Consumption Commitments and Unemployment Insurance

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EEA Conference

August, 2022

Motivation

- Consumption commitments:
  - Goods that require unavoidable monthly payments that are difficult to adjust
    - Mortgage or rental payments, insurance payments or mobile phone plans
  - 40% of households' expenditures devoted to consumption commitments in the US
  - Limit ability to adjust consumption against negative income shocks
    - $\rightarrow$ Adjustment entirely done through adjustable goods (food, entertainment, transport...)
- Unemployment: one of the most important negative income shocks
  - Unemployment insurance (UI) $\rightarrow$ main government program for unemployed.
- Literature on UI: Benefits of smoothing consumption vs negative job search incentives
  - Abstracts from consumption commitments.
  - Households devote a large share of their budget to commitments.

This paper

- Infinite horizon, search model with heterogeneous agents.
  - Two goods: adjustable good and commitment, whose adjustment is costly.
  - Exogenous unemployment shocks.
  - Unemployed individuals exert effort to find a new job.
  - Government taxes income and runs an UI program.
- Calibrate the model with household-level data from the US.

Research questions

How do commitments affect savings and search behavior?

How do commitments affect the value of the UI?

What is the optimal replacement rate in an economy with commitments?

Related Literature

Preview of findings

- Commitments increase precautionary savings
  - Median assets are 24% higher than in an economy without commitments.
- Effort reacts more to removing UI in an economy with commitments.
  - Unemployment duration reduced by 23% when UI is removed.
  - Only by 14% without commitments.
- Important welfare losses of removing UI in an economy with commitments.
  - Median welfare loss of 4.5% (consumption terms), 3.4% w/o commitments.
  - Non-college educated, 5% welfare loss.
- Optimal replacement rate higher: 65% in economy with commitments
  - 55% without them.

Facts

Facts on Consumption Commitments and Unemployment

1. Small fraction of HHs adjust shelter (2.5%), insurance (30%) and phone payments (35%) every quarter Fact 1
   - Expenditures on food, entertainment or transportation adjusted by many more HHs (70-80%)
   - Commitments amount to 40.6% of household expenditures.

2. Commitments barely adjusted during unemployment spells Fact 2
   - Expenditures on food, transportation and entertainment fall by 15-30%

3. Individuals with commitments exit unemployment faster Fact 3
   - Even after controlling for observables, individuals with commitments have 26% higher hazard rate of exiting unemployment

Data

Model

Overview

- Infinite horizon: monthly frequency
  - Households live, on average, for 30 years.
- Two goods: adjustable and commitment
- Search model: No intensive margin of labor supply
- Unemployment Insurance: proportional to earnings prior to unemployment, with limited duration
- Idiosyncratic productivity shocks.
  - Permanent component, skills (θ)
  - Persistent component (ξ)
- Progressive Taxation

Preferences

- HH's discount future at rate $\beta_\theta = \hat{\beta}_\theta \pi$
  - $\hat{\beta}_\theta$ usual discount factor, depends on skill type θ
  - π probability of death.
- Utility function:

$$u(c_t, s_t, s_{t-1}) = \frac{\mathbb{C}_t(c_t, s_t)^{1-\sigma}}{1-\sigma} - \kappa_f \mathbb{I}_{s_t \neq s_{t-1}}$$

  where $\mathbb{C}_t(c_t, s_t) = [\alpha c_t^\eta + (1-\alpha) s_t^\eta]^{\frac{1}{\eta}}$
  - κ_f: adjustment cost
  - η: determines the elasticity of substitution between c and s
- Unemployed individuals exert effort, $\nu \in [0, 1]$, to find a job.
  - Effort is costly, disutility: $\psi(\nu) = \psi \nu^2$

Labor Market: Employed individuals

- Productivity of the individuals:
  - Permanent (or "skills"): $\theta \in \{\theta_l, \theta_h\}$
    - Fraction of each type f_l and f_h
  - Persistent: ξ
  - Wages: $\log w = \theta + \xi$
- Persistent component while employed:

$$\xi' = \rho_\xi \xi + \epsilon_\xi, \quad \epsilon_\xi \sim \mathcal{N}(0, \sigma_\xi^2)$$

  - For unemployed the persistent component remains constant.
- Each period, an employed agent is separated from her job with probability δ_θ.

