Appendix for Online Publication

"Do physicians respond to the costs and cost-sensitivity of their patients?"
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A Supplemental Analyses

A.1 Additional Robustness Checks

A.1.1 Composition of patient population starting statin prescriptions over time.

In this section we report statin usage rates and compare trends in observables over the entire population covered in our claims database who fit at least one of the criteria defined as risk factors for statin usage: above age 45 (if male) or 55 (if female), hypertension, diabetes, or cardiac disease. If physicians responded to Zocor's patent expiration by prescribing statins more broadly, to patients who might be more price-sensitive, or in less need of a statin, then our estimates of the average copay effect on drug choice will be biased.

Although we control for observable patient characteristics such as age and chronic conditions, significant changes in the distribution of these characteristics over time could be indicative of changes in unobservable characteristics. When we compare the observable characteristics in the period before and after the patent expirations, however, the differences are small (see Table 2). In fact, most of these differences are either smaller than or equivalent to the changes over the same time period among the entire population of covered patients with a statin risk factor in our data, which are reported in Appendix Table A2, Panel B.

To address the acute concern that more price-sensitive patients might be more likely to appear after the patent expiration, Table 2 reports the averages of each patient's *generic share of unique drugs purchased in the past year*, which is a proxy measure of price sensitivity or willingness to try generic drugs.[1] Table 2 shows that the mean generic share of past drugs increased significantly in our sample, from 60 to 65%, from the pre- to post-expiration period. This increase is close in size, however, to the increase seen among people with at least one risk factor for statin use who did not use *any* statin during the entirety of the prior year (see Appendix Table A2, Panel B, and Figure A1.). Therefore, it reflects the market growth of generics over this time period rather than a change in the type of patient initiating statin

[1] Given the variance in generic drug prominence across different drug classes, this a rather crude measure, but it is clearly correlated with generic statin use: In the period before the patent expiration, the average value of this variable is 60% among those who started on a brand-name statin and 67% among those who started on generic Mevacor. After the patent expiration, the average value is 63% among those who start on a brand-name statin and 68% among those who start on an offpatent statin (Zocor, Pravachol, or Mevacor).

prescriptions. Furthermore, the increase in this variable is equal across the below- and above-median salary patients in our sample (see Appendix Table A2, Panel A).

Lastly, the share of patients with at least one statin-related risk factor who are observed to purchase at least one statin prescription in each six-month period from 2004 to 2007 is shown in Figure A2. Our sample mirrors the overall national trend of gradual increase in statin use over this period but does not reveal any troubling breakpoints at the time of the patent expiration, nor major differences in the increases by salary. Although there appears to be some narrowing in the difference between low- and high-salary groups before and after the patent expiration, this is driven by a narrowing in their rates of continuing a statin prescription rather than starting a statin prescription (See Figures A3 and A4). In combination with the fact that the observable characteristics of starting patients hardly change between these periods, this analysis supports Assumption 5, that the distribution of unobserved characteristics of patients starting statin prescriptions is similar before and after Zocor's patent expirations.

A.1.2 Plans included in the main sample

Our main sample is an unbalanced panel of firms because half of them entered the database in 2005, meaning initial prescriptions could not be identified until the first quarter of 2006. Of the six firms present in the sample before 2005, one does not appear in 2007. To prevent any differences in the employee populations of these firms from affecting our estimates, we allow each group of firms (based on the years spanned by their initial prescriptions) to have its own drug-specific intercepts in all specifications. When we limit the sample to the five firms with initial prescriptions spanning 2005-2007, however, the difference between the idiosyncratic and average copay responses grows larger. As shown in Table A11, Panel A, the copay effect appears significantly smaller, while the average copay effect appears larger. As a result, the estimated λ shrinks from 0.33 to 0.16, although the sample is smaller and 0.16 is within the 95% confidence interval of the baseline 0.33 estimate.

In Table A11, Panel A, we also show results based on different samples from our claims data, relaxing the exclusion restrictions we used to create the main sample, such as the exclusion of one-tier plans (same copay for all drugs). We exclude these plans in the main sample because the purpose of our paper is to understand how tiered copays affect prescribing. The fact that the coefficient on average copay appears smaller when we include these plans suggests that the shift in prescribing towards Zocor was not as large in plans where there is no copay incentive to prescribe generic drugs.

A.2 Measurement error in physician's copay expectations

In this section, we explain the Monte Carlo simulations that were introduced in Section V.A. In theory, measurement error in a covariate in a logit model leads to bias in the coefficient of that variable, and the extent of the bias depends on how the error in the mismeasured variable relates to the distribution of the structural error [Chen et al., 2011]. Although we have no way of knowing how measurement error in physicians' $\bar{p_{jt}}$ perceptions might be distributed, we run these simulations to gauge whether bias caused by a normally distributed expectational error in physicians' $\bar{p_{jt}}$ perceptions, that is centered at zero and uncorrelated with the structural error, could meaningfully affect the point estimate of $\bar{p_{jt}}$. That is, if physicians' prescriptions are determined by their own expectations of copays for brand and generic drugs: $\tilde{p}_{jdt} = \bar{p}_{jt} + \epsilon_{jd}$, with ϵ_{jd} being independently drawn for each doctor for brand statins and generic statins, how does the failure to observe ϵ_{jd} bias the estimated effect of $\tilde{p}_{jdt}$?

We conduct the following procedure for two hypothetical scenarios in which ϵ_{jd} for brand and generic drugs are independently and normally distributed around zero with standard deviations of \$2.50 and \$5.00.[2] For each scenario, we run 500 simulations where ϵ_{jd} are drawn and used to generate a set of chosen prescriptions for a large sample. In each simulated dataset, we estimate the logit model in two ways: (1) using the "true" values of $\tilde{p}_{jt}$ and $p_{ijt} - \tilde{p}_{jt}$ as the covariates (i.e. no measurement error), and (2) using instead $\bar{p}_{jt}$ and $p_{ijt} - \bar{p}_{jt}$ as the covariates (i.e. as we do in our main analysis, ignoring possible variation in physicians' expectations). We then compare the average coefficients obtained with and without mismeasurement to the true parameters used in the data generating process.

The data generating process consisted of the following steps:

1. We used the original dataset and baseline value to obtain predicted values of $V = X\hat{B}$. We subtracted from V the copay-related terms: $\hat{\beta}_1 * \bar{p_{jt}}$ and $\hat{\beta}_2 * (p_{ij} - \bar{p_{jt}})$, since these components will be replaced by physician-specific draws of $\tilde{p_{jdt}}$, affecting $(p_{ij} - \tilde{p_{jdt}})$ as well.

2. We drew a large sample of 100,000 observations from the original dataset, with replacement.

3. We randomly drew six EV-1 error terms (e_{ij}), one for each drug choice, for each

[2]Gibson et al. [2012] find that the standard deviations of state-specific average drug copays are approximately 9-11% of each average copay. With average copays being \$20 in our sample, a \$2 standard deviation would reflect variation across state averages. We chose to use standard deviations of \$2.50 and \$5.00 as reasonable approximations of moderate and larger variation across physicians in copay expectations for brand and generic drugs.

observation.

4. For each individual physician we drew one random value of error ϵ_{brand} for $\bar{p}_{brand}$ and another value for error $\epsilon_{generic}$ for $\bar{p}_{generic}$. These errors were added to the actual $\bar{p}_{jt}$ value for each brand and generic drug, respectively. For doctors appearing more than once in our sample, the same draw was added to $\bar{p_{jt}}$ in all cases to reflect the notion that one physician might consistently overestimate the copay of brand drugs or generic drugs. Then we calculate V' using the new values $\bar{p_{jt}}'$ and $p_{ij} - \bar{p_{jt}}'$, and the values of $\hat{\beta}_1$ and $\hat{\beta}_2$ from the regression in step 1, which we are setting as the "true" parameters in the simulations. This was done for two different specifications of measurement error:

   (a) Physician-specific errors ϵ_{brand} and $\epsilon_{generic}$ are independently and normally distributed around 0 with a standard deviation of \$2.50.

   (b) Physician-specific errors ϵ_{brand} and $\epsilon_{generic}$ are independently and normally distributed around 0 with a standard deviation of \$5.00.

5. Finally we calculated $U'_{ij} = V'_{ij} + e'_{ij}$, and selected drug j as the chosen drug for patient i if $U'_{ij} > U'_{ik}$ for all $k \in J$. We then estimated the logit model once using the physician-specific values of $\tilde{p}_{jt}$ used to generate the simulated data as the (correct) covariates, and once using simply the national averages $\bar{p}_{jt}$ as the (mismeasured) covariates.

We repeated steps 2-5 500 times and summarize the coefficient estimates for β_1 and β_2, for the scenarios of moderate and more severe variation in physicians' perceptions, comparing the estimates when the covariates are correctly specified versus mismeasured. The results, in Table A6, show very small deviations in the estimated β parameters relative to their true values, although the estimates grow noisier and appear to exhibit small bias when the physician-specific variation is ignored. We conclude that physician expectational error does not cause a meaningful amount of bias if the errors are centered around 0 and uncorrelated with the structural error term.

In Table A7, we show estimates of our main results while assuming that all physicians have homogenous but mistaken copay expectations. The estimated elasticity of prescribing with respect to average copay varies from -0.557 when we assume physicians greatly overestimate the copay differences between brand and generic drugs faced by privately insured employees, to -0.796 when physicians assume that the copay difference is \$10 (about 30% smaller than the average difference reported by Kaiser Family Foundation employer surveys). If we believe that most physicians' expectations are somewhere between these two extremes, then we can conclude that the elasticity of prescribing with respect to average copays is 2-4 times as large as the elasticity of prescribing with respect to actual copays.

A.3 Additional checks for endogenous plan selection

In section V.B, we describe the bias that could result from patients within firms selecting into plans with different levels of generosity or incentive-based formularies, and show that our results remain similar when excluding the firms whose plan choices offer the greatest scope for such selection. We can also assess such bias with a control function, used in a similar manner as Sacks [2016]. Specifically, we regress plan-specific copays on firm-quarter-drug fixed effects, which capture the average copay of each drug in a given quarter across each firm's plan offerings, and obtain residuals. We then control for these residuals in the main specification, so that $(p_{ijt} - \bar{p}_{jt})$ captures solely the variation in copay across firms rather than within a firm, across its plans. The results, shown in Column 8 of Table A11, show very similar results as our baseline model, supporting our earlier conclusion that endogenous plan selection does not cause notable bias in our sample.

A.4 Additional check for forward-looking prescribing

In this section, we expand on the discussion of Section V.C by describing our second test for forward-looking prescribing, which may have led physicians to begin prescribing Zocor at higher rates prior to its patent expiration.

For each drug in the choice set of each prescription, *DocLastStatin* is equal to 1 if that drug was chosen by the same physician in his most-recently observed initial prescription. Suppose all doctors prescribed their own favorite statin exclusively in the period prior to Zocor's patent expiration, and then switched to prescribing generic Zocor (simvastatin) exclusively. In that scenario, the coefficient on *DocLastStatin* should be large in the pre-period, exhibit a one-time drop in the time period when each doctor made their first prescription following the patent expiration, and then return to a high value once generic Zocor was established as their new drug of choice. If a sizeable share of physicians began switching towards generic Zocor in anticipation of its patent expiration, we would expect the one-time drop in the coefficient on *DocLastStatin* to begin before the patent expiration. Our results, shown in Table A13, are that the coefficient on *DocLastStatin* drops significantly, by more than one-third, in the first prescription each physician makes after the patent expiration.[3] By contrast, the estimated change in the last prescription they make prior to the patent expiration is small and statistically insignificant. In subsequent prescriptions occuring in the post-expiration period (i.e. a physician's second or third observation during that period), the coefficient is not significantly different than in the period prior to the patent expiration. The

[3] An effect size of 0.77+0.08-0.36 = 0.49 corresponds to the first prescription made after the patent expiration, which is more than one-third smaller than 0.77

point estimates, taking into account the overall "post" effect as well as the other interaction terms, suggest that the effect of *DocLastStatin* went from 0.77 in the pre-period to 0.732 just before the patent expiration to 0.49 just after the patent expiration to 0.85 in the rest of the post-period. This analysis lessens concerns about forward-looking prescribing as well as possible concerns about delayed responses to the patent expiration, supporting Assumption 2.

