting because insurers submit bids and not premiums. The latter are the difference between bids and the direct subsidy that CMS calculates by multiplying the (enrollment weighted) average of the bids by a number less than one linked to the expected amount of reinsurance. Although the broad patters of bids and premiums are very similar, premium changes can be amplified or depressed relative to bid changes to differences in the expected amount of reinsurance for the year. To ensure that this type of effect is driving my findings, I replicated the analysis in the paper using bids instead of premiums. As Table A.8 shows, the results are broadly in line with those present din the paper. The LIS concentration measure is positively associated with bids growth. The significance of the stimulates and the relative size of the coefficients reveal a close match between these estimates and those in terms of premiums and, hence, support the validity of the main estimates presented.

- Finally, I present the calculation of a baseline value for a bound on the downward pressure exercised by the enrollment weighting system on the premiums of non-manipulating plans. This simple calculation entails calculating the change in premiums for the plans subject to the strongest downward pressure.[2] This tentative assessment leads to finding a bound of the downward pressure effect on premiums growth of -10 percent. Although, as mentioned in the main text, there are many caveats to this calculation it is nevertheless suggestive of the potential relevance of this pressure.

[2] To implement this calculation, I combine ideas from the model presented in this web appendix with the findings in Table 5 in the paper. In particular, I identify the market where the largest number of LIS enrollees potentially subject to random reassignment and, hence, where the stakes associated to pricing within the LIPSA are the highest. This is a proxy for the quantity $F$ in the model and I obtained it from the data by summing the inflow of new LIS enrollees in each market with the number of LIS receivers enrolled by insurers losing their eligibility. Then, based on the findings in Table 5 I select those plans that are unlikely to manipulate the LIS because of a LIPSA weight below average, but nevertheless are very interested in LIS enrollees due to a high (at least 70%) ratio of LIS over regular enrollees in $t-1$. The result of this exercise is that the market with the largest $F$ is that of California in 2011 and that the growth rate of premiums for the plans satisfying the above criteria is -10 percent. I am grateful to one of the referees for suggesting to combine the model and the results in Table 5 to analyze the effects of the downward pressure.

# 3) Pricing with Exogenous LIPSA

Consider the case of a monopolist insurer offering one single plan to both regular and LIS enrollees. Demand by regular enrollees is linear in the premium, $p$. LIS enrollees, of which there is a mass $F$, are assigned to the firm if its premium is no higher than an exogenously given amount, $P_{LIS}$. The resulting kinked demand that the firm faces is given by:

$$p(q) = A - q + \mathbf{1}_{\{p \leq P_{LIS}\}} F$$

Further suppose the firm faces the following piecewise linear marginal cost curve:

$$MC(q) = \begin{cases} B - \alpha q & \text{if} \quad q < A - P_{LIS} \\ c_{LIS} & \text{if} \quad A - P_{LIS} \leq q < A + F - P_{LIS} \\ B - \alpha(q - F) & \text{if} \quad q \geq A + F - P_{LIS} \end{cases}$$

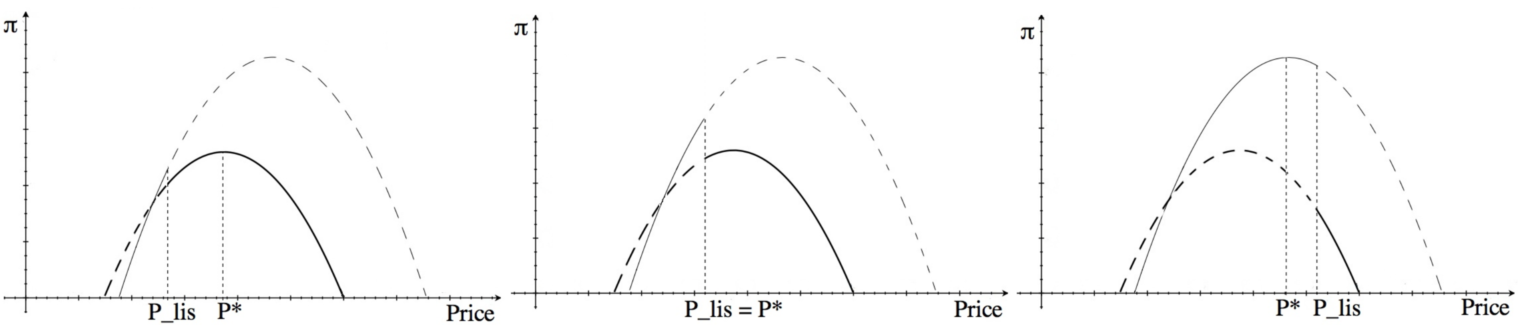
Where $c_{LIS}$ is the average per enrollee cost of LIS enrollees and $(B, \alpha)$ parameterize marginal costs of the regular enrollees. I express both demand and costs as a function $q$ to conform to the simple graphical illustration of insurance pricing in the $(Q, P)$ space (see, for instance, Einav, Finkelstein and Cullen (2010)). Therefore, adverse/advantageous in this framework depends on the sign of $\alpha$. If $\alpha > 0$, then demand is positively correlated with cost and the firm experiences adverse selection. Alternatively when $\alpha < 0$ the firm experiences advantageous selection. If $\alpha = 0$, marginal costs of the regular enrollees are constant. Given marginal costs, average costs can be computed to determine the equilibrium premium. What complicates the equilibrium analysis of this otherwise textbook example of linear demand and supply is the fact that when $p < P_{LIS}$ the firm cannot deny enrolling LIS enrollees and so $q \in (A - P_{LIS}, A + F - P_{LIS})$ are not in the firm choice set.

