Section 9: Unemployment Insurance, Consumption Commitments, and Coronavirus

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April 10, 2020

Outline

1. Review Bailey-Chetty Setup
2. State-Dependent Utility? (Aguiar & Hurst, 2005)
3. Consumption Commitments? (Chetty & Szeidl, 2007)
4. Implications for Coronavirus

Section 1

Bailey-Chetty

Optimal UI: Ingredients of Utility

- People like to consume stuff
- People have some control over the probability they become unemployed, p
  - People find it costly to reduce their probability of unemployment: $-\psi(1-p)$, $\psi' > 0$, and $\psi'' > 0$.

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If we let

$$
\begin{aligned}
v(c) &\equiv \text{utility over consumption of the employed} \\
u(c) &\equiv \text{utility over consumption of the unemployed} \\
w &\equiv \text{labor earnings when employed} \\
\tau &\equiv \text{taxes when employed} \\
b &\equiv \text{benefits for the unemployed} \\
A &\equiv \text{assets,}
\end{aligned}
$$

we have expected utility:

$$\mathbb{E}[u] = pu(A+b) + (1-p)v(A+w-\tau) - \psi(1-p)$$

Optimal UI: Planner's Problem

To maintain a balanced budget, the taxes raised from the employed must balance the benefits given to the unemployed:

$$pb = (1-p)\tau$$

The planner can then solve for the level of benefits that maximize utility subject to this budget constraint.

$$\max_b pu(A+b) + (1-p)v(A+w-\tau) - \psi(1-p) \text{ s.t. } pb = (1-p)\tau$$

Plugging in $\tau = \frac{pb}{1-p}$ gives us:

$$\max_b pu(A+b) + (1-p)v\left(A+w-\frac{pb}{1-p}\right) - \psi(1-p)$$

Optimal UI: Planner's Solution

$$\max_b pu(A+b) + (1-p)v\left(A + w - \frac{pb}{1-p}\right) - \psi(1-p)$$

Taking FOC with respect to b gives us:

$$0 = \frac{dp}{db}\underbrace{\left[u(A+b) - v\left(A + w - \frac{pb}{1-p}\right) + \psi'(1-p)\right]}_{\text{Individual FOC} = 0} + pu'(A+b)$$

$$+\left[-\frac{p}{1-p} - b\frac{dp}{db}\left[\frac{1}{1-p} + \frac{p}{(1-p)^2}\right]\right](1-p)v'\left(A + w - \frac{pb}{1-p}\right)$$

$$0 = pu'(A+b) - pv'\left(A + w - \tau\right) - \frac{b}{1-p}\frac{dp}{db}v'\left(A + w - \tau\right)$$

Rearranging gives us:

$$\frac{u'(A+b) - v'\left(A + w - \tau\right)}{v'\left(A + w - \tau\right)} = \frac{1}{1-p}\underbrace{\frac{b}{p}\frac{dp}{db}}_{\epsilon_{p,b}}$$

Optimal UI: Planner's Solution

$$\underbrace{\frac{u'(A+b) - v'(A+w-\tau)}{v'(A+w-\tau)}}_{\text{\% Difference in MU}} = \underbrace{\frac{1}{1-p}\epsilon_{p,b}}_{\text{Fiscal Externality}}$$

Optimal UI: Planner's Solution Under State-Independent Utility

State-independent implies $u = v$. Let $c_u = A + b$ and $c_e = A + w - \tau$. Then:

$$u'(c_u) \approx u'(c_e) + u''(c_e)(c_u - c_e)$$

So % difference in marginal utility is:

$$\frac{u''(c_e)(c_u - c_e)}{u'(c_e)} = \frac{\sigma \Delta c}{c}$$

We then have optimal benefit level implicitly pinned down by:

$$\underbrace{\frac{\sigma \Delta c}{c}}_{\text{Value of UI}} = \underbrace{\frac{1}{1-p}\epsilon_{p,b}}_{\text{Fiscal Externality}}$$

Measuring change in consumption

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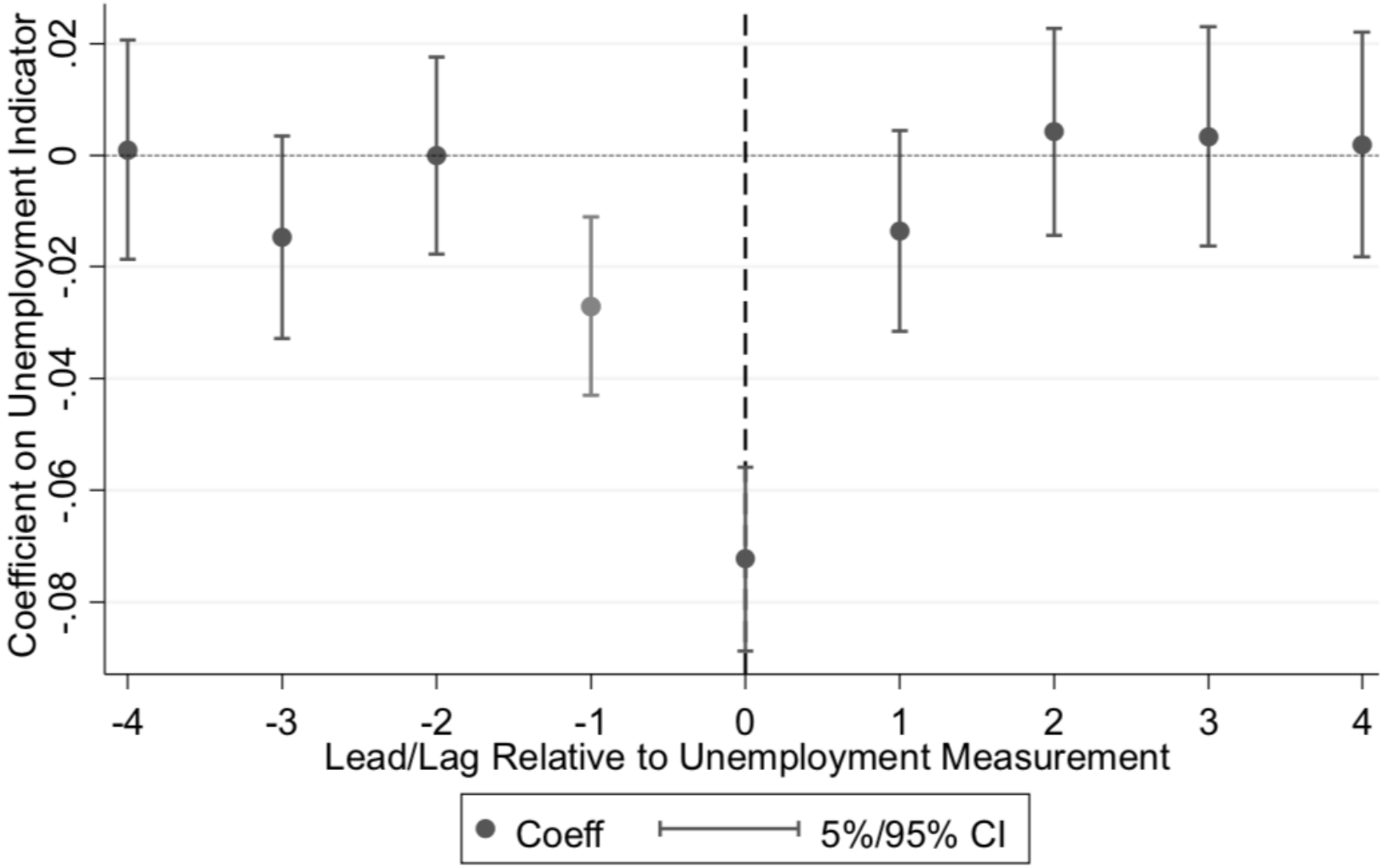
  - If you don't reduce consumption before unemployment, then it might still suck to be unemployed but it might be that money is less useful in the unemployed state
    - This means that unemployment insurance doesn't make sense from a utilitarian perspective since transfers resources from states with higher to lower MUs
    - However, if there was concavity in social preferences wrt utility, then could still be a motive for UI.

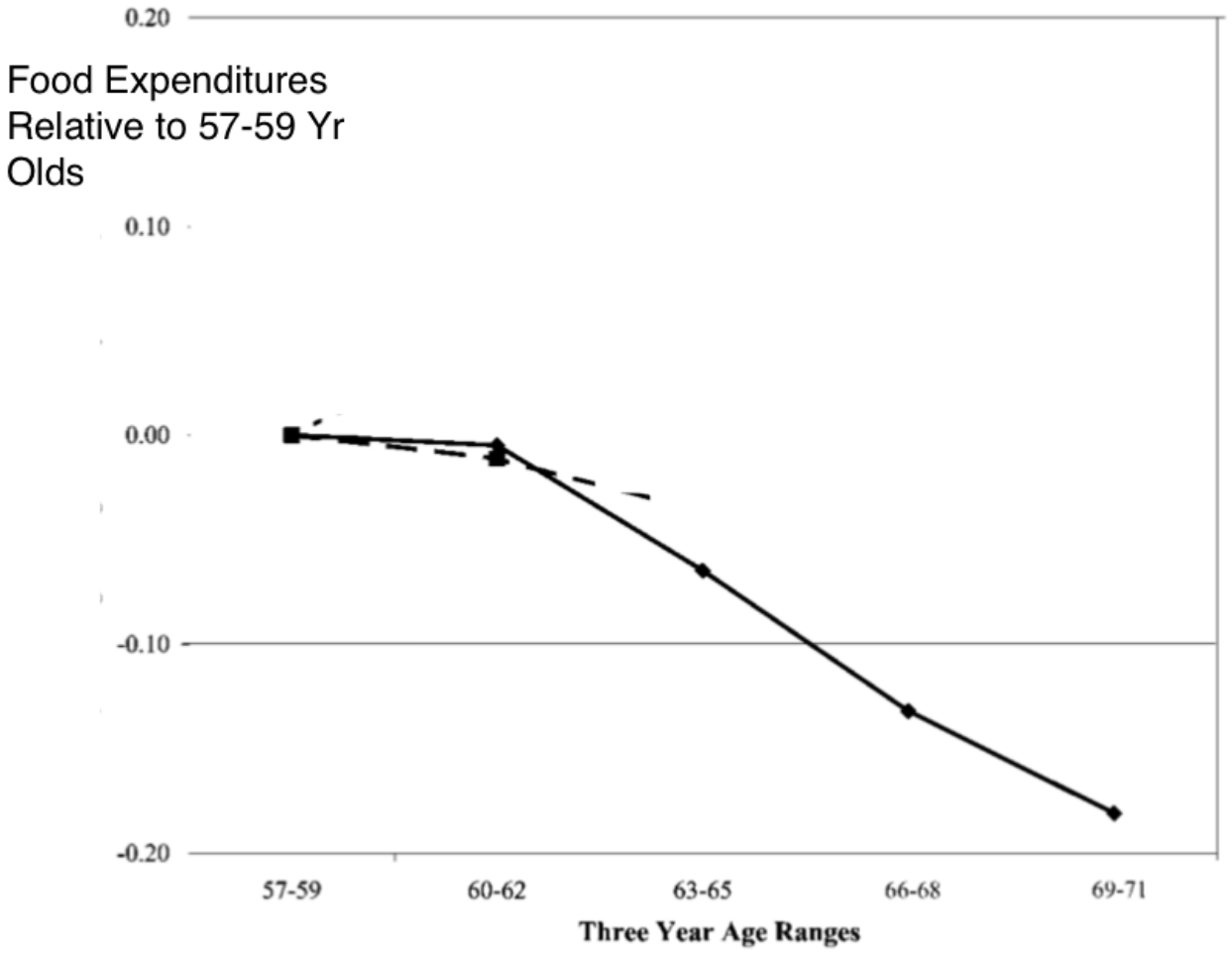
Section 2

State-Dependent Production Function

Food Consumption Around Unemployment Shocks



Food Consumption Around Retirement Surprises(??)



