Value Based Insurance Design

Michael Chernew

(with Mark Fendrick, Allison Rosen, Mayur Shah, Steven Rosenberg, Iver Juster, Arnold Wegh, Michael Sokol and Kristina Yu-Isenberg)

April 16, 2008

Funded by Pfizer and GSK.

Two Concerns

High (and rising) Costs

Premiums rose 87% since 2000*

Response:

- Raise Copays

Poor Quality

About 50% of time appropriate care is not delivered**

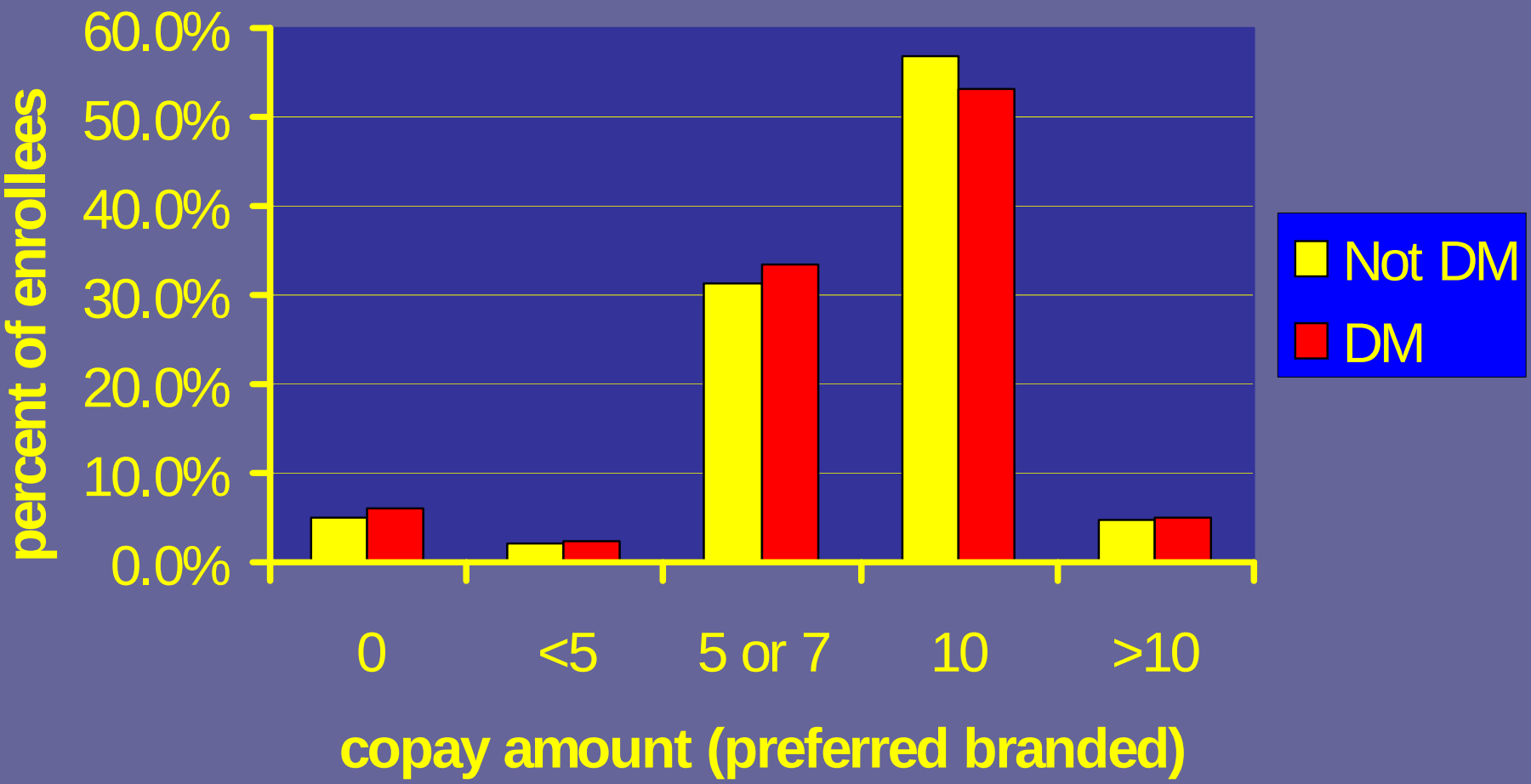
Response:

