Web Appendix for "Age-Based Heterogeneity and Pricing Regulation on the Massachusetts Health Insurance Exchange"

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A.1 Data Appendix

A.1.1 Insurance Price Data

For November and December 2009, we used a Perl script to acquire price quotes from the Connector website in various age-zipcode-family size cells. We selected ten geographically distributed zipcodes in which to get a detailed set of price quotes.[32] In these selected zipcodes, we downloaded price quotes for each insurance plan for a single individual for each possible age under 65. (We also obtained family price quotes, but do not analyze them in this paper). Then, for every zipcode in Massachusetts, we downloaded price quotes for each plan for a 30 year old individual.

To build the full choice menu each individual faced, we then constructed estimated prices for all plans for all single individuals in November and December 2009. Using the estimated price quotes from the detailed zipcodes, we estimated the following model separately for each month. The price of plan j for age a in geographical region (market) m is given by

$$p_{ajm} = b_j + b_1 p_{30jm} + \sum_{s \in 1,\dots 7} \left(1_{a_{s-1}^* > a \geq a_s^*} \right) \cdot (b_{2s} + b_{3s} p_{30jm})$$

where $1_{a_{s-1}^* > a \geq a_s^*}$ is an indicator for whether the age for the price quote is in a given age category (between cutoffs a_{s-1}^* and a_s^*). This model which allows for a main effect of plan (b_j), age category (b_{2s}) and level of age-30 price, as well as interactions between age category and age-30 price (b_{3s}). The model has an R^2 of 0.978 on the detailed premium data. Taking the estimated coefficients from this model, we predict $\hat{p}_{ajm}$ for all j, m, a where we have age 30-price quotes.

We did not download any price quotes from the website prior to November 2009. However, the Connector transaction data contains the list prices paid for the plans that individuals actually chose. On their own, these observations

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[32]These zipcodes are 01020, 01240, 01604, 01824, 01923, 02124, 02130, 02360, 02459, 02474, 02601.

are not rich enough to construct the full menu of choices each individual faced. Thus, we combine them with the detailed price quotes in the following manner. Based on the choices individuals made, we determined that the set of plans j offered was constant between July 2009 and December 2009: no plans appeared or disappeared during this period. For each month t between July and October, we estimated the following equation based on the observed premiums paid by individual i for each plan (among new enrollees for each plan) and the November 2009 price of that plan as follows:

$$p_{i,ajmt} = b_0 + b_1 p_{ajm,Nov2009} + b_{insurer} + b_m$$

where $b_{insurer}$ and b_m are month-specific insurer and geographic region effects. We then use this model to predict the prices $\hat{p}_{ajmt}$ of each plan in each cell. Because we estimate a geographic region fixed effect b_m, we exclude geographic regions that have fewer than 10 zipcodes from the July-Oct. choice menu construction (and hence from analyses using the July-Oct. data).