Labor Market: Unemployed individuals

- Unemployed individuals exert effort that affects the job finding probability.

$$\mathcal{P} = \nu \, \Phi(n_u) \tag{1}$$

  - n_u: number of periods unemployed.
- $\Phi(n_u)$ controls for duration dependence of the probability of finding a job.
- Following Kekre (2021),

$$\Phi(n_u) = \begin{cases} 1 - \lambda_0 + \lambda_0 \exp(n_u \lambda_1), & n_u < 8 \\ 1 - \lambda_0 + \lambda_0 \exp(7\lambda_1), & n_u \geq 8 \end{cases} \tag{2}$$

  - λ_0 controls the level of Φ.
  - $\lambda_1 < 0$ controls the slope of Φ.
- During unemployment, ξ remains constant.

Government

- Unemployment Insurance:
  - Eligibility conditions:
    - Must have worked during the last $\overline{N_E}$ periods prior to unemployment.
    - Can participate up to $\overline{N_{UI}}$ periods
  - Unemployment benefits: $B(w_{-1}) = \min\{\Theta_0 w_{-1}, \Theta_1\}$
    - Θ_0: replacement rate
    - Θ_1: cap on UI benefits
    - w_{-1}: earnings before losing job
- Progressive tax schedule:
  - Average tax rate for individual with income y: $t(y) = 1 - \gamma \left(\frac{y}{\overline{y}}\right)^{-\tau}$
    - γ controls the level of taxes
    - τ controls the progressivity of the system.
    - $\overline{y}$ denotes mean income in the economy.
  - Total taxes paid: $T(y) = t(y) * y$

Individual decisions: Employed

- State for employed individuals: $(\theta, \xi, n_E, a, s_{-1})$
  - n_E: number of months employed (eligibility requirement for UI)

$$V_E(\theta, \xi, n_E, a, s_{-1}) = \max_{c,s,a'} \left[u(c, s, s_{-1}) + \beta_\theta \left\{ (1-\delta_\theta) \mathbb{E}_{\xi'} \left\{ V_E(\theta, \xi', n_E + 1, a', s) \right\} + \delta_\theta V_U(\theta, \xi, 1, \mathcal{E}', a', s) \right\} \right],$$

subject to

$$\begin{aligned} c + s + a' &= y + a - T(y), \\ y &= w(\theta, \xi) + ra, \\ \mathcal{E}' &= \mathbb{I}(n_E \geq \overline{N_E}), \end{aligned}$$

and

$$c > 0, \quad s > 0, \quad a' \geq 0.$$

- $\mathcal{E} \in \{0, 1\}$: eligibility for unemployment insurance.

Individual decisions: Unemployed

$$V_U(\theta, \xi, n_u, \mathcal{E}, a, s_{-1}) = \max_{c,s,a',\nu} [u(c, s, s_{-1}) - \psi(\nu) + \beta_\theta \{\mathcal{P}(\nu, n_u) V_E(\theta, \xi, 1, a', s) + (1 - \mathcal{P}(\nu, n_u)) V_U(\theta, \xi, n_u + 1, \mathcal{E}', a', s)\}],$$

subject to

$$c + s + a' = y + a - T(y),$$

$$y = \mathcal{E} B(\exp(\theta + \xi)) + ra,$$

$$\mathcal{E}' = \begin{cases} \mathcal{E}, & \text{if } n_U < \overline{N_{UI}}, \\ 0, & \text{otherwise.} \end{cases}$$

and

$$c \geq 0, \quad s \geq 0, \quad a' \geq 0.$$

Calibration

Calibration

- Model period: 1 month.
- Data sources:
  - Consumption: CEX (2015-2019) and SIPP (2014-2018).
  - Labor market: Current Population Survey (CPS, 2014-2018).
    - Primary source of monthly labor force statistics in the US.
- Two stages:
  1. Parameters taken from the literature, policy reports or directly estimated from data.
  2. Other parameters calibrated so the model replicates key features of US economy.

