Online Appendix of

The Micro Anatomy of Macro Consumption Adjustments

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A. Additional Empirical Results

A1. Aggregate Income Dynamics During Crisis Episodes

In this appendix we further characterize the dynamics of aggregate income during the crisis episodes included in our sample. We do so by estimating the empirical model used in Cerra and Saxena (2008a) to characterize output dynamics during financial crises. In particular, we estimate the empirical model:

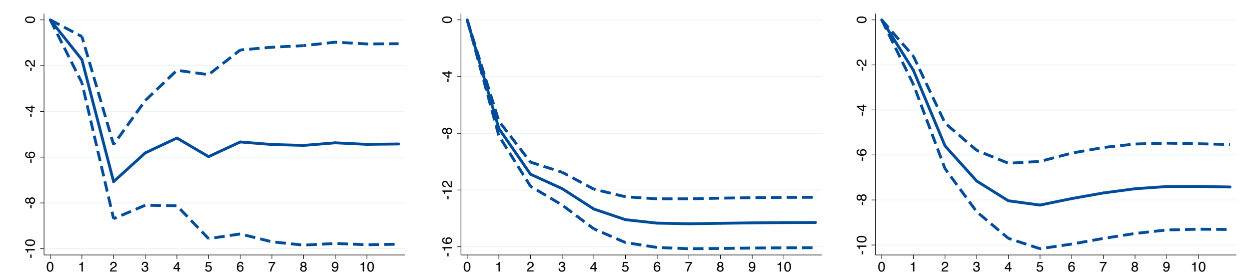
$$g_{it} = a_i + \sum_{j=1}^{4} \beta_j g_{i,t-j} + \sum_{s=0}^{4} \delta_s D_{i,t-s} + \varepsilon_{it}$$

where g_{it} is the percentage change in country's i real GDP in year t and D_{it} is a dummy variable indicating a crisis episode.

Panel (a) shows that our episodes of analysis are characterized by persistent declines in aggregate income. To analyze the external validity of the output dynamics observed in these episodes, we estimate a similar empirical model for a broader set of emerging-market sudden stop episodes, using the sample of episodes identified in Calvo, Izquierdo and Talvi (2006) for 32 emerging markets since the 1980s. The results from this exercise, depicted in Panel (b), show that output dynamics during sudden stop episodes resemble that of our episodes of analysis, providing external validity for the results from our sample of episodes. Finally, Panel (c) reproduces the results from Cerra and Saxena (2008a), which shows that the dynamics observed during our episodes of analysis and emerging-market sudden stops are also similar to that of financial crisis episodes.

Figure A1: Output Dynamics following Crisis Episodes

(a) Episodes in Sample of Analysis (b) Sudden Stops (c) Financial Crises



Notes: Panel (a) "Episodes in Sample of Analysis" estimates the impact on real GDP for Italy, Spain, Mexico, and Peru for 1988-2019 for the five crisis episodes. Panel (b) "Sudden Stops" is for the 32 emerging markets in Calvo *et al.* (2006) for 1980-2004 where the crisis year is the year following the peak in output. Panel (c) "Financial Crises" replicates Cerra and Saxena (2008a) Figure 4 for the impact on real GDP from banking crises for their full sample of countries for 1974-2001. This estimation uses the following model: $g_{it} = a_i + \sum_{j=1}^{4} \beta_j g_{i,t-j} + \sum_{s=0}^{4} \delta_s D_{i,t-s} + \varepsilon_{it}$ for country i in year t where a is a country fixed effect, g is the percentage change in real GDP, and D is a dummy variable indicating the first year of a crisis. The impulse response shows the estimated percentage point impact on real GDP from a crisis using the estimated coefficients. The dashed lines show a one standard deviation error band computed from 1,000 Monte Carlo simulations using the variance-covariance matrix of the estimated coefficients and their asymptotically normal distribution. Data sources: Cerra and Saxena (2008b), World Bank WDI.

A2. Estimates of Consumption Partial Insurance

In this appendix we apply the procedure of Blundell *et al.* (2008a) to the data on Italy and Peru to estimate the response of household consumption to idiosyncratic permanent and transitory income shocks. We assume that the household's residualized income is $y_{i,t} = \eta_{i,t} + \nu_{i,t}$, where $\eta_{i,t} = \eta_{i,t} + \zeta_{i,t}$ is a random walk process with $\zeta_{i,t} \sim^{iid} (0, \sigma_\zeta^2)$ and $\nu_{i,t} = \varepsilon_t + \theta\varepsilon_{t-1}$ is an MA(1) process with $\varepsilon_{i,t} \sim^{iid} (0, \sigma_\varepsilon^2)$. Then income growth is

$$\Delta y_{i,t} = \zeta_{i,t} + \varepsilon_{i,t} + (\theta - 1)\varepsilon_{i,t-1} - \theta\varepsilon_{i,t-2}, \tag{7}$$

and we postulate that consumption growth is

$$\Delta c_{i,t} = \phi\zeta_{i,t} + \varphi\varepsilon_{i,t} + \epsilon_{i,t}, \tag{8}$$

with $\epsilon_{i,t} \sim^{iid} (0, \sigma_\epsilon^2)$ non-income-related changes in consumption, ϕ the permanent shock consumption insurance coefficient, and φ the temporary shock consumption insurance coefficient.

In order to estimate the variance of the income shocks and the partial insurance coefficients, we use a minimum distance estimation between the observed variance and covariance matrices of income and consumption growth and their analytical expressions derived from equations (8) and (7). For the data moments we use our estimations of the residual income and consumption. For the analytical expressions we use the annual growth moments for Peru and the biennial moments for Italy.[22] The sample periods used for our estimation are 2007-2018 for Peru and 1998-2016 for Italy.

Table A1: Individual Elasticities and Partial Insurance Coefficients

		U.S.	Italy	Peru
Individual Elasticity		0.15	0.36	0.32
Blundell et al. (2008) coefficients				
Persistent shocks	ϕ	0.64	0.72	0.93
Transitory shocks	φ	0.05	0.26	0.30

Notes: Income is defined as monetary after-tax nonfinancial income. Consumption is defined as consumption of nondurable goods and services. Both variables are deflated by the CPI and residualized from households' observable characteristics and time trends (see empirical model (9) in Appendix B for details). Individual elasticities are estimated with panel data and an individual-level regression of the log change in consumption on the log change in income and a constant. Persistent and transitory shocks coefficient estimates for the U.S. are from Blundell *et al.* (2008a). Estimates for Italy and Peru are our own computations following the method of Blundell *et al.* (2008a), further described in Section A2. Data source: Blundell, Pistaferri and Preston (2008b), SHIW for Italy and ENAHO for Peru.

Table A1 shows the results. We find that the permanent shocks partial insurance coefficient is large (i.e., more than 0.5) and larger than those of transitory shocks for all countries. The transitory shocks partial insurance estimate is close to 0 for the U.S. but around 0.3 for

[22]In Italy we have annual flows of income and consumption, but the surveys have a biennial frequency. Thus we derive the analytical moments using two-period differences.

Peru and Italy.

A3. Additional Figures and Tables

Table A2: Standard deviation of income and consumption by residualization

	Euro Crisis				Emerging-market Crises			
	Italy		Spain		Mexico		Peru	
	Y	C	Y	C	Y	C	Y	C
Non-residualized	0.68	0.58	0.62	0.65	0.83	0.72	0.92	0.71
Residualized by:								
Age (quadratic)	0.68	0.58	0.62	0.64	0.82	0.71	0.91	0.70
+ Sex	0.68	0.57	0.61	0.63	0.82	0.70	0.90	0.70
+ Education	0.63	0.55	0.57	0.61	0.73	0.64	0.84	0.65
+ Household size	.	.	0.52	0.53	0.71	0.61	0.81	0.59
+ Region	0.62	0.55	0.52	0.53	0.70	0.60	0.80	0.57
+ Sex × year	0.62	0.55	0.51	0.52	0.70	0.60	0.79	0.56
+ Education × year	0.62	0.55	0.51	0.52	0.69	0.60	0.79	0.56
Residualized (Baseline model)	0.62	0.55	0.51	0.52	0.69	0.60	0.78	0.56
R^2 (Baseline model)	0.17	0.10	0.32	0.35	0.30	0.31	0.29	0.40

Notes: Non-residualized are the standard deviation of the log of Income (Y) and Consumption (C) deflated by the CPI. Rows 2 and below are for residualized log of Income and Consumption by successively adding the covariates shown from households' observable characteristics and time trends. Residualized (Baseline model) is the full empirical model after also adding time trends and R^2 is for this regression. For Italy, income and consumption are divided by household size, other countries are total household income and consumption. Regressions use sample weights. Data sources: SHIW-BI Italy, EPF-INE Spain, ENIGH-INEGI Mexico, ENAHO-INEI Peru.