Theory: State-Dependent Production Function

- Production of meals may change with more time on one's hands
- Costs of spending time prepping food falls causing the contributions of $ and time to meals to change
- Food expenditures may fall even if food consumption does not (Aguiar and Hurst, 2005)

Changes in Food Consumption Around Unemployment Spells

Use the composition of people's consumption to predict their socioeconomic status in the cross-section

See how the resulting index of the quality of one's shopping cart changes around unemployment and retirement onset

Dependent Variable	Coefficient on Unemployment Dummy (1)
Consumption:	
Log of food consumption index	−.05
	(.01)

vs. for retirement:

Dependent Variable	Coefficient
1. Log of food consumption index	−.006
	(.02)

State-Dependent Production Function

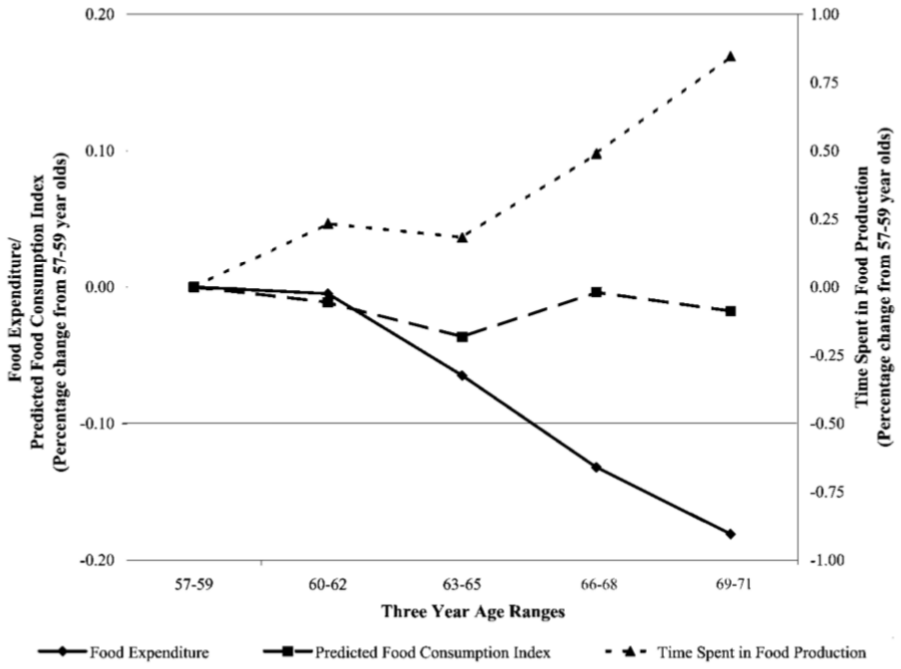


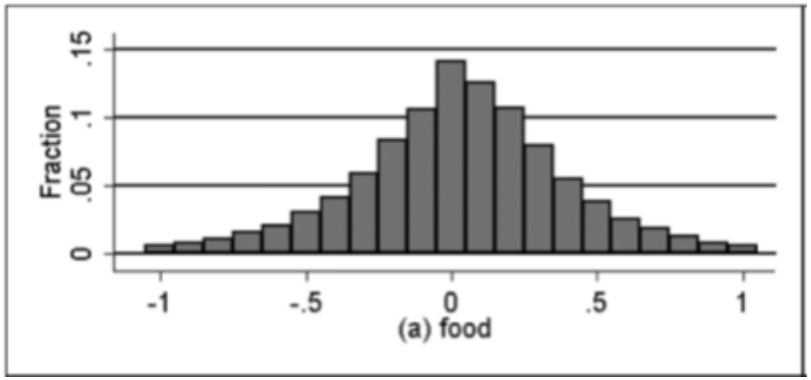
Fig 1.—Percentage change in food expenditure, predicted food consumption index, and time spent on food production for male household heads by three-year age ranges. Data are taken from the pooled 1989–91 and 1994–96 cross sections of the CSFII, excluding the oversample of low-income households. The sample is restricted to male household heads (1,510 households). All series were normalized by the average levels for household heads aged 57–59. All subsequent years are the percentage deviations from the age 57–59 levels. See Sec. IV for details of data and derivation of food consumption index

Section 3

Consumption Commitments

Sticky vs. Variable Consumption

Chetty & Szeidl (2007) use data from the Consumer Expenditure Survey (CEX) to characterize the frequency with which households change their expenditures (and thus their consumption) within various categories from Q1 to Q4



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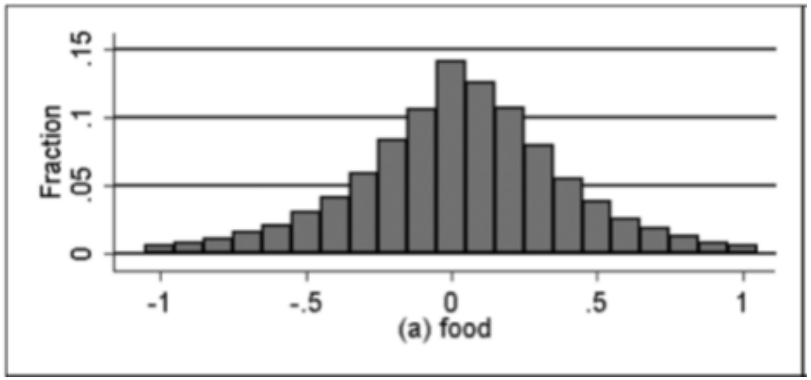

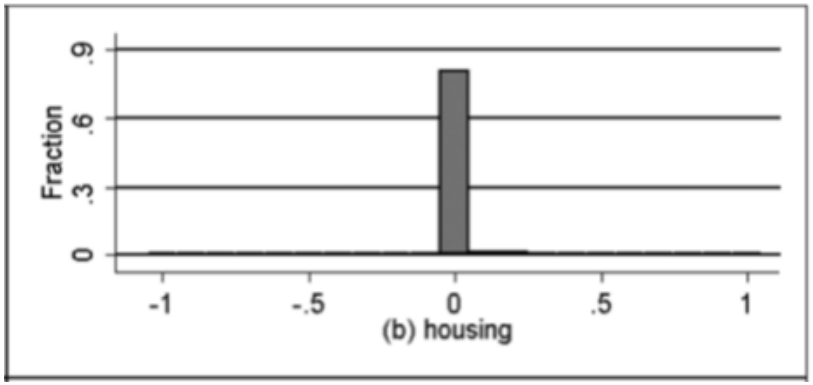

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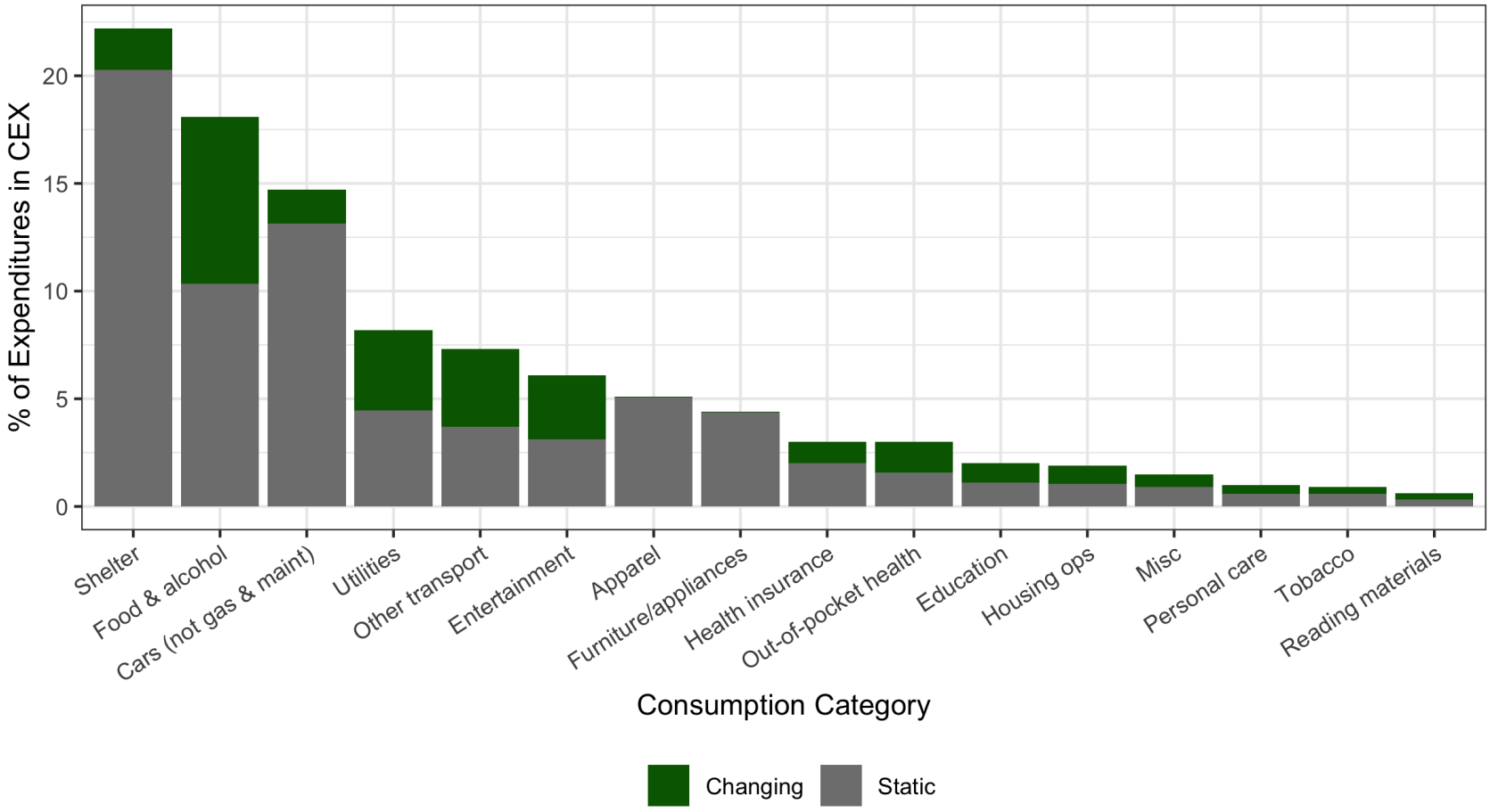
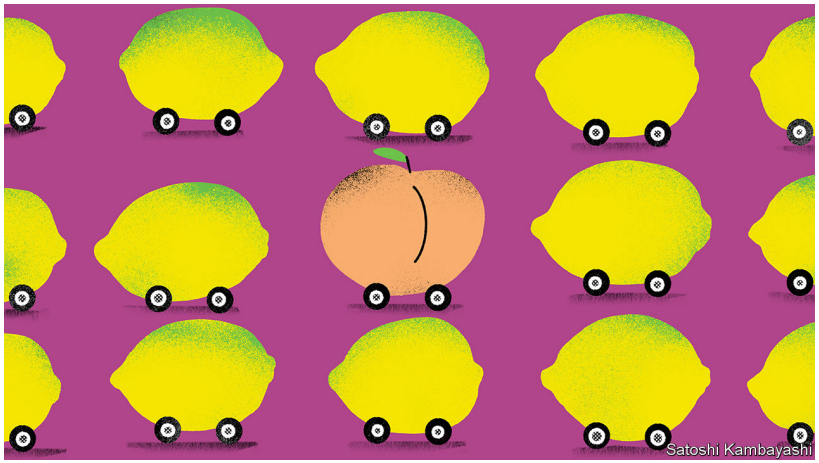