To analyze equilibria and perform comparative statics in the presence of adverse, advantageous or lack of selection plays no major role. Thus, I present only the results for the case of adverse selection, i.e. $\alpha > 0$.[3] The model has some uninteresting equilibria in which $P_{LIS}$ is extremely high so that the firm prices exactly at $P_{LIS}$, even if this entails enrolling only LIS enrollees, or in which $P_{LIS}$ is extremely low so that the firm prices its plan only to regular enrollees essentially ignoring the LIS market. Abstracting from these extreme cases, the equilibrium analysis entails comparing the profits when pricing above or below the $P_{LIS}$ cutoff. I indicate the former profit equation as $\pi_+$ and the latter as $\pi_-$. Their expressions are as follows and their graphical representation is given in Figure A.1:

$$\pi_+ = (p - B + \frac{\alpha}{2}(A - p + 1))(A - p),$$

$$\pi_- = (p - \frac{A-p}{A+F-p}(B - \frac{\alpha}{2}(A - p + 1)) - \frac{F}{A+F-p}c_{lis})(A + F - p).$$

Figure A.1: Premium of Basic PDPs




**(a):** $P_{lis} = 6.7$ **(b):** $P_{lis} = 8$ **(c):** $P_{lis} = 13$

The parameter values used in this example are: $A = 15$, $B = 8$, $\alpha = .7$, $F = 3$, $c_{lis} = 6$. The three plots differ only in terms of the value of $P_{lis}$. The thin line is $\pi_-$, the profit curve when the firm enrolls LIS receivers. The thick curve is $\pi_+$. Feasible profits are those associated with solid portions of $\pi_-$ or $\pi_+$.

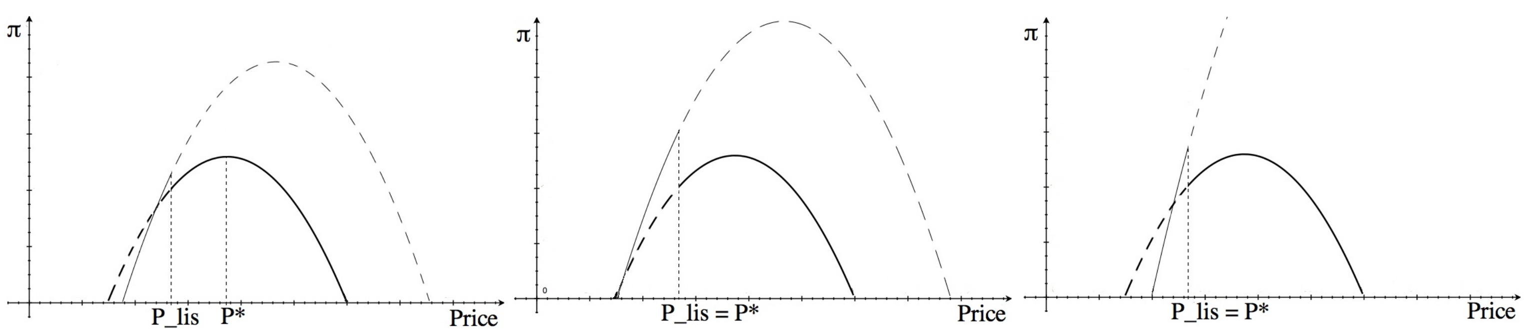
Focusing on plot (a) of Figure A.1, the thin solid line represents $\pi_-$, the profits associated with premiums at or below $P_{LIS}$, where the firm enrolls both regular and LIS enrollees. The thick solid line represents $\pi_+$, the profits associated with premiums above $P_{LIS}$, where the firm enrolls only regular enrollees. In plot (a), given $P_{lis} = 6.7$, the highest profits attainable under $\pi_+$ exceed those under $\pi_-$ and the equilibrium premium, $P^*$, is the same that the firm would choose if LIS enrollees did not exist. However, in plot (b) we see that when the

[3] In particular, I assume $\alpha = 0.7$ and also that $A > B > 0$, more precisely $A = 15$, $B = 8$.

subsidy increases to $P_{lis} = 8$, then $P^* = P_{lis} = 8$. In this case, the LIS subsidy induces the firm to **lower** its price relative to a world without LIS enrollees. In plot (c) an even higher subsidy induces the firm to **increase** its price relative to a world without LIS enrollees.

I illustrate two comparative static exercises in Figure A.2. Plot (a) is the baseline case and is identical to plot (a) in the previous figure. Relative to this baseline case, panel (b) shows that when the average cost of an LIS enrollee declines from 6 to 4, profits under $\pi_-$ improve and, in this example, the change is sufficient to move the equilibrium to $P^* = P_{lis} = 6.7$. Similarly, panel (c) shows that when the mass of LIS enrollees increases from 3 to 8, but $c_{lis}$ is kept equal to 6, the shape of the $\pi_-$ curve changes: in the example this change is sufficient to move the equilibrium to $P^* = P_{lis} = 6.7$.