A.5 Additional checks for insurers' efforts to promote generic drugs

As discussed in Section V.E, our estimates of $\hat{\lambda}$, the ratio of responses to idiosyncratic vs. average copay differences, may be biased downward due to policies imposed by plans to increase prescribing rates of newly off-patent Zocor and Pravachol. We address this primarily through the inclusion of plan payment for each drug, each quarter. Even though it is not perfectly accurate due to the lack of rebate information, this variable is informative in capturing the timing of the large (and exogenous) drop in Zocor's cost to plans, which occurred about six months after the patent expiration due to the exclusivity clause of the Hatch-Waxman Act, giving the first generic entrant a great deal of market power. To the extent that exogenous price shocks motivate plans to implement step therapy or prior authorization, this captures the largest such shock.

We also impute post-rebate plan payments as follows. Following Arcidiacono (2013), we assume that manufacturers giving rebates chose the corner solution of a 15.1% rebate, because regulations in place allowed them to credibly tell insurers that larger rebates would be too costly. We assume that plans would receive these rebates in exchange for placing a brand-name drug on Tier 2, the preferred brand tier, and then calculated the price paid by plan as the negotiated price less the copay. The results in Table A11 Column 11 show that with these imputed plan payment values, the coefficient for plan payment increases slightly in magnitude (-0.0864 to -0.0969). The coefficients on copays change slightly as well, but lead to a smaller estimated lambda than in the main specification (0.25 vs. 0.33).

In addition to the primary robustness checks described in Section V.E, we also take one additional approach inspired by Limbrock (2011) to proxy for the effectiveness of plans' policies to push their preferred drugs. Limbrock (2011) estimates the effect of a statin's "preferred" (Tier 2) status in a plan on its choice probability, after controlling for patient characteristics and copay differences. He argues that this additional effect of a statin's "preferred" status on a formulary represents the influence of unobserved non-pecuniary incentives put in place by the plan, and finds that this effect is stronger in HMO plans than

in non-managed plans.

We follow this reasoning to create a proxy measure of plans' use of non-pecuniary incentives. Using our estimates of equation 1 in the pre-expiry period, we generate predicted prescribing shares for each drug in each plan, based on the plan's copays for all drugs, the estimated copay-responsiveness of prescribing, and patient characteristics. We then construct a plan-level variable *sharediff* which equals the difference between the combined prescribing shares of a plan's low tier drugs and their combined predicted prescribing shares during the pre-expiry period. Assuming that a plan's use of non-pecuniary incentives to encourage choice of generic Zocor is correlated with its use of similar incentives to encourage choice of its "preferred" brand statin(s) prior to Zocor's patent expiry, we can use *sharediff* as a proxy measure for plans' use of such incentives.

In the regression shown in Table A11 Column 12, we include *sharediff* interacted with an indicator for a drug being preferred (labeled as "Pre-expiration low-tier prescribing X low-tier". (Note that preferred status changes for Zocor and Pravachol at the time of their patent expirations, since generic drugs are preferred in all plans.) If plans used the same strategies to encourage choice of preferred statins in both the pre- and post-expiry periods, then the inclusion of this variable should explain most of the increase in Zocor prescribing in 2006, reducing the estimated effect of expected copay ($\bar{p_{jt}}$). While the inclusion of this variable does reduce the size of the average copay effect, it also reduces the size of the idiosyncratic copay effect, such that our estimate of λ remains very similar.

A.5.1 NAMCS analysis

We use data from two waves of the publicly available National Ambulatory Medical Care Survey (NAMCS): 2005-2006 and 2007-2008, to match our sample's time period. The data is collected from physicians' offices at the level of each physician-patient interaction and includes all drug prescriptions (new or continued) given to the patient during the visit.

We identify 565 new statin prescriptions for years 2005-2007, of which 309 were for patients covered by private insurance. We drop the observations for drugs that we exclude from our sample because of their infrequent use (Caduet (N=12), Advicor (N=5), and Lescol (N=3)) and the prescriptions to patients younger than 30 (N=4) or older than 64 (N=94) and are left with 191 initial prescriptions. Using the sampling weights provided with the data, we tabulate new prescriptions by drug, by year, obtaining the initial prescribing shares shown in Panel C of Table A14 and summarized graphically in Figure A5 (for comparison, Panel A shows the shares in our main sample and Panel B shows the shares in the unweighted NAMCS sample). Although there are some differences between the two samples in the levels

of use of different statins, the overall trends in response to the patent expirations of Zocor and Pravachol follow the same trajectory.

We also use the response to the question: "Does the practice have a computer system for orders for prescriptions?" to drop prescriptions from physicians answering "Yes" (N=62). We show the initial prescribing shares in Panel D of Table A14 and in Figure A6. The fact that the increases in prescribing of Zocor and Pravachol, and decreases in prescribing of remaining brand drugs, look roughly similar even when we exclude physicians with computer systems, suggests that plan policies such as step therapy and prior authorization, which are very difficult for physicians to observe without an electronic system, are not largely responsible for the changes in prescribing over time.

A.6 Analysis of Primary Non-adherence

Here, we describe the simulation procedure discussed in Section V.F. We use published data from Liberman et al. [2010] to calculate $q_j(c)$, the probability that a prescription for drug j is purchased, conditional on its copay c. This study combined administrative pharmacy claims with electronic prescription data collected by the Horizon Blue Cross Blue Shield of New Jersey on drug orders written between January 1, 2005, and October 31, 2006. Analyses were limited to "treatment initiators" of asthma-controller or cholesterol-lowering medications, which the authors defined as patients with no paid claims in the previous 180 days for a drug in the relevant medication group. Primary non-adherence was defined as the failure to purchase a clinically equivalent drug in the 60 days following a prescription, and rates of primary non-adherence were calculated for each of the following prescription-copayment bins: $<$ \$10, \$10 to $<$ \$15, \$15 to $<$ \$20, \$20 to $<$ \$25, and $\geq$ \$25. The results indicated that as a drug's copay increases by \$10, the probability that it is purchased after being newly prescribed drops by approximately 6.7 percentage points.

To compute $q_j(c)$, we used the logit equation results reported in the eAppendix of Liberman et al. [2010], computing $V = \hat{\beta}X$ using age range, number of prescription drug fills in the previous calendar year, gender, income, drug copay, and formulary tier. We used the resulting values of $\hat{q}_j(c) = exp(V)/(1 + exp(V))$ to weight the observed prescriptions in our sample by the probability that they are filled, and thus, observed.

A.7 Heterogeneity of patient benefit from a given statin

Leaving aside copay considerations, there are two main dimensions of patient heterogeneity that are relevant to the prescriber's choice: First, how much LDL reduction does the patient

need, and second, what risks of adverse effects does the patient face from each statin? As mentioned in Section I.C, weaker statins can be prescribed at high doses to increase their LDL reduction, but it is well-known that higher doses increase the risk of side effects (muscle pain) and adverse effects such as rhabdomyolysis [Golomb and Evans, 2008]. Observable individual characteristics (e.g. gender, hypertension) can affect the LDL reduction needed as well as the patient's susceptibility to adverse effects. As a result, they might have complex relationships with the probability each statin is chosen. Importantly, the widely relied upon physician's reference Uptodate.com states that "There are no clear data that the adverse event profile differs significantly among statins." This implies that most patients who have risk factors for adverse effects should avoid high doses of any statin, rather than specific statins per se. (There are a few exceptions to this rule, which we list below.)

Given that observable characteristics can separately influence the two dimensions of heterogeneity relevant to statin choice, we estimate a richer model at the drug-dose ("product") level that allows us to separate these effects. In this model, each of the 24 drug-dose combinations shown in Table A1 appears in the choice set, representing each available dose of each statin that we study.[4] We include the expected LDL reduction of each product as an explanatory variable interacted with observable characteristics, to capture the observable portion of the first dimension of patient need. We also include indicators for dosages of 40 mg and 80 mg, interacted with the patient characteristics that are risk factors for adverse effects.[5] Instead of including product-specific intercepts, which would eliminate the necessary variation to identify dosage effects, we include molecule fixed effects. Therefore, we are assuming that the baseline therapeutic value of molecule j in dose m is $d_j + \beta_{LDL} LDLreduction_{jm} + \beta_{40MG}\mathbf{1}(m = 40) + \beta_{80MG}\mathbf{1}(m = 80)$ where d_j is the molecule fixed effect and $LDLreduction_{jm}$ is the expected percentage reduction in LDL from molecule j in dose m.

Of the patient characteristics we observe, age, gender, hypertension, diabetes, high cholesterol, recent heart attack, and cardiac disease affect a patient's predicted heart risk, and therefore, her target LDL level. We interact these variables with $LDLreduction$, and all interactions except those of age, hypertension, and diabetes are statistically significant with the expected sign. (For comparison, the conditionXdrug interaction terms and exclusion tests in the main model are shown in Appendix Table A3, Panel B). Of the characteristics we observe, hypertension, gender, diabetes, and concurrent use of a CYP3A4-inhibitor are

[4]Mevacor/Lovastatin 80mg is excluded since 40mg is the highest dosage commercially available.

[5]The recommended starting dose is 20 mg for all statins except Pravachol (40 mg) and Crestor (10 mg). However, the literature establishing the dose-dependence of adverse effects typically defines either 80mg or 40-80mg as "intensive therapy."

considered risk factors for adverse effects. We include interactions for these variables with the 40mg and 80mg dummies, but only the hypertension and gender interactions have significant effects in the expected direction.

Lastly, we include indicators for the few, rare clinical situations in which certain statin molecules are recommended over others, according to Baker and Rosenson [2012], and interact these with the molecule fixed effects. These situations are renal function impairment (in which case atorvastatin or fluvastatin is recommended), and concurrent use of drugs which pose interaction risks (in which case the recommended statin(s) depend on the other drug being used). While we do not have an indicator for renal function impairment, we control instead for kidney disease, which can impair renal function and afflicts 4.6% of our sample. We also allow molecule intercepts to vary for patients who have taken potentially interacting drugs.[6] Perhaps because these conditions and concurrent drugs are rare, the estimates are generally insignificant, but the interaction terms indicating any strong inhibor of CYP3A4 are jointly highly significant, as are those for cyclosporine and gemfibrozil. Overall, it is striking that the addition of numerous relevant observable characteristics changes the copay estimates so little. This bolsters our assumption that the variation in copays across plans, and the changes in copays over time, are almost entirely unrelated to variation in patient characteristics.

Interestingly, when we add salary interactions to both $LDLreduction$ and the high-dose dummy variables, we find that patients with higher salaries tend to prefer products with less LDL reduction but also products of lower dosage levels.

Finally, we augment this model with a random coefficient for LDL reduction. While the patient characteristics we observe explain more than 60% of the variation in a patient's Framingham heart risk score, which determines what her target level of LDL should be, one important remaining unobserved variable is her current LDL cholesterol level.[7] According to the results of our mixed logit estimation, however, the null hypothesis that the coefficient of LDL reduction is constant, given our set of patient-level controls, cannot be rejected.

As shown in Appendix Table A12, our estimates of the parameters of interest hardly change when we move from our simpler model in the rest of the paper to this richer model where health characteristics separately affect preferences for LDL reduction and low doses,

[6]We include an indicator for taking any drug defined as a "Strong inhibitor" of Cytochrome P450 3A4 (CYP3A4) in the same year as the statin initiation: Atazanavir Boceprevir Chloramphenicol Clarithromycin Cobicistat Conivaptan Darunavir Delavirdine Fosamprenavir Idelalisib Indinavir Itraconazole Ketoconazole Lopinavir Nefazodone Nelfinavir Nicardipine Posaconazole Ritonavir Saquinavir Stiripentol Telaprevir Telithromycin Voriconazole (Source: http://www.uptodate.com/). With separate drug intercepts, we also include indicators for same-year usage of cyclosporine, gemfibrozil, and amlodipine.

[7]Author's calculations using 2005-2008 NHANES data.

and when we add additional controls for the rare interacting conditions described above. This gives us confidence that our results are not biased by the inability to perfectly observe patient-drug match quality due to remaining factors such as the cholesterol level. It also suggests that the small shifts we see in the composition of initiating patients, around the time of the patent expiration are unlikely to be very important. Furthermore, when we add these finer patient controls (kidney disease and other drug interactions) interacted with drug molecules in the adherence regressions, there is no change in the estimated copay effects (Results available upon request).