- Disease Management
- P4P

*Kaiser Family Foundation/HRET: www.kff.org/insurance/ehbs092606nr.cfm

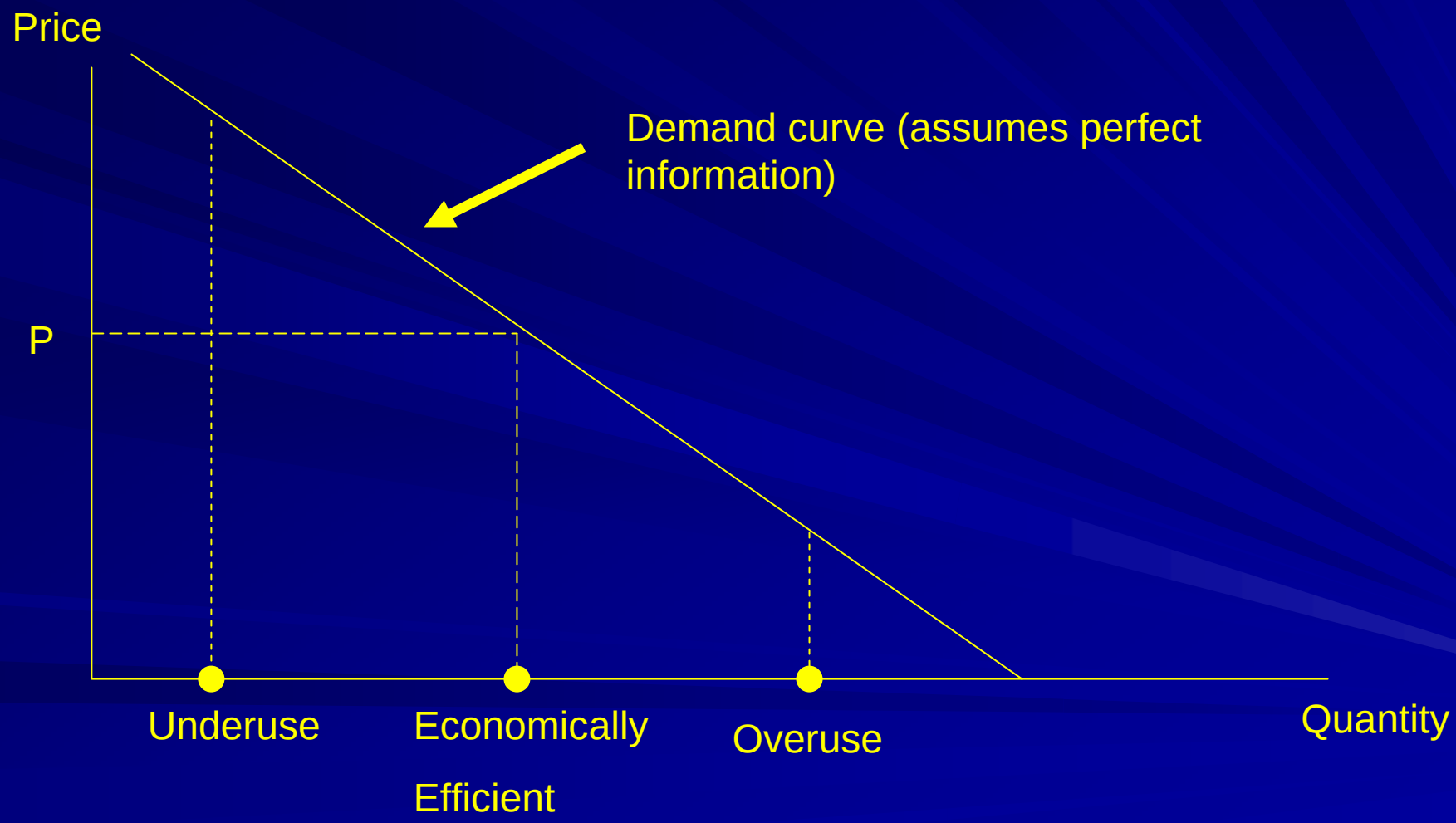
**McGlynn et al The quality of health care delivered to adults in the United States. N Engl J Med 2003;348(26):2635-45

Copays Within and Outside of Disease Management



Source: Chernew, M.E., Rosen, A.B., Fendrick, A.M. "Rising out-of-pocket Costs in Disease Management Programs". American Journal of Managed Care. 2006. 12: 150-155.

Health Econ 101



Considerable Underconsumption

- McGlynn et al (2003)
- Goldman et al. (2004)
- Rice and Masuoka (2004)

Value Based Insurance Design

- Recognize heterogeneity in value
  - By service
  - By patient
- Recognize that for high value services, higher copays lead to under-consumption
- Reduce (or keep low) copays for high value services
  - For high value patients

WSJ.com THE WALL STREET JOURNAL. ONLINE

May 10, 2004

THE JOURNAL REPORT: LEADERSHIP

A Radical Prescription

While most companies look to slash health costs by shifting more expenses to employees, Pitney Bowes took a different tack. The results were surprising.

By VANESSA FUHRMANS
Staff Reporter of THE WALL STREET JOURNAL
May 10, 2004; Page R3

In the fall of 2001, **Pitney Bowes** Inc.'s corporate medical director, John Mahoney, proposed an unusual experiment: Slash the amount that employees pay for diabetes and asthma drugs, and see what happens.

Picture it:

Lower copayments for asthma controllers

Blue Care Network of Michigan

A nonprofit corporation and independent licensee of the Blue Cross and Blue Shield Association

Beginning Jan. 1, 2006, Blue Care Network is charging the lowest copayment (Tier 1) for brand-name formulary drugs used to control asthma.*

Results from literature

- Pitney Bowes (WSJ, AJMC)
  - 6% decrease in overall diabetes costs (relative to benchmark)
  - Savings exceeded $1 million
- Asheville (JAmPharmAss)
  - Reduced annual, per participant, total cost for diabetes by $1,200 to $1,872
    - (self-selected program participants, relative to pre-period)
- Retired public employees in CA (NBER)
  - 20% offset overall
  - 50% in highest spenders

Source: Mahoney AJMC 2005; Cranor et al 2003; Gruber and Chandra, 2007

www.BusinessInsurance.com

Business Insurance

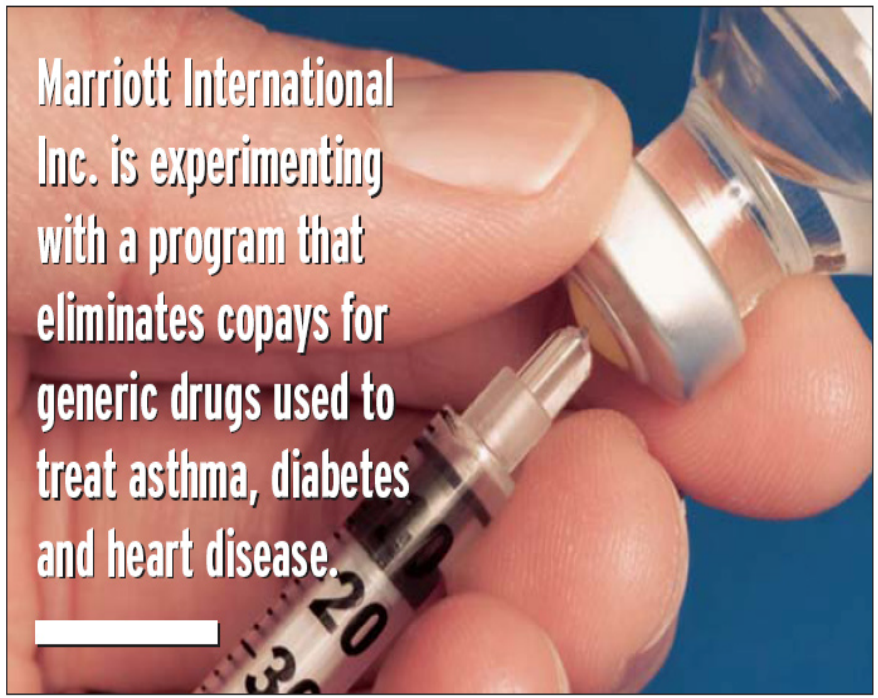
As seen the week

March 26, 2007

Free prescription drugs boost usage, cut costs

Program targeting chronic conditions improves health

By JOANNE WOJCIK



WASHINGTON—A major U.S. hospitality industry employer has found that giving free prescription drugs to certain employees who have chronic but manageable health conditions can save money as well as improve health care outcomes.