A.1.2 Connector Transaction Data

We merged insurance price quotes with our individual level transactions (and add record, cancel record, and payment records). Our main data samples (Nov.-Dec. 2009, and July-Dec. 2009) focus on people who enrolled in given month ("add" transactions). We keep observations where the individual is 27-64 years old (inclusive), and who chose individual (not family) plans. When we estimate dynamic behavior, we count people as having entered the Connector on first effective date of coverage, dropping all individuals for whom we do not see an initial add transaction. Termination of coverage is calculated by the date of the first cancel record; if there are no transactions within 90 days of the end of the sample, we count an individual as canceled on date of their last transaction.
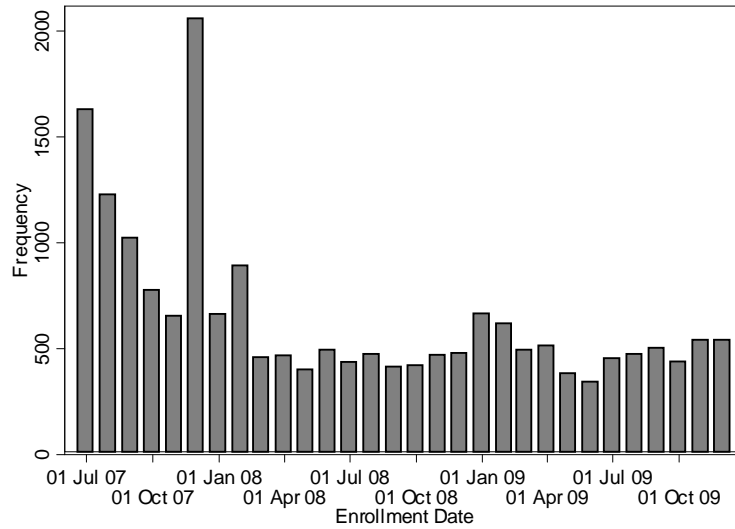
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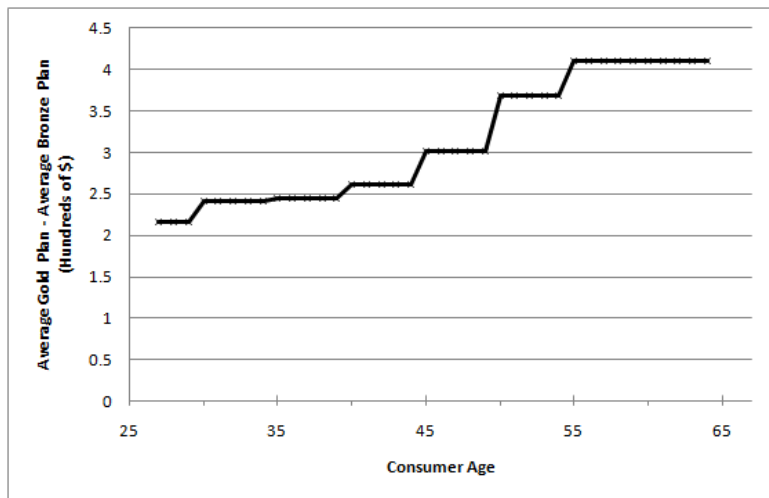Figure A.1: Distribution of Initial Enrollment of Single Individuals.

Figure A.2: Marginal Cost of Average Gold Plan versus Average Bronze Plan, By Age. Unit of observation is the plan-zipcode in Nov. 2009.
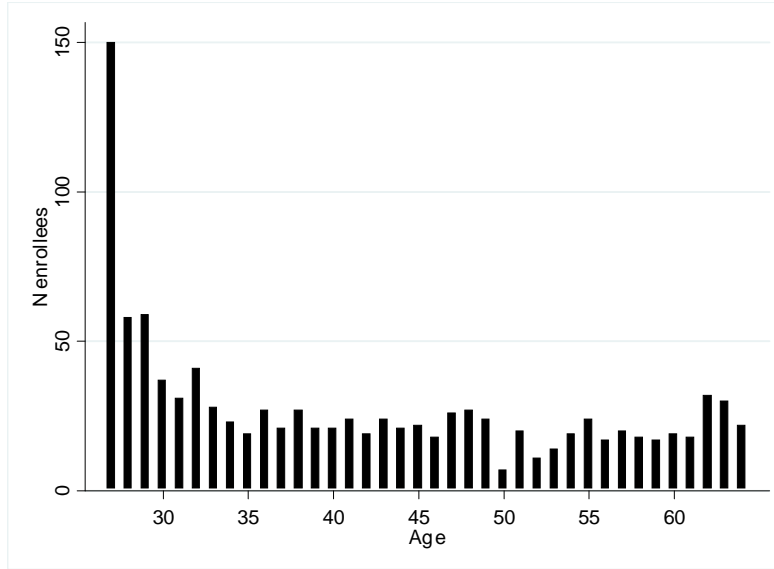
Figure A.3: Number of New Enrollees, By Age. Sample: Nov.-Dec 2009.

