Durable Consumption during the Great Recession: the Role of Ex-ante Heterogeneity

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Introduction

Motivation

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- In Italy for instance: **permanent** and **fixed-term/temporary** labour contracts
- On average, permanent contract workers enjoy higher job security and higher wages
- Italian labour-market is divided:
  - **"high wage, high security"** workers at the center
  - **"low wage, low security"** workers at the margins

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In this paper

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  - Italian hhs halved their durable expenses over the Great Recession

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What is the impact of types of contract on households' consumption patterns over the Great Recession?

- Particular focus on **durable consumption** as it is one of the main drivers of business cycle volatility:
  - Italian hhs halved their durable expenses over the Great Recession
- Study durable consumption's **extensive and intensive margins separately**:

Introduction

Method

1. Empirical evidence from Bank of Italy's **Survey of Households' Income and Wealth** (SHIW)

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1. Empirical evidence from Bank of Italy's **Survey of Households' Income and Wealth** (SHIW)

2. **Structural model of households' saving and consumption behaviour** where labour-market is divided between:
   - a group of workers with low wage, low job security
   - a group of workers with high wage, high job security

Introduction

Preview of the results

- Drop in durable consumption over the Great Recession **along both margins and unevenly distributed** in the population

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Preview of the results

- Drop in durable consumption over the Great Recession **along both margins and unevenly distributed** in the population
- Mechanisms driving durables are **different** between:
  - the extensive and intensive margins
  - Permanent and Fixed-term households

Motivation

Empirical evidence: consumption patterns

Focus on car purchases to study durable consumption

	Cars ext. margin		**Cars int. margin**		**Non-dur. cons.**		**Income**	
	Perm.	F.t.	Perm.	F.t.	Perm.	F.t.	Perm.	F.t.
Boom	15.77	12.08	12009	9175	24529	16334	30731	16601
Recession	12.39	7.03	10594	8034	24530	15854	28835	14845
Change	**-0.21**	**-0.42**	**-0.12**	**-0.12**	**0.00**	**-0.03**	**-0.06**	**-0.11**

Boom is 2002-2006 and Recession is 2008-2014.

Other

The Model

Key features

- Model *a la* Berger and Vavra (2015) or Harmenberg and Oberg (2021)
- Partial equilibrium
- Households supply labor inelastically
- Households derive utility from:
  - Non-durable consumption (c)
  - Durables' stock (D) subject to a non-convex adjustment cost
- Households can save in a risk free, low return, liquid asset (a)
- *Ad-hoc* borrowing constraint (ϕ)

The Model

Household's problem

- The value function of household i can be written as:

$$V = E_0 \max_{\{c_{it}, D_{it}\}} \sum_{t=0}^{\infty} \beta^t u(c_{it}, D_{it})$$

$$with \quad u(c_{it}, D_{it}) = \frac{\left[c_{it}^{\alpha} D_{it}^{(1-\alpha)}\right]^{(1-\sigma)}}{1-\sigma}$$

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- Non-convex adjustment (Grossman and Laroque, 1990)

$$A(D_{it-1}, D_{it}) = \begin{cases} 0, & \text{if } D_{it} = (1-\delta) D_{it-1} \\ \tau(1-\delta) p_{it} D_{it-1}, & \text{otherwise} \end{cases}$$

Durable investments are partially irreversible

The Model

Household's problem

- Household constraint if adjust (choose c_{it}, D_{it}):

$$a_{it} + c_{it} + p_{it} D_{it}$$

$$\leq (1 + r) a_{it-1} + y_{it} + (1 - \delta) p_{it} D_{it-1} - A(D_{it-1}, D_{it})$$

- Household constraints if does not adjust (choose c_{it}):

$$a_{it} + c_{it} \leq (1 + r) a_{it-1} + y_{it}$$

$$D_{it} = (1 - \delta) D_{it-1}$$

The Model

Two layers of idiosyncratic risk

- Layer 1: Households face an idiosyncratic **employment risk**

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- 3 employment states:
  1. employed with a permanent contract
  2. employed with a fixed term contract
  3. unemployed