This was the preliminary con-

officer.

In situations where the patient is not taking a drug because of its cost, ActiveHealth works with the pharmacy benefit manager to provide discounts to make the drug more affordable for the patient, Mr. Reisman said.

"We selectively reduce copayments for drugs that these patients should be taking but aren't," he said. "It's manipulation of plan design based on the physiology of the member."

In Marriott's case, the PBM was instructed to eliminate generic copayments and halve copays for

Intervention

- A large employer lowered copays for selected medications in January 2005:
  - Ace/ARBs
  - Beta Blockers
  - Glucose control
  - Statins
  - Steroids
- Copay reductions:
  - Generic: $ 5.00 → $0
  - Preferred Brand: $25.00 → $12.50
  - Non-Preferred Brand: $45.00 → $22.50

Implementation

- Implemented by an integrated care management firm: Activehealth Management (AHM)
  - Identify consumers that would benefit but were not using meds and inform them
  - Exclude individuals with contra-indications

Adherence

Design and Sample

- Identify control employer
  - Used same Activehealth Management DM/Care Management program
- Identify pre & post cohorts for each class of medications
  - Used within 3 months of Jan 1 (2004 or 2005)
  - Identified by AHM as good candidates for medication

Descriptive stats

client	year	members	age	% female	% empl.	% spouse	% child
Tx Firm	2004	35,807	37.4	53.5%	73.0%	21.4%	5.6%
Control firm	2004	74,345	43.9	51.2%	65.6%	29.4%	5.0%
Tx Firm	2005	37,867	38.0	53.5%	72.2%	21.5%	6.3%
Control firm	2005	70,259	44.7	51.2%	65.7%	29.1%	5.2%

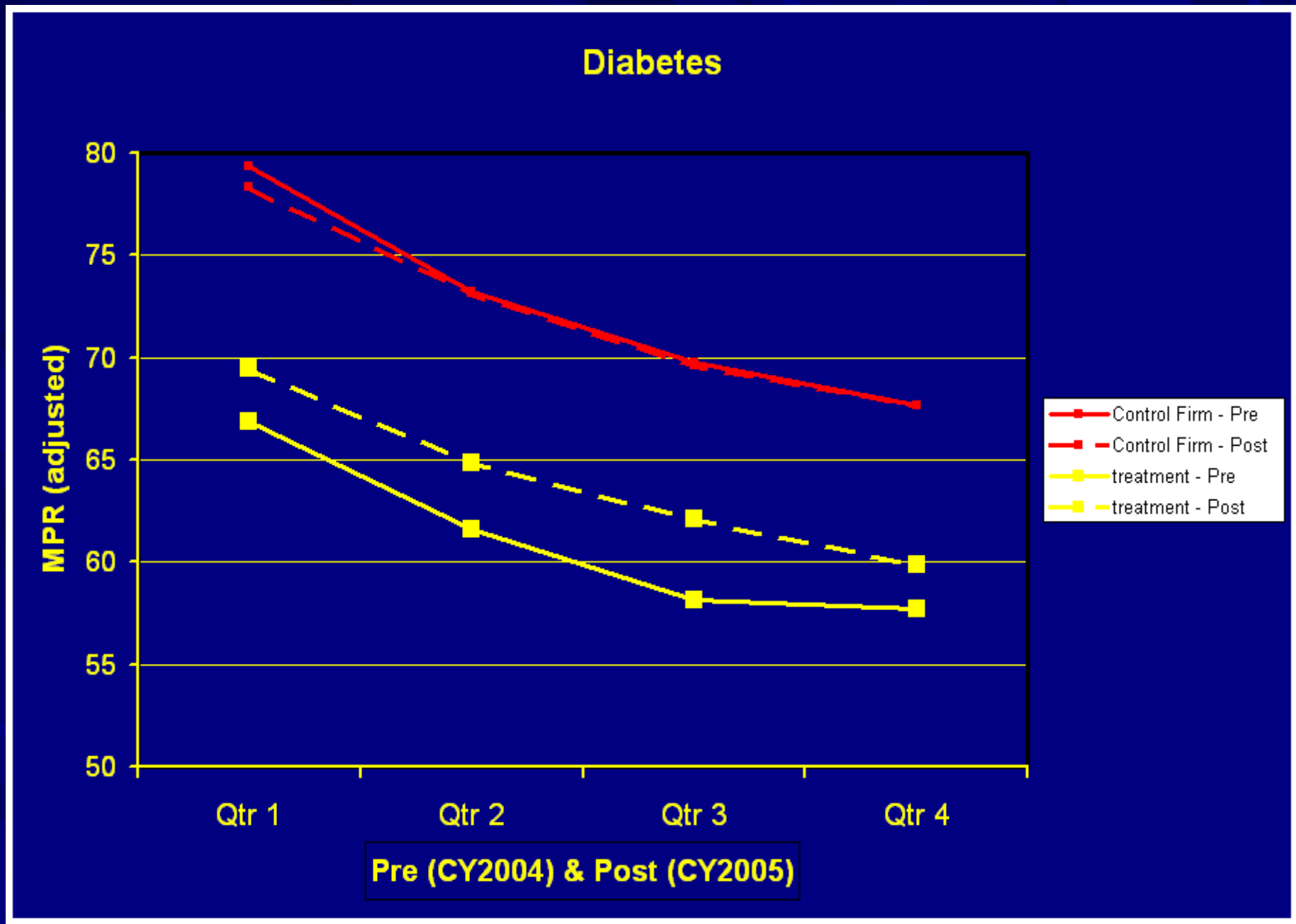
* number of members is the average per quarter