About 50% of all consumption is in "sticky" categories — shelter, cars, health insurance, apparel, furniture — where <35% of HHs actively change consumption from Q1 to Q4

Source of Stickiness

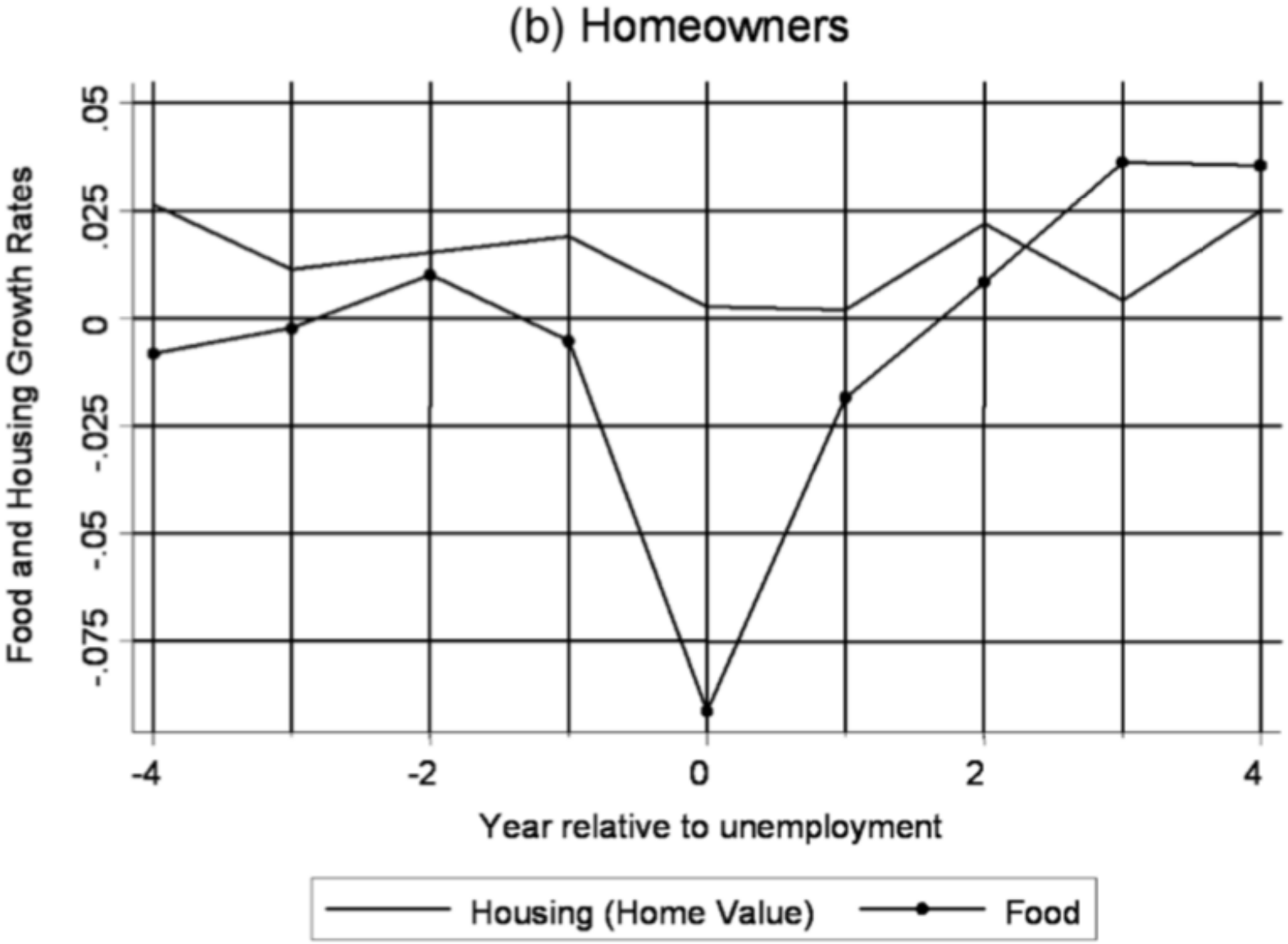
Argue that transaction costs and lemony-resale markets lead to fixed costs of adjusting sticky consumption



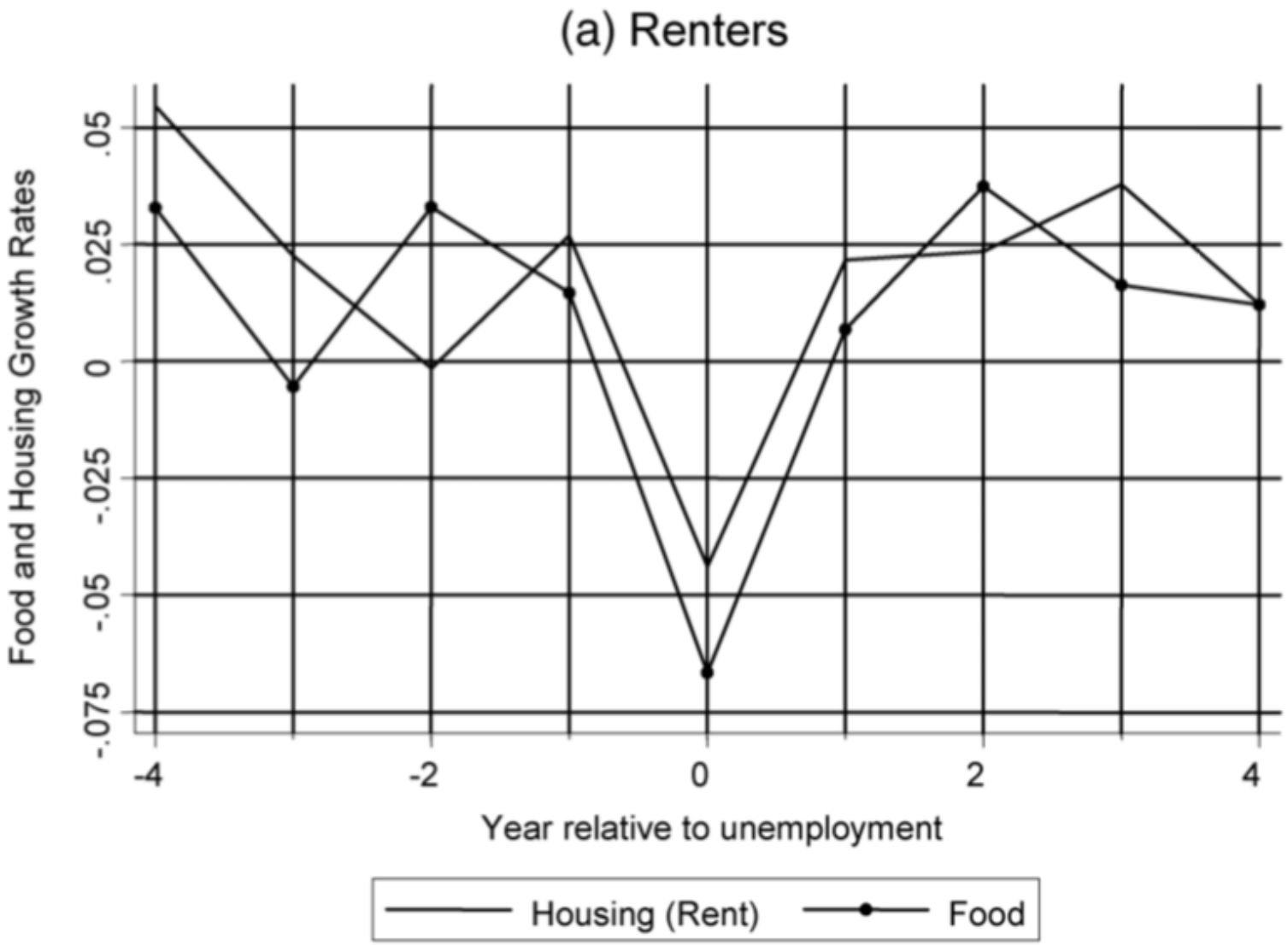
Intuitive Implications

- HHs may absorb small(-ish) negative shocks to income or wealth in non-sticky forms of consumption
- Only pay fixed costs of adjusting commitments in the face of lasting or large negative shocks
- Thus, food consumption will be less responsive to a lasting shock — e.g. disability or poor prep for retirement — than for a transitory shock — e.g. a spell of unemployment

Food and Housing Consumption Around Unemployment Shocks: Homeowners



Food and Housing Consumption Around Unemployment Shocks: Renters



Intuitive Implications (Continued)

- Commitments make people more risk-averse over medium stakes
- But potentially less risk-averse over large stakes where they would change commitments

Two-Period Model of Consumption Commitments

Utility: $u(f_t, x_t)$ where $f_t \equiv$ food and $x_t \equiv$ housing

[1]The paper actually allows for many periods, so you should interpret shocks to y_2 as capturing changes in permanent income. Thus, a large shock might be one that is moderate but persistent or transitory but severe.