Table A3: Consumption-income Elasticities: Alternative Measures

		Euro Crisis		Emerging-market Crises			Average
		Italy	Spain	Mexico '94	Mexico '08	Peru	
a. Baseline							
$\Delta \log Y$	Average	-0.17	-0.15	-0.38	-0.16	-0.08	-0.19
	Top 20-income	-0.13	-0.11	-0.41	-0.17	-0.10	-0.18
	Top 10-income	-0.13	-0.12	-0.42	-0.19	-0.11	-0.19
	Top 5-income	-0.13	-0.14	-0.43	-0.22	-0.12	-0.21
$\Delta \log C$	Average	-0.19	-0.14	-0.30	-0.11	-0.08	-0.16
	Top 20-income	-0.15	-0.12	-0.32	-0.14	-0.12	-0.17
	Top 10-income	-0.12	-0.11	-0.33	-0.17	-0.12	-0.17
	Top 5-income	-0.10	-0.12	-0.32	-0.19	-0.13	-0.17
Elasticity	Average	1.13	0.97	0.78	0.73	0.99	0.92
	Top 20-income	1.10	1.02	0.79	0.86	1.24	1.00
	Top 10-income	0.95	0.90	0.79	0.88	1.15	0.93
	Top 5-income	0.80	0.85	0.75	0.87	1.07	0.87
b. Non-residualized							
$\Delta \log Y$	Average	-0.14	-0.18	-0.40	-0.15	-0.16	-0.20
	Top 20-income	-0.12	-0.12	-0.44	-0.18	-0.22	-0.22
	Top 10-income	-0.11	-0.14	-0.46	-0.20	-0.24	-0.23
	Top 5-income	-0.10	-0.15	-0.49	-0.21	-0.27	-0.24
$\Delta \log C$	Average	-0.15	-0.21	-0.31	-0.07	-0.13	-0.17
	Top 20-income	-0.10	-0.20	-0.37	-0.12	-0.21	-0.20
	Top 10-income	-0.10	-0.21	-0.40	-0.13	-0.23	-0.21
	Top 5-income	-0.07	-0.25	-0.41	-0.13	-0.23	-0.22
Elasticity	Average	1.08	1.19	0.77	0.48	0.80	0.87
	Top 20-income	0.85	1.58	0.85	0.64	0.94	0.97
	Top 10-income	0.89	1.54	0.87	0.64	0.95	0.98
	Top 5-income	0.77	1.69	0.83	0.61	0.84	0.95
c. Average of logs							
$\Delta \log Y$	Average	-0.19	-0.18	-0.37	-0.17	-0.07	-0.19
	Top 20-income	-0.13	-0.10	-0.40	-0.14	-0.08	-0.17
	Top 10-income	-0.11	-0.11	-0.41	-0.17	-0.08	-0.18
	Top 5-income	-0.09	-0.12	-0.42	-0.19	-0.09	-0.18
$\Delta \log C$	Average	-0.20	-0.16	-0.28	-0.12	-0.06	-0.16
	Top 20-income	-0.17	-0.09	-0.33	-0.15	-0.11	-0.17
	Top 10-income	-0.13	-0.08	-0.34	-0.19	-0.11	-0.17
	Top 5-income	-0.09	-0.08	-0.35	-0.22	-0.10	-0.17
Elasticity	Average	1.10	0.86	0.76	0.68	0.89	0.86
	Top 20-income	1.33	0.90	0.82	1.08	1.37	1.10
	Top 10-income	1.21	0.70	0.82	1.13	1.29	1.03
	Top 5-income	0.95	0.61	0.83	1.13	1.16	0.94
N Observations		7,067	21,802	13,122	27,038	21,170	90,199

Notes: Income (Y) is defined as monetary after-tax nonfinancial income. Consumption (C) is defined as consumption of nondurable goods and services. Both variables are deflated by the CPI. Elasticities are calculated as the ratio of the log change in consumption to the log change in income. Panel (a) shows the baseline calculations in which income and consumption are residualized from households' observable characteristics and time trends. Panel (b) shows the same calculations without residualizing variables. Panel (c) uses residualized income and consumption with the elasticity calculated using the average of the log for each variable. Top 20-income, Top 10-income, and Top 5-income households are those above the 80th, 90th, and 95th percentile of income respectively. Further details in Appendix B. Data sources: SHIW-BI Italy, EPF-INE Spain, ENIGH-INEGI Mexico, ENAHO-INEI Peru.

Table A4: Consumption-income Elasticities: By Income and Consumption Definitions

		Euro Crisis		Emerging-market Crises			
		Italy	Spain	Mexico '94	Mexico '08	Peru	Average
a. Baseline							
$\Delta \log Y$	Average	-0.17	-0.15	-0.38	-0.16	-0.08	-0.19
	Top-income	-0.13	-0.12	-0.42	-0.19	-0.11	-0.19
$\Delta \log C$	Average	-0.19	-0.14	-0.30	-0.11	-0.08	-0.16
	Top-income	-0.12	-0.11	-0.33	-0.17	-0.12	-0.17
Elasticity	Average	1.13	0.97	0.78	0.73	0.99	0.92
	Top-income	0.95	0.90	0.79	0.88	1.15	0.93
b. Including All Monetary Income							
$\Delta \log Y$	Average	-0.15	-0.15	-0.37	-0.15	-0.08	-0.18
	Top-income	-0.12	-0.12	-0.39	-0.18	-0.13	-0.19
$\Delta \log C$	Average	-0.19	-0.14	-0.30	-0.11	-0.08	-0.16
	Top-income	-0.12	-0.11	-0.33	-0.15	-0.14	-0.17
Elasticity	Average	1.22	0.97	0.79	0.76	0.97	0.94
	Top-income	1.05	0.90	0.86	0.85	1.13	0.96
c. Including Durable Consumption							
$\Delta \log C$	Average	-0.22	-0.17	-0.28	-0.13	-0.08	-0.18
	Top-income	-0.14	-0.15	-0.26	-0.18	-0.14	-0.17
Elasticity	Average	1.43	1.16	0.76	0.89	0.96	1.04
	Top-income	1.20	1.22	0.67	1.01	1.09	1.04
d. Including All Monetary and Nonmonetary Items							
$\Delta \log Y$	Average	-0.17	-0.14	-0.37	-0.14	-0.07	-0.18
	Top-income	-0.13	-0.11	-0.38	-0.18	-0.13	-0.19
$\Delta \log C$	Average	-0.19	-0.15	-0.28	-0.13	-0.07	-0.17
	Top-income	-0.15	-0.13	-0.25	-0.19	-0.13	-0.17
Elasticity	Average	1.14	1.14	0.76	0.93	0.93	0.98
	Top-income	1.20	1.15	0.66	1.04	1.05	1.02
N Observations		7,067	21,802	13,122	27,038	21,170	90,199

Notes: Income (Y) and Consumption (C) are deflated by the CPI and residualized from households' observable characteristics and time trends. Elasticities are calculated as the ratio of the log change in consumption to the log change in income. Panel (a) shows the baseline, in which Income is defined as monetary after-tax nonfinancial income and consumption includes nondurable goods and services. Panel (b) shows the results when including all of the monetary components of income and nondurable consumption; Panel (c) including all of the monetary components of consumption and income; and Panel (d) including all of the monetary and nonmonetary components of consumption and income. Top-income households are those above the 90th percentile of income. Further details in Appendix B. Data sources: SHIW-BI Italy, EPF-INE Spain, ENIGH-INEGI Mexico, ENAHO-INEI Peru.