The Model

Two layers of idiosyncratic risk

- Layer 1: Households face an idiosyncratic **employment risk**
- 3 employment states:
  1. employed with a permanent contract
  2. employed with a fixed term contract
  3. unemployed
- Fixed term contracts face a larger risk of becoming unemployed than Permanent contracts
- Transitions between the three employment states follow a Markov process

The Model

Two layers of idiosyncratic risk

- Layer 2: Households face **income risk conditional on employment state**

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Two layers of idiosyncratic risk

- Layer 2: Households face **income risk conditional on employment state**

- When employed, income process can be written as:

$$log(y_{it}) = \mu + \rho log(y_{it-1}) + \xi_{it}$$

$$with \quad \xi_{it} \sim \mathcal{N}(0, \sigma_{\xi}^2)$$

The Model

Aggregate risk

- The economy is either in boom or in recession
- State contingent employment states Markov transition matrix
- Transitions between booms and recessions follow a Markov process

Numerical Implementation and Calibration

- The model is solved using the **NEGM+ algorithm** (Druedhal 2021)

parameters | income grids | transition matrices

Numerical Implementation and Calibration

- The model is solved using the **NEGM+ algorithm** (Druedhal 2021)
- Parameterization
  - Contract specific income risk calibrated using **variance covariance identifying restrictions**
  - Set of parameters calibrated with method of matching moments **outside the model**
  - Set of parameters calibrated with method of matching moments **inside the model**