First stage: Parameters set a priori

Table: Parameters set a priori

Parameter		Description	Source
π	1/360	Probability of death	Average of 30 years
σ	1.5	Coefficient risk aversion	Standard
$\overline{N_E}$	12	Employment requirement for benefits	Department of Labor
$\overline{N_{UI}}$	6	Employment requirement for benefits	Department of Labor
Θ_0	0.50	Replacement rate	Graves (2021)
Θ_1	0.67	Cap on UI	Graves (2021)
δ_{θ_l}	0.018	Probability job loss, non-college	CPS (2014-2018)
δ_{θ_h}	0.012	Probability job loss, college	CPS (2014-2018)
f_l	0.633	Fraction non-college	CPS (2014-2018)
f_h	0.367	Fraction college	CPS (2014-2018)
ρ_ξ	0.997	Persistence shock	Krueger et al (2016)
σ_ξ	0.03	Variance persistent shock	Krueger et al (2016)
r	0.0024	Interest rate	Annual rate 3%
γ	0.911	Tax function level	Guner et al (2016)
τ	0.053	Tax function curvature	Guner et al (2016)

Second Stage: Parameters calibrated internally

Table: Parameters and targets

Parameter		Value	Moment
Labor Productivity			
θ_l	Permanent shock non-college	-0.36	Normalized earnings to 1
θ_h	Permanent shock college	0.42	Ratio average earnings COL/NCOL
Preferences			
α	Share of adjustables in utility	0.70	Commit. expenditure/Total expenditure
κ_f	Cost of adjusting commit.	0.12	Fraction adjusting commitments
ψ	Level disut. effort	27.5	Mean duration unemployment
$\widehat{\beta}_{\theta_l}$	Patience non-college	0.9870	Median assets
$\widehat{\beta}_{\theta_h}$	Patience college	0.9945	Share wealth top 40%
η	Elasticity adjust-commit	-1.0	Elasticity U duration-UI benefit duration
Job finding function			
λ_0	Level job finding function	0.95	Fraction duration unemp. 4-6 months
λ_1	Slope job finding function	-0.25	Fraction duration unemp. $>$6 months

Note: Calibrated parameters and the corresponding moments they target.