Figure A.2: Premium of Basic PDPs




**(a):** $P_{lis} = 6.7$, $c_{lis} = 6$, $F = 3$ **(b):** $P_{lis} = 6.7$, $c_{lis} = 4$, , $F = 3$ **(c):** $P_{lis} = 6.7$, $c_{lis} = 6$, $F = 8$

The parameter values used in this example are: $A = 15$, $B = 8$, $\alpha = .7$ and $P_{lis} = 6.7$. The three plots differ only in terms of either $c_{lis}$, panel (b), or $F$, panel (c). The thin line is $\pi_-$, the profit curve when the firm enrolls LIS receivers. The thick curve is $\pi_+$. Feasible profits are only those associated with solid portions of $\pi_-$ or $\pi_+$.

Interestingly, there is also one perverse case in which the market fails. When $P_{lis}$ is high enough so that the insurer would be unable to enroll unsubsidized enrollees by pricing above $P_{lis}$, but, at the same time, the cost of subsidized enrollees is high enough to cause severe losses, then the insurer would not like to offer its plan. Although this stylized example cannot capture the complexity of the strategic environment in which firms compete, it is suggestive of the type of incentives faced by an insurer that takes the LIPSA as given.[4]

[4]Moreover, it suggests that even if the data show evidence of excessing bouncing at the LIPSA, determining a counterfactual distribution is rather complex as it requires knowledge of various parameters that are not directly observable. At the LIPSA both the size and the composition of the mass of enrollees changes.

Table A.1: Extended Summary Statistics

Panel (a): Statistics by Plan, 2006-2011 - Plan-level Data

| | Basic PDPs | | | | Enhanced PDPs | | | | MA-PDs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean | SD | p50 | N | Mean | SD | p50 | N | Mean | SD | p50 | N |
| Basic Premium | 32.86 | 10.18 | 31.50 | 4,882 | 36.92 | 16.19 | 34.40 | 4,606 | 15.36 | 13.45 | 15.10 | 18,373 |
| Total Premium | 32.86 | 10.18 | 31.50 | 4,882 | 53.45 | 22.20 | 47.70 | 4,606 | 19.92 | 17.40 | 21 | 18,373 |
| Deductible | 204.5 | 119.9 | 265 | 4,882 | 18.83 | 53.50 | 0 | 4,606 | 58.12 | 111.2 | 0 | 18,373 |
| Tot. Enrollment | 15,946 | 32,212 | 4,294 | 4,882 | 4,449 | 11,181 | 1,121 | 4,606 | 2,294 | 6,359 | 283 | 18,373 |
| LIS Enrollment | 9,536 | 18,840 | 2,288 | 4,844 | 446.1 | 1,147 | 125 | 4,553 | 531.1 | 1,736 | 46 | 17,790 |
| No. Top Drugs | 83.06 | 15.95 | 88 | 4,511 | 88.29 | 12.42 | 91 | 3,996 | 88.18 | 13.37 | 91 | 13,714 |
| No. Drugs | 3,735 | 1,090 | 3,383 | 4,511 | 3,941 | 1,246 | 3,416 | 3,996 | | | | |
| No. Pharmacies | 1,819 | 1,334 | 1,482 | 4,511 | 1,788 | 1,338 | 1,463 | 3,996 | | | | |

Panel (b): Statistics by Insurer, 2006-2011 - Plan-level Data

| | Total Enrollment Share in PDPs | | | | | | Share of LIS out of Total Enrollees | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
| United Health Group | 0.23 | 0.29 | 0.24 | 0.26 | 0.27 | 0.28 | 0.30 | 0.35 | 0.25 | 0.25 | 0.26 | 0.23 |
| Humana | 0.22 | 0.21 | 0.19 | 0.12 | 0.10 | 0.14 | 0.25 | 0.25 | 0.20 | 0.11 | 0.09 | 0.14 |
| Universal American | 0.03 | 0.03 | 0.03 | 0.10 | 0.11 | 0.11 | 0.79 | 0.70 | 0.69 | 0.68 | 0.69 | 0.73 |
| CVS Caremark | 0.03 | 0.02 | 0.03 | 0.06 | 0.07 | 0.08 | 0.89 | 0.86 | 0.72 | 0.81 | 0.79 | 0.84 |
| Coventry Health Care | 0.04 | 0.04 | 0.05 | 0.09 | 0.10 | 0.07 | 0.41 | 0.38 | 0.37 | 0.30 | 0.30 | 0.30 |
| WellCare Health Plans | 0.06 | 0.06 | 0.06 | 0.05 | 0.04 | 0.06 | 0.79 | 0.72 | 0.69 | 0.57 | 0.53 | 0.60 |
| CIGNA | 0.01 | 0.02 | 0.02 | 0.02 | 0.03 | 0.03 | 0.57 | 0.56 | 0.69 | 0.63 | 0.58 | 0.71 |
| | **Total Number of PDPs** | | | | | | **Total Number of Basic PDPs** | | | | | |
| | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
| United Health Group | 72 | 170 | 170 | 168 | 108 | 70 | 72 | 102 | 102 | 97 | 72 | 35 |
| Humana | 93 | 102 | 102 | 102 | 102 | 95 | 31 | 34 | 34 | 34 | 40 | 34 |
| Universal American | 186 | 99 | 102 | 204 | 166 | 68 | 95 | 33 | 34 | 68 | 66 | 34 |
| CVS Caremark | 68 | 102 | 102 | 102 | 170 | 102 | 68 | 34 | 34 | 34 | 68 | 68 |
| Coventry Health Care | 115 | 160 | 196 | 170 | 170 | 68 | 47 | 69 | 60 | 68 | 68 | 34 |
| WellCare Health Plans | 102 | 102 | 68 | 68 | 66 | 66 | 34 | 68 | 68 | 34 | 33 | 33 |
| CIGNA | 102 | 102 | 102 | 102 | 102 | 68 | 34 | 34 | 53 | 34 | 68 | 34 |

