Does Cost-Sharing Affect Compliance? Insurance and the Market for Prescription Drugs (Addendum, May 3, 2006)

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ABSTRACT

Insurance for prescription drugs is characterized by two regimes: *flat copayments* and *variable coinsurance*. We develop a simple model to show that patient compliance is lower under coinsurance due to uncertainty in cost-sharing. Empirically, we derive comparable models for compliance behavior in the two regimes. Using claims data from nine large firms, we focus our analysis on diabetes, a common chronic condition that leads to severe complications when inappropriately treated. In the coinsurance model, an increase in the coinsurance rate from 20% to 75% resulted in the share of persons who never comply to increase by 9.9%, and reduced the share of fully compliant persons by 24.6%. In the copayment model, an increase in the copayment from $6 to $11 resulted in a 6.2% increase in the share of never-compliers, and a concomitant 9% reduction in the share of full compliers.

Similar results hold when the level of cost-sharing is held constant across regimes. While non-compliance reduces expenditures on prescription drugs it may also lead to increases in indirect medical costs due to avertable complications. Using available aggregate estimates of the cost of diabetic complications, we calculate that the $6-$11 increase in copayment would have the direct effect of reducing national drug spending for diabetes by $216 million. However, the increase in non-compliance rates is expected to increase the rate of diabetic complications resulting in an additional $350 million in treatment costs for poor glycemic control, a 9.7% increase. The results suggest that both private payers and public payers may be able to reduce overall medical costs by switching from coinsurance to copayments in prescription drug plans.

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TABLE 2: DESCRIPTIVE STATISTICS[a]				
	All Firms		Firms without Choice	
Variables	Copayment Sample	Coinsurance Sample	Copayment Sample	Coinsurance Sample
Never Comply	.309	.422	.358	.427
Partially Comply	.322	.289	.290	.281
Always Comply	.369	.289	.352	.292
Average Copayment	8.953 (3.7)	15.833 (17.416)	9.672 (3.875)	16.603 (18.094)
Average Coinsurance Rate	.404 (.275)	.47 (.333)	.444 (.286)	.488 (.340)
Average Days Supplied	31.890 (6.490)	30.691 (3.983)	31.651 (6.198)	30.480 (3.384)
Hospitalization	.070	.060	.069	.057
Age	67.300 (12.518)	64.306 (12.718)	66.159 (12.661)	63.920 (12.769)
Female	.498	.545	.485	.547
Union	.242	0	.348	0
Hourly Wage	.324	.008	.430	0
Dependent	.268	.284	.262	.284
North East	.283	.003	.399	.001
North Central	.362	.079	.162	.002
South	.312	.913	.392	.997
West	.043	.005	.047	.000
Diabetic complications	.061	.036	.072	.038
Peripheral vascular disease	.035	.023	.043	.025
Hypertension	.251	.085	.315	.079
Chronic pulmonary disease	.055	.035	.062	.033

Congestive heart failure	.053	.035	.059	.033
Number of Observations	20,494	6,563	14,242	5,925
Number of Firms	7	3	5	1

[a] Standard deviations are in parentheses

TABLE 3: ORDERED LOGIT ESTIMATES OF COMPLIANCE UNDER COPAYMENTS FOR ALL FIRMS [a]

Independent Variables:	(1)	(2)	(3)
Average Copayment	-0.025**	-0.055**	-0.050**
	(0.005)	(0.008)	(0.008)
Average Days Supplied	0.035**	0.038**	0.037**
	(0.003)	(0.003)	(0.003)
Hospitalization	-0.529**	-0.517**	-0.533**
	(0.055)	(0.056)	(0.055)
Age 65-73	3.831**	3.715**	3.547**
	(0.060)	(0.061)	(0.062)
Age 74+	3.825**	3.729**	3.553**
	(0.061)	(0.063)	(0.064)
Female	0.041	0.047	0.031
	(0.029)	(0.030)	(0.030)
Union	0.810**	0.650**	0.666**
	(0.067)	(0.072)	(0.070)
Hourly Wage	-0.456**	-0.458**	-0.434**
	(0.060)	(0.074)	(0.074)
Dependent	0.261**	0.263	0.292**
	(0.035)	(0.036)	(0.036)
North Central	0.146**	0.079	0.055
	(0.038)	(0.057)	(0.057)
South	(0.040)	0.010	-0.019
	0.203**	(0.053)	(0.052)
West	(0.078)	0.135	0.102
28 chronic conditions	Yes	Yes	Yes
K_1	2.607**	5.540**	5.284**
	(0.104)	(0.586)	(0.603)
K_2	4.934**	7.893**	7.653**
	(0.110)	(0.587)	(0.604)
19 Drug Fixed Effects	No	Yes	Yes
7 Firm Fixed Effects	No	Yes	No
17 Drug Benefit Fixed Effects	No	No	Yes
WaldX^2(df)	7,340 (40)	7,639 (64)	593,862 (83)
Psuedo R^2	0.29	0.30	0.30
Number of Observations	20,494	20,494	20,494