Measuring Adherence

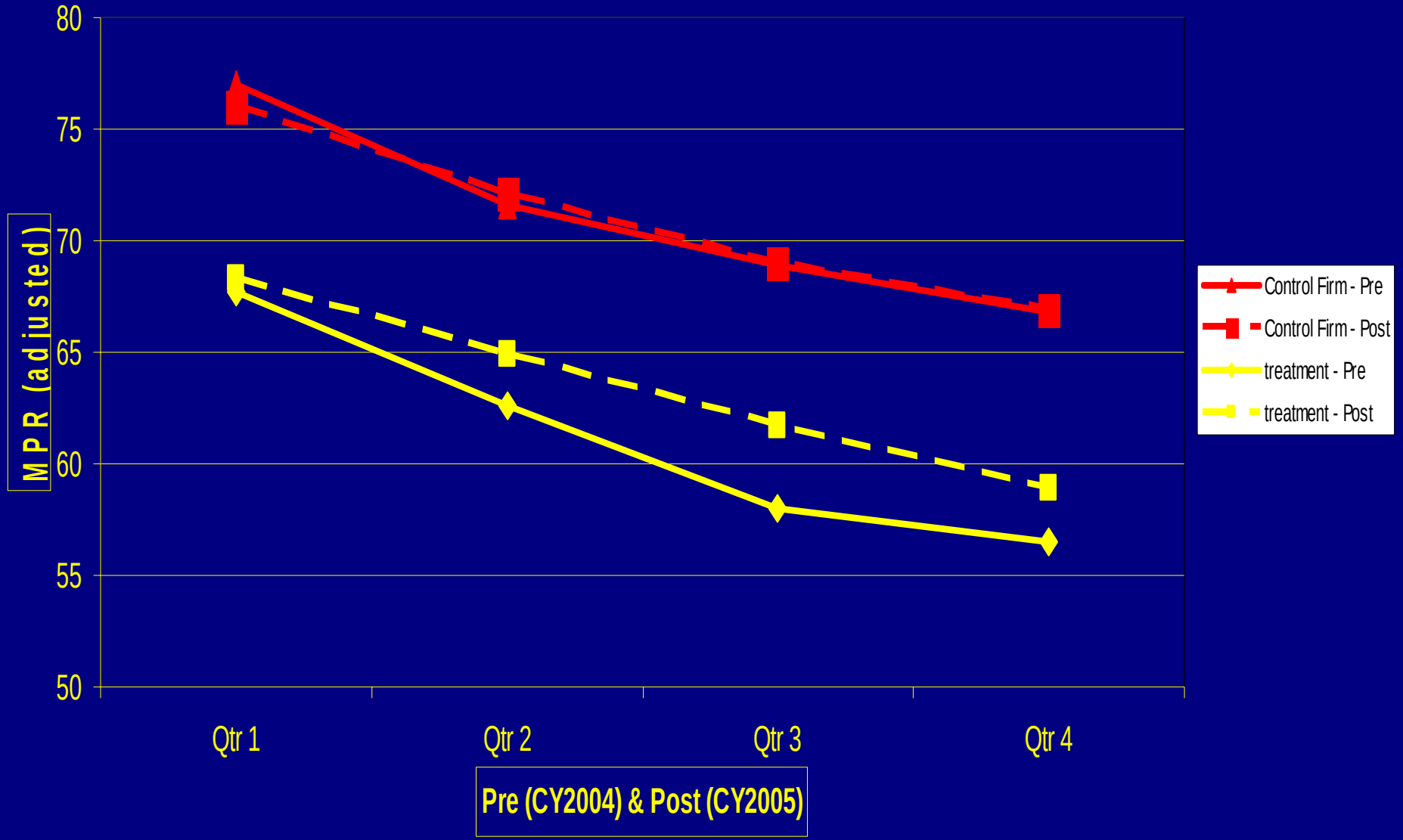
- Use prescription and days supplied data to assess days with available medications per quarter (Medical Possession Ratio, MPR)
  - Adjust for partial eligibility over the quarter
  - Adjust for inpatient admission
  - Adjust for medication switching

Analysis

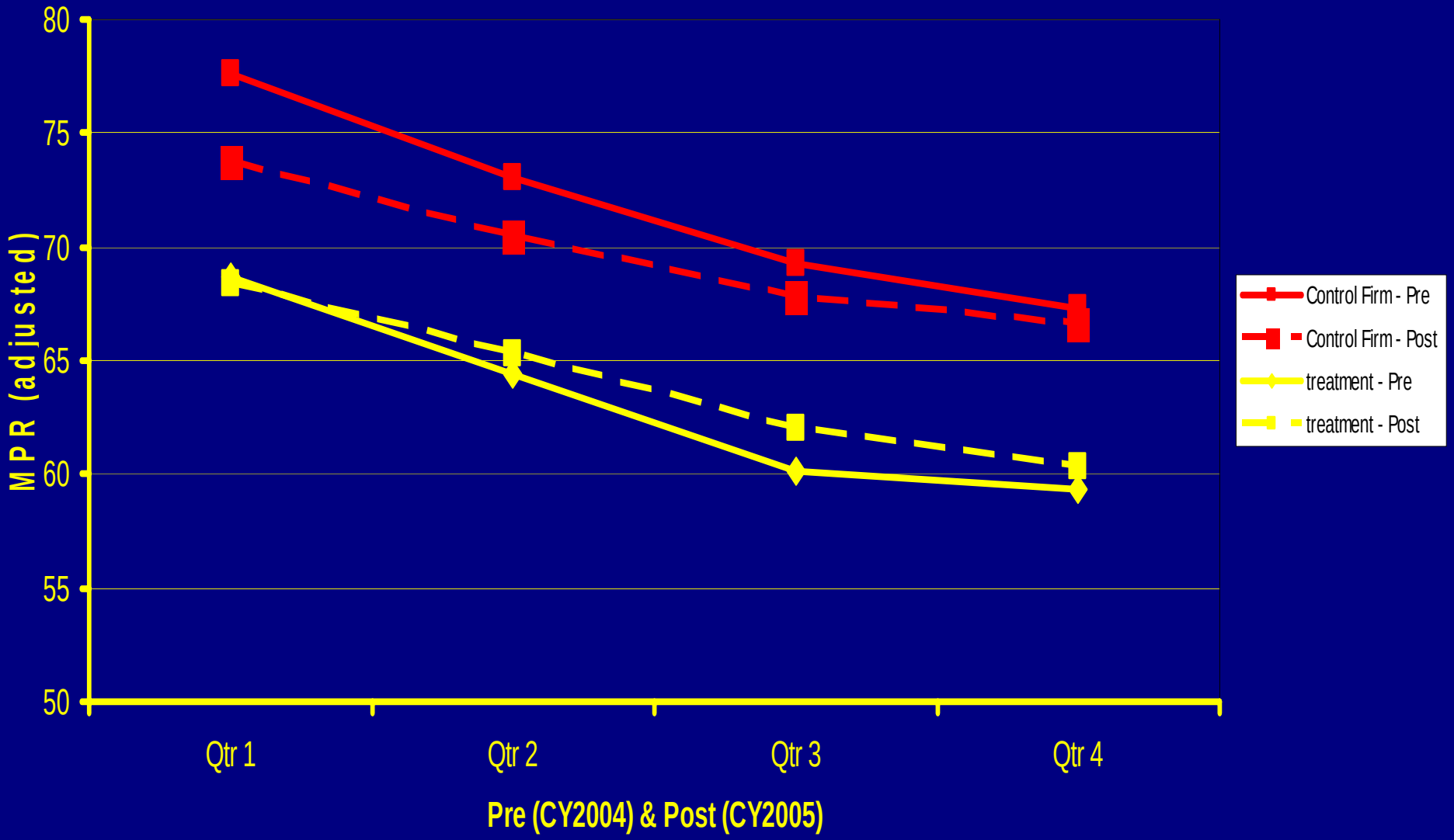
- Regress MPR per person/quarter on:
  - Treatment firm
  - Post dummy (2005 vs 2004)
  - Interaction between post and treatment firm
  - Controls: Age, Gender (1 if the subject is male), prior use (within 6 months), duration (number of quarters eligible for the study), Comorbidities
- Adjust for multiple observations per person