Two-Period Model of Consumption Commitments

Utility: $u(f_t, x_t)$ where $f_t \equiv$ food and $x_t \equiv$ housing

1st Period: choose housing (x_1), food (f_1), and savings (w_1):

$$\max u(f_1, x_1) + \mathbb{E}[v(x_1, w_1)] \text{ s.t. } f_1 + x_1 + w_1 = y_1$$

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2nd Period:[1] choose food (f_2) & housing (x_2) given:

- realization of second period income y_2
- endowments of housing x_1 and wealth w_1 from first period
- fixed costs of k of changing housing away from x_1

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Chetty & Szeidl (2007) focus on 2nd period problem, taking 1st period decisions as given

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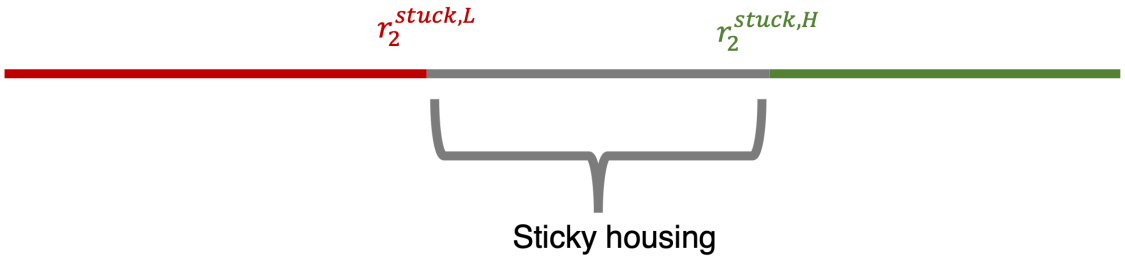
Implications of fixed costs of adjustment



- $r_2 \equiv w_1 + y_2 < r_2^{sticky,L}$: too painful to eat lost resources in ↓food so incur adjustment costs to move
- $r_2 > r_2^{sticky,H}$: diminishing returns to more food makes it worth it to move to have better ways to utilize the bonanza

Indirect utility

Aggregate resources, $r_2 \equiv w_1 + y_2$:

$$v(r_2, x_1) = u(f(r_2, x_1), x(r_2, x_1))$$

As a benchmark, suppose people can flexibly change their housing ($k = 0 \approx$ everyone rents) so $v(r_2, x_1) = v(r_2)$

Risk aversion of the uncommitted

Define the coefficient of relative risk aversion for the uncommitted case:

$$\sigma_{uncommitted} = -\frac{v''(r_2)r_2}{v'(r_2)}$$

First note, $v(r_2) = u(f(r_2), x(r_2))$, so differentiating yields:

$$v'(r_2) = u_f(f(r_2), x(r_2))f'(r_2) + u_x(f(r_2), x(r_2))x'(r_2)$$

FOC tells us $u_f(f(r_2), x(r_2)) = u_x(f(r_2), x(r_2))$ so:

$$v'(r_2) = u_f(f(r_2), x(r_2))(f'(r_2) + x'(r_2))$$

Differentiating again gives us:

$$v''(r_2) = (u_{ff}f'(r_2) + u_{fx}x'(r_2))(f'(r_2) + x'(r_2)) + \underbrace{u_f(f''(r_2) + x''(r_2))}_{\text{Second Order}}$$

Combining these we have:

$$\sigma_{uncommitted} = -\frac{(u_{ff}f'(r_2) + u_{fx}x'(r_2))(f'(r_2) + x'(r_2))r_2}{u_f(f(r_2), x(r_2))(f'(r_2) + x'(r_2))}$$

Risk aversion of the uncommitted

$$
\begin{aligned}
\sigma_{uncommitted} &= -\frac{(u_{ff}f'(r_2) + u_{fx}x'(r_2))r_2}{u_f(f(r_2), x(r_2))} \\
&= \underbrace{-\frac{u_{ff}f(r_2)}{u_f(f(r_2), x(r_2))}}_{\sigma_f} \underbrace{\frac{f'(r_2)r_2}{f(r_2)}}_{\epsilon_{f,r}^{uncommitted}} \\
&\quad - \underbrace{\frac{u_{fx}x(r_2)}{u_f}}_{\epsilon_{u_f,x}} \underbrace{\frac{u_{fx}x'(r_2)r_2}{x(r_2)}}_{\epsilon_{x,r}} \\
&= \sigma_f \epsilon_{f,r}^{uncommitted} - \epsilon_{u_f,x}\epsilon_{x,r}
\end{aligned}
$$

Risk aversion of the uncommitted

$$\sigma_{uncommitted} = \sigma_f \epsilon_{f,r}^{uncommitted} - \epsilon_{u_f,x} \epsilon_{x,r}$$

- 1st term reflects the pain of cutting back on food (which is equal to the pain of reducing housing if uncommitted)
- 2nd term reflects complementarities between the two types of consumption.
  - If $\downarrow$ housing makes reductions in variable expenditures (e.g. electricity for heat) less painful (or chilly), then this will dampen risk aversion.

Risk aversion of the committed

Consider the region where housing doesn't react to changes in income. Then we have:

$$v(r_2, x_1) = u(r_2 - x_1, x_1)$$

So

$$v_r(r_2, x_1) = u_f(r_2 - x_1, x_1) \text{ and } v_{rr}(r_2, x_1) = u_{ff}(r_2 - x_1, x_1).$$

Thus:

$$\begin{aligned}\sigma_{committed} &= -\frac{u_{ff}(r_2 - x_1, x_1) r_2}{u_f(r_2 - x_1, x_1)} \\ &= \sigma_f \frac{r_2}{f_2} = \sigma_f \epsilon_{f,r}^{committed}\end{aligned}$$

Differences in risk aversion

Around the level of resources where optimal housing is x_1, we can express the differences in risk aversion:

$$\begin{aligned}\sigma_{committed} - \sigma_{uncommitted} &= \sigma_f \epsilon_{f,r}^{committed} - (\sigma_f \epsilon_{f,r}^{uncommitted} - \epsilon_{u_f,x}\epsilon_{x,r}) \\ &= \sigma_f (\epsilon_{f,r}^{committed} - \epsilon_{f,r}^{uncommitted}) + \epsilon_{u_f,x}\epsilon_{x,r}\end{aligned}$$

The first term will be positive and reflects the fact that it is more painful to absorb the full shock in food consumption

- Can also write this term as $\frac{\sigma_f}{\gamma_f}(1 - f'(r_2))$ where $\gamma_f \equiv \frac{f_2}{r_2}$
- Commitments will be more costly when the variable component of consumption is a smaller share of total consumption (lower γ_f)

The second term will be positive if changing housing softens the blow of reduced variable expenses (e.g. utilities)

Differences in risk aversion

We can also consider the ratio of the committed versus uncommitted levels of risk aversion:

$$\frac{\sigma_{committed}}{\sigma_{uncommitted}} = \frac{\sigma_f \frac{r_2}{f_2}}{\sigma_f \epsilon_{f,r}^{uncommitted} - \epsilon_{u_f,x}\epsilon_{x,r}} = \frac{\sigma_f \frac{r_2}{f_2}}{\sigma_f \frac{r_2}{f_2} f'(r_2) - \epsilon_{u_f,x}\epsilon_{x,r}}$$

Without complementarities between fixed and variable consumption, we have:

$$\frac{\sigma_{committed}}{\sigma_{uncommitted}} = \frac{\sigma_f \frac{r_2}{f_2}}{\sigma_f \frac{r_2}{f_2} f'(r_2)} = \frac{1}{f'(r_2)}$$

Special Case

Suppose utility has the following form:

$$u(f,x) = \frac{f^{1-\sigma_f}}{1-\sigma_f} + \mu \frac{x^{1-\sigma_x}}{1-\sigma_x}$$

Since there are no complementarities between fixed and variable consumption, the ratio of risk aversions simplifies to:

$$\frac{\sigma_{committed}}{\sigma_{uncommitted}} = \frac{1}{f'(r_2)}.$$

To find $f'(r_2)$, we turn to the optimization problem:

$$\max_{f_2} \frac{f_2^{1-\sigma_f}}{1-\sigma_f} + \mu \frac{(r_2 - f_2)^{1-\sigma_x}}{1-\sigma_x}$$

Special Case (Cont)

$$\max_{f_2} \frac{f_2^{1-\sigma_f}}{1-\sigma_f} + \mu \frac{(r_2 - f_2)^{1-\sigma_x}}{1-\sigma_x}$$

yields the FOC:

$$f_2^{-\sigma_f} - \mu(r_2 - f_2)^{-\sigma_x} = 0 \implies f_2^{-\sigma_f} = \mu(r_2 - f_2)^{-\sigma_x}.$$

We can fully differentiate the FOC wrt to r_2 to see how a change in resources will affect food consumption:

$$-\sigma_f f^{-\sigma_f - 1} f'(r_2) - \sigma_x \mu (w - f)^{-\sigma_x - 1} f'(r_2) + \sigma_x \mu (r_2 - f)^{-\sigma_x - 1} = 0$$

Rearranging this gives us:

$$f'(r_2) = \frac{\sigma_x \mu (r_2 - f)^{-\sigma_x - 1}}{\sigma_f f^{-\sigma_f - 1} + \sigma_x \mu (r_2 - f)^{-\sigma_x - 1}}$$

We then have:

$$\frac{\sigma_{committed}}{\sigma_{uncommitted}} = \frac{\sigma_f}{\gamma_f} \frac{\sigma_f f^{-\sigma_f - 1} + \sigma_x \mu (r_2 - f)^{-\sigma_x - 1}}{\sigma_x \mu (r_2 - f)^{-\sigma_x - 1}}$$

Special Case (Cont II)

Simplifying gives us:

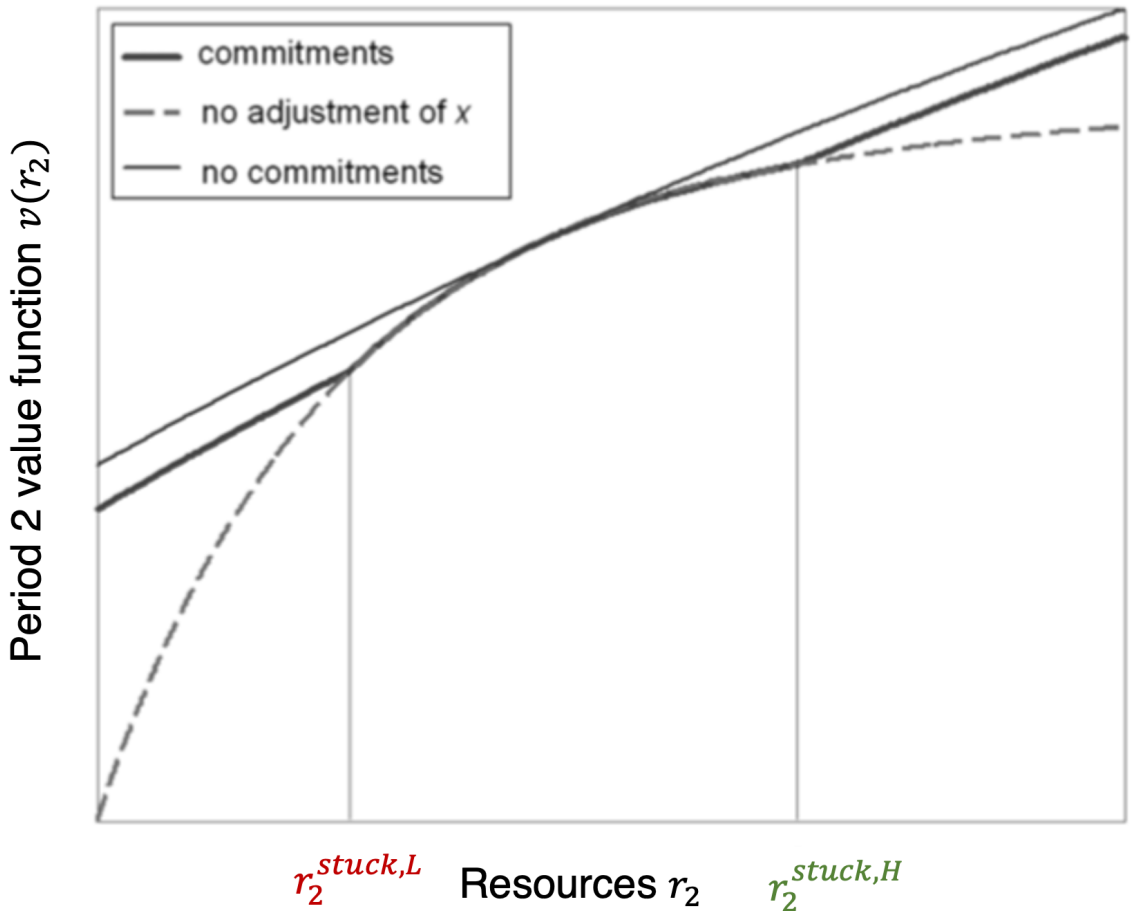
$$\frac{\sigma_{committed}}{\sigma_{uncommitted}} = 1 + \frac{\sigma_f f^{-\sigma_f - 1}}{\sigma_x \mu (r_2 - f)^{-\sigma_x - 1}}$$