*aRobust standard errors are in parentheses. Dependent variable is ordered as: 2 if Always Comply, 1 if Partially Comply, and 0 ifNever Comply.** Significant at 1%.* Significant at 5%.† Significant at 10%.*

TABLE 4: ORDERED LOGIT ESTIMATES OF COMPLIANCE UNDER COINSURANCE FOR ALL FIRMS[a]

Independent Variables:	(1)	(2)	(3)	(4)	(5)	(6)
Average Copayment				-0.002	0.002	0.001
				(0.002)	(0.003)	(0.003)
Average Days Supplied	0.045**	0.046**	0.046**	0.045**	0.045**	0.045**
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Average Coinsurance Rate	-0.678**	-0.793**	-0.794**			
	(0.101)	(0.105)	(0.106)			
(Average Coinsurance Rate)^2				-0.960**	-1.138**	-1.140**
				(0.103)	(0.117)	(0.117)
Hospitalization	-0.513**	-0.510**	-0.511**	-0.534**	-0.530**	-0.531
	(0.111)	(0.112)	(0.112)	(0.111)	(0.113)	(0.113)
Age 65-73	5.009**	4.965**	4.965	5.007**	4.941**	4.939
	(0.117)	(0.120)	(0.120)	(0.117)	(0.121)	(0.121)
Age 74+	5.022**	4.973**	4.972	5.025**	4.952**	4.946
	(0.120)	(0.125)	(0.127)	(0.120)	(0.125)	(0.127)
Female	-0.096	-0.090	-0.090	-0.106†	-0.100†	-0.102†
	(0.059)	(0.059)	(0.060)	(0.059)	(0.060)	(0.060)
Union	–	–	–	–	–	–
Hourly Wage	-1.365**	-2.169**	-2.169**	-1.365**	-2.190**	-2.190**
	(0.497)	(0.541)	(0.541)	(0.496)	(0.542)	(0.542)
Dependent	-0.027	-0.008	-0.008	-0.026	-0.007	-0.006
	(0.067)	(0.067)	(0.067)	(0.067)	(0.067)-	(0.068)
North Central	-1.072	-0.623	-0.623	-1.100	0.607	-0.611
	(0.946)	(0.787)	(0.788)	(0.966)	(0.809)	(0.809)
South	-0.296	-0.542	-0.543	-0.239	-0.526	-0.530
	(0.943)	(0.786)	(0.786)	(0.963)	(0.810)	(0.810)
West	-1.454	-1.171	-1.171	-1.482	-1.171	-1.173
	(1.018)	(0.852)	(0.852)	(1.036)	(0.871)	(0.870)
27 chronic conditions	Yes	Yes	Yes	Yes	Yes	Yes
K_1	3.058**	2.907**	3.968**	3.073**	2.975**	4.074**
	(0.988)	(0.798)	(0.852)	(1.010)	(0.817)	(0.874)
K_2	5.640**	5.504**	6.566**	5.683**	5.602**	6.702**
	(0.990)	(0.799)	(0.855)	(1.011)	(0.818)	(0.877)
18 Drug Fixed Effects	No	Yes	Yes	No	Yes	Yes
3 Firm Fixed Effects	No	Yes	No	No	Yes	No
4 Drug Benefit Fixed Effects	No	No	Yes	No	No	Yes
WaldX^2(df)	2,153 (38)	2,341 (58)	2341 (59)	2,153 (39)	2,401 (59)	2,402 (60)
Psuedo R^2	0.40	0.40	0.41	0.40	0.40	0.41
Number of Observations	6,563	6,563	6,563	6,563	6,563	6,563