Second Stage: Model fit

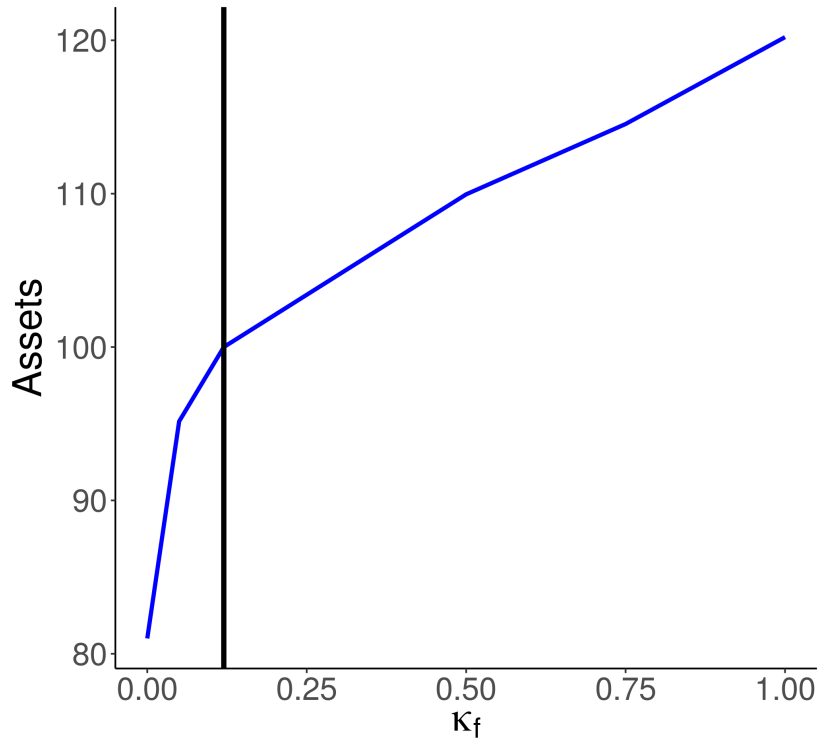
Table: Model fit, Targeted Moments

Moment	**Model**	**Data**
Commitments' expenditure/Total expenditure	40.9%	40.6%
Fraction adjusting commitments (quarterly)	11.4%	11.8%
Mean duration unemployment (months)	6.69	6.57
Fraction unemployed with duration 4-6 months	13.2%	11.9%
Fraction unemployed with duration $>$6 months	33.3%	35.0%
Elasticity U duration-UI benefit duration	0.36	0.37
Median assets/Mean earnings	0.7	1.0
Share wealth top 40%	80.1%	93.3%

Note: Targeted moments generated by the model and their data counterpart.

Results

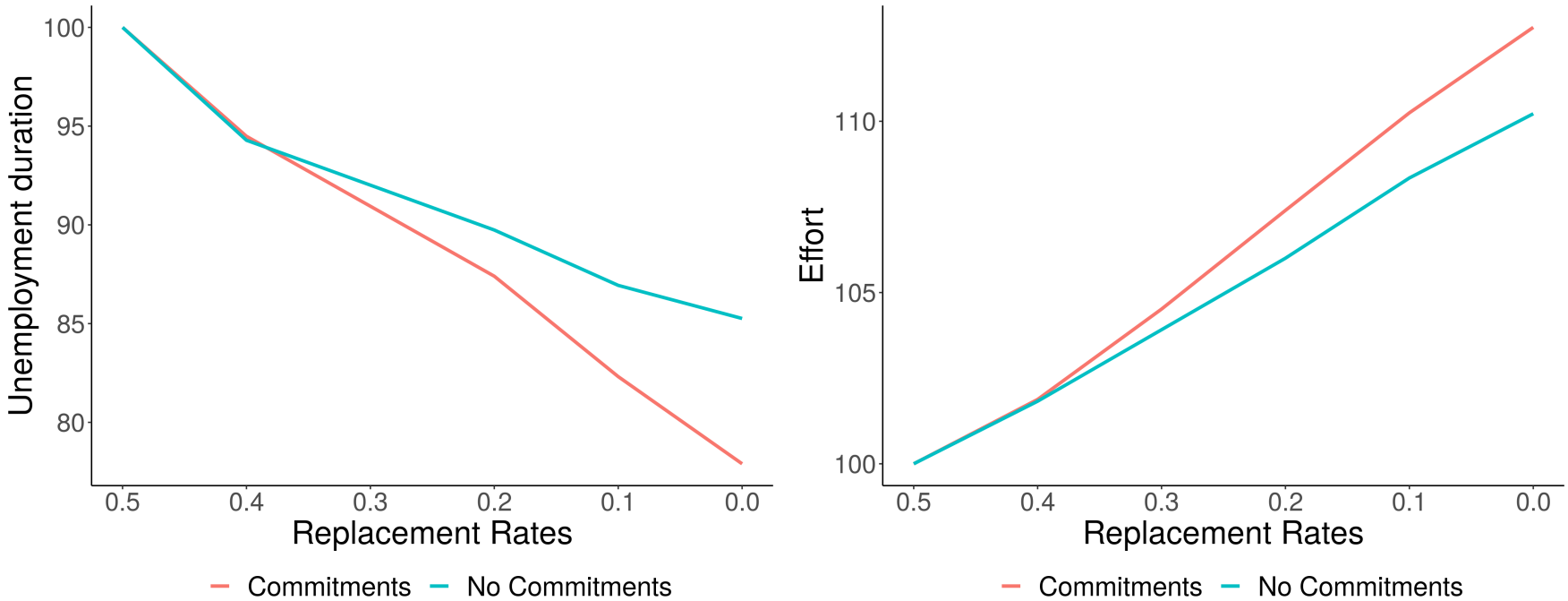
Effect of commitments on precautionary savings



- Precautionary savings are substantially higher in the economy with commitments.
- Median assets decrease by 19% when both goods become fully adjustable ($\kappa_f = 0$).