parameters | income grids | transition matrices

Policy Functions

Evidence of (S,s) rules for durable consumption

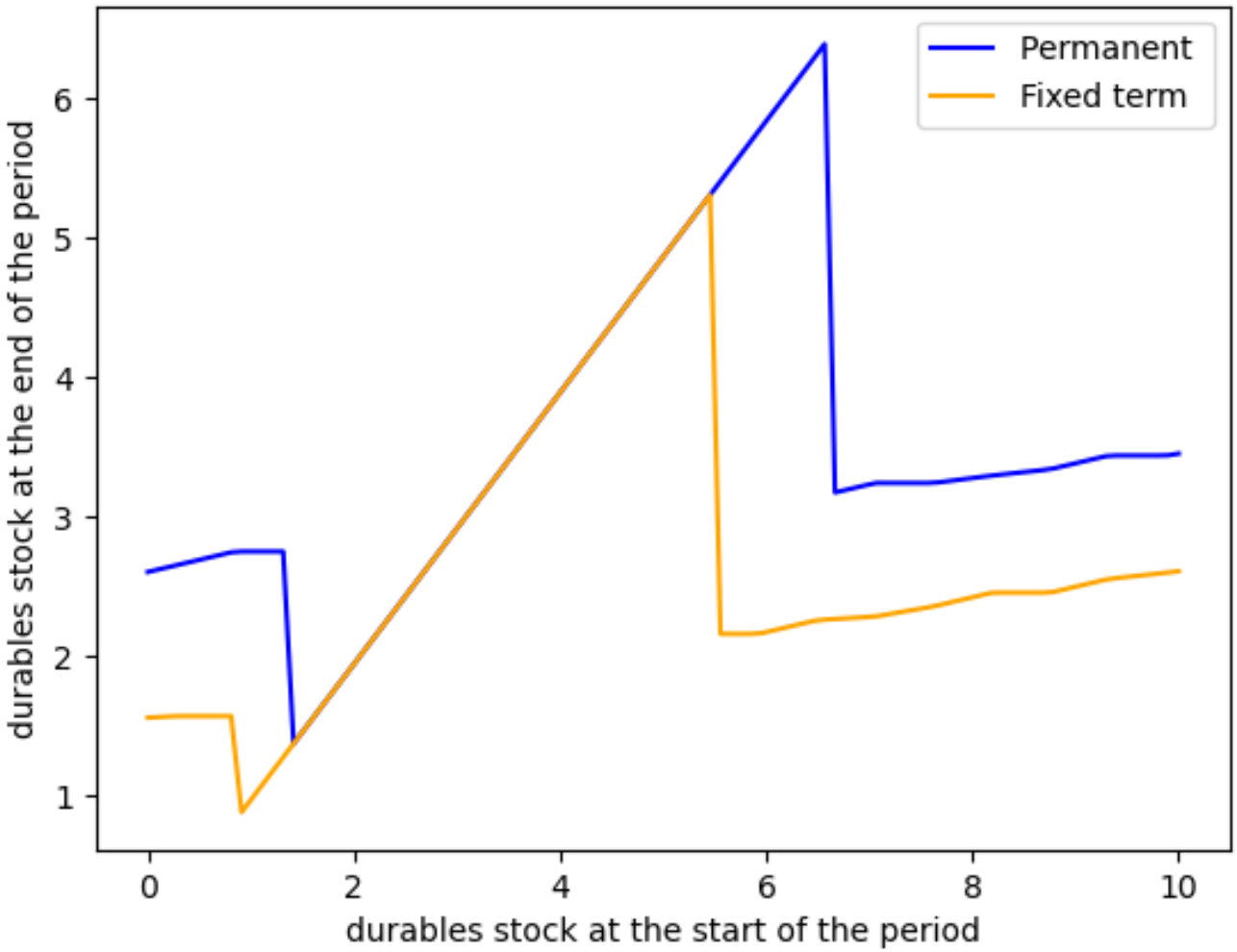


Figure 1: Stock of durables

The Great Recession Experiment

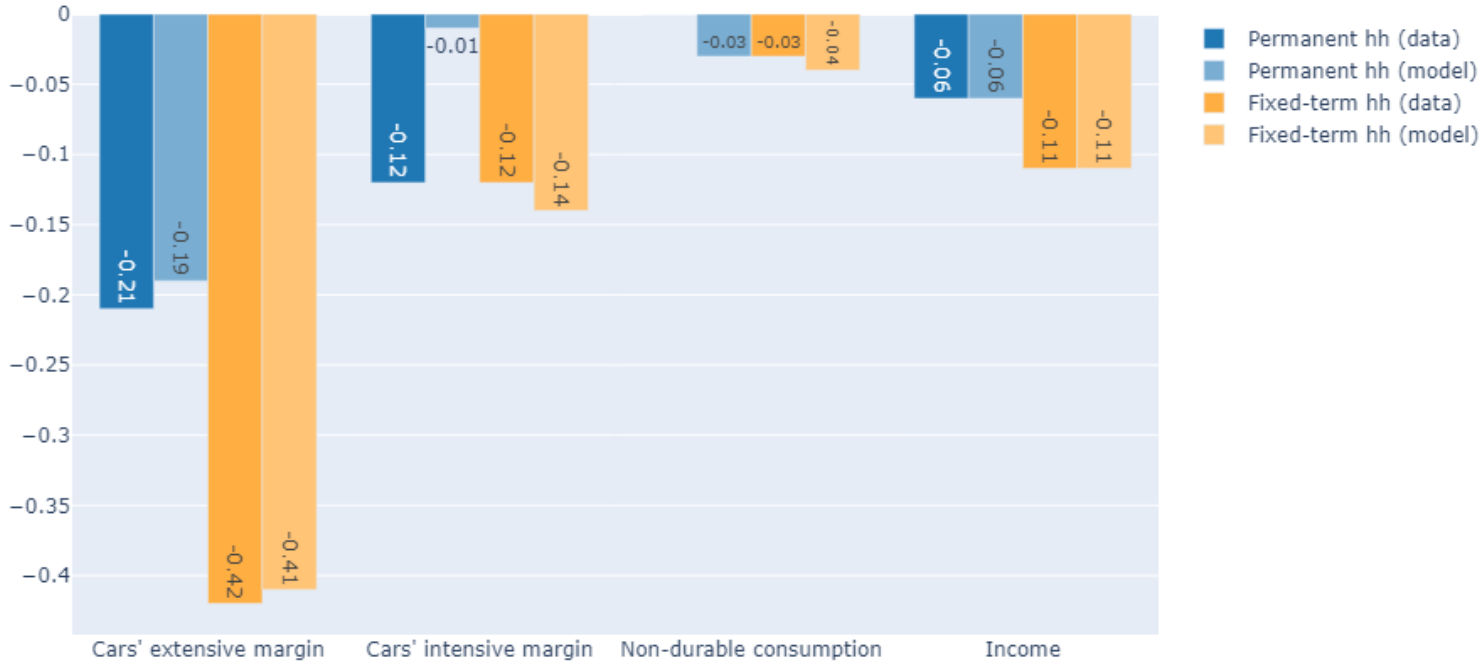


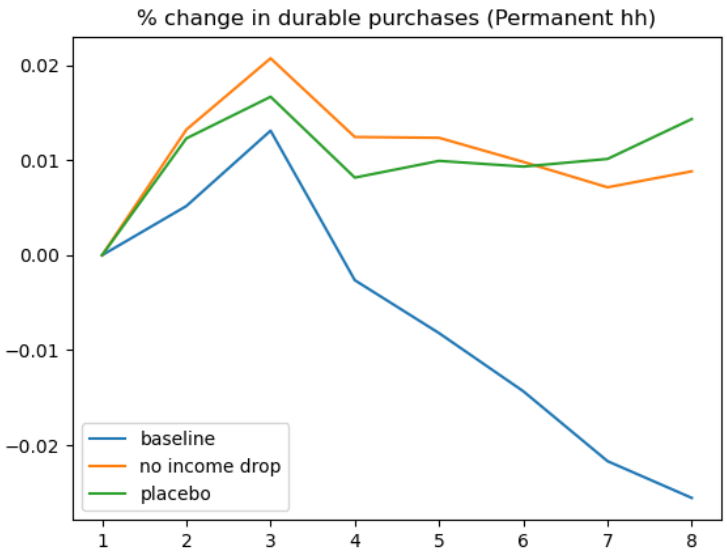
Figure 2: Consumption and income changes over the Great Recession (data *vs* model)