A.1.3   Appendix Figures and Tables

Table A.1: Price and Spending Response to Age Discontinuities: Comparing Samples

	ln(premiums faced)		ln(premiums paid)	
Indicators:				
Above 30	0.0259***	0.0292***	-0.0438	-0.0597***
	(0.00523)	(0.00262)	(0.0323)	(0.0136)
Above 35	0.0466***	0.0241***	0.0442	0.0287**
	(0.00789)	(0.00305)	(0.0411)	(0.0143)
Above 40	0.141***	0.0891***	0.147***	0.0813***
	(0.0105)	(0.00405)	(0.0447)	(0.0150)
Above 45	0.0759***	0.0536***	0.0138	0.00526
	(0.0117)	(0.00422)	(0.0440)	(0.0150)
Above 50	0.196***	0.163***	0.207***	0.124***
	(0.0145)	(0.00500)	(0.0502)	(0.0156)
Above 55	0.150***	0.138***	0.192***	0.131***
	(0.0143)	(0.00511)	(0.0462)	(0.0157)
Linear Age Spline	Yes	Yes	Yes	Yes
Basic Controls	Yes	Yes	Yes	Yes
Plan Fixed Effects	Yes	Yes	No: NA	No: NA
Sample	July-Dec 2009	Full Sample	July-Dec 2009	Full Sample
N	2,616	20,895	2,616	20,895
R2	0.981	0.972	0.572	0.519

Note: Heteroskedasticity robust standard errors in parentheses. Age spline consists of piecewise linear age controls within each age group. Controls include indicators for month of enrollment, indicators for geographic market, and gender. *** p<0.01, ** p<0.05, * p<0.1.

Table A.2: Regression Discontinuity Robustness Checks: Zipcode Characteristics Compared to Younger Age Group

	Unemployed	Fraction Married	White	Zip Code Income Mean	Zip Code Income Median	Count (binsize 1 year)
			Omitted Category:Age 27-29			
Above 30	0.00295	-0.00778	-0.0411	-2,739	-1,499	-9.107
	(0.00318)	(0.0260)	(0.0291)	(2,392)	(3,992)	(24.51)
Above 35	0.00387	0.0157	-0.0352	-2,947	822.7	21.98
	(0.00402)	(0.0246)	(0.0340)	(2,620)	(3,722)	(18.89)
Above 40	-0.00753**	0.0319	0.0265	894.0	6,051	4.412
	(0.00323)	(0.0253)	(0.0272)	(2,280)	(4,039)	(6.624)
Above 45	0.00153	-0.000514	-0.0354	-902.8	1,518	-8.676
	(0.00319)	(0.0242)	(0.0357)	(2,307)	(4,006)	(7.041)
Above 50	-0.00202	-0.0150	-0.0284	-761.4	219.0	-26.29**
	(0.00422)	(0.0257)	(0.0291)	(2,471)	(4,483)	(9.906)
Above 55	-0.00696**	0.0334	0.0474*	3,730**	6,887*	-9.959
	(0.00319)	(0.0212)	(0.0250)	(1,827)	(3,524)	(8.320)
Age	-0.00544	-0.0188	0.00433	2,252	-819.5	-90.25*
	(0.00675)	(0.0480)	(0.0552)	(4,564)	(8,011)	(51.01)
Age^2	0.000118	0.000417	0.000118	-34.93	13.87	1.847*
	(0.000154)	(0.00109)	(0.00127)	(103.1)	(184.2)	(1.050)
Age^3	-7.90e-07	-2.95e-06	-1.81e-06	0.147	-0.131	-0.0121*
	(1.10e-06)	(7.77e-06)	(9.10e-06)	(0.734)	(1.326)	(0.00697)
Constant	0.105	0.771	0.670	-10,126	70,991	1,433*
	(0.0933)	(0.667)	(0.759)	(63,563)	(109,728)	(772.0)
Observations	1,052	1,052	1,052	1,052	1,052	38
R^2	0.019	0.050	0.032	0.007	0.012	0.767

Note: Heteroskedasticity robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Zipcode demographics are taken from the 2000 Census.