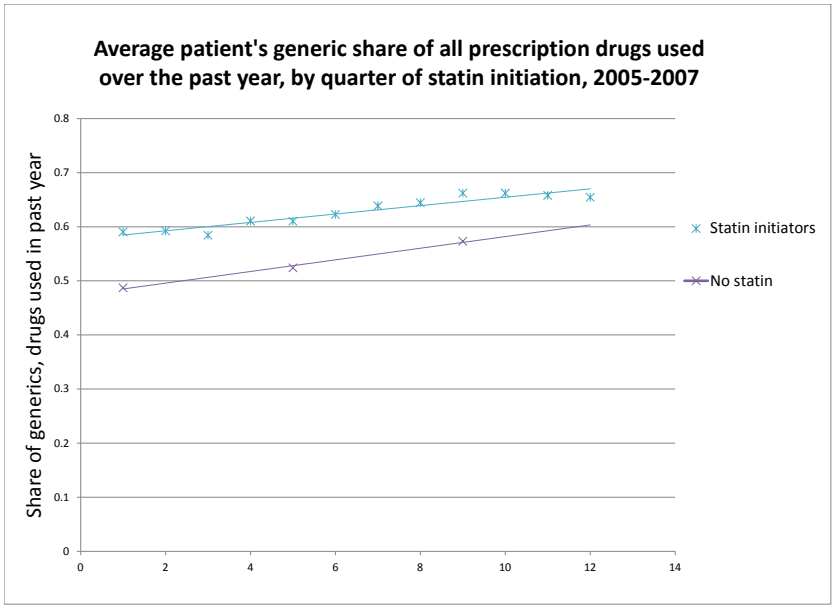


Figure A1. Described in Section A.1.1.

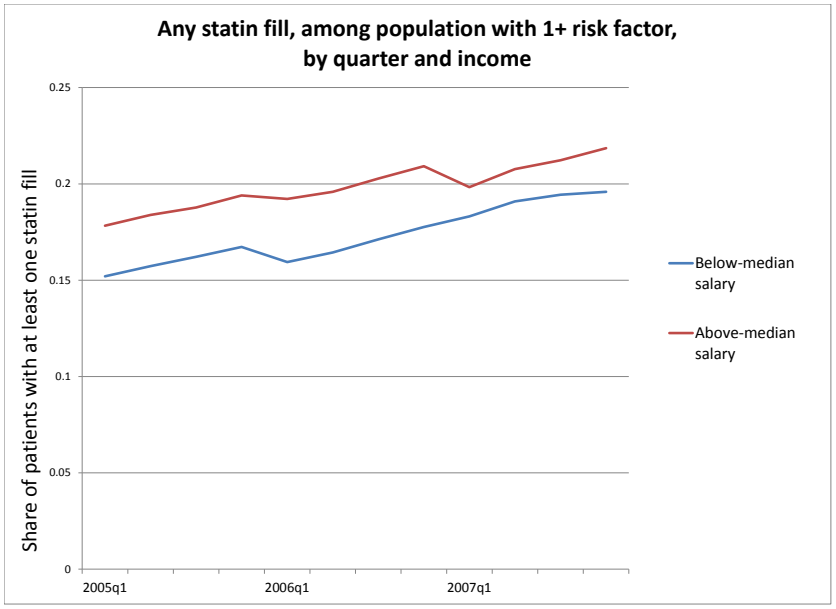


Figure A2. Described in Section A.1.1.

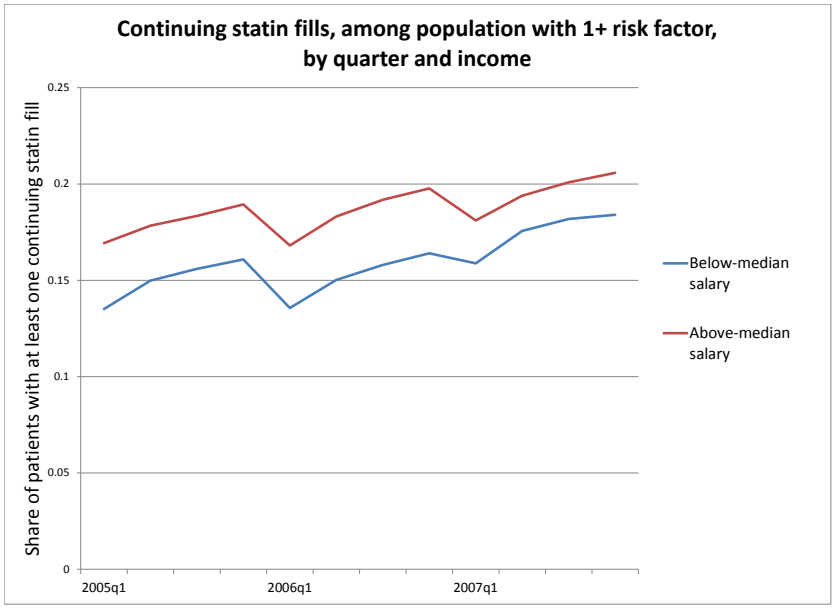


Figure A3. Described in Section A.1.1.

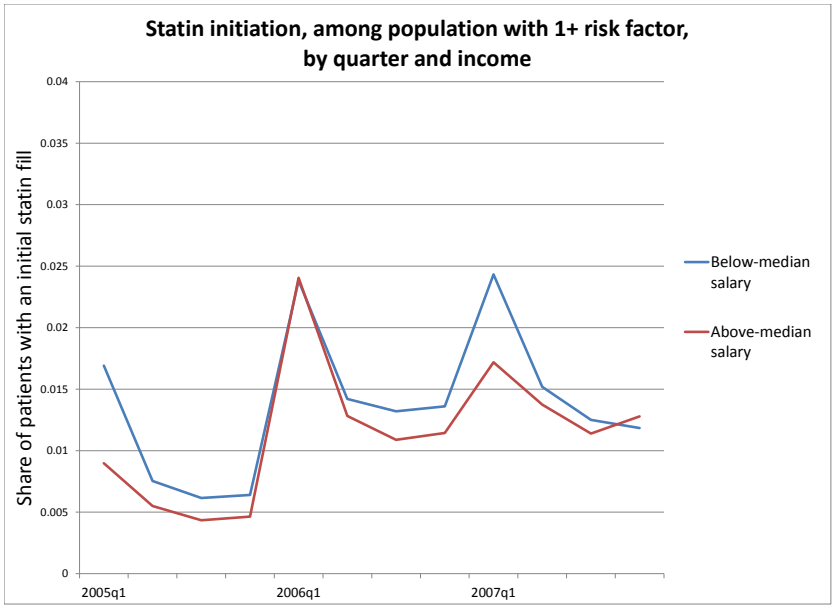


Figure A4. Described in Section A.1.1.

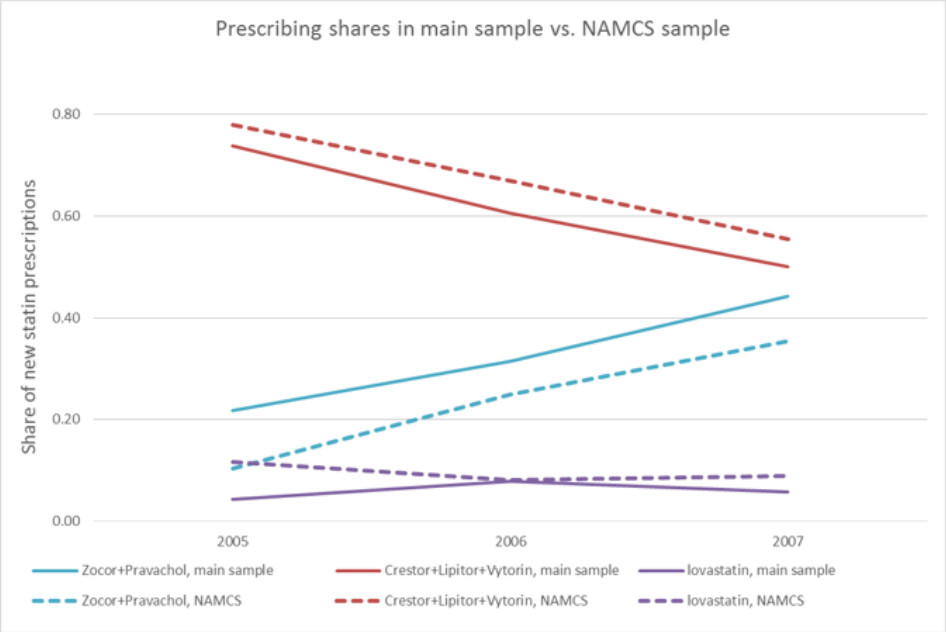


Figure A5. Described in Section A.5.

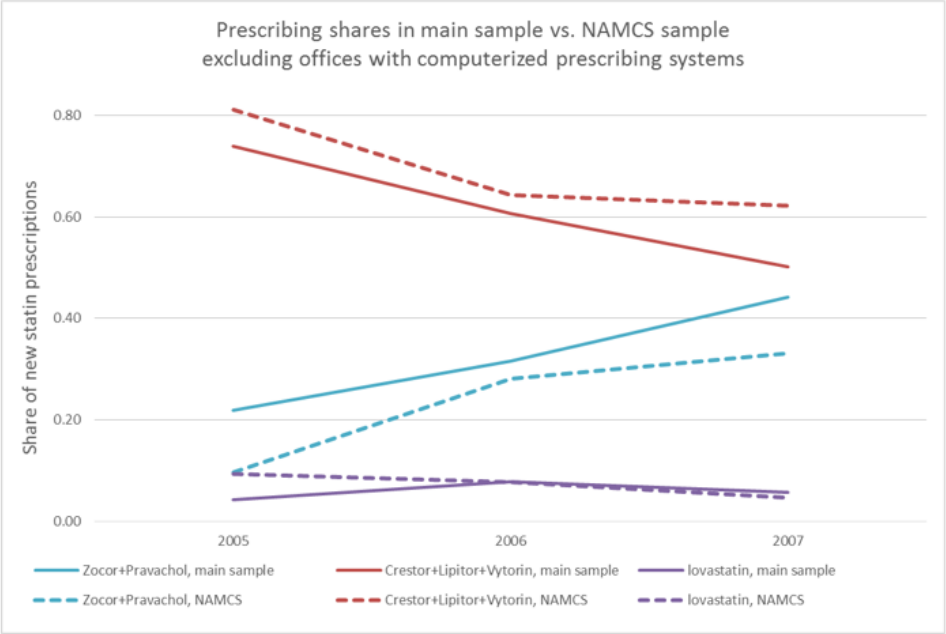
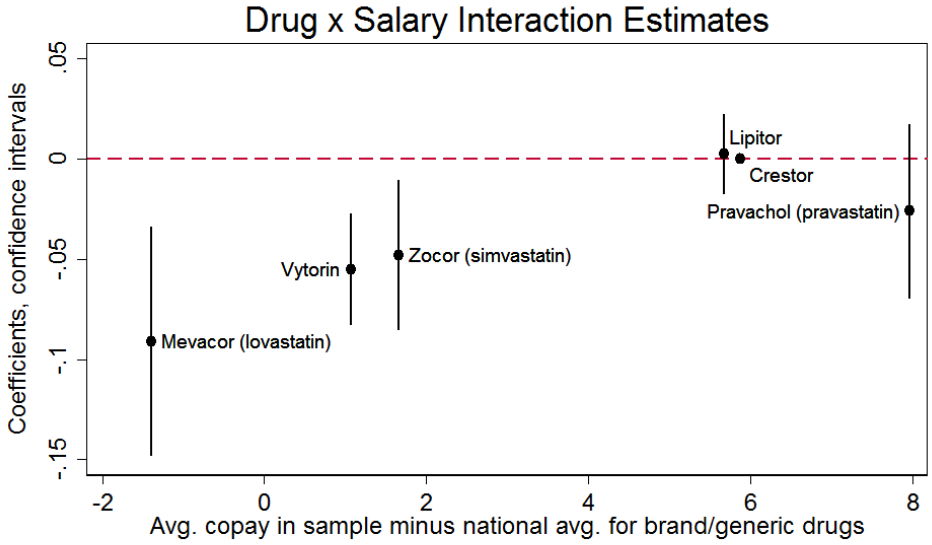


Figure A6. Described in Section A.5.