Table A5: Consumption-income Elasticities: Synthetic Cohort and Panel

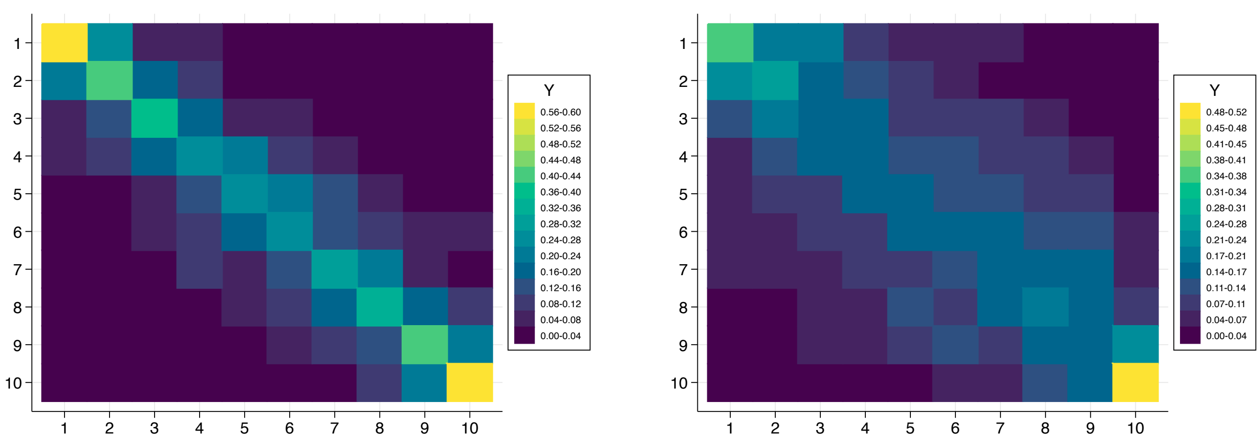
		Euro Crisis Italy		Emerging-market Crises Peru	
		Synthetic Cohort	Panel	Synthetic Cohort	Panel
$\Delta \log Y$	Average	-0.17	-0.07	-0.08	-0.07
	Top-income	-0.13	-0.12	-0.11	-0.20
$\Delta \log C$	Average	-0.19	-0.09	-0.08	-0.11
	Top-income	-0.12	-0.11	-0.12	-0.24
Elasticity	Average	1.13	1.32	0.99	1.70
	Top-income	0.95	0.92	1.15	1.21
N Observations		7,067	1,044	21,170	2,114

Notes: Income (Y) is defined as monetary after-tax nonfinancial income. Consumption (C) is defined as consumption of nondurable goods and services. Both variables are deflated by the CPI and residualized from households' observable characteristics and time trends (see empirical model (9) in Appendix B for details). Elasticities are calculated as the ratio of the log change in consumption to the log change in income. Top-income households for the synthetic cohort are those in the highest decile of residualized income in each year, and for the panel are on average over all years in the episode. The synthetic cohort values are calculated using sample weights and panel values are an unweighted average. Further details in Appendix B. Data sources: SHIW-BI Italy, and INEI Peru.

Figure A2: Income mobility in Italy and Peru

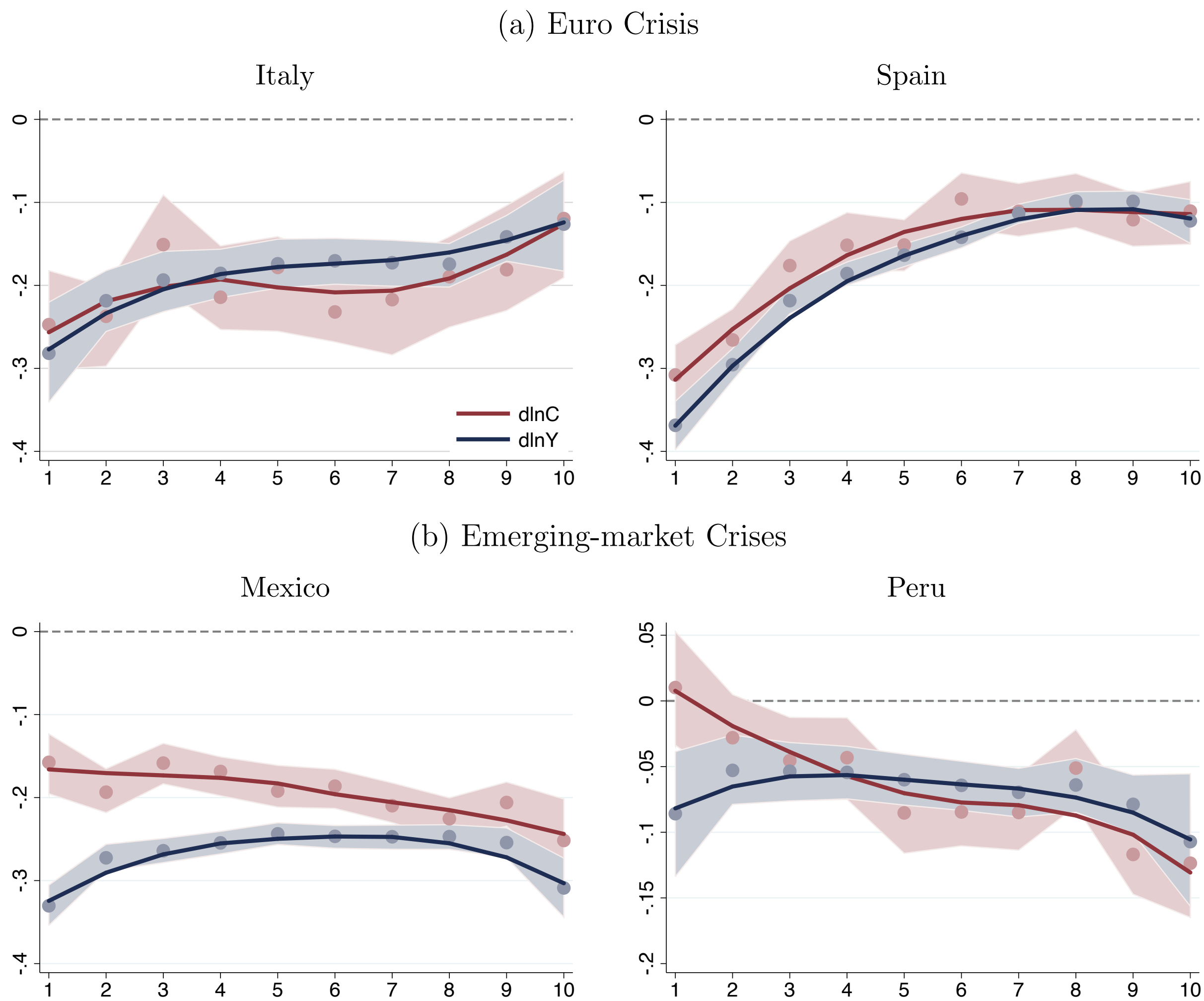
(a) Italy

(b) Peru



Notes: Panel (a) and (b) show the income transition probabilities across income deciles in Italy and Peru, respectively. Each square shows the probability of moving from a given initial income decile (row) to the next period's income decile (column). For Italy the probability is biennial and for Peru the probability is annual. Income is defined as monetary after-tax nonfinancial income. Income is deflated by the CPI and residualized from households' observable characteristics and time trends (see empirical model (9) in Appendix B for details). The transition probabilities are calculated for the crisis episodes. Data sources: SHIW-BI Italy, and ENAHO-INEI Peru.

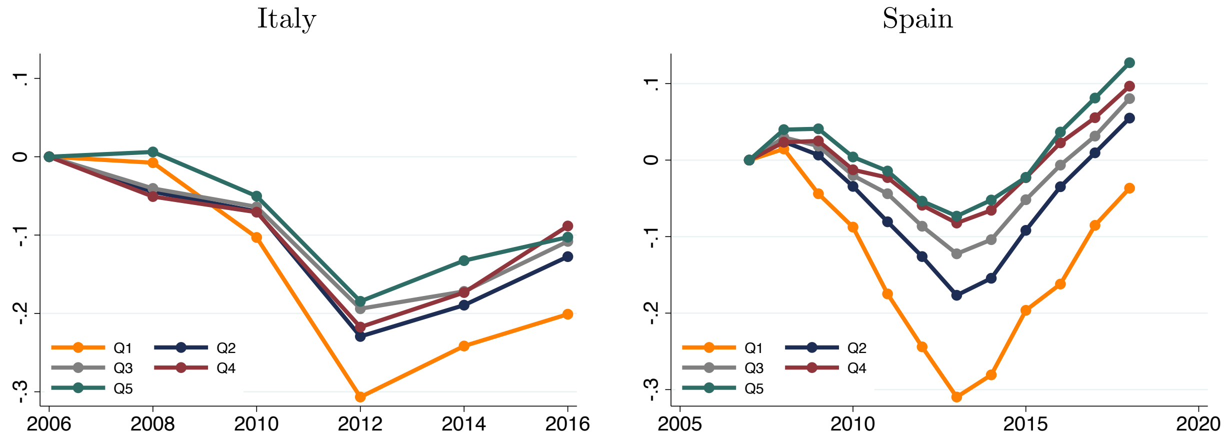
Figure A3: Consumption-income Elasticities Across the Income Distribution