- Success in matching consumption patterns over the Great Recession

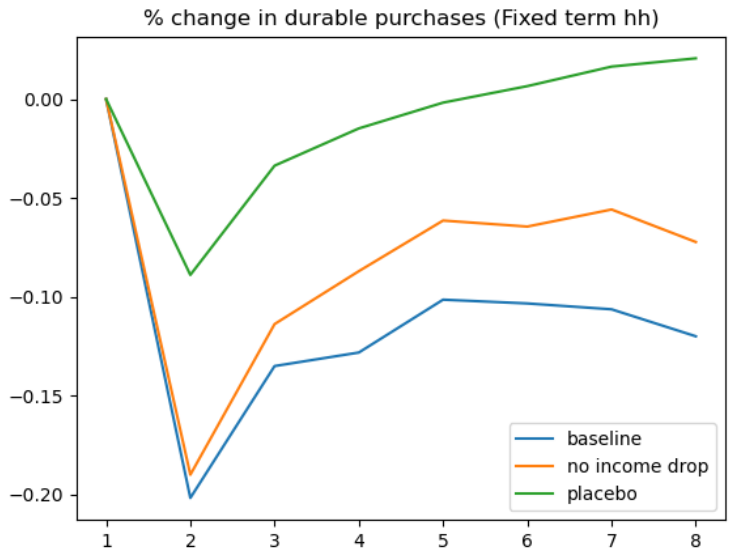
IRFs Break Down Exercise

- **Baseline (Great Recession) experiment**: recession employment transition matrix and extra labour income drop
- **Placebo experiment**: boom employment transition matrix and no extra labour income drop