The plotted coefficients for each drug interacted with salary come from the regression shown in Table A8, Column 5 and described in Section 6.7. The three drugs available as generics at the end of our sample period are labeled with both brand and generic names. The x-axis shows the dollar difference between each drug's average monthly copay in our sample and the national average used as p-bar (national average copay) in our analysis.

Figure A7. Described in Section V.G.

Table A1. Statin dosages available at each range of expected LDL reduction

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Average LDL reduction	<26%	28-32%	34-39%	40-47%	50-52%	57-59%	60-70%
Mevacor (lovastatin)	20mg .038	40mg .024	80mg* 0				
Pravachol	10mg .003	20mg .015	40mg .022	80mg .002			
Zocor	5mg .003	10mg .034	20mg .156	40mg .102	80mg .009		
Lipitor			10mg .165	20mg .115	40mg .043	80mg .009	
Vytorin				10mg .014	20mg .090	40mg .045	80mg .005
Crestor				5mg .026	10mg .071	20mg .011	40mg .002
Share of Initial Rx	.04	.07	.34	.26	.21	.06	.006

Table constructed using mean percent LDL cholesterol lowering from manufacturers' prescribing information as reported in Smith et al. [2009]. The gaps between the dosage ranges in different columns show how close the expected reductions within each column are. For example, the largest reduction expected from a product in column (5) is 52% while the lowest reduction expected by a product in column (6) is 57%.
* While 80 mg is the maximum recommended daily dose of lovastatin, it requires taking two 40 mg pills. All other doses shown are commercially available as one pill.

Table A2: Descriptive Statistics: Main Sample, Before and After Zocor's Patent Expiration

Panel A. Statin initiators, by salary	Below-median salary patients				Above-median salary patients				Firms not reporting salaries			
	Pre	Post	Diff.	P-value[2]	Pre	Post	Diff.	P-value[2]	Pre	Post	Diff.	P-value[2]
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Demographics												
Age	50.26	50.358	0.099	0.60	48.97	48.975	0.000	1.00	50.49	50.44	-0.055	0.63
Male	0.52	0.507	-0.009	0.45	0.64	0.622	-0.013	0.34	0.57	0.57	-0.001	0.90
Salary	47.544	47.086	**-0.458**	0.00	103.85	106.114	2.260	0.06				
Health Characteristics												
High Cholesterol (0/1)	0.203	0.196	-0.008	0.44	0.213	0.211	-0.002	0.85	0.163	0.19	**0.025**	0.00
Hypertension (0/1)	0.230	0.254	**0.023**	0.02	0.189	0.195	0.005	0.64	0.201	0.24	**0.035**	0.00
Diabetes (0/1)	0.164	0.173	0.009	0.31	0.098	0.110	0.012	0.17	0.128	0.14	**0.014**	0.01
Cardiac Disease (0/1)	0.083	0.079	-0.004	0.57	0.065	0.056	-0.008	0.21	0.107	0.10	-0.006	0.25
Past heart attack (0/1)	0.023	0.017	-0.006	0.10	0.015	0.015	0.000	0.89	0.028	0.03	**0.006**	0.02
Imputed heart risk	0.048	0.048	0.000	0.96	0.053	0.052	-0.001	0.24	0.051	0.05	0.000	0.97
Drugs purchased in past year												
Number of unique drugs	5.12	5.164	0.040	0.72	4.63	4.881	0.254	0.05	5.04	5.14	0.094	0.19
Generic share	0.59	0.654	**0.065**	0.00	0.55	0.606	**0.060**	0.00	0.63	0.67	**0.043**	0.00
Plan Copays												
Brand statins	$30.93	$29.33	**-$1.60**	0.00	$27.20	$26.16	**-$1.04**	0.00	$23.21	$24.04	**$0.83**	0.00
Generic statins	$10.34	$11.95	**$1.61**	0.00	$10.18	$12.10	**$1.92**	0.00	$9.99	$10.00	**$0.01**	0.00
Initial Statin Prescription												
Prescribed by specialist	0.08	0.063	**-0.017**	0.01	0.07	0.075	0.003	0.69	0.07	0.06	-0.004	0.26
Generic statin	0.13	0.561	**0.431**	0.00	0.09	0.416	**0.328**	0.00	0.06	0.45	**0.391**	0.00
Copay (1 month supply)	$26.35	$18.14	**-8.204**	0.00	$23.82	$19.89	**-3.921**	0.00	$19.83	$17.45	**-0.238**	0.00
N	2,673	4,693	**0.570**		2,034	3,347	**0.608**		7,082	8,622	**0.821**	

Notes: P-values of a t-test of mean equality are shown. Differences that are significant at the 5% level are bolded. Salaries are only available for a subset of the firms in our sample. "Past heart attack" is coded as 1 if the patient has any medical claim with an ICD9 code representing myocardial infarction during their prior years of coverage in the claims data. "Imputed heart risk" is the imputed 10-year risk of a cardiac event (Framingham score) based on observed characteristics. "Number of unique drugs" counts any drugs filled at least once in the 365 days prior to the first statin fill, and "Generic share" is the share of these drugs that are generic. "Prescribed by cardiac specialist" is imputed to be 1 if the prescribers observed prescriptions for cardiac drugs exceeds 60%.

Table A2: Descriptive Statistics within Claims Data, Before and After Zocor's Patent Expiration

Panel B. Comparisons to Full Claims Database	All patients with 1+ risk factor				Patients with 1+ risk factor and no statin				Main Sample (Starting statin, 0+ risk factors)			
	Pre	Post	Diff.	P-value[2]	Pre	Post	Diff.	P-value[2]	Pre	Post	Diff.	P-value[2]
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Demographics												
Age	52.05	52.32	**0.265**	0.00	51.72	52.09	**0.370**	0.00	50.18	50.12	-0.054	0.54
Male	0.709	0.700	**-0.009**	0.00	0.704	0.697	**-0.007**	0.00	0.57	0.56	-0.008	0.19
Salary	76.283	76.868	**0.585**	0.00	75.108	76.120	**1.012**	0.00	71.88	71.66	-0.218	0.77
Health Characteristics												
High Cholesterol (0/1)	0.097	0.128	**0.031**	0.00	0.054	0.074	**0.020**	0.00	0.181	0.195	**0.014**	0.00
Hypertension (0/1)	0.189	0.236	**0.046**	0.00	0.181	0.227	**0.045**	0.00	0.205	0.233	**0.027**	0.00
Diabetes (0/1)	0.079	0.093	**0.015**	0.00	0.052	0.061	**0.009**	0.00	0.131	0.144	**0.013**	0.00
Cardiac Disease (0/1)	0.044	0.053	**0.009**	0.00	0.024	0.029	**0.005**	0.00	0.094	0.086	**-0.008**	0.02
Imputed heart risk	0.063	0.063	**0.0003**	0.00	0.062	0.062	**0.0005**	0.00	0.051	0.050	0.000	0.25
Drugs purchased in past year												
Number of unique drugs	3.994	4.381	**0.387**	0.00	3.15	3.469	**0.315**	0.00	4.988	5.093	0.105	0.05
Generic share	0.498	0.547	**0.049**	0.00	0.54	0.587	**0.044**	0.00	0.604	0.653	**0.049**	0.00
Statin Use												
1+ fill	0.258	0.265	**0.007**	0.00								
Below-median salary	0.250	0.255	**0.005**	0.00								
Above-median salary	0.270	0.281	**0.012**	0.00								
Initiation	0.063	0.066	**0.002**	0.00								
Below-median salary	0.066	0.070	**0.004**	0.00								
Above-median salary	0.054	0.064	**0.010**	0.00								
N	541,451	561,082			401,641	412,516			11,895	16,662		

Notes: The sample presented in Columns 1-8 includes all firms in the database, regardless of whether they appear in our final sample. "Pre" includes all patients who appear in either 2005 or 2006 with at least one risk factor for a statin, defined as age above 45 (male) or 55 (female), high cholesterol, hypertension, diabetes, or cardiac disease. "Post" includes patients with at least one risk factor observed in either 2006 or 2007. In Columns 5 and 6, the sample is limited to patients with at least one risk factor who did not fill a single statin prescription in the pre or post period, respectively. Columns 9-12 repeat the statistics shown in Table 2, for comparison purposes. In all columns, the sample sizes shown correspond to all rows except Salary (which is only observed for some firms), Unique drugs in the past year (which requires a patient to have been observed for the previous year) and Generic share (which requires patients to have at least 1 prescription observed in the previous year). See Table 2 Notes for other variable descriptions.

Table A3: Copay effects on initial prescription, prior to the 2006 patent expirations

Panel A.	**All Firms**	**Subset reporting salaries**	
	(1)	(2)	(3)
Copay (in $10)	-0.186***	-0.165***	-0.160***
	(0.045)	(0.054)	(0.054)
x Salary (in $10,000)			-0.0044
			(0.007)
Plan payment (in $10)	-0.017	-0.029	-0.028
	(0.03)	(0.04)	(0.04)
Doctor's last prescription	0.68***	0.83***	0.83***
	(0.05)	(0.08)	(0.08)
Patient's last prescription	1.702***	1.529***	1.531***
	(0.2)	(0.4)	(0.4)
DTP Advertising (in $10 mill.)	0.0195	0.0136	0.0133
	(0.02)	(0.02)	(0.02)
L1.DTP	0.0609***	0.0864***	0.0867***
	(0.02)	(0.03)	(0.03)
L2.DTP	0.0466	0.00415	0.00420
	(0.03)	(0.04)	(0.04)
L3.DTP	-0.0196	-0.0245	-0.0245
	(0.02)	(0.02)	(0.02)
N	9278.000	3427.000	3427.000
Log likelihood	-12959.450	-4909.968	-4909.748

Notes: Conditional logit coefficients. Standard errors in parentheses, clustered at the plan-quarter level. Columns 1, 2, and 3 appear as columns 2, 3, and 4 of Table 3. The estimate of the interaction terms of patient characteristics with each drug intercept are shown in Panel B of this table for the model with all firms shown in Column 1.

Table A3. Logit coefficients and exclusion tests, using Model 2 in Table 3.

Panel B.	Lipitor	Pravachol	Zocor	Vytorin	Mevacor	chi2	p-value
Prescribed by specialist	0.164 (0.2)	0.388 (0.3)	-0.333 (0.2)	0.0804 (0.2)	-0.466 (0.3)	23.37	0.0001
Age	0.000257 (0.005)	0.0190*** (0.007)	0.00158 (0.005)	0.00915 (0.007)	0.00439 (0.008)	15.43	0.0039
Male (0/1)	-0.218** (0.09)	-0.221 (0.1)	-0.238** (0.09)	-0.158** (0.07)	-0.326*** (0.09)	9.83	0.0434
High cholesterol (0/1)	-0.322*** (0.08)	-0.153 (0.2)	-0.312*** (0.09)	-0.137 (0.1)	-0.289** (0.1)	20.86	0.0003
Cardiac disease (0/1)	0.126 (0.2)	0.146 (0.2)	0.148 (0.3)	0.110 (0.2)	-0.778* (0.4)	0.49	0.9742
Diabetes (0/1)	-0.109 (0.2)	0.00677 (0.2)	0.117 (0.2)	0.112 (0.1)	0.404** (0.2)	10.71	0.0300
Hypertension (0/1)	-0.110 (0.09)	-0.105 (0.1)	0.0207 (0.1)	-0.129 (0.09)	-0.126 (0.1)	6.37	0.1735
Kidney Disease (0/1)	0.348** (0.1)	0.511** (0.2)	0.297** (0.2)	0.151 (0.2)	0.0298 (0.2)	13.31	0.0098
Past heart attack (0/1)	1.299*** (0.4)	0.866 (0.7)	1.661*** (0.4)	0.200 (0.5)	1.160* (0.6)	64.38	0.0000
Firm entering the data in 2005	-0.722** (0.3)	-0.188 (0.6)	-0.370 (0.3)	-0.0774 (0.3)	-1.024*** (0.3)	11.6	0.0206
Firm present in data 2004-2007	-0.679* (0.4)	-0.578 (0.7)	0.335 (0.6)	0.637 (0.5)	0.252 (0.5)	9.2	0.0562

Notes: Conditional logit coefficients. Standard errors in parentheses, clustered at the plan-quarter level. Chi-squared and p-value shown for a joint exclusion test of each characteristic's interaction with each of the drug intercepts. Regarding the last two dummy variables for the time period each firm is present in the data, the excluded category is one firm which was present from 2004-2006.