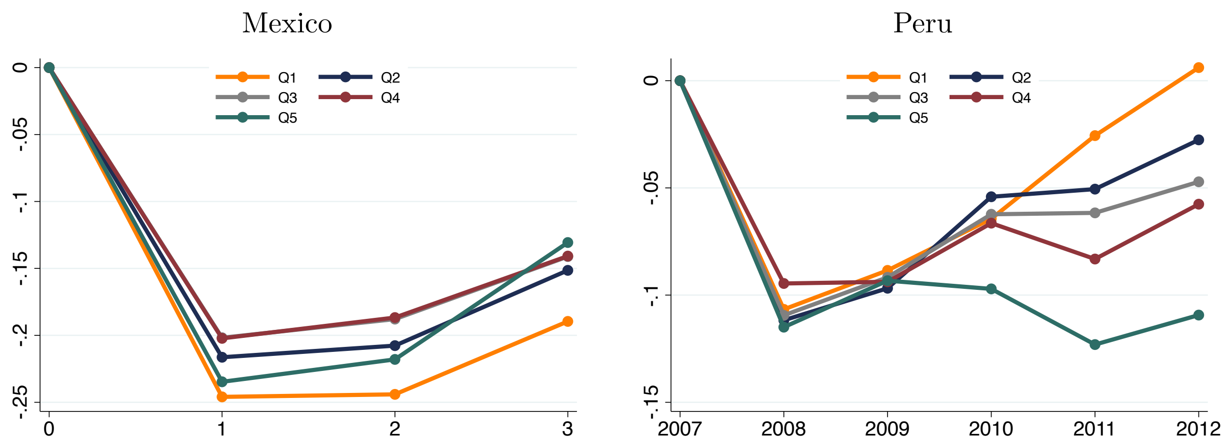
Notes: This figure shows the log-change of consumption and income during each episode for different deciles of residualized income on the horizontal axis. Income is defined as monetary after-tax nonfinancial income. Consumption is defined as consumption of nondurable goods and services. Income and consumption are deflated by the CPI and residualized from households' observable characteristics and time trends (see empirical model (9) in Appendix B for details). Dots correspond to observed values, the solid line is the locally weighted smoothing of observed values, and the shaded area shows the 90% confidence intervals computed using 2,000 bootstrap replications. Values for Mexico are the simple average of its two episodes in the sample (1994 and 2008). Further details in Appendix B. Data sources: SHIW-BI Italy, EPF-INE Spain, ENIGH-INEGI Mexico, ENAHO-INEI Peru.

Figure A4: Income Dynamics by Income Quintiles

(a) Euro Crisis



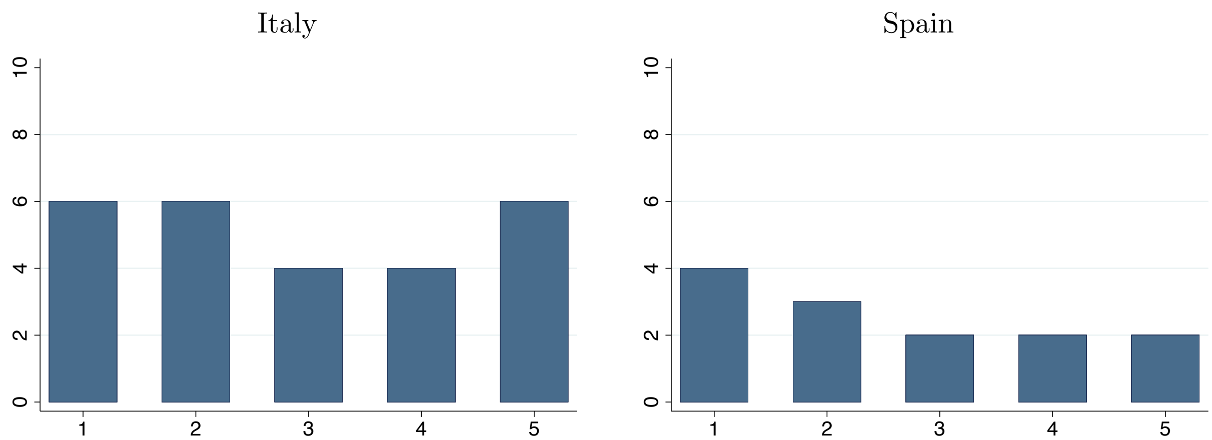
(b) Emerging-market Crises



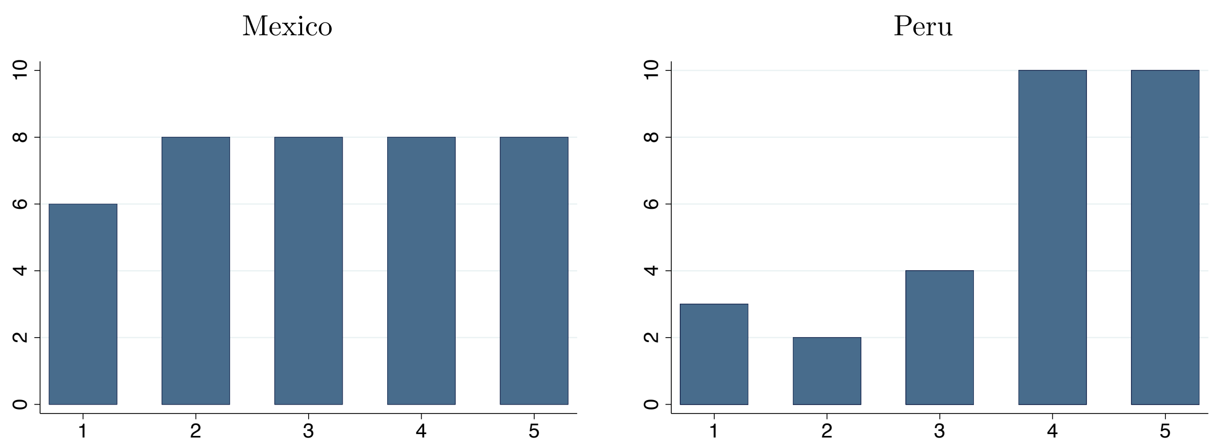
Notes: This figure shows the detrended income during each episode for different income quintiles of residualized income. Income is defined as monetary after-tax nonfinancial income, deflated by the CPI. Values for Mexico are the simple average of its two episodes in the sample (1994 and 2008). Data sources: SHIW-BI Italy, EPF-INE Spain, ENIGH-INEGI Mexico, ENAHO-INEI Peru.