Results. Effect of commitments on search behavior

Figure: Unemployment and Unemployment Insurance



- Unemployment duration decreases by 23% when UI is removed.
  - Only by 14% in an economy without commitments.

Value of unemployment insurance

Table: Welfare losses from eliminating unemployment insurance

	Commitments	No Commitments
All		
Median CE	4.5%	3.4%
College		
Median CE	4.1%	2.8%
Non-College		
Median CE	5.0%	3.9%

- Large welfare losses from UI for the median individual.
  - Larger than in an economy without commitments (4.5% compared to 3.4%).
- Large losses for non-college individuals, 5% in consumption terms. Distribution

Value of unemployment insurance

	Commitments		No Commitments	
	UI	No UI	UI	No UI
Unemployment rate	4.88%	4.29%	4.89%	4.41%
CV consumption	100	102.3	100	101.0
Average savings	100	187.4	100	154.3
Effort	100	114.0	100	110.7

Note: CV is coefficient of variation, normalized to benchmark value (UI)

- Three reasons, when removing unemployment insurance:
  - Substantial increase in precautionary savings
  - Volatility rise twice as large in economy with commitments compared to an economy without them
  - Higher rise in search effort in economy with commitments

Optimal Replacement Rate

- What is the optimal replacement rate?
- Economy with commitments: optimal replacement rate is 65% (50% in BM).
  - Welfare gain is 0.36%. Unemployment rate of 5.18%.
  - College welfare loss: 0.38%.
  - Non-college welfare gain: 1.82%
- Economy without commitments: optimal replacement rate is 55%.
  - Welfare gain is only 0.09%. Unemployment rate of 5.01%.
  - College welfare loss: 0.14%.
  - Non-college welfare gain: 0.61%
- UI is more valuable for individuals in an economy with commitments.

Conclusions

- Households devote more than 40% of their expenditures to commitments.
- We build an infinite horizon, search model with heterogeneous agents.
  - Two goods: adjustable and commitment.
  - Calibrated to the US 2015-2019.
- We find that:
  - Commitments increase precautionary savings and induce higher search effort.
  - Households value more UI under the presence of commitments
  - Optimal replacement rate is higher in economy with commitments

Appendix

Related Literature

- Models with commitments:
  - Chetty (2003), Chetty and Szeidl (2007), Postlewaite et al (2008), Shore and Sinai (2010), Chetty and Szeidl (2016)
  - Contribution: quantitative model studying importance of UI
- Empirical literature on welfare value of unemployment insurance:
  - Baily (1978), Gruber (1997), Hendren (2017), Landais and Spinnewijn (2021), Giupponi et al (2021)
  - Large estimated welfare gains in recent papers.
- Macroeconomic literature on value of unemployment insurance:
  - Lentz (2009), Landais, Michaillat and Saez (2018), Choi and Valladares-Esteban (2020), Haan and Prowse (2020), Setty and Yedid-Levi (2021), McKay and Reis (2021), Kekre (2021)
  - Trade-off insurance/redistribution versus adverse labor supply effects.
  - Contribution: Include commitments in the analysis

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Data

- Consumer Expenditure Survey (CEX, 2016-2019):
  - Rotating panel: households interviewed each quarter, for up to 4 quarters.
  - Quarterly data on expenditure on detailed categories of consumption.
  - Employment data of HH head provided on first and last interviews.
  - HHs dropped if they move to a new address.
- Survey of Income and Program Participation (SIPP, 2014-2018):
  - Rotating panel: households interviewed every four months about previous' months.
  - Followed for a maximum of 4 years.
  - Monthly data on labor and demographics information.
  - Specific question on whether a household has moved.