Table A4: Potential Endogeneity of Plan Choice within Firm

	Y = Copay difference between average brand and average generic statin, by quarter			
Panel A: All firms	(1)	(2)	(3)	(4)
Age	0.0600		0.00122	-0.000464
	(0.0363)		(0.00519)	(0.00185)
Male	0.262		0.128	0.00631
	(0.168)		(0.0872)	(0.0167)
No. of chronic conditions	-0.285		-0.115	-0.00920
	(0.158)		(0.0784)	(0.00825)
Firm-quarter f.e.		Yes	Yes	Yes
Excluding 3 firms				Yes
N	36741	36741	36741	27294
R-sq	0.045	0.758	0.758	0.961
Panel B: Firms reporting salaries	(1)	(2)	(3)	(4)
Age	0.0680		0.00506	-0.00118
	(0.0349)		(0.00809)	(0.00336)
Male	0.220		0.177	0.01180
	(0.259)		(0.119)	(0.01540)
No. of chronic conditions	0.0797		-0.120	-0.00917
	(0.212)		(0.128)	(0.01070)
Salary (in $10,000)	-0.0102		0.0189	-0.00115
	(0.0165)		(0.0114)	(0.00099)
Firm-quarter f.e.		Yes	Yes	Yes
Excluding 3 firms				Yes
N	18826	18826	18826	12462
R-sq	0.006	0.585	0.591	0.971

Notes: Standard errors in parentheses. The dependent variable is calculated as the average quarterly difference between a plan's brand and generic statins. The table shows that variation in this variable is almost entirely across firms rather than across the plan options available within a firm. In Column 4, we exclude the 3 firms with the widest range of options along this dimension, shown graphically as Firms 3, 9, and 12 in Figure 10. The R-squared is identical within this set of firms, whether or not we include the patient characteristics shown in the table, as it is entirely driven by the firm-quarter fixed effects.

Table A5: Sensitivity to measurement error, Salary subsample

Panel A: All initial prescriptions	**Plan inclusion based on accuracy of modal copays.**				
	All	**>75%**	**>90%**	**>95%**	**>97.5%**
	(1)	(2)	(3)	(4)	(5)
$\overline{p}_{jt}$ (National avg. copay)	-0.43***	-0.52**	-0.52*	-0.71***	-0.68***
	(0.10)	(0.18)	(0.21)	(0.16)	(0.17)
x Salary (in $10,000)	0.031***	0.038***	0.038***	0.021**	0.024***
	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)
$p_{ij} - \overline{p}_{jt}$ (Copay difference)	-0.14***	-0.17***	-0.20***	-0.11**	-0.074
	(0.02)	(0.04)	(0.04)	(0.04)	(0.04)
x Salary (in $10,000)	0.0045	0.0054	-0.0031	-0.0058	-0.0088*
	(0.00)	(0.01)	(0.01)	(0.01)	(0.00)
N	30233.00	15688.00	12747.00	6917.00	6586.00
	-45108.12	-23331.81	-18693.66	-10284.88	-9817.24
Lambda(median salary)	0.32	0.32	0.38	0.15	0.11
	0.09	0.15	0.20	0.06	0.06
Elasticity w.r.t $\overline{p}$jt	-0.67	-0.80	-0.81	-1.09	-1.05
Elasticity w.r.t pij - $\overline{p}$jt	-0.25	-0.30	-0.36	-0.19	-0.12
$\beta_1 - \beta_2$	-0.30	-0.36	-0.33	-0.60	-0.61
	0.11	0.20	0.24	0.16	0.17
Correlation	.72	.86	0.87	0.88	0.88
Panel B: Only 30-day prescriptions	**Plan inclusion based on accuracy of modal copays.**				
	All	**>75%**	**>90%**	**>95%**	**>97.5%**
	(6)	(7)	(8)	(9)	(10)
$\overline{p}_{jt}$ (National avg. copay)	-0.47***	-0.60**	-0.58**	-0.78***	-0.76***
	(0.11)	(0.19)	(0.23)	(0.17)	(0.17)
x Salary (in $10,000)	0.027***	0.033***	0.030***	0.017*	0.020*
	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)
$p_{ij} - \overline{p}_{jt}$ (Copay difference)	-0.14***	-0.13**	-0.16***	-0.076*	-0.024
	(0.02)	(0.04)	(0.05)	(0.04)	(0.04)
x Salary (in $10,000)	0.0085*	0.0099	-0.0013	-0.0064	-0.0096
	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)
N	22621.00	11998.00	9646.00	5138.00	4873.00
	-33994.35	-18015.72	-14259.09	-7783.96	-7399.99
Lambda(median salary)	0.29	0.21	0.27	0.10	0.03
	0.09	0.11	0.16	0.05	0.05
Elasticity w.r.t $\overline{p}$jt	-0.73	-0.92	-0.90	-1.20	-1.17
Elasticity w.r.t pij - $\overline{p}$jt	-0.24	-0.23	-0.29	-0.13	-0.04
$\beta_1 - \beta_2$	-0.34	-0.47	-0.43	-0.70	-0.74
	0.12	0.21	0.25	0.17	0.18
Correlation	.78	.9	0.91	0.95	0.96

Notes: Accuracy of modal copays is measured as the percentage of observed copayments for 30-day fills at retail pharmacies with no deductible applied, in our sample, that fall within a 99-cent bound of the modal copay for that plan/quarter/drug based on all statin fills for 30-day fills at retail pharmacies during that quarter. Column 3 uses the sample we use in other tables and analyses. At the bottom of each panel, the correlation between observed copays (per-day supplied) and imputed copays within each sample is shown.

Table A6: Sensitivity to physician-specific variation in $\overline{p}_{jt}$

	Estimation bias when physician-specific average copays for brand and generic drugs are distributed around the KFF average value with a standard deviation of...			
	$2.50		**$5.00**	
	Correct covariates	Mismeasured covariates	Correct covariates	Mismeasured covariates
	(1)	(2)	(3)	(4)
Average difference: $\hat{\beta} - \beta$	-0.00012	0.00035	0.00002	-0.00763
for $\overline{p}_{jt}$ (Average copay)	0.01751	0.02651	0.01040	0.02594
Average difference: $\hat{\beta} - \beta$	-0.00077	-0.00077	-0.00020	0.00119
for $p_{ij} - \overline{p}_{jt}$ (Copay diff.)	0.00655	0.00713	0.00614	0.00712
N	100,000	100,000	100,000	100,000
Simulation runs:	500	500	500	500

Notes: In these simulations, physicians are assumed to have rational expectations of the average copays for brand and generic drugs in each quarter, but with fixed physician-specific expectational errors independently drawn for brand and generic drugs. Each column shows the average difference between the estimated coefficients and the true parameters used to generate the data. "Mismeasured covariates" means the regressors ignored the existence of physician-specific error values in $\overline{p}$jt. "Correct covariates" means the regressors were the correct values used to simulate the choice of drug: $\tilde{}p_{jdt} = \overline{p}_{jt} + \varepsilon_{jd}$. The "true values" of beta used in generating the data were -0.48903824 for average copay and -0.16045144 for copay difference ($p - \overline{p}_{jt}$).

Table A7: Sensitivity to measurement error in p-bar

	Varying physicians' perceived average copays of brand and generic drugs			
	KFF average: Brand-generic copay difference = $12.92	**Sample average: Brand-generic copay difference = $15.31**	**Perceived as similar to Med Part D plans: Brand - generic copay difference = $26**	**Perceived brand-generic copay difference = $10**
	(1)	(2)	(3)	(4)
$\overline{p}_{jt}$ (National avg. copay)	-0.489***	-0.446***	-0.327***	-0.592***
	(0.126)	(0.106)	(0.056)	(0.166)
$p_{ij} - \overline{p}_{jt}$	-0.160***	-0.160***	-0.161***	-0.161***
	(0.032)	(0.033)	(0.032)	(0.032)
N	28557	28557	28557	28557
Log. Lik.	-41472.414	-41471.083	-41471.814	-41471.814
Elasticity $\overline{p}jt$	-0.757	-0.743	-0.557	-0.796
Elasticity pij - $\overline{p}jt$	-0.271	-0.271	-0.272	-0.272
Lambda	0.328	0.359	0.493	0.272
se	0.130	0.136	0.144	0.115

Notes: Column 1 reports the baseline estimates first reported in Table 4, Column 3. In this specification, physicians are assumed to be perfectly informed of the national average copays for brand and generic drugs, for privately insured patients, as reported in the Kaiser Family Foundation's annual surveys of employer-sponsored health plans. In Column 2, we assume physicians use instead the average copays for brand and generic drugs, by quarter, determined by our sample alone. Averaging over all quarters, the average copay difference between brand and generic drugs in our sample is $15.31, somewhat larger than the KFF reported average difference of $12.92. In column 3 we assume an even larger perceived average copay difference of $18, by adding $5 to KFF-reported brand copays, and in column 4 we assume that physicians perceived a $10 copay difference between the average brand and average generic drug, which is the modal value in our sample.

Table A8: Robustness Checks: Firms reporting salaries

	Baseline	Drop highest sal. groups	Drop lowest sal. group	Avg. salary of other patients	With salary-drug interactions
	(1)	(2)	(3)	(4)	(5)
$\bar{p}_{jt}$ (National avg. copay)	-0.52**	-0.50**	-0.64***	-0.54**	-0.50**
	(0.21)	(0.22)	(0.16)	(0.21)	(0.20)
x Salary (in $10,000)	0.037***	0.039***	0.023***		0.010
	(0.00)	(0.01)	(0.01)		(0.01)
x Avg. Salary among doctor's patients				0.044***	
				(0.01)	
x Salary minus Avg. Salary				0.027***	
				(0.01)	
Copay difference	-0.20***	-0.19***	-0.21***	-0.20***	-0.18***
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
x Salary (in $10,000)	-0.0030	-0.0077	0.00074		-0.0093
	(0.01)	(0.01)	(0.01)		(0.01)
x Avg. Salary among doctor's patients				-0.00073	
				(0.01)	
x Salary minus Avg. Salary				-0.0072	
				(0.01)	
N	12,747	12,148	7,040	12,747	12,747
Log. Lik.	-18685.68	-18235.43	-18680.56	-18683.04	-18636.52
Lambda(median salary)	0.38*	0.37*	0.33**	0.37*	0.36
se	(0.20)	(0.21)	(0.11)	(0.20)	(0.21)

Notes: The salary variable is defined in $10,000 bins starting at $50,000 and below (which accounts for 45% of the sample) and ending at $250,000 and above. Column 1 repeats the specification from Table 4 Column 6. In Column 2, we exclude the top 5% of earners ($220,000 and above). In Column 3 we exclude the lowest category ($50,000 and below). In Column 4, average salary of a doctor's patients is calculated using all of the patients in the broader claims data observed to receive any statin prescription from each prescriber. In Column 5, we add salaryXdrug interaction terms. The estimated coefficients of these interactions are plotted in Appendix Figure A7.

Table A9: Other Functional Forms for Salary

	Baseline	**Squared**	**2 groups**	**3 groups**	**Percentiles**
	(1)	(3)	(4)	(5)	(6)
$\overline{p}_{jt}$ (National avg. copay)	-0.52**	-0.53**	-0.64***	-0.63***	-0.42*
	(0.21)	(0.21)	(0.22)	(0.22)	(0.22)
x Salary (in $10,000)	0.037***	0.057***			
	(0.00)	(0.01)			
x Salary squared		-0.0018*			
		(0.00)			
x Salary > $50,000			0.30***	0.21***	
			(0.04)	(0.05)	
x Salary > $80,000				0.15***	
				(0.05)	
x Salary (in percentiles)					0.0045***
					(0.00)
Copay difference	-0.20***	-0.19***	-0.17***	-0.17***	-0.20***
	(0.04)	(0.04)	(0.05)	(0.05)	(0.04)
x Salary (in $10,000)	-0.0030	-0.0082			
	(0.01)	(0.01)			
x Salary squared		0.00050			
		(0.00)			
x Salary > $50,000			-0.046	-0.054	
			(0.04)	(0.04)	
x Salary > $80,000				0.020	
				(0.05)	
x Salary (in percentiles)					-0.00056
					(0.00)
N	12747	12747	12747	12747	12747
Log. Lik.	-18685.68	-18683.71	-18687.28	-18681.55	-18679.72
Lambda(median salary or below)	0.38*	0.37*	0.27*	0.27*	0.48
	(0.20)	(0.20)	(0.14)	(0.14)	0.30

Standard errors in parentheses, clustered at the plan-quarter level. Salary is measured in $10,000 increments and centered around the median salary of $55,000. Reported lambda values correspond to either the median salary level, or in the case of columns 4 and 5, the lowest group (Salary below $50,000). For column 5, to compute the values of beta corresponding to the highest salary tertile, the two interaction terms (Salary > $50,000 and Salary>$80,000) must be summed.