Figure A5: Half-life of Income by Income Quintiles

(a) Euro Crisis



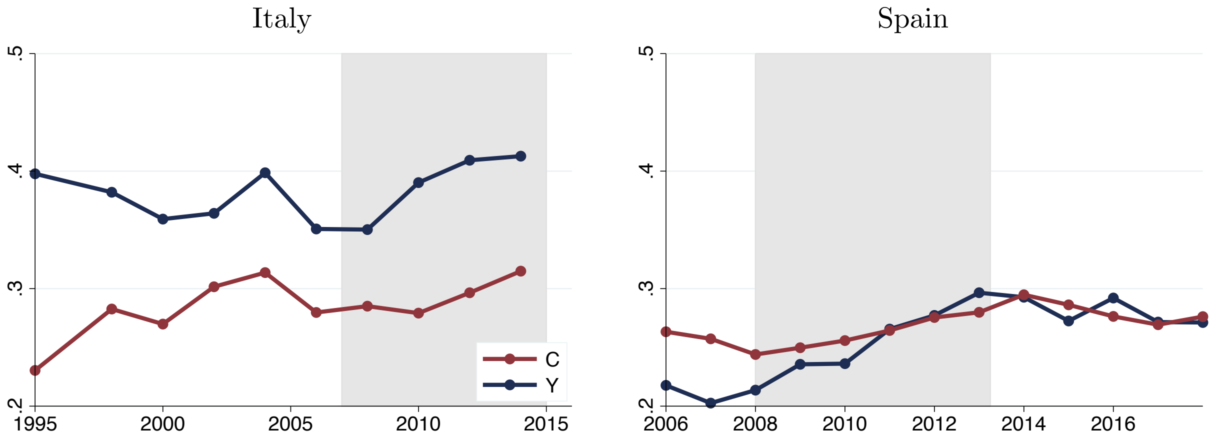
(b) Emerging-market Crises



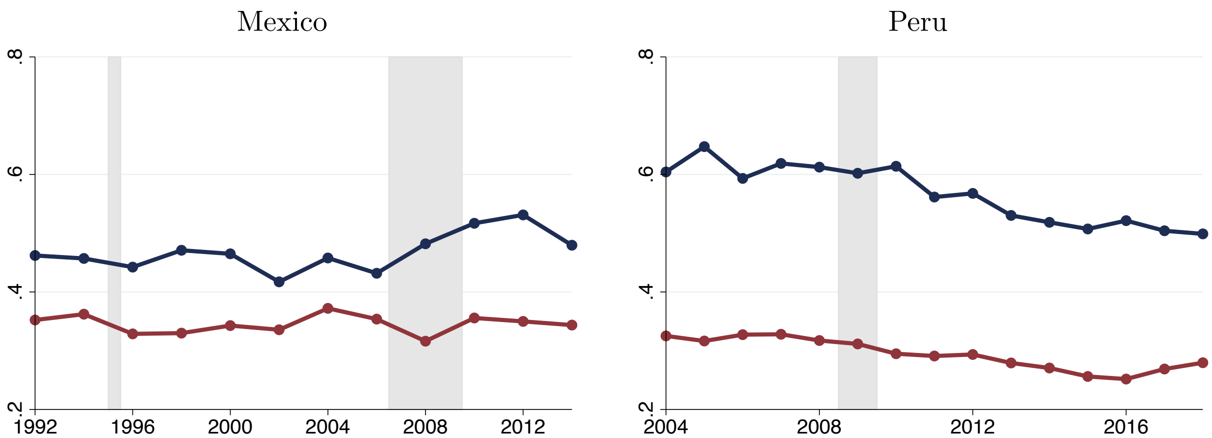
Notes: This figure shows the half-life of detrended income during each episode for different quintiles of residualized income. Half-life refers to the number of years that took to recover half of the contraction in income. Values for Mexico are the simple average of its two episodes in the sample (1994 and 2008). Data sources: SHIW-BI Italy, EPF-INE Spain, ENIGH-INEGI Mexico, ENAHO-INEI Peru.

Figure A6: Variance of Consumption and Income

(a) Euro Crisis



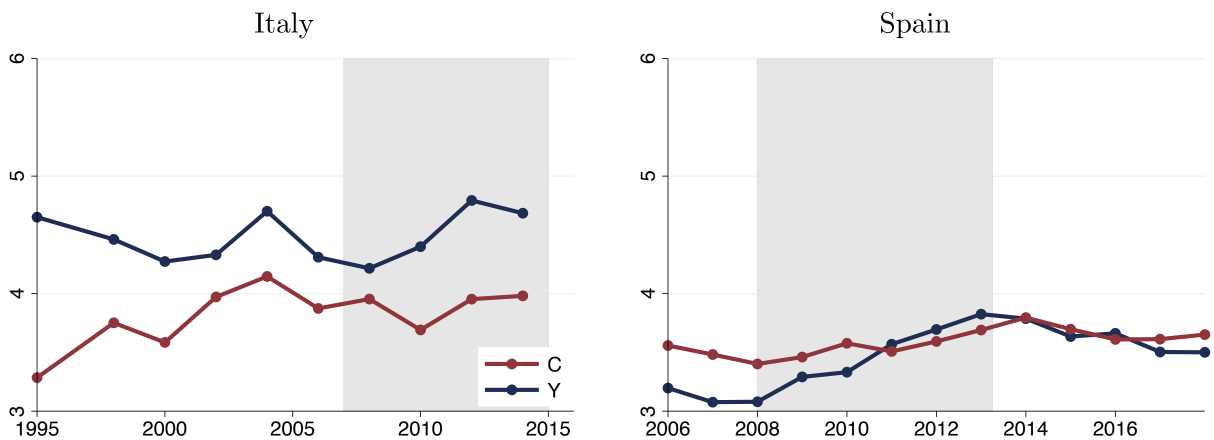
(b) Emerging-market Crises



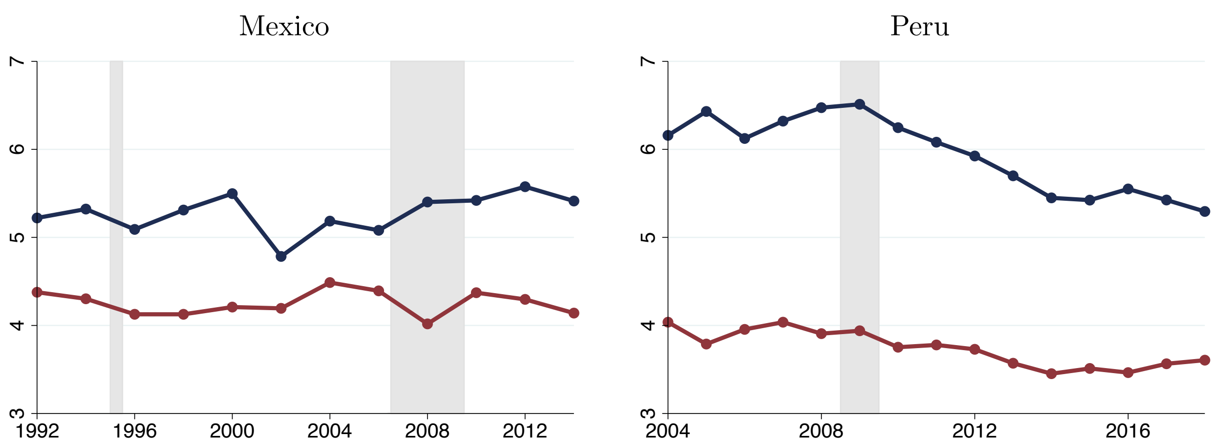
Notes: This figure shows the cross-sectional variance of the log of consumption and income in each year. Income is defined as monetary after-tax nonfinancial income. Consumption is defined as consumption of nondurable goods and services. Income and consumption are deflated by the CPI and residualized from households' observable characteristics and time trends (see empirical model (9) in Appendix B for details). The shaded area is peak-to-trough of detrended GDP per capita during each episode. Data sources: OECD, SHIW-BI Italy, EPF-INE Spain, ENIGH-INEGI Mexico, ENAHO-INEI Peru.

Figure A7: 90/10 Ratio of Consumption and Income

(a) Euro Crisis



(b) Emerging-market Crises



Notes: This figure shows the ratio of the 90th percentile to the 10th percentile of consumption and income in each year. Income is defined as monetary after-tax nonfinancial income. Consumption is defined as consumption of nondurable goods and services. Income and consumption are deflated by the CPI and residualized from households' observable characteristics and time trends (see empirical model (9) in Appendix B for details). The shaded area is peak-to-trough of detrended GDP per capita during each episode. Data sources: OECD, SHIW-BI Italy, EPF-INE Spain, ENIGH-INEGI Mexico, ENAHO-INEI Peru.