A.2 Appendix: The Choice Process in the Connector

Consumers in the Connector are presented information on plans available online. Screenshots the Connector (circa October 2009) are below:

HealthConnector

News: "E-Pay" for Commonwealth Choice members.

Home | Find Insurance | Health Care Reform | About Us

SEARCH

You need health insurance. The state's Health Connector can help.

Find the right health plan for you or your family.
- Compare plans. We'll let you know if you might qualify for a low or no-cost plan.

GET STARTED

Individuals & Families | **Young Adults** | **Employees** | **Employers** | **Brokers**

HealthConnector

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SEARCH

Overview • Find a Plan • FAQ

Find Insurance: *Individuals & Families*

FIND INSURANCE TODAY

We can help you find health insurance that is a good value. Explore the choices. Find the plan that is right for you.

Use the box at right to get started.

EXEMPTIONS FROM THE MANDATE

Don't think that you can afford health insurance? Learn if you might be exempt from the Health Care Reform law's penalties.

More on exemptions...

RENEWING YOUR COMMONWEALTH CHOICE PLAN?

Want to change your plan during your open enrollment or renewal period? Call 1-866-636-4654. The TTY line for

Get Started

Your family size is: 2 (change)
If your current gross family income is **less than** **$43,716.00/yr** ($3,643.00/mo), you may be eligible for the Commonwealth Care program.

If your current gross family income is **more** than this level, then...

SHOP FOR INSURANCE NOW

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HealthConnector

Home | Find Insurance | Health Care Reform | About Us

SEARCH

Overview ▪ Find a Plan ▪ FAQ

✔ Step 1:
Eligibility

Step 2:
Provide information

Step 3:
Choose type of plan

Step 4:
Compare plans

Step 5:
Confirm your plan

Step 6:
Enroll

Find Insurance: *Individuals & Families or Young Adults*
STEP 2 OF 6 - PROVIDE INFORMATION

To begin, please provide us with some basic information.

🔴 Health insurance rates depend on where you live, your age, and the number of people you want to insure.

Decide who you want to cover. Yourself? Your immediate family?

Young Adult Plans for 18-26 year-olds are for individuals only.

All rates were negotiated by the Health Connector. The rating method is approved by the Massachusetts Division of Insurance.

Residential Zip Code: `02138`

Your date of birth: `01` / `01` / `1970`
(mm / dd / yyyy)
(month / day / year)

Your spouse's date of birth: `01` / `01` / `1970`
(mm / dd / yyyy)
(month / day / year)

Select Coverage Type:
○ Self
◉ Self + spouse / domestic partner
○ Self + `____` dependent child/children
○ Family

Effective date of coverage: 1st day of `November 2009` ▾

[Continue]

HealthConnector

Home | Find Insurance | Health Care Reform | About Us

SEARCH

Overview ▪ Find a Plan ▪ FAQ

✔ Step 1:
Eligibility

✔ Step 2:
Provide information

Step 3:
Choose type of plan

Step 4:
Compare plans

Step 5:
Confirm your plan

Step 6:
Enroll

Find Insurance: *Individuals & Families*
STEP 3 OF 6 - CHOOSE TYPE OF PLAN

Using your information, we found 21 Health Connector plans for you. Click the plans that you want to see. You can click "Show Selected Plans" to see some plans. You can also decide to see all plans.

[Show Selected Plans]   [Show All Plans]

☐	Bronze	Low premium. Most have deductibles and co-payments. Prescription drug coverage included.	6 plans	$586.00 - $689.15/mo
☐	Silver	Moderate co-payments. Some have no deductible. Prescription drug coverage included.	10 plans	$810.93 - $1,003.67/mo
☐	Gold	Low co-payments. No deductible. Prescription drug coverage included.	5 plans	$1,108.60 - $1,333.84/mo

[Show Selected Plans]   [Show All Plans]

VeriSign

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HealthConnector

| Home | Find Insurance | Health Care Reform | About Us |

SEARCH

Overview • Find a Plan • FAQ

Step 1: Eligibility
Step 2: Provide information
Step 3: Choose type of plan
Step 4: Compare plans
Step 5: Confirm your plan
Step 6: Enroll

Find Insurance: *Individuals & Families*
STEP 4 OF 6 - COMPARE PLANS (OVERVIEW)

Click "View Plan" to see details. You can also compare up to 3 plans at a time. Check the box next to the plans you want to compare. Then click "Compare Selected Plans."