Table A10: Simulated changes under perfect observation of copays

Panel A: Only average copays observed (lambda = 0). Based on Model of Table 4, Col. 5	Change in generic prescribing rate	Change in monthly copay (average)	Predicted change in adherence rate
	(1)	(2)	(3)
Salary of $50,000 or below	-0.020	$1.09	-0.0035
Salary of $50,000-$80,000	-0.009	$1.01	-0.0032
Salary above $80,000	-0.006	$0.76	-0.0018
All	-0.013	$0.98	-0.0030
Panel B: Only average copays observed (lambda = 0). Based on Model of Table 4, Col. 6	Change in generic prescribing rate	Change in monthly copay (average)	Predicted change in adherence rate
	(4)	(5)	(6)
Salary of $50,000 or below	-0.016	$0.82	-0.0026
Salary of $50,000-$80,000	-0.007	$0.76	-0.0024
Salary above $80,000	-0.005	$0.59	-0.0014
All	-0.010	$0.74	-0.0022

Notes: This table summarizes the results of the simulation exercise described in Section VI for the third scenario, in which lambda equals 0 and physicians do not observe any portion of idiosyncratic copays.

Table A11: Other Robustness checks

	1+ risk factor	No prior statin use	Balanced panel	Including 1-tier plans	No control for entering late	Monthly time trends	Drop all firms with different plans	Control function approach	Forward-looking prescribing		Imputing rebates on plan payments	Plan push towards low tier	Plan payment divided into components	"Average" prices defined by drug
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
$\bar{p}_{it}$ (National avg. copay)	-0.46***	-0.43***	-0.70***	-0.38***	-0.52***	-0.29**	-0.52***	-0.50***	-0.39***	-0.35***	-0.57***	-0.21***	-0.48***	-0.31***
	(0.13)	(0.12)	(0.14)	(0.13)	(0.15)	(0.12)	(0.15)	(0.13)	(0.14)	(0.12)	(0.11)	(0.05)	(0.13)	(0.06)
… One-quarter lead									-0.22					
									(0.16)					
… at time of first refill										-0.15*				
										(0.08)				
Copay difference	-0.15***	-0.15***	-0.11***	-0.26***	-0.21***	-0.14***	-0.19***	-0.15***	-0.14***	-0.13***	-0.14***	-0.084***	-0.15***	-0.17***
	(0.03)	(0.03)	(0.03)	(0.04)	(0.04)	(0.03)	(0.04)	(0.03)	(0.05)	(0.04)	(0.03)	(0.01)	(0.04)	(0.04)
… One-quarter lead									-0.017					
									(0.05)					
… at time of first refill										-0.0034				
										(0.00)				
Plan payment	-0.080***	-0.087***	-0.056**	-0.10***	-0.11***	-0.058***	-0.081***	-0.086***	-0.086***	-0.086***	-0.097***	-0.083***		-0.088***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)		(0.02)
… national average													-0.12***	
													(0.02)	
… plan-specific difference													-0.065***	
													(0.02)	
Residuals of control function								-0.024***						
								(0.01)						
Pre-expiration low-tier prescribing x low-tier												3.06***		
												(0.19)		
N	21,298	25,161	18,422	30,308	28,557	28,557	21,869	28,557	28,557	27,198	28,557	28,557	28,557	28,557
Lambda	0.33**	0.35**	0.16**	0.68**	0.42**	0.48*	0.37**	0.29***	0.26***	0.26**	0.25***	0.39***	0.32**	0.54***
	0.14	0.15	(0.07)	0.29	0.17	0.25	0.16	0.12	0.10	0.11	0.08	0.13	0.14	0.16

Notes: All specifications contain the same controls as the main baseline specification in Table 4, Column 3. Col. 1 excludes patients younger than 45 (male) or 55 (female) who have no diagnosis of high cholesterol, hypertension, diabetes, or heart disease. Col. 2 excludes patients with an observed statin purchase prior to their one-year "clean" window. Col. 3 includes only the five firms that appear in our sample of initial prescriptions over the entire sample period 2005-2007. Col. 4 includes two firms offering all statins at the same copay level, one of which was $0. Col. 5 excludes the controls that allow drug intercepts to vary between three groups of firms: Those included for full period 2004-2007 (meaning initial prescriptions observed over 2005-2007), those not observed in 2004, and those not observed in 2007. Col. 6 interacts drug intercepts with separate linear time trends by month. Col. 7 drops the six firms with notable copay variation across plans, as described in Section 6.2 of the paper. Col. 8 instead uses a control function approach to address the potential endogeneity of plan selection, as described in Section A.3. Col. 9-10 include two different controls for future copays, and show lambda values calculated for the sum of current and lead copays. Col. 11-12 are robustness checks described in detail in Section A.5. "Pre-expiration low-tier prescribing x low-tier" is the interaction of "sharediff", the difference between predicted drug share in the pre-period, based on copay, and actual drug shares of preferred brand drugs, with Tier 1 or Tier 2 status of a drug. In Col. 13 we show separate coefficients for plan payments- average and idiosyncratic plan portion, parallel to the decomposition used for copays. In Col. 14 we do the same, but use drug-specific averages from within our sample as the national average copay and plan payment.

Table A12: Patient heterogeneity and drug choice

Panel A. All firms	(1)	(2)	(3)
$\overline{p}_{jt}$ (National avg. copay)	-0.489***	-0.507***	-0.507***
	(0.126)	(0.126)	(0.126)
Copay difference	-0.160***	-0.164***	-0.164***
	(0.032)	(0.033)	(0.033)
Expected LDL reduction		9.556***	9.535***
		(0.652)	(0.653)
Dose = 40 mg		-1.275***	-1.271***
		(0.032)	(0.032)
Dose = 80 mg		-4.248***	-4.238***
		(0.087)	(0.086)
Choice set	6 drugs	24 drug-doses	24 drug-doses
Patient characteristics	x drug	x LDL, dose	x LDL, dose
Random coefficients			X
N	28,557	28,557	28,557
Log. Lik.	-41472.414	-76917.746	-76917.033
Lambda(median salary)	0.328	0.323	0.324
	0.130	0.126	0.126

Notes: Column 1 repeats our main specification. Columns 2-3 show that a more robust model that allows more flexible controls for patients' heterogeneous needs (including unobserved heterogeneity in need for LDL reduction in Columns 3 and 6, in panel B) has minimal effect on our estimates of interest. In the mixed logit specification (column 3), we cannot reject the null that the coefficient on Expected LDL reduction is constant. The parameter estimated as its mean is shown, and the parameter estimated as its standard deviation is 0.0021 (s.e. 0.00583) in Column 3.

Table A12: Patient heterogeneity and drug choice

Panel B. Salary firms	(4)	(5)	(6)	(7)
$\overline{p}_{jt}$ (National avg. copay)	-0.524**	-0.541**	-0.541**	-0.587***
	(0.214)	(0.215)	(0.215)	(0.217)
x Salary (in $10,000)	0.0375***	0.0391***	0.0391***	0.0616***
	(0.005)	(0.005)	(0.005)	(0.009)
Copay difference	-0.197***	-0.199***	-0.199***	-0.196***
	(0.044)	(0.044)	(0.044)	(0.043)
x Salary (in $10,000)	-0.00302	-0.00278	-0.00279	-0.00571
	(0.006)	(0.006)	(0.006)	(0.006)
Expected LDL reduction		9.862***	9.840***[1]	10.33***
		(0.937)	(0.937)	(0.974)
x Salary (in $10,000)				-0.170***
				(0.052)
Dose = 40 mg		-1.223***	-1.218***	-1.164***
		(0.051)	(0.050)	(0.054)
x Salary (in $10,000)				-0.0481***
				(0.009)
Dose = 80 mg		-4.120***	-4.108***	-4.035***
		(0.134)	-0.131	(0.142)
x Salary (in $10,000)				-0.0991***
				(0.029)
Choice set	6 drugs	24 drug-doses	24 drug-doses	24 drug-doses
Patient characteristics	x drug	x LDL, dose	x LDL, dose	x LDL, dose
Random coefficients			X	
N	12,747	12,747	12,747	12747.000
Log. Lik.	-18685.682	-34529.420	-34859.734	-34429.853
Lambda(median salary)	0.375	0.368	0.368	0.334
	0.204	0.196	0.196	0.167

Notes: Column 4 repeats our main specification. Columns 5-6 show that a more robust model that allows more flexible controls for patients' heterogeneous needs (including unobserved heterogeneity in need for LDL reduction in Columns 3 and 6) has minimal effect on our estimates of interest. As in Panel A column 3, in the mixed logit specification of column 6, we cannot reject the null that the coefficient on Expected LDL reduction is constant. The parameter estimated as its mean is 0.0044 (s.e. 0.00797) in Column 6. In Column 7 we allow the preference for LDL reduction and for high doses to vary with patient salary.

Table A13: Changes in physician habit persistence

	(1)	(2)
$\overline{p}_{jt}$ (National avg. copay)	-0.48***	-0.48***
	(0.12)	(0.12)
Copay difference	-0.16***	-0.16***
	(0.03)	(0.03)
Doctor's last prescription	0.77***	0.77***
	(0.06)	(0.06)
x Post- Zocor's patent expiration	0.080	0.10
(after June 23, 2006)	(0.07)	(0.08)
x Last Prescription written prior	-0.038	-0.060
to June 23, 2006 (in year 2006)	(0.07)	(0.07)
x First Prescription written	-0.36***	-0.38***
after June 23, 2006	(0.05)	(0.06)
x Second Prescription written		-0.049
after June 23, 2006		(0.06)
N	28557	28557
Log. Lik.	-41444.88	-41408.88
Lambda(median salary)	0.33***	0.33
	(0.13)	(0.13)

Notes: This analysis is described in Appendix Section A.4

Table A14: Initial statin prescribing shares in main sample and NAMCS data

Panel A. Main sample from claims data (N= 28,566)

	Crestor	Lipitor	Vytorin	Pravachol	Zocor	lovastatin
2005	0.085	0.527	0.126	0.041	0.177	0.043
2006	0.123	0.313	0.170	0.029	0.286	0.079
2007	0.113	0.237	0.151	0.052	0.390	0.057

Panel B. NAMCS sample, unweighted (N=191)

	Crestor	Lipitor	Vytorin	Pravachol	Zocor	lovastatin
2005	0.086	0.379	0.224	0.035	0.172	0.103
2006	0.119	0.390	0.153	0.068	0.220	0.051
2007	0.108	0.297	0.108	0.108	0.270	0.108

Panel C. NAMCS sample, using sampling weights (N=191, population size 6,912,886)

	Crestor	Lipitor	Vytorin	Pravachol	Zocor	lovastatin
2005	0.084	0.397	0.298	0.020	0.084	0.117
2006	0.184	0.317	0.169	0.054	0.195	0.082
2007	0.147	0.286	0.123	0.093	0.262	0.090

Panel D. NAMCS excluding practices with e-prescribing, using sampling weights (N=129, population size 4,523,412)

	Crestor	Lipitor	Vytorin	Pravachol	Zocor	lovastatin
2005	0.079	0.333	0.399	0.027	0.069	0.093
2006	0.202	0.317	0.123	0.045	0.235	0.078
2007	0.083	0.273	0.266	0.126	0.206	0.047

Notes: The supplemental analysis with NAMCS data is described in Section A.5.1. The NAMCS sample is created to match our main sample in patient age range, private insurance status, and year of first prescription.

B Analysis of Patient Adherence Decision

Recall that we have defined an *initial fill* as a patient's first observed purchase of a statin following at least one year of coverage in the data. We use a common medical definition of *class-based full adherence over six months* (henceforth simply *adherence*) – filling enough statin prescriptions to maintain a supply of medication during at least 80% of the days in the six months following the initial fill. Our empirical analysis of patient adherence makes the following assumptinos.