Panel (c): Statistics by Market, 2007-2011 - Market-level Data

| | Mean | SD | p50 | N | | Mean | SD | p50 | N |
|---|---|---|---|---|---|---|---|---|---|
| *b.premium* | 25.38 | 5.88 | 26.07 | 170 | HHI | 0.12 | 0.04 | 0.11 | 170 |
| *m.premium* | 25.54 | 5.15 | 25.90 | 170 | MA-PD Share 2006 | 0.21 | 0.15 | 0.19 | 170 |
| *r.premium* | 28.83 | 7.58 | 30.24 | 170 | MA Share 2005 | 0.11 | 0.10 | 0.08 | 170 |
| $\Delta$ ln(*b.premium*) | 0.06 | 0.08 | 0.05 | 170 | MA Share 2004 | 0.11 | 0.10 | 0.07 | 170 |
| *wLIS4* | 0.42 | 0.25 | 0.48 | 170 | MA Share 2003 | 0.11 | 0.10 | 0.07 | 170 |

Panel (a) reports summary statistics for the plans in the plan-level data. Statistics are shown separately for basic PDPs, enhanced PDPs and MA-PDs. The sample includes all PDPs and MA-PDs excluding MA private fee-for-service plans, PACE programs under section 1894, 800 series plans, and 1876 (Cost Plans). Plans with enrollment of less than 11 customers are reported as zero enrollment.

Panel (b) reports separately for each sample year and for each one of the seven largest insurers: *(i)* the share of total enrollment into PDPs (top left corner), *(ii)* the share of LIS enrollees relative to all the insurer enrollees (top right corner), *(iii)* the total number of PDPs offered (bottom left corner) and *(iv)* the total number of basic PDPs offered (bottom right corner).

Panel (c) reports summary statistics for the market-level data. The sample period goes from 2007 to 2011. The value of the HHI, rescaled to range from 0 to 1, is lagged by one year. Premiums are in nominal terms.

Table A.2: Robustness: Placebo Analysis

| Instrument | | [1] | [2] | [3] | [4] | [5] | [6] |
|---|---|---|---|---|---|---|---|
| $MA\text{-}PD_{2006}$*$Post_{2009}$ | 2SLS | 0.543** | 0.616* | 0.688*** | 0.632* | 0.749*** | 0.701** |
| | | [0.237] | [0.324] | [0.242] | [0.336] | [0.252] | [0.314] |
| | $R^2$ | 0.433 | 0.609 | 0.401 | 0.617 | 0.403 | 0.625 |
| Placebo Analysis: | | | | | | | |
| $MA\text{-}PD_{2006}$*$Post_{2008}$ | 2SLS | 0.363 | 0.774 | 0.566 | 2.540 | 0.627 | 1.893 |
| | | [0.585] | [0.828] | [0.507] | [5.604] | [0.548] | [3.429] |
| | $R^2$ | 0.467 | 0.575 | 0.439 | | 0.444 | 0.103 |
| $MA\text{-}PD_{2006}$*$Post_{2010}$ | 2SLS | 0.466** | 0.186 | 0.780* | 0.884 | 0.811* | 0.432 |
| | | [0.198] | [1.287] | [0.412] | [2.274] | [0.402] | [1.927] |
| | $R^2$ | 0.452 | 0.633 | 0.364 | 0.559 | 0.378 | 0.652 |
| Controls | | | | | | | |
| Region Time Trends | | No | Yes | No | Yes | No | Yes |
| Unemployment, HHI | | No | No | Yes | Yes | Yes | Yes |
| Plan Age, Pharmacies, Drugs | | No | No | No | No | Yes | Yes |
| Number of Excluded Instruments | | 1 | 1 | 1 | 1 | 1 | 1 |
| Observations | | 170 | 170 | 170 | 170 | 170 | 170 |

Significance: *** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered by region. All estimates include region and year fixed effects. For the MA Share 2004, model [2] could not be estimated via 2SLS because the variance-covariance matrix was highly singular due to the sparsity of the covariates used.