Cars - Intensive Margin



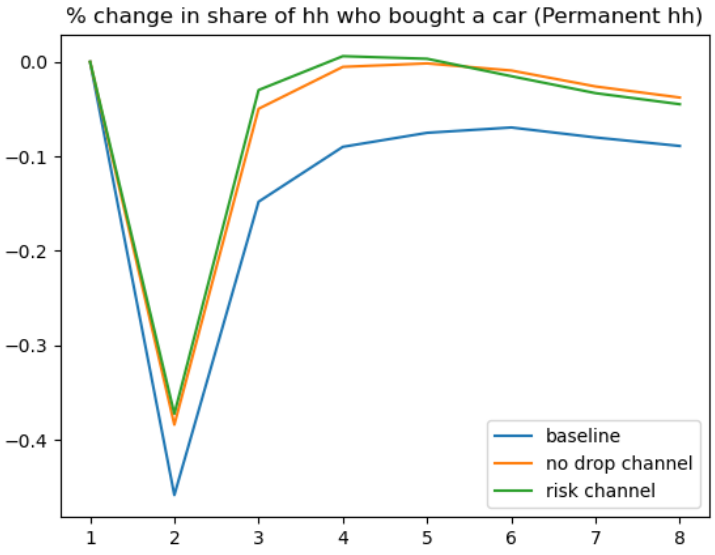
(a) Permanent contract



(b) Fixed-term contract

Realised income loss is the main driver of the intensive margin

Cars - Extensive Margin



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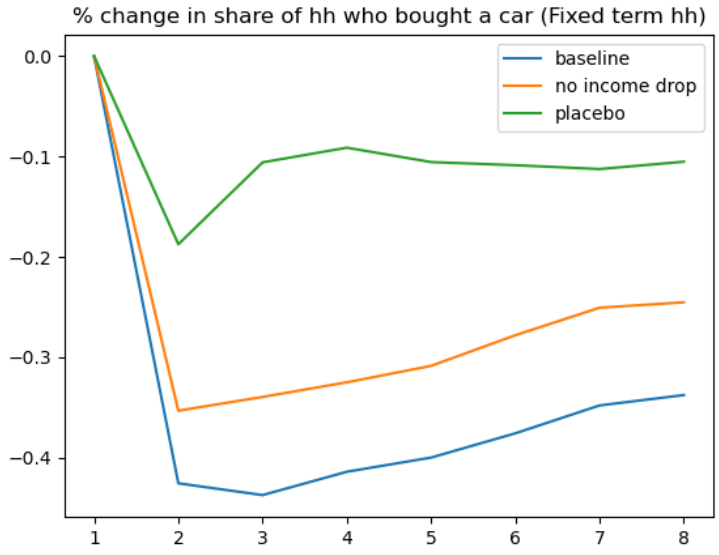
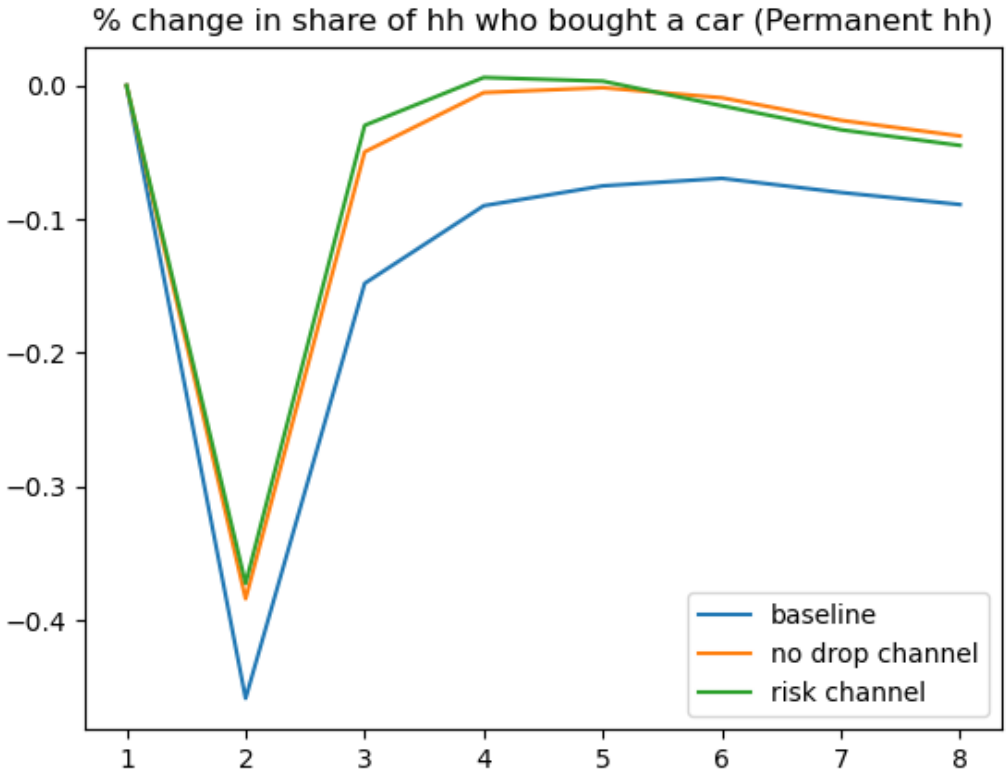