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Fact 1. Commitments

- Some categories like shelter, insurance and phone contracts are much less frequently adjusted than other goods.

Table: Fraction of Households Adjusting between two Quarters

	% Adjust	Expenditure Share
Food	70.8%	19.9%
Utilities	65.1%	5.1%
Transport	83.5%	21.3%
Entertainment	80.9%	6.1%
Shelter	2.5%	27.0%
Phone	35.2%	3.1%
Life insurance	29.0%	0.9%
Vehicle insurance	31.2%	3.4%
Health insurance	28.1%	6.2%

- Commitments amount to 40.6% of HH's budget.
  - Commitments: goods or services that are adjusted by less than 50% of households.

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Fact 2. Unemployment and Commitments

Table: Unemployment and Commitments

Consumption item	Estimates for γ^u	Ganong and Noel (2019)	Kolsrud et al (2018)
Food	-0.141*** (0.040)	-15.8%	-0.083* (0.044)
Transport	-0.272*** (0.094)	-10.6%	-0.348*** (0.080)
Entertainment	-0.254*** (0.092)	-13.4%	-0.189*** (0.072)
Shelter	-0.052 (0.056)	—	0.043 (0.031)
Health insurance	-0.184 (0.119)	-2.8%	—
Vehicle insurance	-0.110* (0.07)		—
Life insurance	0.000 (0.188)		—

Note: Ganong and Noel (2019), include only aggregate payments for insurance. Kolsrud et al (2018), shelter only includes rents. Back

Fact 3. Commitments and Unemployment Durations

- Cox proportional hazard model $\rightarrow$ regression model to analyze relationship between unemployment duration and commitments.

$$\log h_{it} = \alpha_t + \beta_1 \text{Commit}_i + \beta_2 X_{it} \tag{3}$$

	Regression coefficient	exp(coefficient)
Commit	0.233**	1.26
	(0.073)	
Education COL	0.191**	1.21
	(0.067)	

Note: The first row shows the coefficients for β_1 (column 1) and $\exp(\beta_1)$ (column 2).

- Commitments increase the hazard rate of unemployment by 26%.
- Individuals with commitments exit unemployment much faster than those without commitments. Back

Fraction adjusting 5% Threshold

Table: Fraction of Households Adjusting between two Quarters, Threshold 5%

	% Adjust	Expenditure Share
Food	88.8%	19.9%
Utilities	82.3%	5.1%
Transport	90.7%	21.3%
Entertainment	91.6%	6.1%
Shelter	2.5%	27.0%
Phone	53.5%	3.1%
Life insurance	36.7%	0.9%
Vehicle insurance	40.1%	3.4%
Health insurance	32.9%	6.2%

Note: Shelter is not modified as it is computed as the fraction of movers in SIPP

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Fraction adjusting 1% Threshold

Table: Fraction of Households Adjusting between two Quarters, Threshold 1%

	% Adjust	Expenditure Share
Food	96.2%	19.9%
Utilities	94.1%	5.1%
Transport	97.6%	21.3%
Entertainment	95.3%	6.1%
Shelter	2.5%	27.0%
Phone	60.5%	3.1%
Life insurance	45.3%	0.9%
Vehicle insurance	55.2%	3.4%
Health insurance	45.5%	6.2%

Note: Shelter is not modified as it is computed as the fraction of movers in SIPP

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Kaplan-Meier survival rates

⏩ Back

Calibration economy without commitments

Table: Parameters a priori in economy with commitments

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Note: Calibrated parameters and the corresponding moments they target.

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Value of unemployment insurance

	Commitments		No Commitments	
	Benchmark	Optimal RR	Benchmark	Optimal RR
Unemployment rate	4.88%	5.18%	4.89%	5.01%
CV consumption	100	99.6	100	100
Average savings	100	93.3	100	98.4
Effort	100	96.7	100	99.1
% Adjusting, unemployed	52.8%	49.4%	—	—

Note: CV is coefficient of variation, normalized to benchmark value (UI)

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