Diabetes
80
75
70
65
60
55
50
MPR (adjusted)
Qtr 1
Qtr 2
Qtr 3
Qtr 4
Pre (CY2004) & Post (CY2005)
Control Firm - Pre
Control Firm - Post
treatment - Pre
treatment - Post

Beta Blocker



ACEi-ARB


80
75
70
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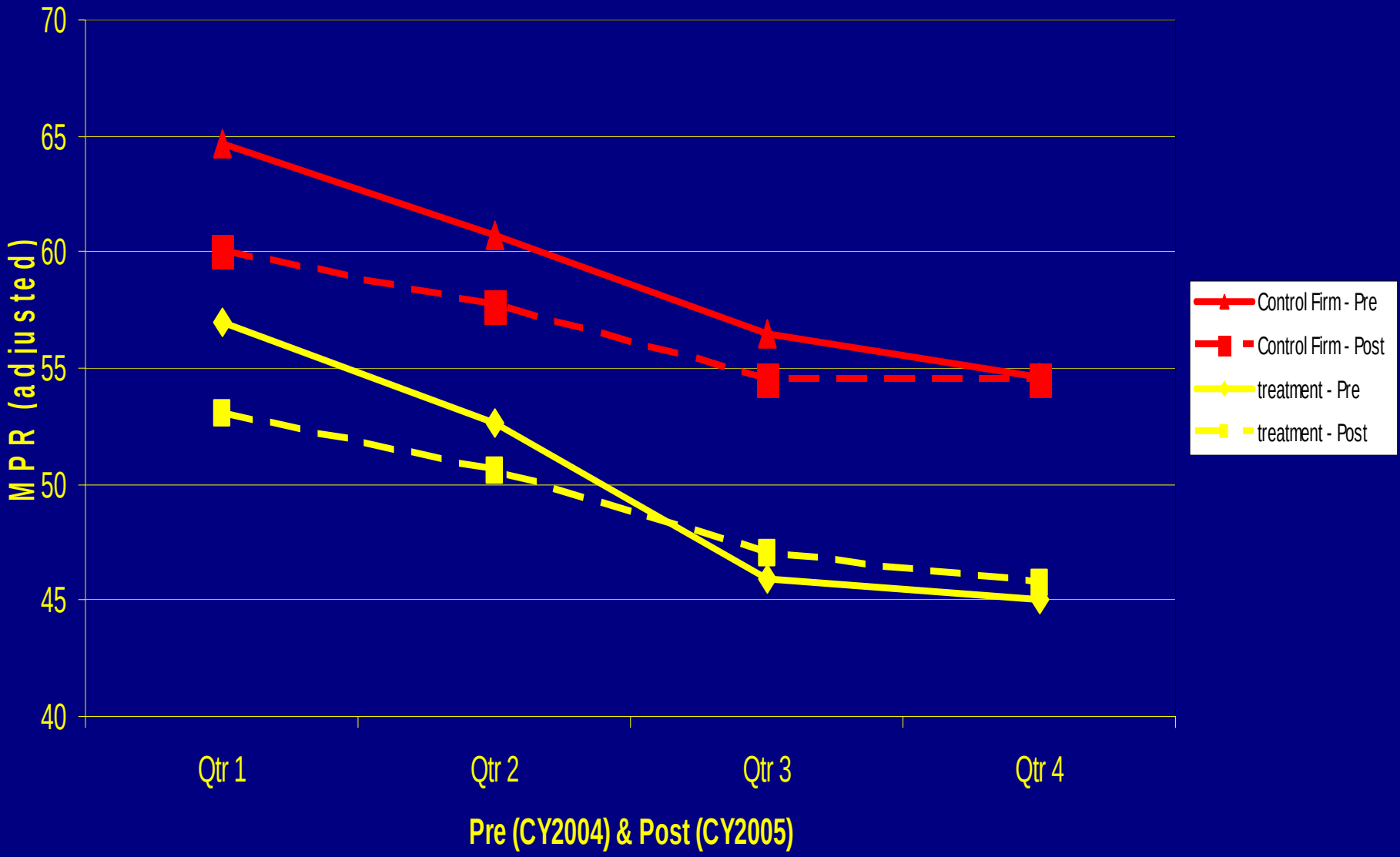
MPR (adjusted)
Qtr 1
Qtr 2
Qtr 3
Qtr 4
Pre (CY2004) & Post (CY2005)
Control Firm - Pre
Control Firm - Post
treatment - Pre
treatment - Post