(b) Fixed-term contract

Perceived risk is a strong driver of the extensive margin

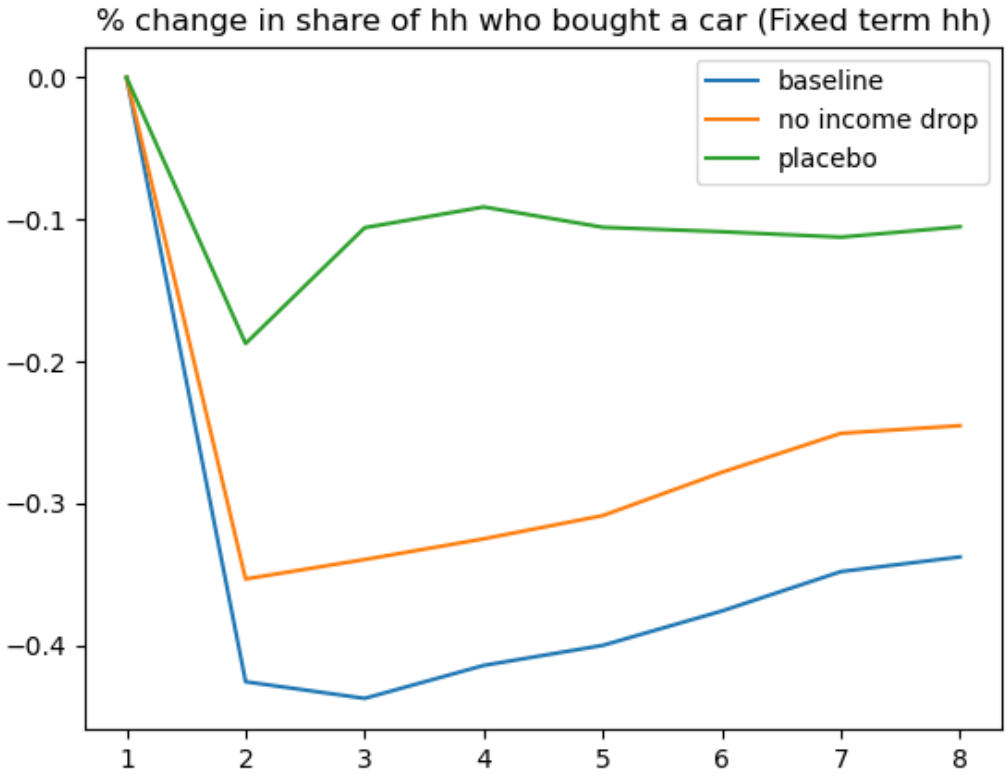
- Permanent households: drives most of the action
- Fixed-term households: drives roughly a third of the drop