Assumption 1. *Patients who are adherent, but finish the six month period on a different statin than the initial fill, would have continued on the first statin if switching were not possible.*

This assumption is consistent with a notion of patients deciding to continue statin treatment prior to deciding whether to stay on drug j or switch to another statin. While it appears strong, this simplifying assumption is consistent with the data: While the copay of the drug initially filled affects continuation, the copays of other drugs– even when a much less expensive one is available– have no effect. Furthermore, switching costs appear to be high, based on the low rates of switching we see in the data[8]: Immediately after the first fill, less than 3% of patients switch to a different statin for their second prescription, while 27% simply stop filling statin prescriptions. Among patients who adhere, 85% remain on the drug of the initial fill.

Following the equation below, we regress adherence on all of the factors that enter the main analysis of prescribing:

$$\begin{aligned} Y_{ij} &= T_j + a_1 p_{ijt} + a_2 p_{ijt} * Salary_i + \beta_3 PlanCost + \gamma_1 LastDocRx_{jd} + \gamma_2 LastPatRx_{ij} \quad (1) \\ & \gamma_0 DTP_{j,t} + \gamma_1 DTP_{j,t-1} + \gamma_2 DTP_{j,t-2} + \gamma_3 DTP_{j,t-3} + X_i B + \epsilon_{ij} \quad (2) \end{aligned}$$

where $Y_{ij} = 1$ if patient i is adherent in the statin class after starting on drug j, and ϵ_{ij} is a Type 1 EEV error. Patient i's monthly copay, p_{ijt}, is measured in \$10 units. Thus a_1, expected to be negative, represents the average effect of a \$10 copay increase on a patient's utility of statin treatment.[9] T_j represent fixed effects for the drug molecule prescribed and

[8] Among other factors, these may include the time and effort necessary to contact the doctor, the psychic cost of expressing concern over monetary costs, and procrastination between doctor visits.

[9] Recall that we use a class-based measure of adherence. As some patients switch to cheaper drugs, our effect of copay on adherence will be smaller than the effect of copay on utility. Nevertheless, this is the margin that is most relevant for assessing health consequences.

X_i includes the individual health and demographic characteristics included in the prescribing analysis as well as $Salary_i$ and a dummy for if the patient's initial fill is for more than 30 days.[10]

Variation in p_{ij} comes from cross-sectional variation in plan copays and changes in each plan's copays over time. The necessary assumption is that variation in p_{ij} be uncorrelated with variation in unobservable determinants of v_{ij} as well as unobservable determinants of a_i.

Table B1 reports the results of the equation above, estimated on the subsample of firms reporting salaries. Marginal effects for the probability of adherence are shown, for a copay change of $10. We show results using a continuous salaryXcopay interaction term, as well as another specification that allows for discrete changes in the copay response across different salary groups. This is done because the lowest salary group ($50,000 and below) accounts for 45% of our sample and the effect of salary on cost-sensitivity might be non-linear.

In Column 2 of Table B1, we show that adding a dummy variable "generic" for whether the drug prescribed is available as a generic does not have any significant effect on adherence. This supports the assumption that brand and generic versions are perceived to be of equal therapeutic value.

In Columns 1-2 and 4-5, the identification of the copay effect comes from the fact that multi-tier plans have different copays for different brand drugs: for example, two plans may have the same copay structure, with their Tier 2 drugs costing $15 and their Tier 3 drugs costing $25 per month, but one plan may place Lipitor on Tier 2 and Crestor on Tier 3, while another plan might do the reverse. In Columns 3 and 6, instead of fixed effects at the plan level, we use the control function approach described in Section V.B to isolate copay variation across firms, avoiding any concerns of endogenous selection of cost-sensitive patients to low-copay plans.

Based on Models 3 and 6, a $10 copay increase is estimated to reduce a low salary patient's adherence probability by 3.2 to 3.3 percentage points (approximate 7% reduction relative to baseline adherence of 46%). The adherence of a high salary patients (e.g. salary=$125k, the mean salary in the group above $80k) is much higher at the baseline (60%), but much less elastic, with a $10 copay increase reducing adherence probability by only 0.003 to 0.008.

To summarize, in this analysis of patient adherence decision we have found:

[10]We do not control for the days supplied (i.e. 30 day or 90 day supplies) in the prescribing analysis because it is not clear whether this decision precedes or follows the choice of which drug to prescribe. When considering adherence, however, it is an important factor for two reasons: First, people on 90-day prescriptions need only make one refill to appear fully adherence over six months, and choosing a larger supply could be driven by the intention to continue taking the drug.

1. Evidence that salary is negatively correlated with adherence, conditional on health characteristics.

2. Evidence that salary is negatively correlated with the price sensitivity of adherence (i.e. lower-salary patients are the most sensitive to copay).

3. Evidence that patients perceive the therapeutic value of brand and generic versions of the same drug similarly.

Table B1. Copay effects on Adherence

	Continuous Salary			Salary tertiles		
	(1)	(2)	(3)	(4)	(5)	(6)
Copay (in $10)	-0.0337***	-0.0338***	-0.0321***	-0.0350***	-0.0351***	-0.0322***
	(0.010)	(0.012)	(0.012)	(0.008)	(0.011)	(0.011)
x Salary (in $10,000)	0.00115*	0.00115*	0.00120**			
	(0.001)	(0.001)	(0.001)			
x 1(Salary $50,000-$80,000)				-0.00187	-0.00185	-0.00128
				(0.011)	(0.011)	(0.011)
x 1(Salary above $80,000)				0.0220***	0.0220***	0.0229***
				(0.006)	(0.006)	(0.006)
Salary (in $10,000)	0.0106***	0.0106***	0.0105***			
	(0.003)	(0.003)	(0.003)			
Salary above $50,000				0.0874***	0.0874***	0.0868***
				(0.031)	(0.031)	(0.031)
Salary above $80,000				0.0742**	0.0741**	0.0735**
				(0.030)	(0.030)	(0.029)
Generic dummy		-0.00111			-0.00143	
		(0.049)			(0.046)	
Observations	9652	9652	9652	9652	9652	9652
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Only firm-level variation in copays			Yes			Yes

Note: Average marginal effect of a $10 copay increase on the probability of *Six month adherence* (80% or greater days supplied) is shown. In column (1), the Copay X Salary interaction is centered at the median salary. In columns 4-6, the omitted group is salary < $50,000, of whom 46.6% adhere. The average adherence for both groups with salary > $50,000 is 59%. The patient characteristics, advertising variables, and plan payments included in the prescribing analysis are all included here, as well as a dummy variable for "90-day prescription." "Generic dummy" identifies a molecule after it has become available as a generic. Standard errors in parentheses are clustered at the plan level.

C Data

C.1 Sample creation

We begin by identifying the individuals between the ages of 30 and 64 who were covered in the claims data for at least one full year prior, and who filled no statin prescriptions for 365 days prior, to what we call an "initial prescription." Our dataset of 28 firms contains 78,819 initial prescriptions. After merging in the imputed plan copays for each drug in each quarter, we drop plans that do not have a tiered copay benefit system, either because they have no copay, no coinsurance, and no deductible for all drugs (N=1,548), the same copay for all drugs (N=271), or a coinsurance system in which the out of pocket cost is a percentage of the retail price of the drug (N=3,982). We are left with 72,985 initial prescriptions from 27 firms.

We then check how accurately the modal copays for a standard prescription in each plan (computed using all prescriptions in a drug-plan-quarter rather than just initial prescriptions) explain the copays for these initial prescriptions. By plan, we compute the share of 30-day initial fills with no deductible for which the reported copay is within a 99 cent interval of the modal copay. We keep the plans in which this share is above 0.90, reducing the size of our sample by 60%. Lastly, we drop plans in which we could not impute a copay for all six statins in any quarter, due to a drug not being prescribed to any beneficiary of the plan (N=1,168), plans with fewer than 50 initial prescriptions (N=183), and observations that appear to be returns (both copay and amount paid by plan are negative values, N=33). Our final sample contains 12 firms (of which eight report employee salaries), 27 plans, and 28,557 initial prescriptions.

C.2 Salary bins

Our data include salary bins which range from "1" (Under $50,000 or missing) to "17" (Above $200,000). The fact that missing salary observations receive the same code as "salary below $50,000" introduces measurement error. We took several steps to reduce this error. First, we assumed that firms reporting only a salary code of "1" for all employees in 2005-2007 were not reporting salaries but "missing" for all employees, and excluded these firms from our analysis. Second, we used the longitudinal structure of the claims data to address the possibility that some firms' (or some employees') salaries were only reported in some years. Specifically, for each employee, we used the highest salary code reported in the 2005-2007 period.[11] We

[11] We determined that two firms followed an unusual pattern in their 2005 coding, with values of "1" (lowest value) assigned to all dependents and values of "17" (highest value) assigned to all primary beneficiaries.

also matched dependents to the highest reported salary code of their corresponding primary beneficiary.[12] As a result of these edits, the fraction of our sample with a bin value of 1 is reduced from 50.6% to 44.8%. The distribution of salary bins after these adjustments is shown below.

For bins 2-16, which have salary ranges of $10,000, we assign the midpoint ($55,000, $65,000, ..., $195,000). For bin 1, which represents salaries below $50,000 or missing, we assign $45,000, and for bin 17, which represents salaries above $200,000, we assign $205,000. In Table 7, we show that our results remain similar when we drop the top 5% of earners, including bin 17, and when we exclude bin 1.

C.3 Plan Copays

During the period prior to Zocor's patent expiration, most of the plans in our sample (17 of 25, covering 88% of the statin initiators in that period) are "3-tier" plans: brand statins were offered at two different copay amounts (Tiers 2 and 3), while generic Mevacor had the lowest copay (Tier 1). Three small plans, together covering 4.8% of the statin initiators, had only 2 tiers (all brand statins had the same copay). 6.9% of statin initiators belonged to plans in which there were more than two copay levels occupied by the brand statins.

The average difference between a plan's least and most expensive statins in this period was $33. Within the 3 and 4 tier plans, the average difference between preferred (Tier 2) and other brands (Tiers 3 or 4) was $18, and the average difference between "preferred" brands and generic Mevacor was $14. In most of these plans (59%), there were three statins on the "preferred brand" tier and two on the non-preferred tier. Pravachol was the drug most likely to be on the non-preferred tier, and Vytorin was the least likely. The table below summarizes the relative pricing of Zocor in comparison to the other brand statins within the 3-tier plans, before its patent expiration.

After their patent expirations, generic versions of Pravachol and Zocor entered the market and were made available at lower copays than the remaining brand statins. In 4 of 27 plans, the imputed copays of generic Zocor, generic Pravachol, and generic Mevacor (lovastatin) were not exactly equal to each other, most likely because a patient's out of pocket costs are capped at the retail price of the drug, and for example, Walmart sold generic pravastatin and lovastatin for $4 a month starting in 2006. In the other plans, all three generic statins had imputed copays within ± $1 of one another.

Since both firms had more plausible salary distributions in 2006 and 2007, we excluded the 2005 values when calculating the highest reported salary of each employee in these firms.

[12] In 85% of cases, dependents already had the same code as the primary; in the other 15%, dependents had a code of "1".

Table C1: Relative pricing of Zocor within 3 and 4 tier plans, prior to its patent expiration

	Priced higher than Zocor	Same copay	Priced lower than Zocor
Crestor[1]	16%	71%	13%
Lipitor	5%	82%	12.5%
Pravachol	90%	0%	10%
Vytorin	0%	87%	13%

[1] Estimates are weighted according to the number of statin initiators in each plan and quarter.

Tier level changes among brand drugs happened occasionally within the plans in our sample: four plans changed the tier level of one or more brand drugs during the period prior to Zocor's patent expiration, and ten plans made changes in the post period. Although the typical plan had 3 tiers in the pre-expiration period, after the expiration, the majority of such plans offered all three of the remaining brand statins at the same copay level. Thus, 66% of patients initiating statin prescriptions after Zocor's patent expiration faced a formulary with all brand statins on the same copay tier.

To illustrate the type of variation that identifies the effect of copays on prescribing, the tables below show copays before and after Zocor's patent expiration for two large plans in our sample. They are 3-tier plans that differ in their tier levels($10, $18, $36 and $10, $25, $40) as well as in the placement of brand drugs on their preferred vs. non-preferred tiers. In one of these plans, the remaining brand statins all remained on Tier 2 after the Zocor's patent expiration, but in the other, Lipitor was moved from Tier 2 to Tier 3.