Table A6: Consumption-income Elasticities: Illiquid Wealth – Italy

		Value	Elasticity
a. All Households			
Total Net Wealth-to-Income	Low	1.85	1.11
	High	14.19	1.39
Liquid Wealth-to-Income	Low	0.14	1.20
	High	1.49	1.19
Risky Liquid Wealth-to-Income	Low	0.29	2.93
	High	2.19	1.55
Debt-to-Income	Low	0.29	1.03
	High	3.51	1.13
N Observations		7,067	7,067
b. Top-Income			
Total Net Wealth-to-Income	Low	2.15	1.23
	High	13.37	0.89
Liquid Wealth-to-Income	Low	0.17	1.59
	High	1.68	0.73
Risky Liquid Wealth-to-Income	Low	0.24	3.45
	High	1.84	1.00
Debt-to-Income	Low	0.43	1.29
	High	3.58	0.81
N Observations		1,359	1,359

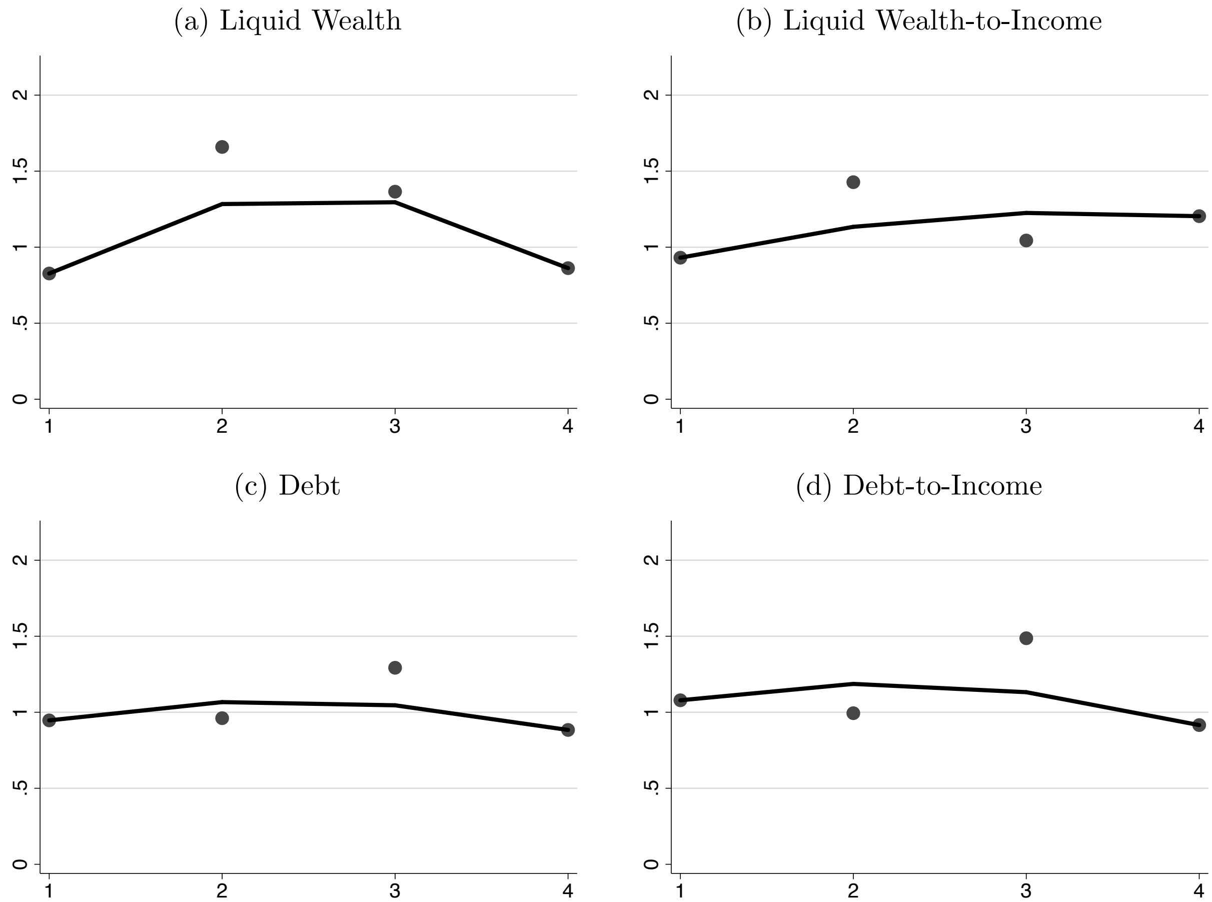
Notes: The column Value is the median ratio of wealth to annual income by wealth category. The column Elasticities shows the elasticities by wealth category. Low (high) households are those with wealth-to-income ratio below (above) the median. The sample is limited to households with positive values of wealth/debt for each category. Total net wealth is the sum of the household's liquid wealth and illiquid assets. Liquid assets are net financial assets, which include deposits, bonds, stocks, mutual funds, and investment accounts. Illiquid assets are real assets, which include real estate, business assets, and valuables. Risky liquid assets are government bonds, stock holdings, and other securities. Debts are financial liabilities, which include liabilities to banks and companies, trade debt, and liabilities to other households. Top-income households are those in the highest quintile of income. Income (Y) is defined as monetary after-tax nonfinancial income. Consumption (C) is defined as the consumption of nondurable goods and services. Both variables are deflated by the CPI and residualized from households' observable characteristics and time trends (see empirical model (9) in Appendix B for details). Elasticities are calculated as the ratio of the log change in consumption to the log change in income. Data sources: SHIW-BI Italy.

Table A7: Consumption-income Elasticities by Ownership of Illiquid Assets

	Euro Crisis		Emerging-market Crises			Average
	Italy	Spain	Mexico '94	Mexico '08	Peru	
a. All Households						
Firm Ownership						
Yes	1.31	1.96	0.68	0.97	1.64	1.31
No	1.10	0.93	0.79	0.59	1.03	0.89
Home Ownership						
Yes	1.29	1.04	0.79	0.71	1.02	0.97
No	0.90	0.79	0.67	0.75	1.03	0.83
N Observations	7,067	21,802	13,122	27,038	21,170	90,199
b. Top-Income						
Firm Ownership						
Yes	1.49	1.61	0.68	1.08	1.87	1.35
No	1.00	0.94	0.82	0.76	1.17	0.94
Home Ownership						
Yes	0.73	1.03	0.78	0.89	1.26	0.94
No	0.81	1.00	0.70	0.79	1.08	0.88
N Observations	1,359	4,300	2,444	5,184	4,401	17,688

Notes: This table shows consumption-income elasticities by ownership. Income is defined as monetary after-tax nonfinancial income. Consumption is defined as consumption of nondurable goods and services. Both variables are deflated by the CPI and residualized from households' observable characteristics and time trends (see empirical model (9) in Appendix B for details). Elasticities are calculated as the ratio of the log change in consumption to the log change in income. Categories are constructed such that they are comparable across countries. Top-income households are those in the highest quintile of income.Further details in Appendix B. Data sources: SHIW-BI Italy, EPF-INE Spain, ENIGH-INEGI Mexico, ENAHO-INEI Peru.

Figure A8: Consumption-income Elasticities By Liquid Wealth — Italy



Notes: This figure shows consumption-income elasticities for different quartiles of liquid wealth on the horizontal axis. Income is defined as monetary after-tax nonfinancial income. Consumption is defined as consumption of nondurable goods and services. Income and consumption are deflated by the CPI and residualized from households' observable characteristics and time trends (see empirical model (9) in Appendix B for details). Dots correspond to observed elasticities and the solid line is the locally weighted smoothing of observed elasticities. Elasticities are calculated as the ratio of the log change in consumption to the log change in income. Liquid wealth is the household's financial assets, which include deposits, bonds, stocks, mutual funds, and investment accounts. Debts are financial liabilities, which include liabilities to banks and companies, trade debt, and liabilities to other households. Further details can be found in Appendix B. Data source: SHIW-BI Italy.

Table A8: Consumption-income Elasticities: Durable and Nondurable Goods

		Euro Crisis		Emerging-market Crises			Average
		Italy	Spain	Mexico '94	Mexico '08	Peru	
$\Delta \log Y$	Average	-0.17	-0.15	-0.38	-0.16	-0.08	-0.19
	Top-income	-0.13	-0.12	-0.42	-0.19	-0.11	-0.19
a. Nondurable							
$\Delta \log C$	Average	-0.19	-0.14	-0.30	-0.11	-0.08	-0.16
	Top-income	-0.12	-0.11	-0.33	-0.17	-0.12	-0.17
Elasticity	Average	1.13	0.97	0.78	0.73	0.99	0.92
	Top-income	0.95	0.90	0.79	0.88	1.15	0.93
b. Durable							
$\Delta \log C$	Average	-0.29	-0.17	-0.24	-0.28	-0.20	-0.24
	Top-income	-0.04	-0.18	-0.19	-0.34	-0.23	-0.20
Elasticity	Average	1.77	1.15	0.63	1.80	2.51	1.57
	Top-income	0.35	1.46	0.46	1.75	2.12	1.23
N Observations		7,067	21,802	13,122	27,038	21,170	90,199

Notes: This table shows various moments related to households' consumption of nondurable and durable goods. Income (Y) is defined as monetary after-tax nonfinancial income. In Panel (a) Consumption (C) is defined as consumption of nondurable goods and services. In Panel (b) it is defined as consumption of durable goods. Both income and consumption variables are deflated by the CPI and residualized from households' observable characteristics and time trends (see empirical model (9) in Appendix B for details). Elasticities are calculated as the ratio of the log change in consumption to the log change in income. Top 10-Income households are those in the highest decile of residualized income. Further details on the classification of goods in Appendix B. Data sources: SHIW-BI Italy, EPF-INE Spain, ENIGH-INEGI Mexico, ENAHO-INEI Peru.