Statins


70
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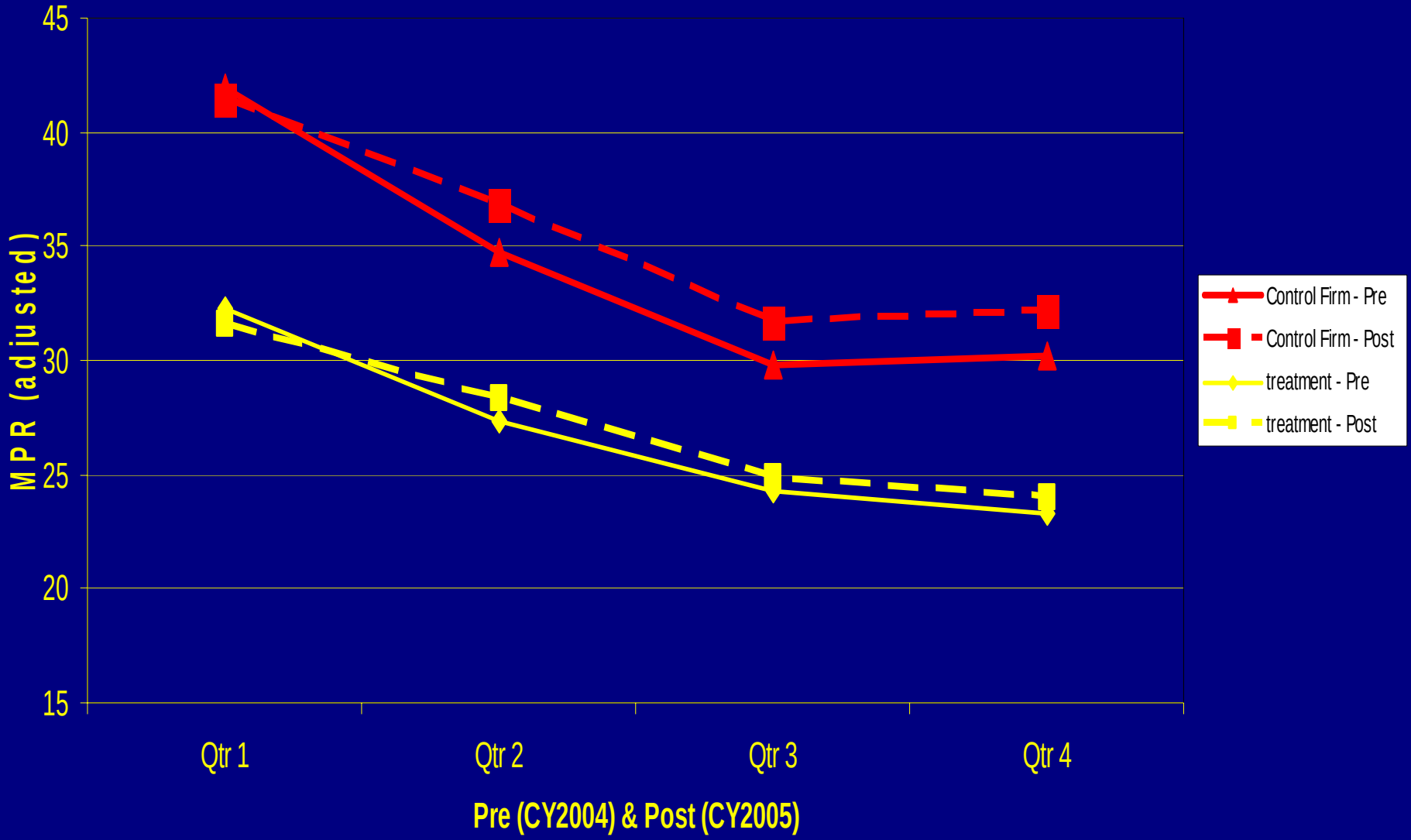
45
40
MPR (adjusted)
Qtr 1
Qtr 2
Qtr 3
Qtr 4
Pre (CY2004) & Post (CY2005)
Control Firm - Pre
Control Firm - Post
treatment - Pre
treatment - Post

Steroids


45
40
35
30
25
20
15
MPR (adjusted)
Qtr 1
Qtr 2
Qtr 3
Qtr 4
Pre (CY2004) & Post (CY2005)
Control Firm - Pre
Control Firm - Post
treatment - Pre
treatment - Post

Other adherence results

- No trend in control group
  - ‘Post’ coef never statistically significant
- Treatment firm always less adherent
- Models that allow the effect to change over the year tend to show a growing effect

Effects size for MPR analysis

	Effect size (% points)	Base MPR	% increase*	Take-up %**
Ace/Arb	2.59	68.37	3.79%	8.2%
Beta Blockers	3.02	68.30	4.43%	9.5%
Diabetes	4.02	69.46	5.79%	13.2%
statins	3.39	52.99	6.28%	7.1%
steroids	1.86	31.56	5.88%	2.7%

Expenditures

Perspective is key

- Societal
  - Treat greater employer share for inframarginal prescriptions as a transfer (zero cost)
  - Appropriate for cost effectiveness analysis
  - Distributional issues dealt with separately
- Firm
  - Treat greater employer share for inframarginal prescriptions as a cost

Methods

- Three Approaches
  - Actuarial analysis
  - Econometric model
  - Plausibility analysis
    - Use clinical data and literature to estimate effect size

Actuarial Approach

- Projected Tx firm 2005 =

  Tx Firm 2004 * (control 2005/ control 2004)

- Compute Cost/Savings =

  Projected Tx firm 2005 – Tx Firm 2005

- Estimate for RX, non RX and Total

Actuarial Results (PMPM)

Control Firm: Societal perspective

		Rx	Non RX	Total
Control Firm	2004	135.36	377.44	
	2005	134.48	425.7	
	trend	-1%	13%	
Tx Firm	2004	151.23	420.17	571.40
	2005 (projected)	149.01	476.39	622.12
	2005 (actual)	169.88	425.36	595.24
	Cost	$20.87	($51.03)	($26.88)

Actuarial Results (PMPM)