Table C2: Copays in Example Plan 1

	Copay before Zocor's patent expiration	Copay after Zocor's patent expiration
Crestor	$18	$18[1]
Lipitor	$18	$18
Mevacor	$10	$10
Pravachol	$36	$10
Vytorin	$18	$18
Zocor	$18	$10

The table below reports the "national average copays" of brand and generic drugs, for

Table C3: Copays in Example Plan 2

	Copay before Zocor's patent expiration	Copay after Zocor's patent expiration
Crestor	$25	$25
Lipitor	$25	$40
Mevacor	$10	$10
Pravachol	$25	$10
Vytorin	$25	$25
Zocor	$40	$10

employer-insured patients, used in the analysis of Section IV.B, and how they compare to the average statin copays across the plans in each of our samples.

Table C4: Average Copay Comparison

Panel A: Single-Source Brand Drugs

	KFF Survey*	Full claims data	Main sample
2005 mean	$22.5	$21.08	$24.58
sd			9.05
2006 mean	$24	$23.77	$26.64
sd mean			10.76
2007 mean	$24	$23.63	$25.82
sd			8.62

Panel B: Generic Drugs

	KFF Survey*	Full claims data	Main sample
2005 mean	$10	$9.81	$9.83
sd			0.69
2006 mean	$11	$11.02	$11.47
sd			9.22
2007 mean	$10.5	$8.45	$10.57
sd			3.93

*These values were taken from Kaiser Family Foundation [2007], based on annual surveys of a random sample of U.S. employers. These are the values we take to be a prescriber's expectation of brand and generic drug copays for an employer-insured patient, in Section IV.2

D Clinical Evidence on the Comparative Therapeutic Value of Different Statins

We assume that controlling for direct-to-physician advertising, the relative perceived therapeutic benefit of the statins is constant over our 2005-2007 time period. The main threat to this assumption would be changes in the clinical evidence about these drugs or in the national recommendations based on such evidence.[13] For example, in August 2004, the guidelines were modified to recommend more intensive treatment for high-risk patients, based on the results of five clinic trials published after 2001, when the previous guidelines were written.[14] Importantly, after the 2004 update, before the start of our study period, the guidelines remained unchanged until 2013.[15] The length of this period with no change, compared to the frequency of earlier guideline revisions, reflects the fact that after 2004, the accumulation of new evidence challenging the clinical consensus slowed.

Looking at all the studies cited in the 2013 guideline's Evidence Statements, we see that the only two important trials whose results were released during our study period (2005-2007) were TNT[16] (April 2005, RCT comparing 20mg simvastatin vs 80mg Lipitor) and IDEAL[17] (Nov. 2005, RCT comparing 10mg vs 80mg Lipitor). However, TNT and IDEAL were focused on patients already diagnosed with coronary heart disease, and with a history of heart attack, respectively. Both studies found some evidence in favor of more aggressive statin therapy for patients in these high-risk groups, and are cited in the Evidence Statements informing the 2013 guidelines along with earlier landmark trials and later ones such as JUPITER (2008) which focused on patients with no known cardiovascular disease.[18]

[13]The U.S. National Cholesterol Education Program convenes expert panels to comprehensively review clinical evidence and develop up-to-date recommendations on the identification and treatment of high cholesterol. Their guidelines are broadly disseminated through the medical community. Their first Adult Treatment Panel guidelines (ATP I) were released in 1988, followed by ATP II in 1993 and the highly influential ATP III in 2001.

[14]The new language read: "When LDL-lowering drug therapy is employed in high-risk or moderately high-risk persons, it is advised that intensity of therapy be sufficient to achieve at least a 30% to 40% reduction in LDL-C levels."

[15]The so-called "ATP IV," officially "2013 ACC/AHA Guideline on the Treatment of Blood Cholesterol to Reduce Atherosclerotic Cardiovascular Risk in Adults" was published online on November 12, 2013 and appeared in the supplement to the June 24, 2014, issue of the journal *Circulation* (Stone, Robinson, Lichtenstein et al. 2014).

[16]LaRosa JC, Grundy SM, Waters DD, et al. 2005

[17]Pedersen TR, Faergeman O, Kastelein JJP, et al. High-dose atorvastatin vs usual-dose simvastatin for secondary prevention after myocardial infarction: the IDEAL study: a randomized controlled trial. JAMA. 2005;294:243745

[18]JUPITER's finding that a high-intensity statin (Crestor) was beneficial even for low-risk patients with low cholesterol levels generated substantial media attention and a major advertising campaign by AstraZeneca. This is exactly the type of study release that could bias our results, but it occurred in November 2008,

Since TNT and IDEAL came out during our study period, one might worry that the perceived efficacy of stronger relative to weaker statins might be changing over our time period for patients with a history of heart attack or coronary heart disease. Thus, we conduct a robustness check that excludes the 9% of our sample with either heart disease or a previous heart attack (Table 6, Column 3). The results are extremely similar to our main specification. When we go further and exclude the quartile of our sample with the highest estimated 10-year heart attack risk rate (most of whom fall into the "moderately high-risk" category of 10-20%), we see a larger estimated effect of average copay in the remaining (low-risk) population, reflecting a larger shift towards Zocor. This is entirely consistent with the NCEP guidelines described above, which have advocated a lower goal level of LDL cholesterol for patients with coronary heart disease since ATP-III in 2001.

Apart from TNT and IDEAL, one other trial (CORONA), published in NEJM Nov. 2007, studied patients over age 60 with heart failure, and found no benefit of statin therapy. The only other 2005-2007 publications which are cited in the 2013 Evidence Statements either upheld the existing evidence for the use of statins (Nakamura H, Arakawa K, Itakura H, et al. 2005, Baigent C, Keech A, Kearney P, et al. 2005), re-analyzed earlier trials' data focusing on small subgroups such as diabetics with cardiovascular disease (Ahmed S, Cannon CP, Murphy SA, et al. 2006) or diabetics receiving hemodialysis (Wanner C, Krane V, Mrz W, et al. 2005), or studied the effect of statins on hematological malignancies, finding no effect (Bonovas S, Filioussi K, Tsantes A, et al. 2007).

In addition to our robustness check excluding patients with a past heart attack or cardiac disease diagnosis, we also show our model with molecule time trends (linear, monthly) included, as a second check. Both appear in Table A11.

outside of our 2005-2007 study period.

2005-2007 Publications cited in the Evidence Statements of "2013 ACC/AHA Guideline on the Treatment of Blood Cholesterol to Reduce Atherosclerotic Cardiovascular Risk in Adults"

1. Ahmed S, Cannon CP, Murphy SA, et al. Acute coronary syndromes and diabetes: is intensive lipid lowering beneficial? Results of the PROVE IT-TIMI 22 trial. Eur Heart J. 2006;27:232329.

2. Baigent C, Keech A, Kearney P, et al. Efficacy and safety of cholesterol-lowering treatment: prospective meta-analysis of data from 90 056 participants in 14 randomised trials of statins. Lancet. 2005;366:126778.

3. Bonovas S, Filioussi K, Tsantes A, et al. Use of statins and risk of haematological malignancies: a meta-analysis of six randomized clinical trials and eight observational studies. Br J Clin Pharmacol. 2007;64:25562.

4. LaRosa JC, Grundy SM, Waters DD, et al. Intensive lipid lowering with atorvastatin in patients with stable coronary disease. N Engl J Med. 2005;352:142535.

5. Nakamura H, Arakawa K, Itakura H, et al. Primary prevention of cardiovascular disease with pravastatin in Japan (MEGA Study): a prospective randomised controlled trial. Lancet. 2006;368:115563

6. Pedersen TR, Faergeman O, Kastelein JJP, et al. High-dose atorvastatin vs usual-dose simvastatin for secondary prevention after myocardial infarction: the IDEAL study: a randomized controlled trial. JAMA. 2005;294:243745.

7. Wanner C, Krane V, Mrz W, et al. Atorvastatin in patients with type 2 diabetes mellitus undergoing hemodialysis. N Engl J Med. 2005;353:23848.

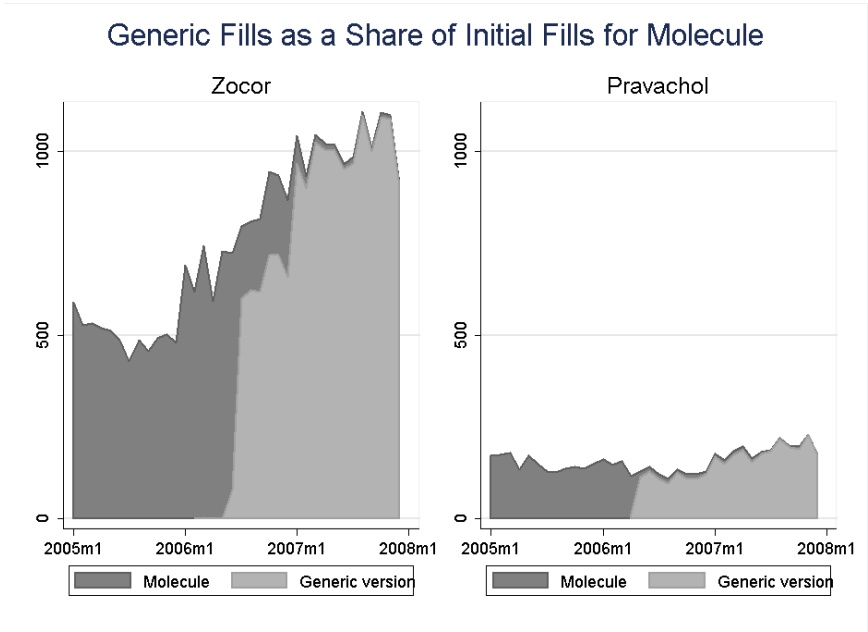


Figure C1: *Generic substitution rates, initial prescriptions.* The dark gray represents all fills of initial prescriptions for each molecule. The light gray shows the share of fills for generic versions in each period.

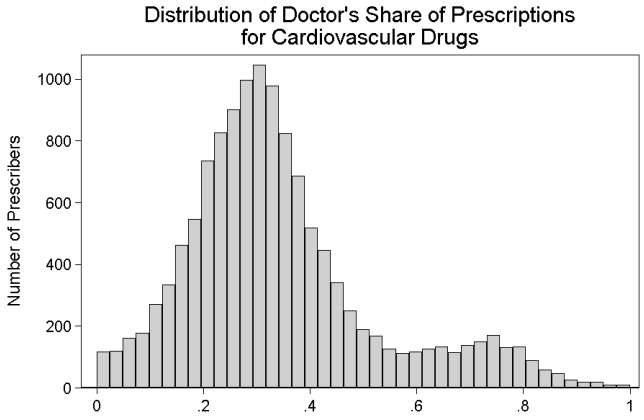


Figure C2: This figure shows the distribution of the share of prescriptions for cardiovascular drugs, by unique prescriber. We denote prescribers with shares above 0.60 as *specialists*.

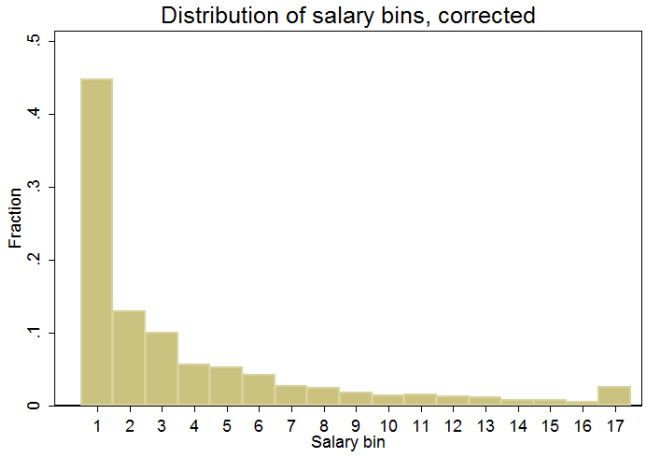


Figure C3: The distribution of salary bins in our main sample. Bin 1 represents annual salaries $50,000 and below, Bins 2-16 represent $10,000 increases in the bin range, and Bin 17 represents $200,000 and above.