Table A.3: Alternative Instruments

| Instrument | | [1] | [2] | [3] | [4] | [5] | [6] |
|---|---|---|---|---|---|---|---|
| MA-PD$_{2006}$*Year | 2SLS | 0.540** | 0.568* | 0.650*** | 0.607* | 0.724*** | 0.696** |
| | | [0.198] | [0.333] | [0.213] | [0.350] | [0.216] | [0.337] |
| | LIML | 0.543** | 0.573* | 0.657*** | 0.615* | 0.729*** | 0.701** |
| | | [0.200] | [0.337] | [0.218] | [0.357] | [0.219] | [0.341] |
| | F-stat. | 26.670 | 22.700 | 18.990 | 19.760 | 20.410 | 14.600 |
| | $R^2$ | 0.954 | 0.978 | 0.965 | 0.98 | 0.965 | 0.982 |
| MA$_{2005}$*Year | 2SLS | 0.384** | 0.113 | 0.422** | 0.139 | 0.481*** | 0.181 |
| | | [0.167] | [0.382] | [0.184] | [0.393] | [0.174] | [0.380] |
| | LIML | 0.393** | 0.108 | 0.444** | 0.134 | 0.501** | 0.177 |
| | | [0.178] | [0.391] | [0.206] | [0.403] | [0.192] | [0.386] |
| | F-stat. | 10 | 9.134 | 14.5 | 13.4 | 17.44 | 10.07 |
| | $R^2$ | 0.955 | 0.976 | 0.963 | 0.979 | 0.964 | 0.98 |
| MA$_{2004}$*Year | 2SLS | 0.371** | . | 0.402** | 0.114 | 0.460*** | 0.157 |
| | | [0.159] | . | [0.175] | [0.393] | [0.166] | [0.379] |
| | LIML | 0.379** | 0.0861 | 0.421** | 0.108 | 0.478** | 0.153 |
| | | [0.169] | [0.391] | [0.196] | [0.401] | [0.183] | [0.384] |
| | F-stat. | 9.92 | . | 13.65 | 12.7 | 16.4 | 9.606 |
| | $R^2$ | 0.956 | . | 0.964 | 0.979 | 0.965 | 0.98 |
| MA$_{2003}$*Year | 2SLS | 0.366** | 0.0839 | 0.396** | 0.105 | 0.454*** | 0.149 |
| | | [0.157] | [0.382] | [0.173] | [0.392] | [0.165] | [0.378] |
| | LIML | 0.375** | 0.0771 | 0.415** | 0.0991 | 0.471** | 0.145 |
| | | [0.168] | [0.392] | [0.194] | [0.401] | [0.182] | [0.384] |
| | F-stat. | 9.963 | 8.744 | 13.09 | 12.21 | 15.54 | 9.176 |
| | $R^2$ | 0.957 | 0.977 | 0.964 | 0.979 | 0.965 | 0.98 |
| Controls | | | | | | | |
| Region Time Trends | | No | Yes | No | Yes | No | Yes |
| Unemployment, HHI | | No | No | Yes | Yes | Yes | Yes |
| Plan Age, Pharmacies, Drugs | | No | No | No | No | Yes | Yes |
| Number of Excluded Instruments | | 4 | 4 | 4 | 4 | 4 | 4 |
| Observations | | 170 | 170 | 170 | 170 | 170 | 170 |

Significance: *** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered by region. All estimates include region and year fixed effects. For the MA Share 2004, model [2] could not be estimated via 2SLS because the variance-covariance matrix was highly singular due to the sparsity of the covariates used.

Table A.4: Additional Controls (OLS Regressions)

| | Demographics [1]-[4] | | | | Drugs [5]-[9] | | | | Market Concentration [10]-[14] | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| VARIABLES | [1] | [2] | [3] | [4] | [5] | [6] | [7] | [8] | [9] | [10] | [11] | [12] |
| $wLIS4$ | 0.301*** | 0.337** | 0.294*** | 0.336** | 0.263*** | 0.353* | 0.267*** | 0.392** | 0.359** | 0.321*** | 0.351*** | 0.385** |
| | [0.077] | [0.142] | [0.078] | [0.143] | [0.090] | [0.186] | [0.093] | [0.180] | [0.152] | [0.073] | [0.077] | [0.166] |
| Med. Schooling | 0.021 | -0.270*** | 0.021 | -0.272*** | | | | | | | | |
| | [0.013] | [0.034] | [0.016] | [0.037] | | | | | | | | |
| House. Income | | | -0.119 | -0.115 | | | | | | | | |
| | | | [0.367] | [0.369] | | | | | | | | |
| Age | | | -0.025 | -0.007 | | | | | | | | |
| | | | [0.055] | [0.083] | | | | | | | | |
| Top drugs | | | | | 0.013* | 0.006 | 0.025* | 0.026 | | | | |
| | | | | | [0.007] | [0.011] | [0.014] | [0.019] | | | | |
| Tier 1-2 top drug | | | | | -0.010 | -0.007 | -0.011* | -0.006 | | | | |
| | | | | | [0.006] | [0.010] | [0.006] | [0.011] | | | | |
| Restricted drug | | | | | -1.443* | -0.507 | -1.200 | 0.524 | | | | |
| | | | | | [0.784] | [1.404] | [0.735] | [1.249] | | | | |
| Firm C4 | | | | | | | | | -0.036 | -0.012 | 0.012 | -0.009 |
| | | | | | | | | | [0.071] | [0.059] | [0.071] | [0.080] |
| Firm LIS C4 | | | | | | | | | | | -0.044 | -0.048 |
| | | | | | | | | | | | [0.050] | [0.089] |
| HHI | 0.101 | 0.129 | 0.094 | 0.099 | 0.146 | 0.050 | 0.196 | -0.022 | | | | |
| | [0.470] | [0.693] | [0.483] | [0.647] | [0.443] | [0.730] | [0.454] | [0.643] | | | | |
| Unemployment | -0.0072 | -0.023 | -0.008 | -0.022 | -0.015 | -0.025 | -0.012 | -0.023 | -0.022 | -0.007 | -0.010 | -0.025 |
| | [0.011] | [0.024] | [0.011] | [0.024] | [0.011] | [0.023] | [0.012] | [0.023] | [0.024] | [0.011] | [0.013] | [0.024] |
| Plan Age | -0.070 | -0.056 | -0.068 | -0.053 | -0.072 | -0.059 | -0.070 | -0.061 | -0.054 | -0.071 | -0.081 | -0.056 |
| | [0.067] | [0.106] | [0.069] | [0.111] | [0.054] | [0.108] | [0.056] | [0.110] | [0.102] | [0.070] | [0.071] | [0.105] |
| Pharmacies | -0.183 | -1.330 | -0.189 | -1.320 | 0.350 | -0.996 | 0.233 | -1.220 | -0.911 | -0.077 | -0.086 | -1.090 |
| | [1.320] | [1.580] | [1.360] | [1.610] | [1.310] | [1.610] | [1.250] | [1.520] | [1.590] | [1.310] | [1.300] | [1.720] |
| Drugs | -0.290 | -0.243 | -0.279 | -0.253 | | | -1.298 | -2.840 | -0.336 | -0.318 | -0.324 | -0.331 |
| | [0.356] | [0.474] | [0.348] | [0.477] | | | [1.282] | [2.066] | [0.435] | [0.346] | [0.351] | [0.439] |
| Constant | 0.108 | 1.947*** | 2.063 | 2.534 | 0.170 | 0.223 | 0.315 | 0.779* | 0.457 | 0.290 | 0.328 | 0.456 |
| | [0.370] | [0.456] | [4.125] | [5.990] | [0.324] | [0.395] | [0.343] | [0.416] | [0.431] | [0.331] | [0.334] | [0.432] |
| Region | | | | | | | | | | | | |
| Time Trends | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes |
| Observations | 170 | 170 | 170 | 170 | 170 | 170 | 170 | 170 | 170 | 170 | 170 | 170 |
| $R^2$ | 0.489 | 0.671 | 0.490 | 0.671 | 0.516 | 0.656 | 0.522 | 0.668 | 0.655 | 0.488 | 0.492 | 0.657 |