Noting $f_2^{-\sigma_f} = \mu(r_2 - f_2)^{-\sigma_x}$ from the FOC, we have:

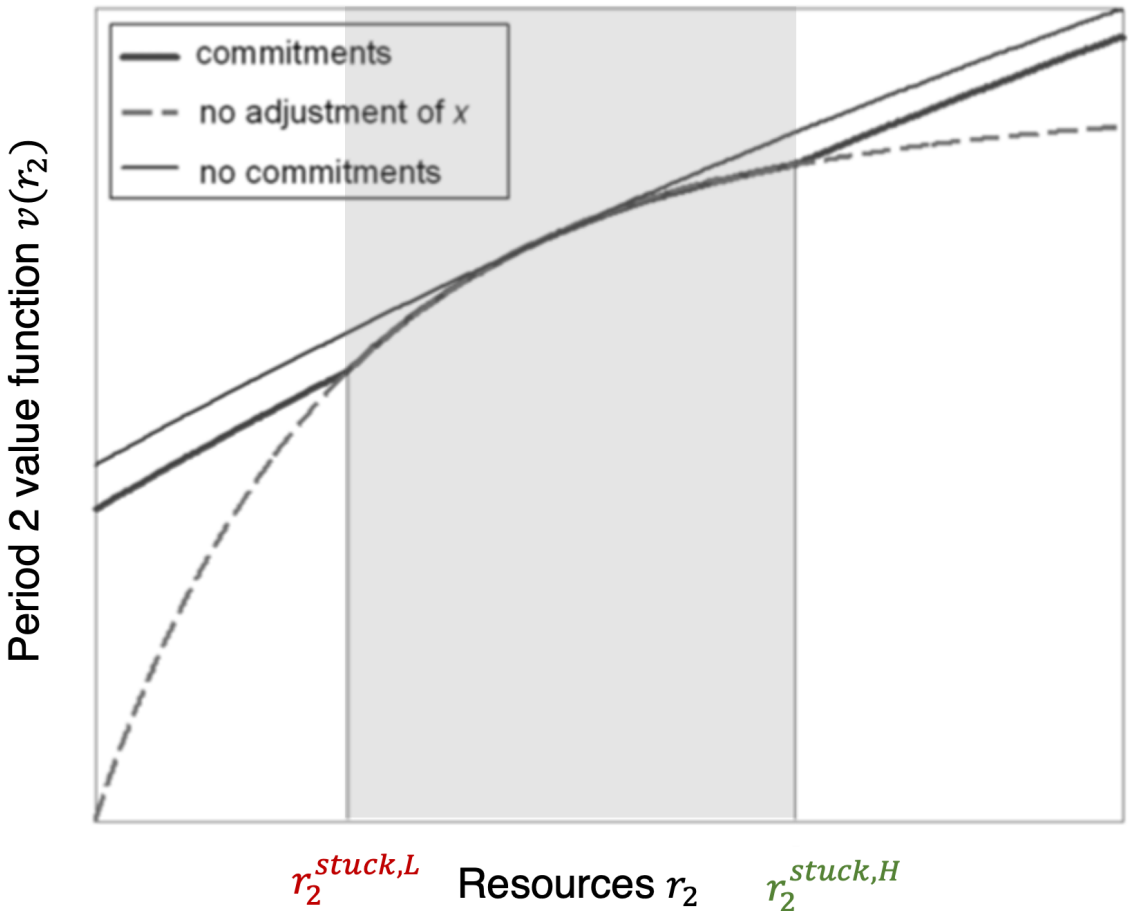
$$\frac{\sigma_{committed}}{\sigma_{uncommitted}} = 1 + \frac{\sigma_f}{\sigma_x}\frac{x}{f}.$$

The gap in risk aversions will be greater when there is relatively more curvature in the utility over food than housing (σ_f versus σ_x) and when food makes up a relatively smaller share of the total budget (f versus x).

Broader Implications

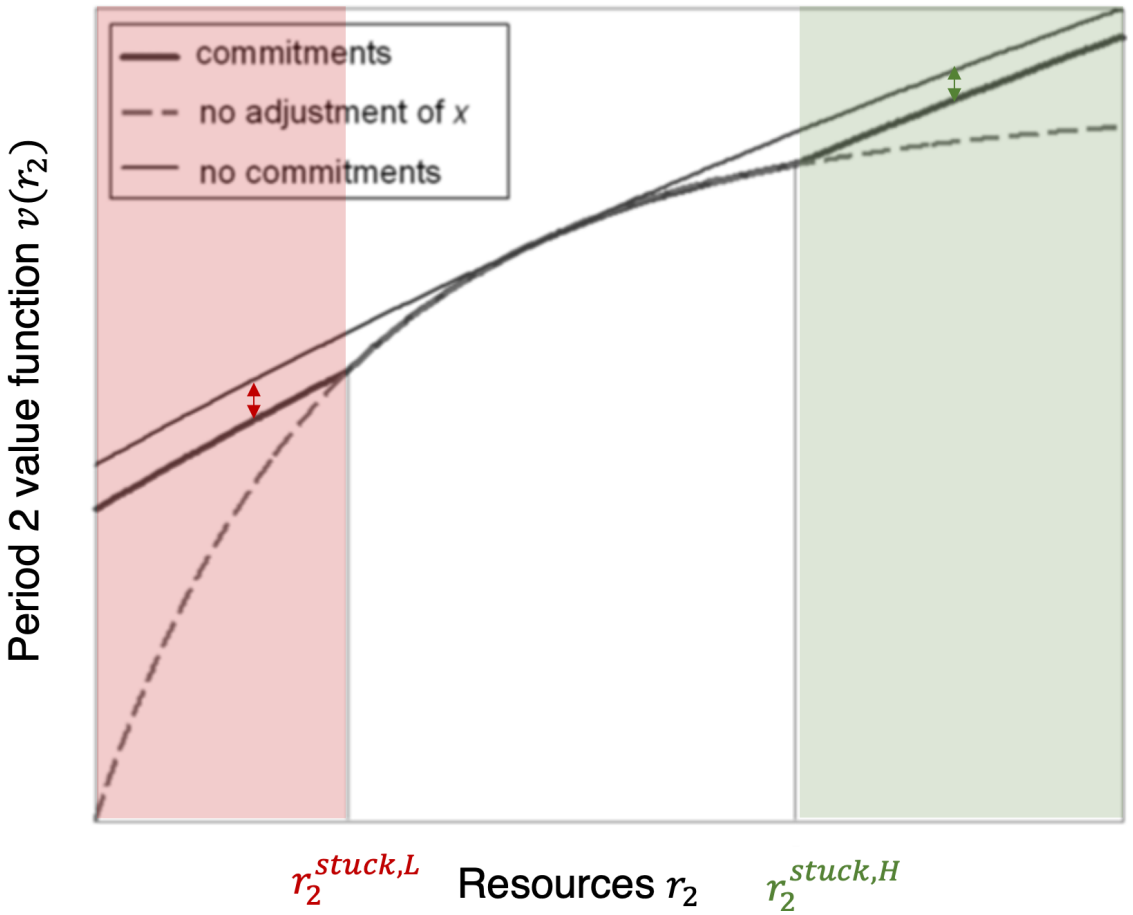


Broader Implications



In the band of no adjustment, greater curvature of utility than under no commitments because must concentrate all the changes in a subset of consumption.