*a. Robust standard errors are in parentheses. Dependent variable is ordered as: 2 if Always Comply, 1 if Partially Comply, and 0if Never Comply.** Significant at 1%.* Significant at 5%.† Significant at 10%*

TABLE 5: ORDERED LOGIT ESTIMATES OF COMPLIANCE[a]

	All Firms				Firms without Choice			
	Copayment Sample		Coinsurance Sample		Copayment Sample		Coinsurance Sample	
Independent Variables:	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Average Copayment	-.049*** (.006)	-.050*** (.008)	--	.001 (.003)	-.061*** (.007)	-.059*** (.009)	--	.002 (.003)
Average Coinsurance Rate	--	--	-.794*** (.106)	--	--	--	-.808*** (.105)	--
(Average Coinsurance Rate)^2	--	--	--	-1.140*** (.117)	--	--	--	-1.171*** (.118)
19 Drug Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Drug Benefit Fixed Effects	No	Yes (17)	Yes (4)	Yes (4)	No	Yes (12)	Yes (1)	Yes (1)
Number of Observations	20,494	20,494	6,563	6,563	14,242	14,242	5,925	5,925

*a Robust standard errors are in parentheses. Dependent variable is ordered as: 2 if Always Comply, 1 if Partially Comply, and 0 if NeverComply.*** Significant at 1%.** Significant at 5%.* Significant at 10%.*

TABLE 6: SIMULATED PERCENT CHANGE IN COMPLIANCE ASSOCIATED WITH AN INCREASE IN COST-SHARING[a]

	All Firms			Firms without Choice		
	Initial Compliance Distribution	Final Compliance Distribution	Change in Compliance Distribution	Initial Compliance Distribution	Final Compliance Distribution	Change in Compliance Distribution
Copayment Sample:						
Copayment:[b]	$6	$11		$6	$11	
Never Comply	0.307	0.326	0.019** [+6.2%] (0.007)	0.343	0.381	0.038*** [+11.1%] (0.009)
Partially Comply	0.313	0.328	0.015 [+4.8%] (0.013)	0.278	0.296	0.018 [+6.5%] (0.016)
Always Comply	0.380	0.346	-0.034** [-9.0%] (0.014)	0.378	0.323	-0.055*** [-14.6%] (0.011)
Coinsurance Sample:						
Coinsurance Rate:[c]	20%	75%		20%	75%	
Never Comply	0.414	0.455	0.041** [+9.9%] (0.007)	0.417	0.458	0.041*** [+9.8%] (0.013)
Partially Comply	0.265	0.303	0.038 [+14.3%] (0.04)	0.256	0.293	0.037 [+14.5%] (0.047)
Always Comply	0.321	0.242	-0.079* [-24.6%] (0.04)	0.328	0.249	-0.079*** [-24.1%] (0.031)

*A The compliance distributions give the probability of being in each of the three compliance categories. Results are simulated from regressions in columns (2) and (4) of Table 5. Bootstrapped standard errors are in parentheses.*** Significant at 1%. ** Significant at 5%.* Significant at 10%.*

b Moving from 25th to 75th copayment percentiles.

c Moving from 25th to 75th coinsurance percentiles.

Table 7: Simulated Comparison of Copayments vs. Coinsurance[a]				
	All Firms		Firms without Choice	
	Copayment Model Distribution	Coinsurance Model Distribution	Copayment Model Distribution	Coinsurance Model Distribution
Never Comply	0.351	0.453	0.408	0.468
	(0.019)	(0.012)	(0.181)	(0.197)
Partially Comply	0.345	0.301	0.306	0.301
	(0.102)	(0.123)	(0.082)	(0.092)
Always Comply	0.304	0.246	0.286	0.231
	(0.124)	(0.119)	(0.107)	(0.103)
Observations:	20,494	6,563	14,236	5,920

a The distributions give the probability of being in each of the three compliance categories when the copayment and the coinsurance rate are set so that the expected out-of-pocket is $15. Results are simulated from regressions in columns (2) and (4) of Table 5. Bootstrapped standard errors are in parentheses.