National Benchmark

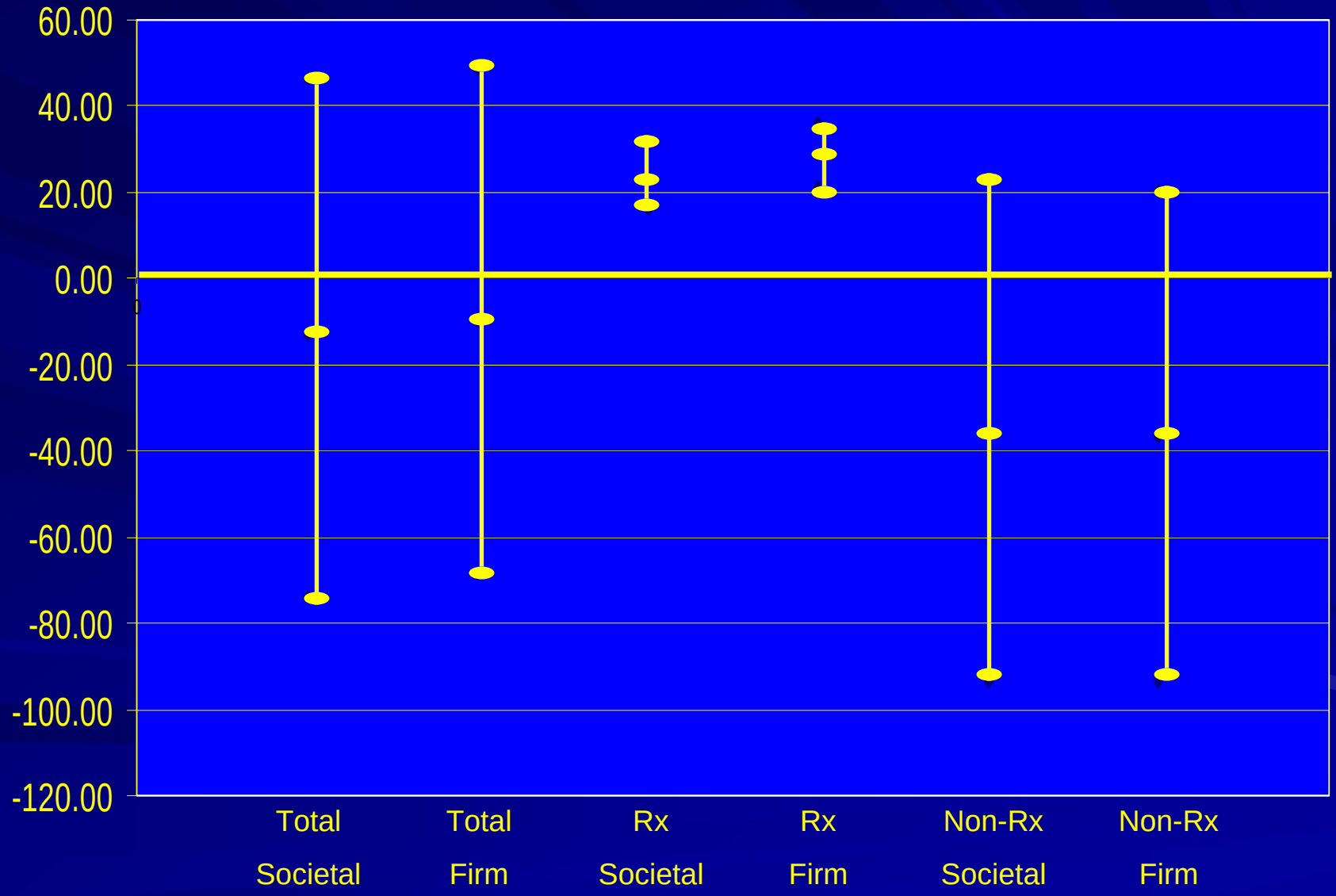
		Rx	Non RX	Total
National trend	2004/2005	5.8%	7.4%	
Tx Firm	2004	151.23	420.17	571.40
	2005 (projected)	160.00	451.27	611.27
	2005 (actual)	169.88	425.36	595.24
	Cost	$9.88	($25.90)	($16.03)

Source for trend: Catlin et al. Health Affairs 2007. Non-RX reflects hospital and professional services. Not adjusted for population growth

Econometric Methods

- Evaluate comprehensive intervention
  - Not by class
- Employees in multiple classes, benefit from copay changes for all meds
- Use a pre-post control group design
- Test several non-linear specification using goodness of fit and split sample techniques
  - Split Sample
  - Decile tests

Estimated Impact



Simulation

- How much must compliance reduce non-RX costs to completely offset extra RX spending
  - Aggregate perspective: 17%
  - Employer perspective: 48%
- Could break even with less effectiveness if:
  - Add in productivity gains
  - Add in disability savings
  - Target more effectively

What I believe

- Intervention did good things clinically
- Financially, it was close to cost neutral from a societal perspective
  - Non-RX savings financed extra RX costs
- The intervention probably increased firm expenditures
  - But expenditure trends for non-RX were favorable so something else good happened at tx firm

Financing VBID

- Could come closer to break even if:
  - Add in productivity gains
  - Add in disability savings
  - Target more effectively
- Increase employee share of premiums
- Increase costs for other services
  - Low value
  - All others

VBID Summary

- Higher copays lead to lower spending (even with offsets)
  - Because of this copays will rise
- VBID allows firms to mitigate deleterious consequences
  - Allow firms to hit a cost target in a more efficient manner
  - Can be part of other strategies to improve quality or decrease costs
    - Disease management
    - P4P
    - CDHP/ HSAs
- VBID cannot be perfect, but imperfect may be better than non-existent

END

Split Sample Diagnostics

	MSE: Ratio to OLS		MAPE: Ratio to OLS	
	Societal	Employer	Societal	Employer
Linear Models				
Square Root	1.003	1.004	0.998	0.999
Log	1.042	1.068	1.076	1.096
OLS	1.000	1.000	1.000	1.000
Non-Linear Models				
Normal	1.002	1.003	1.007	1.009
Poison	1.004	1.004	0.999	1.000
Gamma	1.015	1.020	1.034	1.048

Decile Diagnostics

(societal perspective)

Ratio actual to predicted (by decile)

	Linear Models			Non-Linear Models		
Decile	**Sqrt**	**LN**	**OLS**	**Norm**	**Pois**	**Gamma**
1	77.1	142.3	94.5	82.8	86.8	78.0
2	89.7	117.6	100.5	91.7	94.6	88.7
3	94.4	109.7	93.1	100.9	92.0	89.2
4	89.3	101.4	101.9	90.9	98.5	91.7
5	98.4	97.1	94.0	95.7	99.0	98.9
6	94.8	92.0	96.7	91.7	93.8	90.4
7	94.9	89.3	95.6	94.3	97.9	94.5
8	96.0	82.2	101.1	98.3	97.8	95.4
9	108.0	81.4	99.8	100.8	103.9	101.0
10	141.1	86.2	104.0	113.1	114.6	112.1

Econometric results: summary

	Total		RX		Non-RX	
	Societal	Firm	Societal	Firm	Societal	Firm
Point Estimate	-13.77	-10.07	23.57	28.90	-35.52	-36.73
Lower bound	-73.70	-68.48	15.86	21.47	-93.80	-93.67
Upper Bound	46.17	48.35	31.28	36.34	22.77	20.22

Plausibility Analysis

(Societal Perspective)