Broader Implications

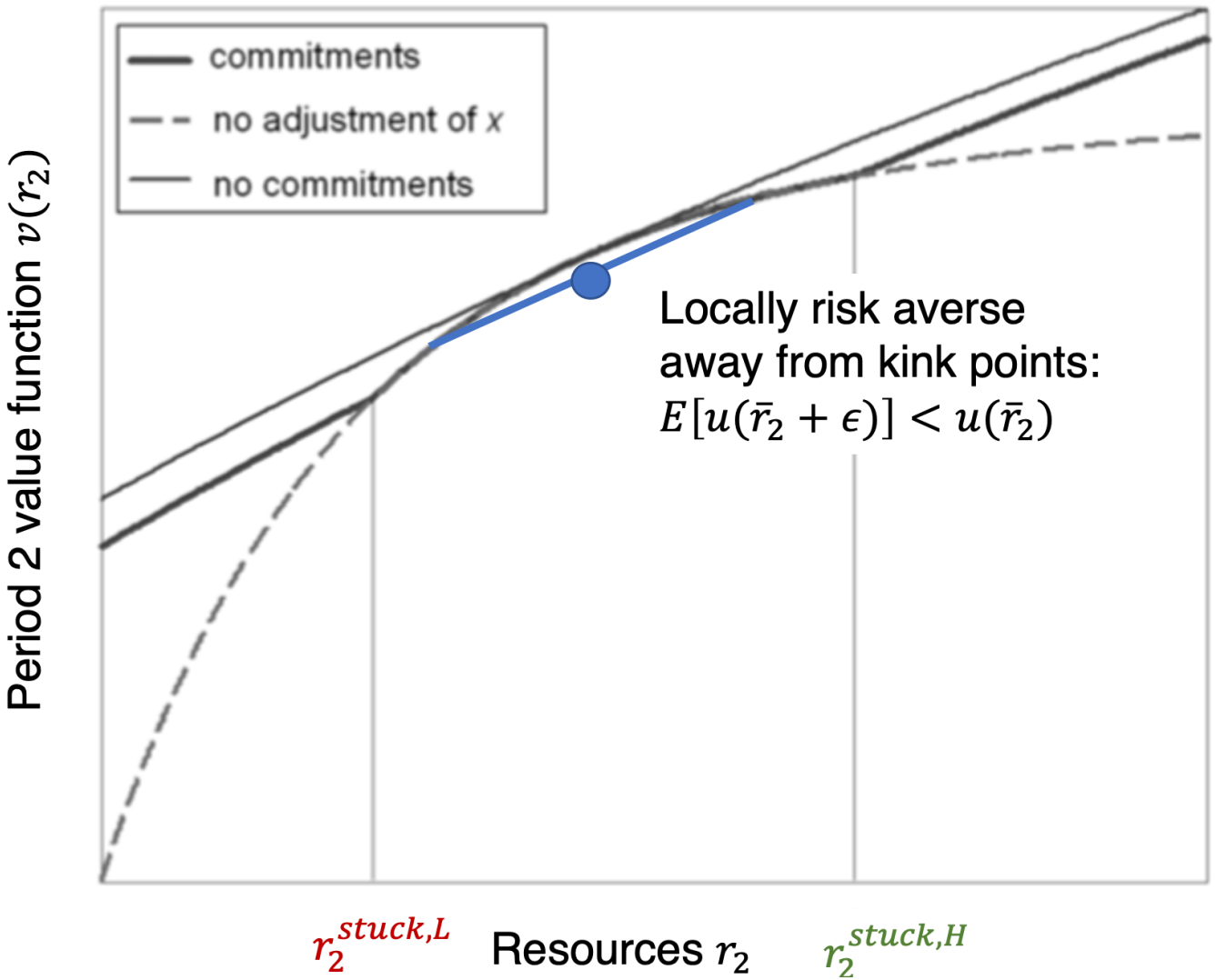


Level shift down from paying fixed costs outside the band of no adjustment.

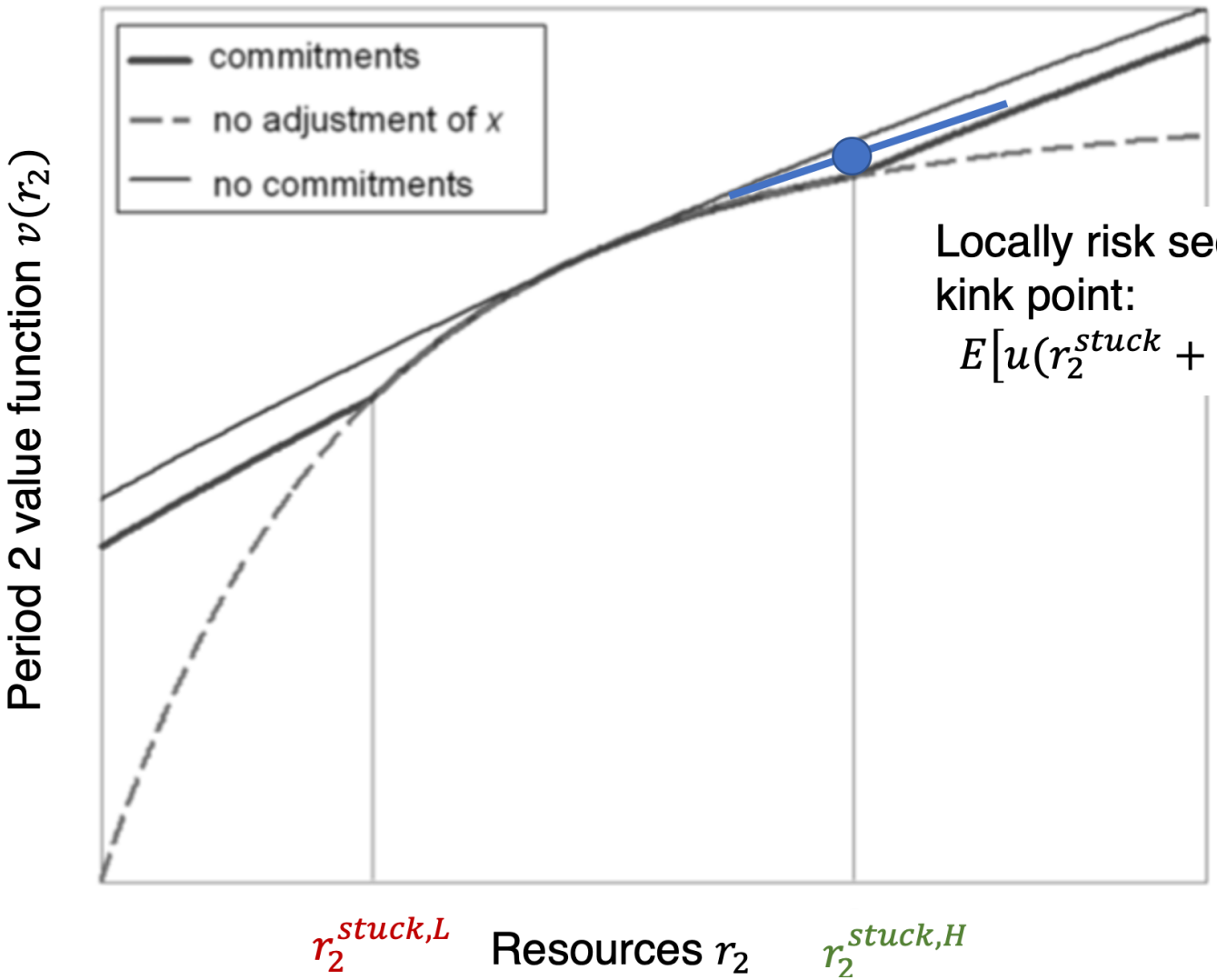
No change in curvature.

Would be a big change in curvature and levels if were barred from adjusting

Implications for Risk Aversion



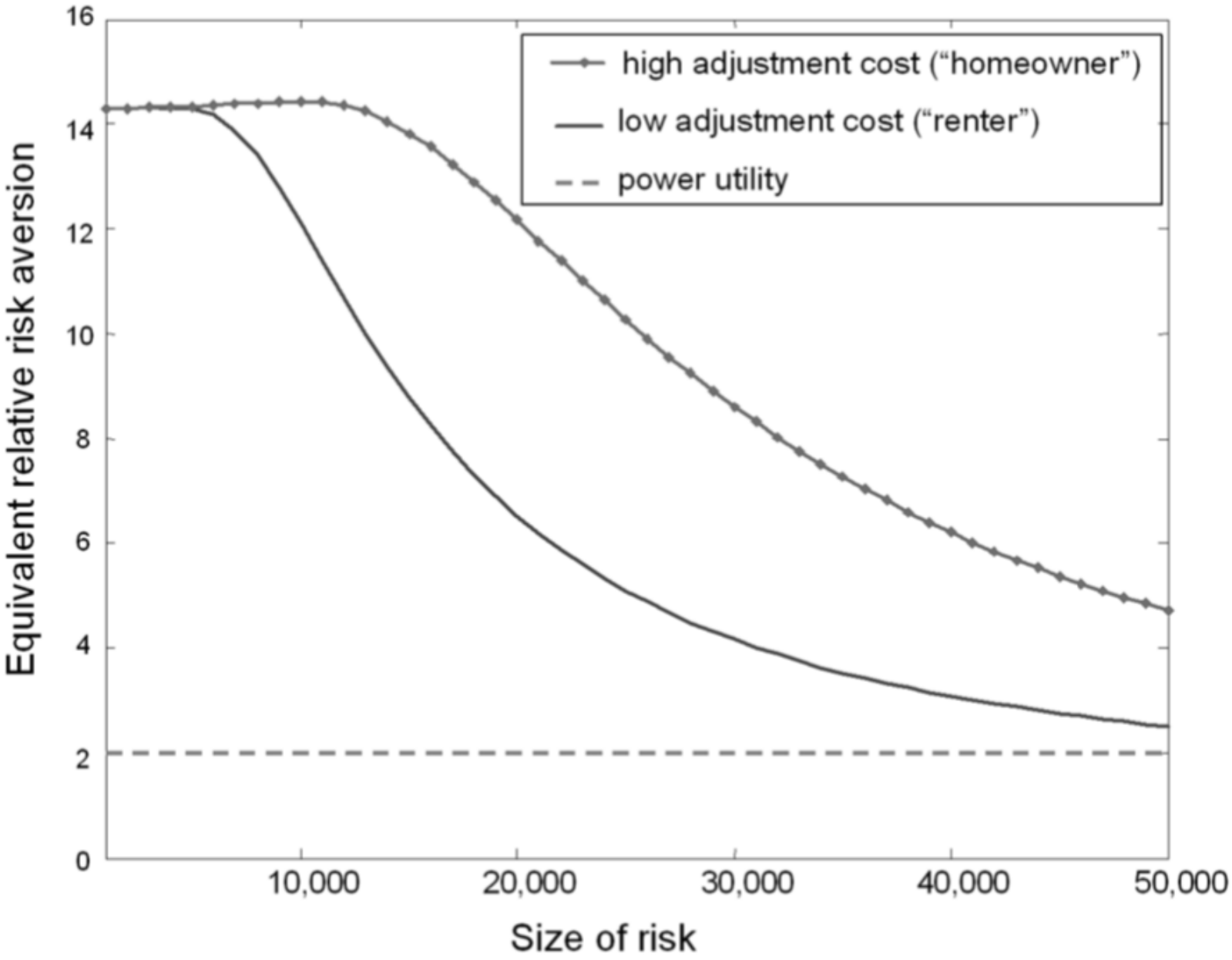
Implications for Risk Aversion



Locally risk seeking around kink point:

$$E\left[u(r_2^{stuck} + \epsilon)\right] > u(r_2^{stuck})$$

Risk Aversion



Risk preferences

Suppose someone offered you a 50/50 bet of losing $1000 versus gaining $1005, would you take it?

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How about $1000 versus $1025?