Table A9: Consumption-income Elasticities: Tradable/Non-tradable and Luxury/Non-luxury Goods

		Euro Crisis	Emerging-market Crises		Average
		Spain	Mexico '94	Mexico '08	
$\Delta \log Y$	Average	-0.15	-0.38	-0.16	-0.23
	Top-income	-0.12	-0.42	-0.19	-0.25
a. Tradable					
$\Delta \log C$	Average	-0.18	-0.23	-0.06	-0.16
	Top-income	-0.13	-0.15	-0.16	-0.14
Elasticity	Average	1.19	0.60	0.41	0.73
	Top-income	1.03	0.34	0.81	0.73
b. Non-tradable					
$\Delta \log C$	Average	-0.17	-0.37	-0.26	-0.27
	Top-income	-0.16	-0.40	-0.27	-0.28
Elasticity	Average	1.13	0.98	1.68	1.26
	Top-income	1.35	0.95	1.38	1.23
c. Luxury					
$\Delta \log C$	Average	-0.34	-0.36	-0.32	-0.34
	Top-income	-0.30	-0.29	-0.33	-0.31
Elasticity	Average	2.26	0.95	2.03	1.75
	Top-income	2.42	0.68	1.73	1.61
d. Non-luxury					
$\Delta \log C$	Average	-0.13	-0.26	-0.05	-0.14
	Top-income	-0.11	-0.24	-0.08	-0.14
Elasticity	Average	0.86	0.67	0.30	0.61
	Top-income	0.88	0.56	0.43	0.62
N Observations		21,802	13,122	27,038	61,962

Notes: This table shows various moments related to households' consumption of tradable and non-tradable goods and luxury and non-luxury goods. Income (Y) is defined as monetary after-tax nonfinancial income. In Panels (a) and (b) Consumption (C) is defined as consumption of tradable and non-tradable goods, respectively. In Panels (c) and (d) Consumption (C) is defined as consumption of luxury and non-luxury goods, respectively. Both income and consumption variables are deflated by the CPI and residualized from households' observable characteristics and time trends (see empirical model (9) in Appendix B for details). Elasticities are calculated as the ratio of the log change in consumption to the log change in income. Top 10-Income households are those in the highest decile of residualized income. Further details on the classification of goods in Appendix B. Data sources: EPF-INE Spain, ENIGH-INEGI Mexico.

Table A10: Consumption-Income Elasticities Adjusted by Inflation Heterogeneity

		Emerging-market Crises			Average
		Mexico '94	Mexico '08	Peru	
Average − Top-income Inflation		2.0%	0.9%	1.2%	1.4%
$\Delta \log Y$	Average	-0.38	-0.16	-0.07	-0.20
	Top-income	-0.42	-0.19	-0.09	-0.23
$\Delta \log C$	Average	-0.31	-0.11	-0.08	-0.17
	Top-income	-0.33	-0.20	-0.09	-0.21
Elasticity	Average	0.82	0.73	1.09	0.88
	Top-income	0.79	1.01	1.02	0.94
N Observations		13,122	27,038	21,170	61,330

Notes: The first row refers to the difference between the average inflation and the inflation of households in the top income decile. Inflation for both groups is computed using log-differences from the peak (CPI = 100) to trough of each episode. Income (Y) is defined as monetary after-tax nonfinancial income. Consumption (C) is defined as consumption of nondurable goods and services. Both variables are residualized from households' observable characteristics and time trends (see empirical model (9) in Appendix B for details). Income is deflated using baseline CPI and consumption decile-specific CPI constructed using the decile's consumption basket. Elasticities are calculated as the ratio of the log change in consumption to the log change in income. Data sources: ENIGH-INEGI Mexico, and ENAHO-INEI Peru.

Table A11: Robustness: Permanent Heterogeneity

		Euro Crisis Italy	EM Crises Peru	Average
Low-Elasticity HHs				
$\Delta \log Y$	Average	-0.14	-0.12	-0.13
	Top-income	-0.08	-0.14	-0.11
$\Delta \log C$	Average	-0.13	-0.08	-0.11
	Top-income	-0.07	-0.09	-0.08
Elasticity	Average	0.94	0.64	0.79
	Top-income	0.88	0.65	0.76
High-Elasticity HHs				
$\Delta \log Y$	Average	-0.12	-0.14	-0.13
	Top-income	-0.10	-0.15	-0.13
$\Delta \log C$	Average	-0.13	-0.18	-0.16
	Top-income	-0.10	-0.20	-0.15
Elasticity	Average	1.11	1.27	1.19
	Top-income	1.00	1.29	1.15
N Observations		1,044	2,114	3,158

Notes: Income (Y) is defined as monetary after-tax nonfinancial income. Consumption (C) is defined as consumption of nondurable goods and services. Both variables are deflated by the CPI and residualized from households' observable characteristics and time trends (see empirical model (9) in Appendix B for details). Elasticities are calculated as the ratio of the log change in consumption to the log change in income. Top-Income households are those above the median of residualized income. Households with high (low) elasticity are those with individual estimated elasticities above (below) the median. Further details in Appendix B. Data sources: SHIW-BI Italy, ENAHO-INEI Peru.

B. Data Description

B1. Macrolevel Data

In the analysis involving aggregate data, we use real per capita GDP to measure aggregate income and real per capita personal consumption expenditure (PCE) and nondurable PCE, including services, to measure aggregate consumption. The data are from the following sources:

1. *Italy and Spain*. National accounts data and annual population estimates are from the OECD. National accounts data are quarterly and seasonally adjusted. To compute per capita income and consumption, we linearly interpolate annual population.

2. *Mexico.* National accounts data are from the OECD and annual population estimates from FRED. Quarterly GDP series are available with seasonal adjustment from the OECD. We seasonally adjust quarterly PCE and nondurable PCE using the X-13 ARIMA method. To compute per capita income and consumption, we linearly interpolate annual population.

3. *Peru.* National accounts data are from *Instituto Nacional de Estadistica e Informatica de Peru* (INEI-Peru) and annual population estimates from WEO-IMF. National accounts data are quarterly and seasonally adjusted. To compute per capita income and consumption, we linearly interpolate annual population.

In Figure 2, we use these data to document the macro dynamics in the crisis episodes of our sample. The data are log-linearly detrended, using as the detrending period for each country the same window for which the microlevel data are available.

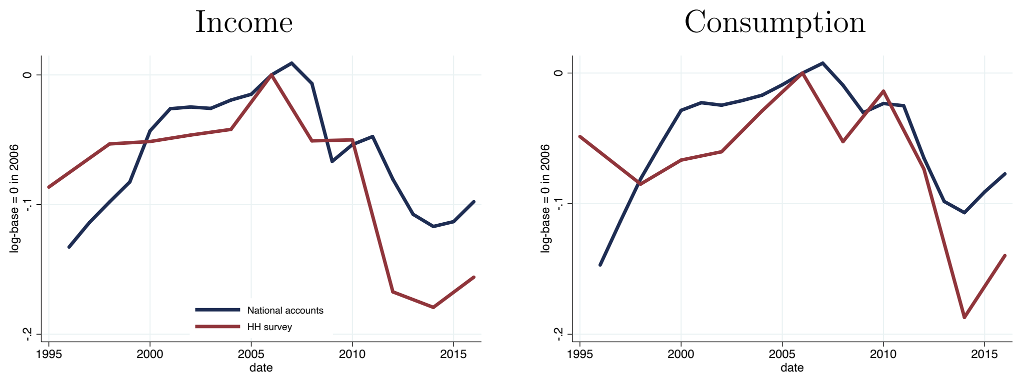
B2. Microlevel Data

In this section we describe the data sources, sample selection criteria, and variable definitions for our empirical analysis in Section 2. Our sample selection criteria and income/consumption definitions are as homogeneous as possible across countries and databases, and follow standard practices in the literature (e.g., Blundell *et al.*, 2008a; Aguiar *et al.*, 2020). As noted in Section 2, our empirical results are robust to several variants of the baseline measurement.