Compare Selected Plans

Tier	Plan	Premium* ❷	Deductible ❷	Co-Payments ❷			Hospital Stay ❷	Doctors You Can See ❷	Choose Plan
				Doctor	RX	ER			
B	☑ *Fallon Community Health Plan* FCHP Direct Care	$586.00	$2,000/$4,000	$25	$15 / $50 / $100	$200	$500 per admission after deductible	Find Doctor	View Plan
B	☐ *Neighborhood Health Plan* NHPThree Select	$636.22	$2,000/$4,000	$25	$15 after Rx deductible / 50% co-insurance after Rx deductible / 50% co-insurance after Rx deductible	$100 after deductible	20% co-insurance after deductible	Find Doctor	View Plan
B	☐ *Harvard Pilgrim Health Care* Harvard Pilgrim Core Coverage 1750	$641.71	$1,750/$3,500	$25 copay up to 3 medical care office visits per individual (or 6 per family); next visits are subject to the deductible; then 20% co-insurance thereafter	$15 / 50% co-insurance after Rx deductible / 50% co-insurance after Rx deductible	$250	20% co-insurance after deductible	Find Doctor	View Plan
B	☐ *Fallon Community Health Plan* FCHP Select Care	$676.00	$2,000/$4,000	$25	$15 / $50 / $100	$200	$500 per admission after deductible	Find Doctor	View Plan
B	☐ *Tufts Health Plan* Advantage HMO Select 2000 (Limited choice of doctors & hospitals)	$676.73	$2,000/$4,000	$40	$20 after Rx deductible / $50 after Rx deductible / $75 after Rx deductible	$200	$0 after deductible	Find Doctor	View Plan
B	☐ *Blue Cross Blue Shield of Massachusetts* HMO Blue Basic Value	$689.15	$250 per plan year /$500 per plan year	$25	$15 / 50% co-insurance after Rx deductible / 50% co-insurance after Rx deductible	$200	35% co-insurance after deductible	Find Doctor	View Plan
S	☐ *Tufts Health Plan* Advantage HMO Select 750 (Limited choice of doctors & hospitals)	$810.93	$750/$1,500	$15	$10 after Rx deductible / $30 after Rx deductible / $45 after Rx deductible	$200	$0 after deductible	Find Doctor	View Plan

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Find Insurance: *Individuals & Families*
STEP 4 OF 6 - COMPARE PLANS (DETAILS)

Here are the details of the plan(s) that you are comparing.

❶ Note: Premiums as of 9/25/2009 for an effective date of 11/1/2009.

🖶 Print this page

	Choose Plan
CARRIER NAME	**FALLON COMMUNITY HEALTH PLAN**
Plan Name	FCHP Direct Care
With or Without Pharmacy (Rx)	With Rx
❷ Connector Plan Tier	Bronze
PLAN DETAILS	**Download Plan Details**
❷ **PREMIUM**	**$586.00**
❷ **ANNUAL DEDUCTIBLE** [1]	
Per person	$2,000
Family total	$4,000
❷ **ANNUAL OUT-OF-POCKET (OOP) MAXIMUM** [2]	
Per person	$5,000
Family total	$10,000
Costs that count towards OOP maximum	
↳ Office visit: Adult routine physical	Yes
↳ Office visit: Routine gynecological (GYN) exam	Yes
↳ Office visit: Well-child care	Yes
↳ Office visit: All other visits to PCP	Yes
↳ Office visit: Specialist	Yes
↳ Prescription Drugs (Rx)	No

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