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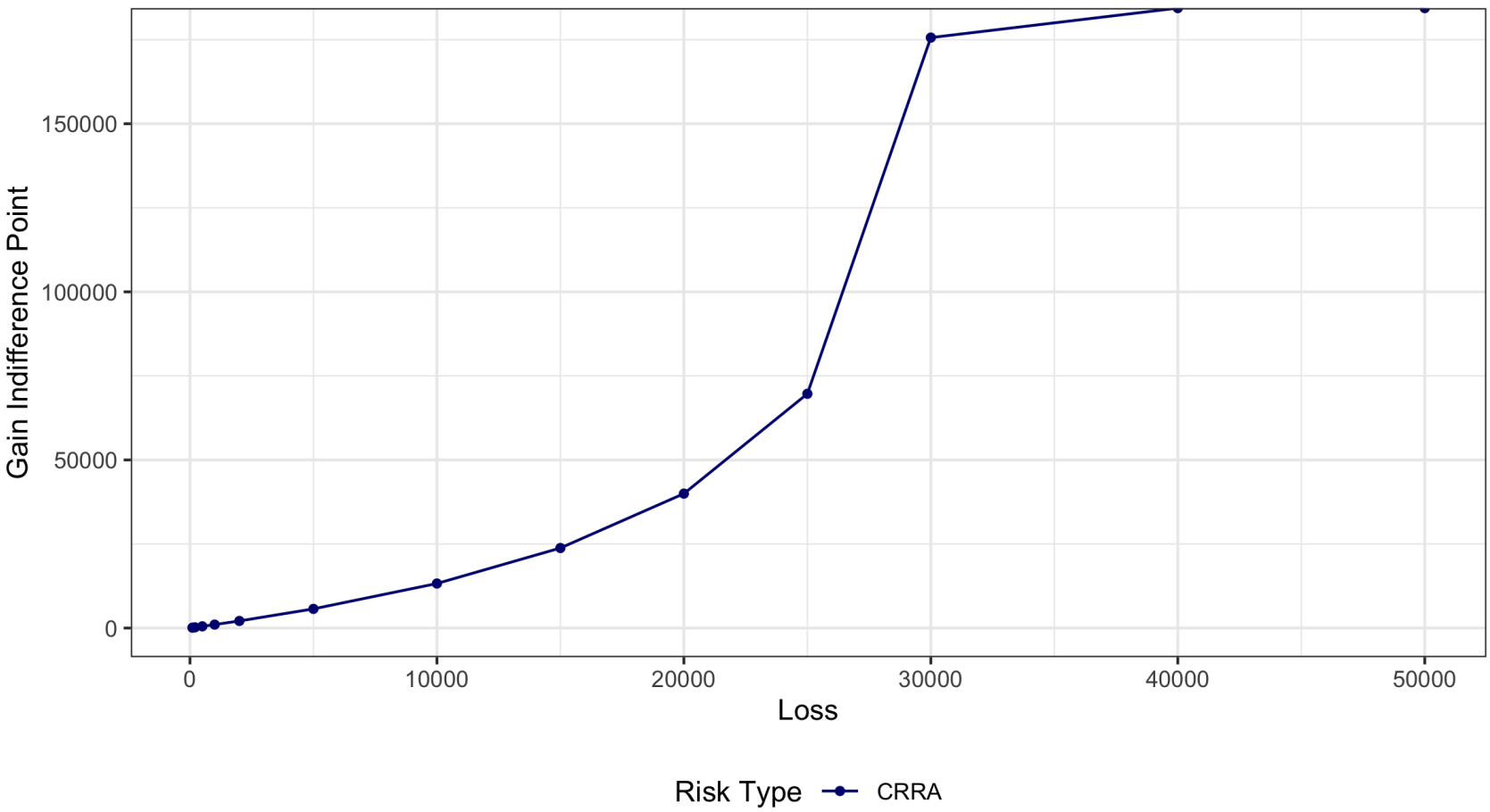
How about $1000 versus $1025?
How about $1000 versus $1100?

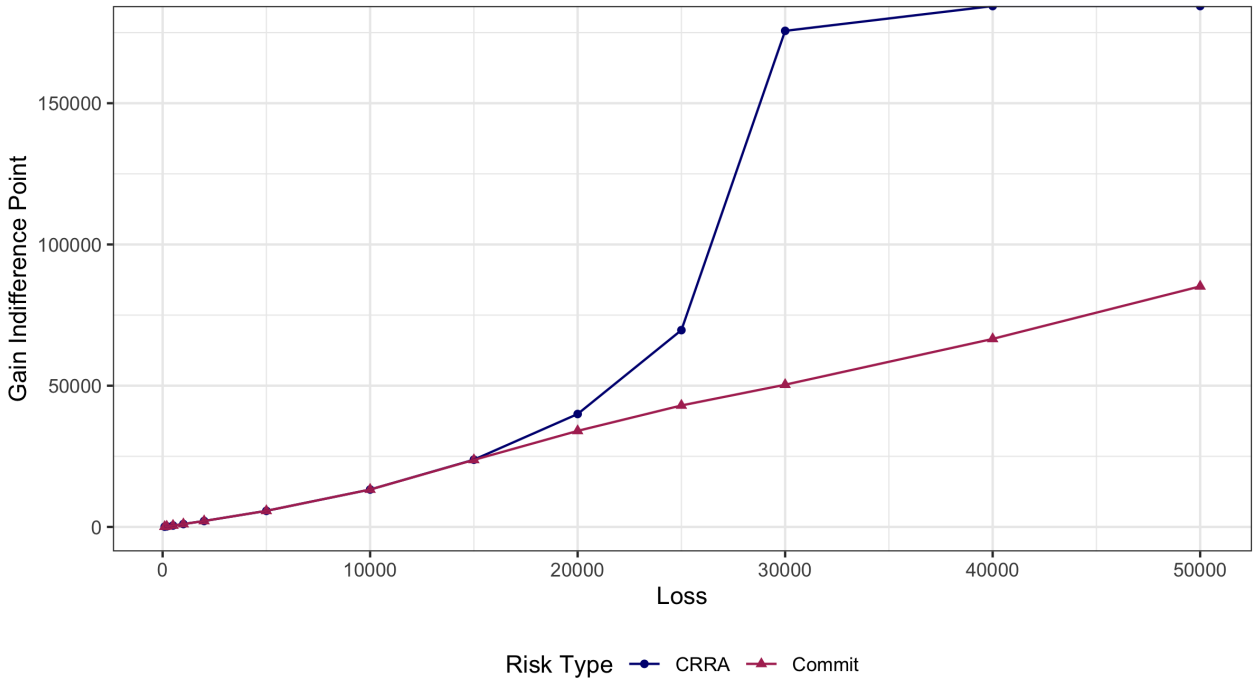
Indifference Points

With CRRA utility and lifetime wealth of 300K, an indifference point of \$1025 $\implies$ ∞ indifference points for $\geq$\$40K gambles!



Indifference Points with Commitment

Suppose you instead have the "special case" commitment preferences and 50% of your budget is spent on housing. Then your indifference point is as below:



Indifference Points with Commitment

Commitment breaks the link between risk preferences over moderate and large stakes

- Over small stakes, risk aversion is determined by the curvature of utility with respect to food (uncommitted) and the share of spending devoted to food
- Risk aversion over large stakes is determined by curvature over housing (committed)

It's worth noting that commitments cannot generate substantial risk aversion with respect to small gambles (<$500), since utility is locally linear. For this, loss aversion is probably a better model.