Risk story - Permanent Contract



- $+7\%$ income variance - **higher uncertainty**
- **wait-and-see** strategy
- strong but short lived response

Risk story - Fixed-term Contract



- −25% income variance - **lower upside income risk**
- **wait-to-downgrade** strategy
- strong and persistent response

Composition Effect

Change in composition of Fixed-term group

- on average Fixed-term group is wealthier in recession
- without composition effect, consumption crash that motivated this paper would be even larger

Conclusion

- Italian empirical evidence:
  - Permanent contract hhs with high security, high wage
  - Fixed-term contract hhs with low security, low wage
  - Fixed-term hhs decrease their extensive margin of car purchases twice as much as Permanent hhs over the Great Recession

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  - Drivers of durable consumption are different between:
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- Build and calibrate a structural model that replicates these facts
- Main results:
  - Drivers of durable consumption are different between:
    - the intensive and the extensive margins
    - Permanent and Fixed-term hhs
  - Composition effect mitigated the drop in Fixed-term hhs' durable consumption over the Great Recession

The case of Italy

Empirical Evidence

Table 1: Factors likely to influence car purchases

	Perm.	F.t.
Mean age of head hh	45	42
Average number of children	1.19	1.06
Rurality / Small town (%)	0.58	0.59

SHIW data between 2000 and 2016.

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Calibration

Parameters

Parameter	Value	Description	Target
Households			
β	0.97	Discount factor	Standard value
σ	2.00	Relative risk aversion	Standard value
r	0.01	Interest rate	Annual interest rate of 4%
α	0.92	Weight of n.d.c.	Harmenberg and Oberg 2021
τ	0.085	Dur. adjustment cost	Method of Moments
δ	0.027	Depreciation rate	Method of Moments
ϕ	0.15	Borrowing constraint	Method of Moments
ub_{boom}	0.38	U.b in boom	Mean u.b 2002-2006
$ub_{recession}$	0.30	U.b in recession	Mean u.b 2008-2014
sub	0.07	Subsistence allowance	€100 for 1 month
p_{ub}	0.12	Probability to get u.b	u.b coverage rate 2002-2014
Agg. state			
ρ_{bb}	0.90	Boom to boom transition	Time spent in rec.
ρ_{rr}	0.87	Rec. to rec. transition	Average length of rec.

Calibration

Income risk when employed (by type of contract)

Permanent contract:

$$\textbf{Income} = \begin{matrix} y1 & y2 & y3 & y4 & y5 \\ (0.45 & 0.67 & 1 & 1.49 & 2.21) \end{matrix}$$

Temporary/Fixed-term contract:

$$\textbf{Income} = \begin{matrix} y1 & y2 & y3 & y4 & y5 \\ (0.23 & 0.34 & 0.51 & 0.76 & 1.13) \end{matrix}$$

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Calibration

Employment states transition matrices

$$\mathbf{P_{boom}} = \begin{array}{c} \\ p \\ f.t \\ u \end{array} \begin{array}{c} \begin{array}{ccc} p & f.t & u \end{array} \\ \begin{pmatrix} 0.988 & 0.008 & 0.004 \\ 0.103 & 0.858 & 0.039 \\ 0.029 & 0.041 & 0.930 \end{pmatrix} \end{array} \quad , \quad \mathbf{P_{recession}} = \begin{array}{c} \\ p \\ f.t \\ u \end{array} \begin{array}{c} \begin{array}{ccc} p & f.t & u \end{array} \\ \begin{pmatrix} 0.984 & 0.011 & 0.006 \\ 0.064 & 0.893 & 0.043 \\ 0.019 & 0.030 & 0.951 \end{pmatrix} \end{array}$$

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