Significance: *** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered by region. All estimates include region and year fixed effects. All odd numbered columns include region specific time trends. The set of controls is described in the text of the Web Appendix. Pharmacies is in 10,000s.

## Table A.5: Additional Controls (IV Regressions)

| | Demographics [1]-[4] | | | | Drugs [5]-[9] | | | | | Market Concentration [10]-[14] | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| VARIABLES | [1] | [2] | [3] | [4] | [5] | [6] | [7] | [8] | [9] | [10] | [11] | [12] |
| $wLIS4$ | 0.724*** | 0.682* | 0.725*** | 0.641* | 0.644*** | 0.760** | 0.725*** | 0.911* | 0.660* | 0.697*** | 0.692*** | 0.685** |
| | [0.220] | [0.337] | [0.224] | [0.315] | [0.211] | [0.366] | [0.216] | [0.454] | [0.336] | [0.205] | [0.192] | [0.301] |
| Med. Schooling | -0.007 | -0.251*** | -0.004 | -0.253*** | | | | | | | | |
| | [0.021] | [0.031] | [0.024] | [0.043] | | | | | | | | |
| House. Income | | | 0.115 | -0.072 | | | | | | | | |
| | | | [0.445] | [0.399] | | | | | | | | |
| Age | | | 0.004 | 0.035*** | | | | | | | | |
| | | | [0.007] | [0.009] | | | | | | | | |
| Top drugs | | | | 1.050 | 0.477 | 2.260 | 3.080 | | | | | |
| | | | | [0.698] | [1.230] | [1.560] | [2.550] | | | | | |
| Tier 1-2 top drug | | | | -1.020 | -0.884 | -1.110* | -0.788 | | | | | |
| | | | | [0.605] | [0.919] | [0.636] | [0.985] | | | | | |
| Restricted drug | | | | -1.042 | -0.318 | -0.686 | 1.128 | | | | | |
| | | | | [0.862] | [1.594] | [0.774] | [1.295] | | | | | |
| Firm C4 | | | | | | | | -0.071 | -0.061 | -0.0015 | -0.019 | |
| | | | | | | | | [0.073] | [0.063] | [0.078] | [0.096] | |
| Firm LIS C4 | | | | | | | | | | -0.094 | -0.088 | |
| | | | | | | | | | | [0.064] | [0.110] | |
| HHI | -0.467 | -0.456 | -0.461 | -0.326 | -0.321 | -0.572 | -0.357 | -0.819 | | | | |
| | [0.558] | [0.665] | [0.553] | [0.691] | [0.517] | [0.723] | [0.552] | [0.769] | | | | |
| Unemployment | -0.013 | -0.022 | -0.013 | -0.023 | -0.019 | -0.025 | -0.017 | -0.024 | -0.024 | -0.011 | -0.018 | -0.028 |
| | [0.013] | [0.027] | [0.013] | [0.028] | [0.013] | [0.026] | [0.014] | [0.028] | [0.028] | [0.013] | [0.015] | [0.026] |
| Plan Age | -0.106 | -0.063 | -0.106 | -0.060 | -0.104* | -0.071 | -0.109* | -0.077 | -0.065 | -0.100 | -0.116* | -0.068 |
| | [0.064] | [0.108] | [0.065] | [0.110] | [0.054] | [0.118] | [0.058] | [0.129] | [0.106] | [0.064] | [0.067] | [0.110] |
| Pharmacies | -0.196 | -1.470 | -0.207 | -1.500 | 0.263 | -1.200 | 0.113 | -1.550 | -1.04 | -0.071 | -0.092 | -1.350 |
| | [0.000146] | [1.560] | [1.480] | [1.570] | [1.490] | [1.640] | [1.490] | [1.550] | [1.600] | [1.410] | [1.370] | [1.760] |
| Drugs | -0.406 | -0.471 | -0.399 | -0.439 | | | -1.470 | -3.854 | -0.470 | -0.375 | -0.378 | -0.450 |
| | [0.471] | [0.489] | [0.464] | [0.470] | | | [1.531] | [2.571] | [0.440] | [0.433] | [0.433] | [0.454] |
| Constant | 0.408 | 2.600*** | 0.000 | 0.000 | 0.450 | 1.307 | 0.481 | 1.458* | 1.108* | 0.333 | 0.504 | 1.098* |
| | [0.573] | [0.612] | [0.000] | [0.000] | [0.514] | [0.955] | [0.532] | [0.818] | [0.560] | [0.475] | [0.497] | [0.551] |
| Region | | | | | | | | | | | | |
| Time Trends | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes |
| Observations | 170 | 170 | 170 | 170 | 170 | 170 | 170 | 170 | 170 | 170 | 170 | 170 |
| $R^2$ | 0.413 | 0.644 | 0.412 | 0.648 | 0.457 | 0.619 | 0.436 | 0.610 | 0.631 | 0.424 | 0.444 | 0.636 |