Implications for Optimal UI vs DI

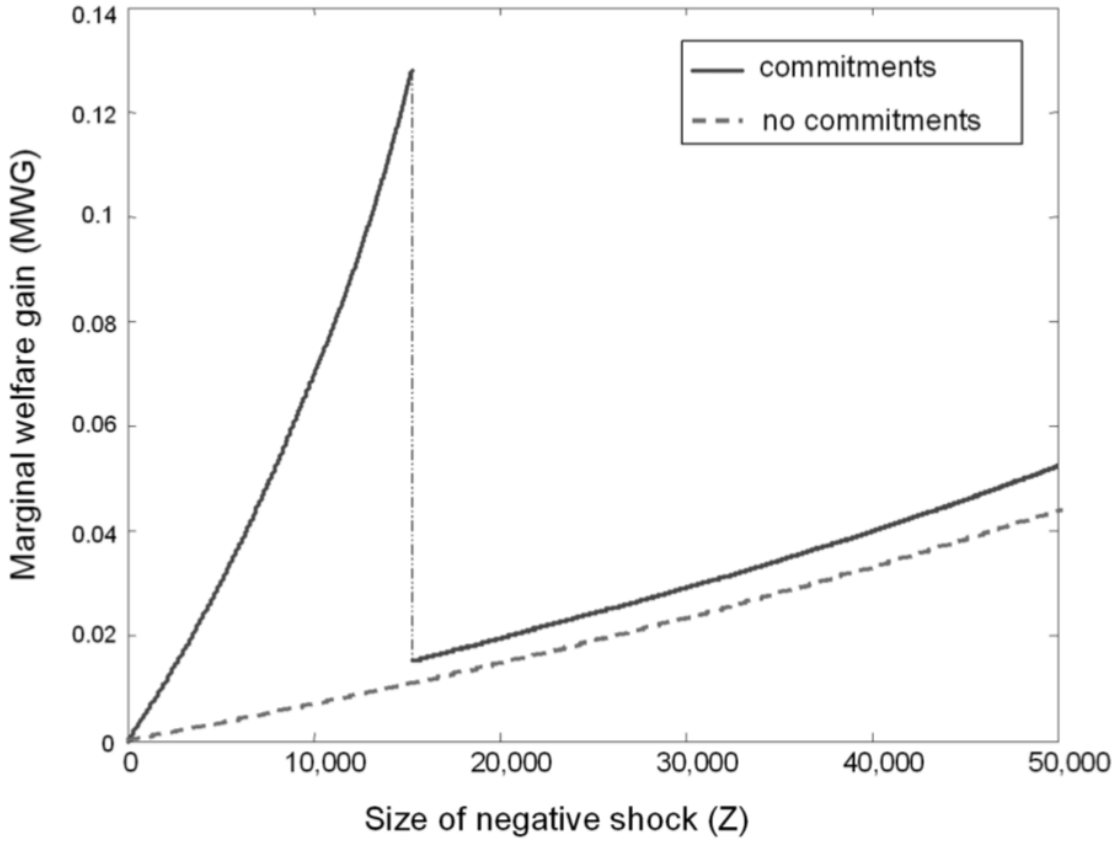


Figure V
Marginal Welfare Gain from Insurance

Section 4

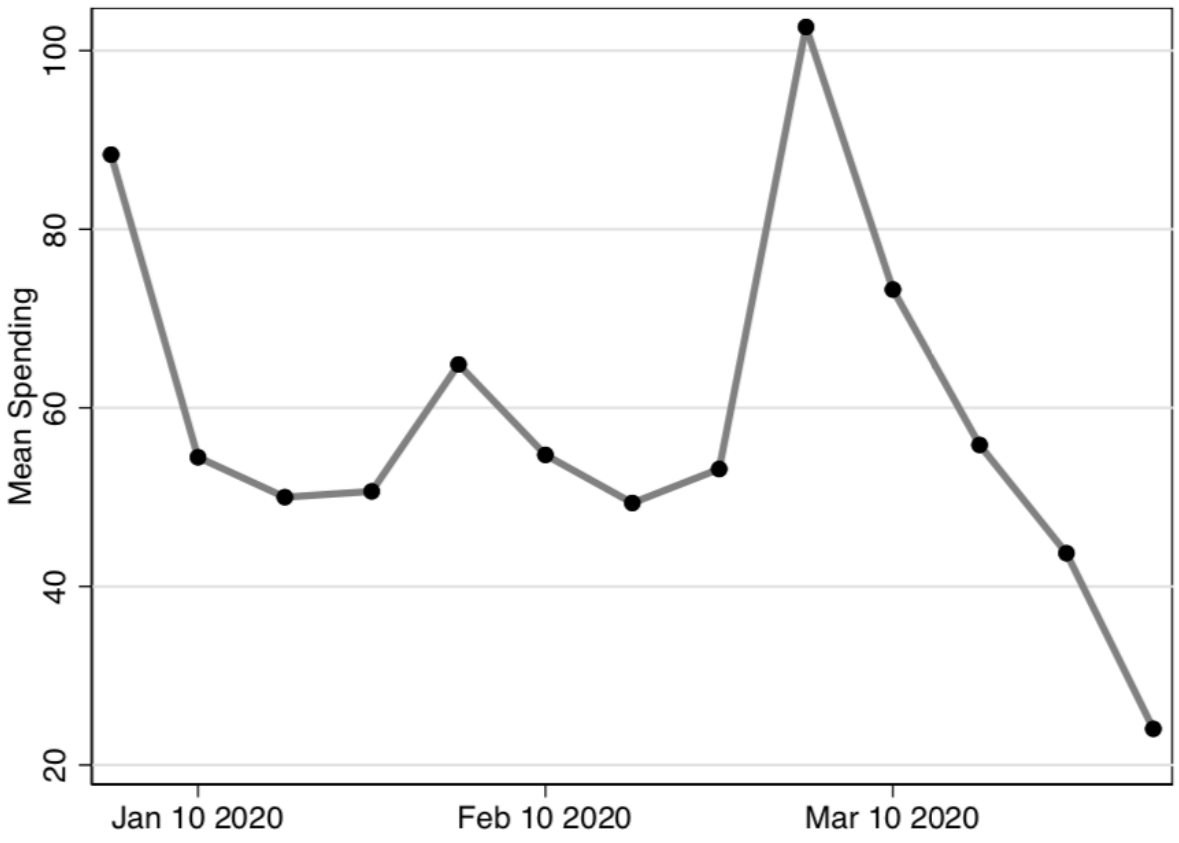
Coronavirus and Consumption

Changes in Variable Consumption during Coronavirus Outbreak

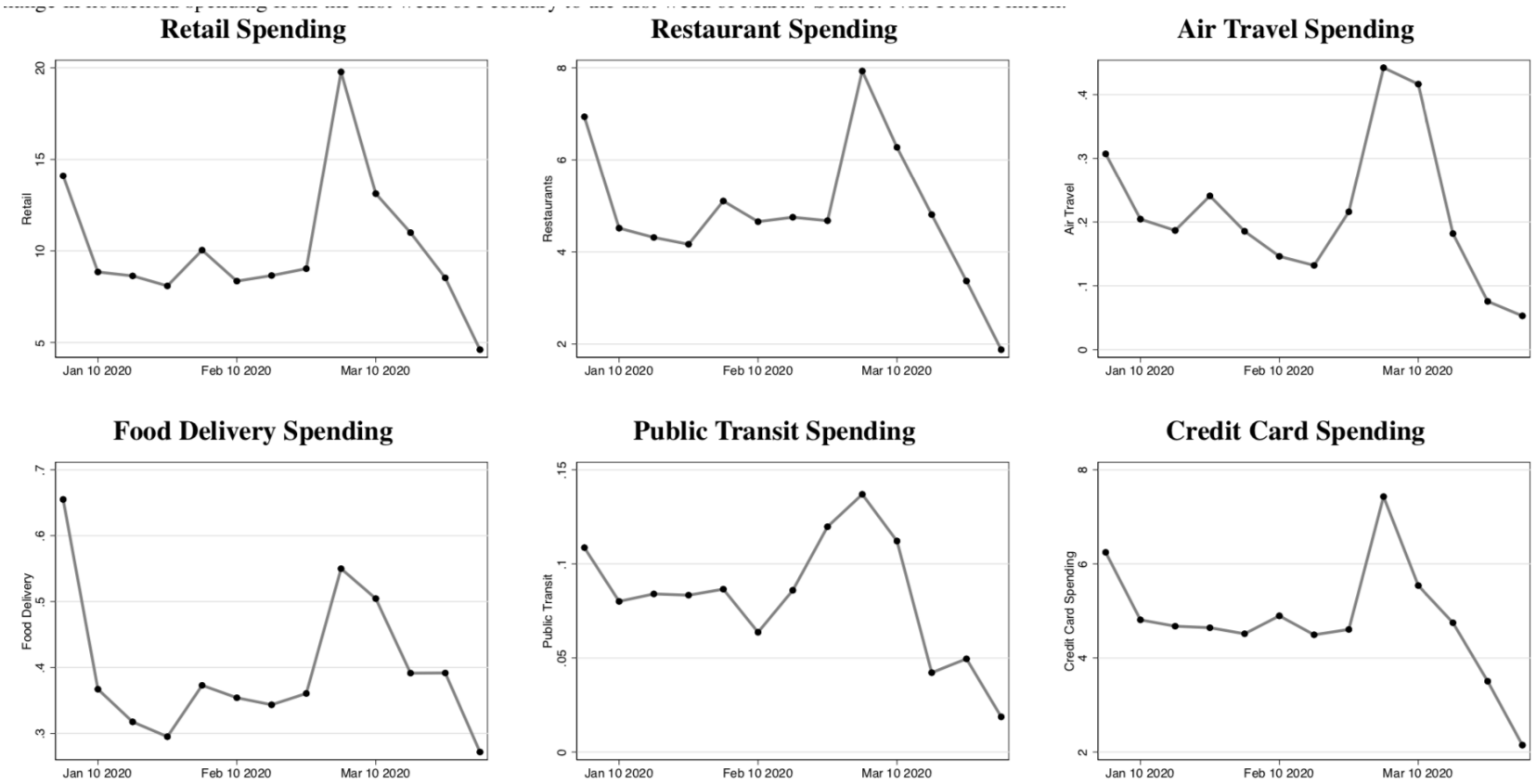
Baker, Farrokhnia, Meyer, Pagel, and Yannelis (2020) trace out consumption over the beginning of the coronavirus outbreak in the US

- Data comes from a non-profit fintech startup that helps people manage their finances and encourages them to save more
- Daily spending and income transactions from all linked checking, savings, and credit card accounts
- Focus on flexible spending (excluding ”bills, mortgages, and rent”)

Changes in Variable Consumption during Coronavirus Outbreak



Changes in Variable Consumption during Coronavirus Outbreak



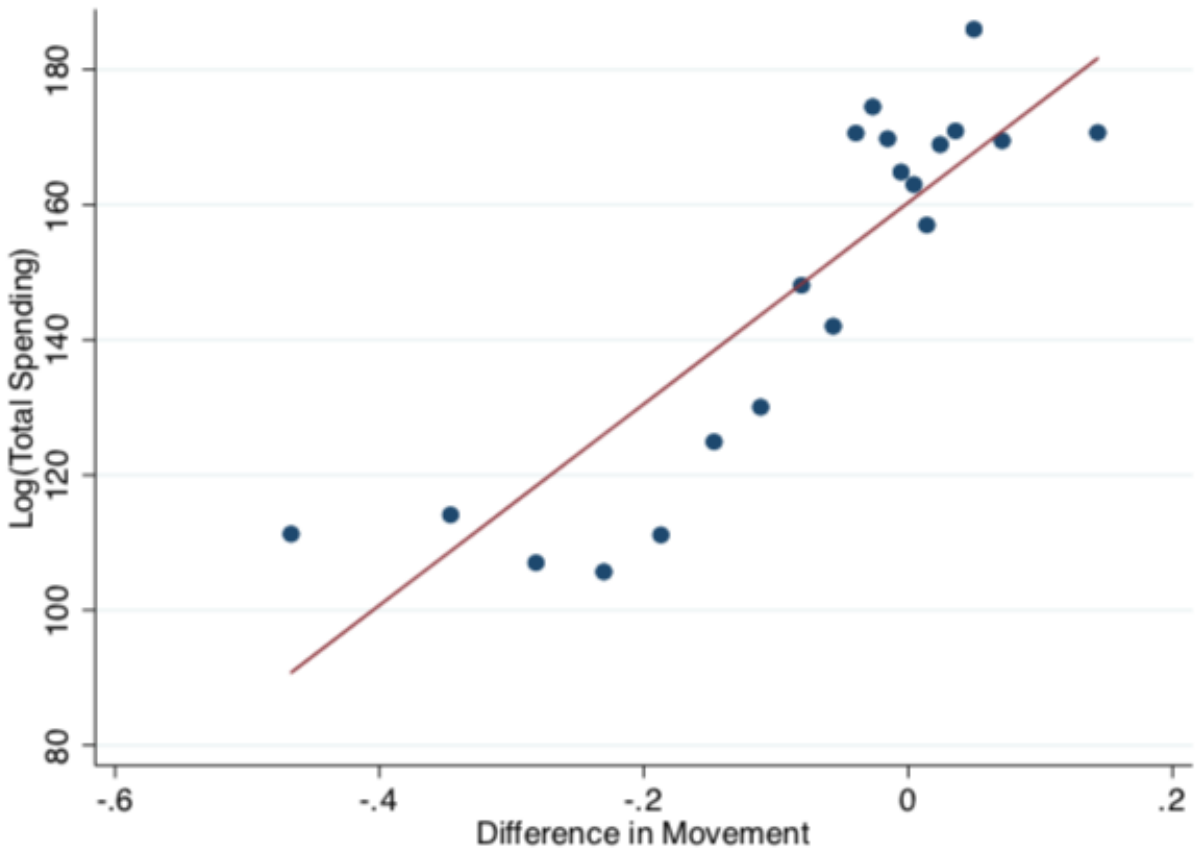
Changes in Variable Consumption during Coronavirus Outbreak

How does the consumption decline vary by the extent of sheltering in place?

Changes in Variable Consumption during Coronavirus Outbreak

How does the consumption decline vary by the extent of sheltering in place?

- Correlate reductions in movement with changes in consumption



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  - Optimal to have high benefit level since large drop in consumption and limited fiscal externality since many people can't work even if they wanted to
- What if changes in consumption are driven by a change in preferences with fixed income?
  - Sheltering in place may lead to lower marginal utility of consumption post-epidemic than pre-epidemic
  - Optimal to have lower benefit level since the value of $s today is actually lower than it is in a normal state

Coronavirus & Consumption Commitments

When a city is on lock down, it's hard to sell your house.

- Shenzhen, China banned all home sales during crisis[2]
- In Italy, Jan-Feb 2020 home sales were down 7% in Lombary and 12% in Milan vis-a-vis Jan-Feb 2019[3]
- In Korea, the first 9 days of March saw 458 apt sales per day compared to 2,272 apt sales per day in December[4]

It may also be difficult to sell durable goods like cars and furniture for fear of contagion.

[2] https://www.bloomberg.com/news/articles/2020-02-11/china-home-sales-plunged-90-in-first-week-of-february-on-virus

[3] https://www.scenari-immobiliari.it/chi-siamo/

[4] https://biz.chosun.com/site/data/html_dir/2020/03/10/2020031003693.html

How would this impact the Bailey-Chetty Condition?

- Suggests high risk aversion than normal since people can't adjust their housing / car consumption even in the face of large shocks to their income