Increase in RX Costs (PMPM)	
New Compliers	3
Scripts per complier	1.25
New Scripts	**3.75**
Total $/ Script	$67.00
Increase in RX PMPM	**$2.51**

Non-RX Savings (PMPM)	
AE rate/yr non-compliers per 1000	125.00
AE rate/yr compliers per 1000	93.75
Weighted AE rate pre	103.13
Weighted AE rate post	102.19
Δ AE rate per 1000	0. 9375
Non-RX $ per AE	$35,000
Non RX Savings PMPM	$2.73

NET SAVINGS: 2.73 – 2.51 = $.22

Reconciling data analysis and simulation

- Large standard errors
  - The analyses really agree
- Data analysis too optimistic
  - Unobserved confounders in tx or control firm
- Sensitivity analysis too pessimistic
  - Complex composition or threshold effects

Role of VBID

- VBID is not a magic bullet
- It should extend beyond cost saving opportunities
- VBID part of any strategy to improve quality or decrease costs
  - Disease management
  - P4P
  - CDHP/ HSAs

Employer perspective

- Adjust extra RX spend for employer share
  - $2.51 ➔ 2.04
- Add inframarginal RX spend
  - users*Scripts/user * Δ copay =

    70 x 1.25 x $6.5 = $5.69
- Reduce AE cost by 5% employee share
  - $2.73 ➔ $2.60

- Savings = $2.60 - $2.04-$5.69 = $5.13

Interpretation

The results suggest

- Large savings
- Not precisely estimated

Plausibility Analysis

Increase in RX Costs (PMPM)		
	Societal Perspective	Employer Perspective
New Compliers	3	3
Scripts per complier	1.25	1.25
New Scripts	3.75	3.75
Total $/ Script	$67.00	$54.5
Added cost for new users	$2.51	$2.04
Added cost for existing users	0.00	$5.69
Increase in RX PMPM	$2.51	$7.73

Plausibility Analysis

Decrease in Non-RX Costs (PMPM) and Net Cost			
	Societal Perspective	Employer Perspective	Employer Perspective
Base Costs	425	360	360
Effectiveness	.25	.25	.48
$ compliers	$386.36	$327.27	$281.93
$ non-compliers	$515.15	$436.36	$542.17
Re-weighted @ 73% compliers	$421.14	$356.73	$352.19
Decrease in RX PMPM	$3.86	$3.27	$7.81
Increase in RX costs	$2.51	$7.73	$7.73
Net Cost	(1.35)	$4.46	$.08

Reconciling data analysis and plausibility analysis

- Large standard errors.
  - The analyses really agree
- Data analysis too optimistic
  - Unobserved confounders in Tx or control firm
    - Something good is going on at Tx firm. We are not sure what.
- Plausibility analysis too pessimistic
  - Effects are bigger than plausibility analysis assumes

What I believe

- Intervention did good things clinically
- Financially, it was close to cost neutral from a societal perspective
  - Non-RX savings financed extra RX costs
- The intervention probably increased firm expenditures a small amount
  - That is not a bad thing
- Something else good happened at tx firm
  - Expenditure trends for non-RX were favorable

Financing VBID

- Savings from improved health (cost offsets)
  - Must target:
    - high risk patients
    - highly effective services
    - services with low baseline use
    - price responsive services
- Increase costs for other services
  - Low value
  - All others
- Increase employee co-premium

Decile Diagnostics

(employer perspective)

Ratio of actual to predicted (by decile)

	Linear Models			Non-Linear Models		
Decile	**Sqrt**	**LN**	**OLS**	**Norm**	**Pois**	**Gamma**
1	75.9	148.1	93.6	82.4	86.4	74.7
2	80.6	120.2	100.2	96.4	90.2	84.8
3	99.8	109.1	90.9	94.1	92.3	89.5
4	83.2	105.0	100.4	94.7	95.1	89.1
5	96.5	85.5	97.5	87.9	98.7	95.0
6	98.3	98.3	92.4	90.9	94.9	89.1
7	91.3	82.1	97.4	90.3	96.9	90.7
8	93.3	84.0	100.8	100.2	97.8	94.0
9	106.5	77.8	99.7	98.2	103.2	98.6
10	151.0	87.1	103.1	114.3	116.3	112.2

The New York Times

February 21, 2007

To Save Later, Some Employers Are Offering Free Drugs Now

By MILT FREUDENHEIM

For years, employers have been pushing their workers to pay more for health care, raising premiums and out-of-pocket medical expenses in an effort to save money for the company and force workers to seek only the most necessary care.

Now some employers are reversing course, convinced that their pennywise approach does not always reduce long-term costs. In the most radical of various moves, a number of employers are now giving away drugs to help workers manage chronic conditions like diabetes, high blood pressure, asthma and depression.

Major employers like Marriott International, Pitney Bowes, the carpet maker Mohawk Industries and Maine痴 state government have introduced free drug programs to avoid paying for more expensive treatments down the road.

Econometric Results (PMPM) Societal Perspective

	Total	RX	Non-RX
age	8.1 [9.45]	3.0 [25.18]	5.4 [6.6]
FEMALE	49.7 [3.09]	8.4 [2.06]	42.3 [2.86]
Existing User	-170.8 [-1.79]	-0.4 [-0.06]	-213.5 [-2.28]
log_duration	-184.5 [-6.62]	-3.1 [-1.05]	-180.2 [-6.6]
POST	87.7 [5.98]	-0.3 [-0.15]	85.6 [5.97]
Tx Firm	-30.1 [-1.14]	-24.5 [-5.63]	-2.2 [-0.09]
POST*Tx Firm	-13.8 [-0.45]	23.6 [5.99]	-35.5 [-1.19]

Econometric results
Employer perspective (PMPM)

	Total	RX	Non-RX
age	6.6 [7.94]	2.2 [20.67]	4.7 [5.83]
female	30.4 [1.95]	1.7 [0.43]	30.1 [2.08]
Existing User	-180.3 [-1.92]	-0.6 [-0.13]	-211.4 [-2.3]
log_duration	-157.3 [-5.86]	-1.8 [-0.65]	-157.3 [-5.96]
POST	73.8 [5.13]	1.3 [0.8]	71.5 [5.07]
Tx Firm	-17.5 [-0.68]	-15.4 [-3.74]	.001 [<.01]
POST*Tx Firm	-10.1 [-0.34]	28.9 [7.62]	-36.7 [-1.26]