Significance: *** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered by region. All estimates include region and year fixed effects. All odd numbered columns include region specific time trends. The set of controls is described in the text of the Web Appendix. Pharmacies is in 10,000s.

Table A.6: Regressions for the Medicare Paid and Regular Enrollees Premiums

| | OLS | | | | 2SLS | | | |
|---|---|---|---|---|---|---|---|---|
| Dep. Var. | Δ ln(*m.premium*) | | Δ ln(*r.premium*) | | Δ ln(*m.premium*) | | Δ ln(*r.premium*) | |
| | [1] | [2] | [3] | [4] | [5] | [6] | [7] | [8] |
| $wLIS4$ | 0.504*** | 0.599*** | 0.147 | 0.219 | 1.125*** | 1.174*** | 0.441* | 0.345 |
| | [0.119] | [0.176] | [0.088] | [0.142] | [0.219] | [0.314] | [0.257] | [0.309] |
| HHI | -0.194 | 0.470 | 0.344 | -0.158 | -1.008 | -0.486 | -0.042 | -0.367 |
| | [0.369] | [1.063] | [0.651] | [0.890] | [0.680] | [1.239] | [0.680] | [0.832] |
| Unemployment | 0.003 | -0.006 | -0.015 | -0.048 | -0.006 | -0.005 | -0.019 | -0.048 |
| | [0.010] | [0.024] | [0.013] | [0.029] | [0.013] | [0.028] | [0.014] | [0.030] |
| Plan Age | -0.039 | -0.105 | -0.142 | -0.087 | -0.089 | -0.116 | -0.165 | -0.089 |
| | [0.073] | [0.150] | [0.116] | [0.178] | [0.080] | [0.147] | [0.115] | [0.177] |
| Pharmacies | 0.025 | -1.040 | 0.047 | 0.049 | 0.021 | -1.310 | 0.072 | 0.043 |
| | [1.080] | [1.460] | [1.220] | [1.620] | [1.460] | [1.750] | [1.330] | [1.620] |
| Drugs | -0.587 | -0.326 | -0.205 | -0.481 | -0.754* | -0.701 | -0.284 | -0.563 |
| | [0.396] | [0.449] | [0.527] | [0.630] | [0.427] | [0.599] | [0.623] | [0.616] |
| Constant | 0.397 | 0.292 | 0.282 | 0.667 | 0.668 | 0.937 | 0.410 | 0.808 |
| | [0.400] | [0.469] | [0.493] | [0.559] | [0.457] | [0.651] | [0.591] | [0.556] |
| Region | | | | | | | | |
| Time Trends | No | Yes | No | Yes | No | Yes | No | Yes |
| $R^2$ | 0.515 | 0.688 | 0.400 | 0.594 | 0.370 | 0.621 | 0.368 | 0.591 |
| Observations | 170 | 170 | 170 | 170 | 170 | 170 | 170 | 170 |

Significance: *** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered by region. All estimates include region and year fixed effects. For readability Pharmacies has been divided by 10,000.

Table A.7: Regressions for Groups of Insurers

| | United Health, Universal American CVS Caremark, WellCare, CIGNA | | | | Humana, Coventry | | | |
|---|---|---|---|---|---|---|---|---|
| | [1] | [2] | [3] | [4] | [5] | [6] | [7] | [8] |
| *Sum Firms wLIS* | 0.077* | 0.061 | 0.079** | 0.063 | 0.038 | 0.038 | 0.039 | 0.040 |
| | [0.039] | [0.079] | [0.039] | [0.082] | [0.031] | [0.038] | [0.031] | [0.040] |
| HHI | 0.274 | 0.458 | 0.241 | 0.389 | 0.407 | 0.298 | 0.380 | 0.263 |
| | [0.399] | [0.471] | [0.428] | [0.738] | 0.459] | [0.601] | [0.492] | [0.884] |
| Unemployment | -0.002 | -0.027 | -0.001 | -0.024 | -0.005 | -0.024 | -0.005 | -0.022 |
| | [0.010] | [0.026] | [0.010] | [0.024] | [0.011] | [0.025] | [0.011] | [0.022] |
| Plan Age | | | -0.048 | -0.046 | | | -0.047 | -0.053 |
| | | | [0.066] | [0.117] | | | [0.075] | [0.114] |
| Pharmacies | | | -0.256 | -0.707 | | | -0.169 | -0.866 |
| | | | [1.310] | [1.690] | | | [1.300] | [1.790] |
| Drugs | | | -0.229 | -0.136 | | | -0.217 | -0.095 |
| | | | [0.355] | [0.516] | | | [0.285] | [0.520] |
| Constant | -0.157** | -0.031 | 0.115 | 0.092 | -0.117 | -0.063 | 0.140 | 0.020 |
| | [0.066] | [0.101] | [0.355] | [0.539] | [0.078] | [0.098] | [0.297] | [0.521] |
| Region | | | | | | | | |
| Time Trends | No | Yes | No | Yes | No | Yes | No | Yes |
| Observations | 170 | 170 | 170 | 170 | 170 | 170 | 170 | 170 |
| $R^2$ | 0.460 | 0.624 | 0.467 | 0.628 | 0.450 | 0.627 | 0.456 | 0.632 |

Significance: *** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered by region. All estimates include region and year fixed effects. The dependent variable in all regressions is the basic premium, $\Delta$ ln($b.premium$). The main independent variable is $Firms\ wLIS$ which is the sum of the LIPSA weights of all the basic PDPs offered in the region-year by the insurers reported at the top of the corresponding columns. Thus, for the first four regressions this variable equals the sum of the LIPSA weights of the basic PDPs of United Health, Universal American, CVS Caremark, WellCare, CIGNA. For the last four columns, it is the equivalent measure calculated summing the weights of Humana and Coventry. All regressions are estimated via OLS. Specifications corresponding to column [1] to [4] (and [5] to [8]) corresponded to those in columns [3] to [6] of Table 8. For readability Pharmacies has been divided by 10,000.

Table A.8: Regressions for the Growth of the Basic Bids

| **OLS** | [1] | [2] | [3] | [4] | [5] | [6] |
|---|---|---|---|---|---|---|
| $wLIS4$ | 0.082*** | 0.078* | 0.082*** | 0.073* | 0.090*** | 0.090** |
| | [0.018] | [0.040] | [0.023] | [0.043] | [0.025] | [0.042] |
| HHI | | | 0.029 | 0.157 | -0.011 | 0.044 |
| | | | [0.134] | [0.151] | [0.140] | [0.203] |
| Unemployment | | | -0.118 | -0.961 | -0.099 | -0.782 |
| | | | [0.365] | [0.722] | [0.371] | [0.686] |
| Plan Age | | | | | -0.014 | -0.014 |
| | | | | | [0.020] | [0.030] |
| Pharmacies | | | | | 0.001 | -0.119 |
| | | | | | [0.388] | [0.469] |
| Drugs | | | | | -0.136 | -0.127 |
| | | | | | [0.106] | [0.139] |
| Constant | -0.122*** | -0.128*** | -0.124*** | -0.118*** | 0.018 | 0.005 |
| | [0.004] | [0.014] | [0.022] | [0.031] | [0.106] | [0.135] |
| Region | | | | | | |
| Time Trends | No | Yes | No | Yes | No | Yes |
| $R^2$ | 0.896 | 0.931 | 0.897 | 0.934 | 0.900 | 0.936 |
| Observations | 170 | 170 | 170 | 170 | 170 | 170 |

| **2SLS** | [1] | [2] | [3] | [4] | [5] | [6] |
|---|---|---|---|---|---|---|
| $wLIS4$ | 0.196** | 0.134* | 0.227*** | 0.154** | 0.246*** | 0.183*** |
| | [0.076] | [0.073] | [0.070] | [0.072] | [0.075] | [0.070] |
| HHI | | | -0.159 | 0.068 | -0.215 | -0.110 |
| | | | [0.157] | [0.111] | [0.161] | [0.150] |
| Unemployment | | | -0.003 | -0.010* | -0.003 | -0.008 |
| | | | [0.004] | [0.006] | [0.004] | [0.006] |
| Plan Age | | | | | -0.027 | -0.016 |
| | | | | | [0.017] | [0.023] |
| Pharmacies | | | | | -0.007 | -0.163 |
| | | | | | [0.376] | [0.340] |
| Drugs | | | | | -0.178 | -0.187* |
| | | | | | [0.127] | [0.109] |
| Constant | -0.145*** | -0.108*** | -0.109*** | -0.078* | 0.086 | 0.109 |
| | [0.0154] | [0.027] | [0.024] | [0.040] | [0.124] | [0.118] |
| Region | | | | | | |
| Time Trends | No | Yes | No | Yes | No | Yes |
| R-squared | 0.881 | 0.929 | 0.876 | 0.930 | 0.877 | 0.931 |
| Observations | 170 | 170 | 170 | 170 | 170 | 170 |

Significance: *** $p<0.01$, ** $p<0.05$, * $p<0.1$. Standard errors are clustered by region. All estimates include region and year fixed effects. For readability Pharmacies has been divided by 10,000 and Unemployment multiplied by 100.