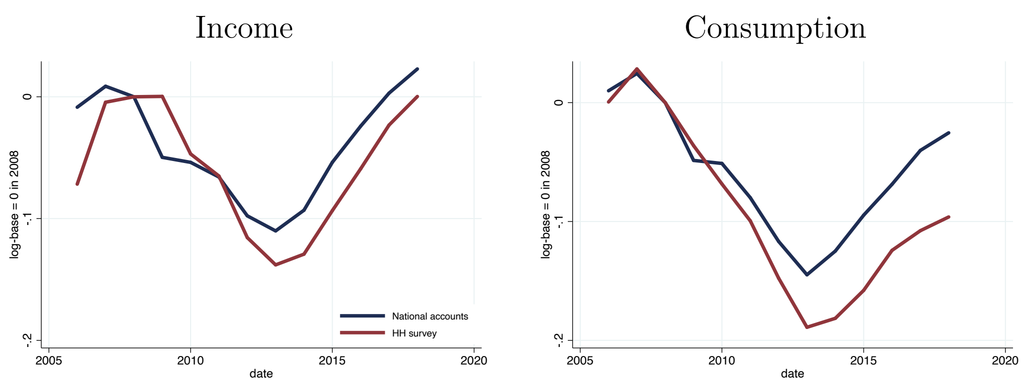
B.2.1. Italy

Figure B1: Microlevel Data and National Accounts: Euro Economies

(a) Italy – SHIW



(b) Spain – EPF-INE



Notes: This figure compares microlevel data on per capita disposable income and total consumption expenditure consumption from the surveys used in the empirical analysis in Section 2 with national accounts data (GDP and PCE). Panel (a) shows the data for Italy, corresponding to the SHIW, and Panel (b) shows the data for Spain, corresponding to the EPF-INE. These sources are further described in Sections B.2.1 and B.2.2. Sources for the national accounts data are described in Section B1. Moments from the microlevel data are computed using sample weights.

For Italy, we use data from the *Survey on Household Income and Wealth* (SHIW), conducted by the Bank of Italy for the period 1995 to 2016. In this period, the survey was conducted on a biennial basis (except for the period 1995 to 1998, with a 3-year interval).[23] Following Jappelli and Pistaferri (2010), Panel (a) of Figure B1 compares the dynamics of per capita disposable income and total consumption from the microlevel data with their counterparts from national accounts for our period of analysis.

The original sample of the SHIW includes 86,729 units observed during the period 1995 to 2016 with available data on consumption, income, and demographics. From this, our sample selection adopts standard practices in the literature using consumption household-level data. First, we exclude observations corresponding to households in small locations (with fewer than 5,000 residents). Second, we only include in the sample units in which the household head's age is between 25 and 60 years. Third, we exclude observations with negative income or with income-to-consumption ratio in the top 0.5% or bottom 0.5% of the distribution to ensure that our results are not driven by outliers. Table B1 details the observations dropped from each of these filters, which results in a sample of 42,278. Our analysis of consumption-income elasticities uses observations from consumption and income data during the peak and trough of the 2006-2014 crisis, involving 7,067 observations. We compute moments with these data using sample weights provided by the SHIW unless otherwise noted.

Table B1: Sample Selection SHIW-Italy

	Obs. Dropped	Obs. in Sample
All units, 1995-2016		86,729
Excluding residents in small locations	10,752	75,977
Excluding age < 25 or > 60	32,472	43,505
Excluding outliers	1,227	42,278
Crisis episode (2006 and 2014)		7,067

Notes: This table shows the number of observations resulting from our sample selection for the SHIW in Italy. The first line, *All units*, shows the original sample of units observed during the period 1995 to 2016. The following lines detail the set of observations dropped from different filters applied to the sample and the resulting number of observations. *Outliers* refer to observations with negative income or with an income-to-consumption ratio in the top 0.5% or bottom 0.5% of the distribution. More details on these filters can be found in the text. Data source: SHIW Italy.

[23] One exception is the analysis of business cycles in Section 2.3, for which we use the time period 1980-2016.

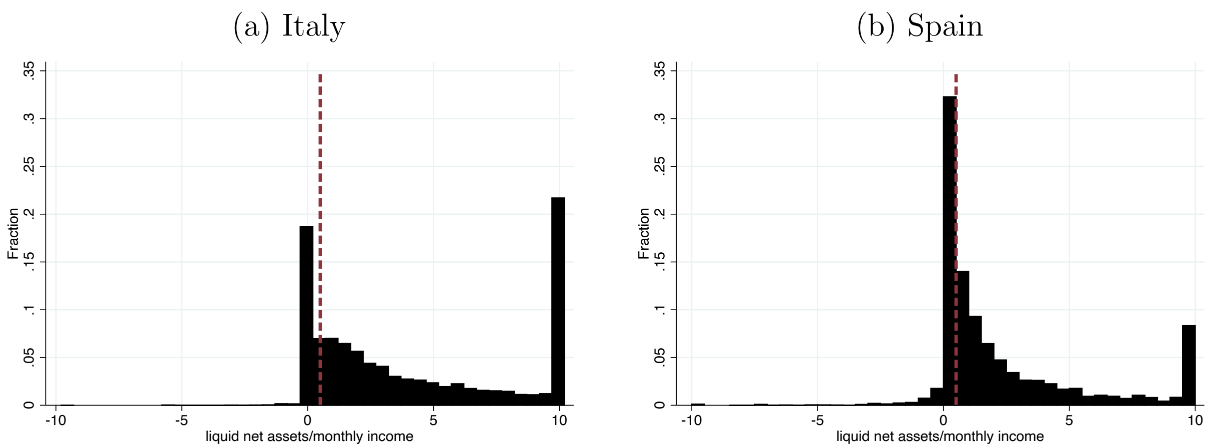
Our baseline measures of consumption and income used to compute consumption-income elasticities in Section 2 are, respectively, nondurable monetary consumption—defined as nondurable expenditure minus payments in kind and imputed rents from owner-occupied housing—and households' after-tax monetary nonfinancial income, defined as the sum of labor income (excluding payments in kind), self-employment income, transfers, pension benefits, and rents from real capital, minus income taxes. We also provide empirical results when all monetary and nonmonetary components of consumption and income are included. As discussed in Section 2, our empirical analysis of consumption-income elasticities follows standard practices in the consumption literature (see, for example, Blundell *et al.*, 2008a; Guvenen and Smith, 2014), and residualizes consumption and income using the empirical model

$$\ln(X_{it}) = \mathbf{Z}'_{it}\boldsymbol{\beta} + t\mathbf{D}'_{it}\boldsymbol{\gamma} + t\eta + \hat{x}_{it}, \tag{9}$$

where X_{it} is either the consumption or income of household i at period t, $\mathbf{Z}_{it}$ and $\mathbf{D}_{it}$ are vectors of household demographics, and $\hat{x}_{i,t}$ is the residualized consumption and income of household i in period t. We include in the vector $\mathbf{Z}_{it}$ a quadratic function of the household head's age, gender of the household's head, an indicator for the household head's education level (elementary school or less, middle school, high school, bachelor's degree or more), an indicator for the household's size, and controls for the household's region of residence population size. The vector $\mathbf{D}_{it}$ includes the education and gender of the household's head and is interacted with linear time trends.

Section 2.3 of our empirical analysis studies consumption-income elasticities for households with different levels of liquid assets and wealth-to-income ratio. An advantage of the Italian data for this analysis is that the SHIW contains data on consumption, income, and wealth in the same dataset. We measure liquid assets using households' net financial assets, which include deposits, bonds, stocks, mutual funds, and investment accounts. Using this definition of liquid assets, we follow Kaplan *et al.* (2014) and define hand-to-mouth households as those with assets worth less than 2 weeks of income.[24] Panel (a) of Figure B2 shows the distribution of net liquid assets to monthly income in the Italian data.

Figure B2: Net Liquid Asset-to-monthly Income Distribution: Italy and Spain



Notes: This figure shows the distribution of the ratio of net liquid assets to monthly income for Italy and Spain. For Italy, net liquid assets are defined as net financial assets. Income excludes financial income. For Spain, net liquid assets includes deposits/accounts usable for payments, public equity shares, fixed-income securities, mutual funds and portfolios under management, and credit card debt. The vertical line corresponds to the HtM cutoff of 2 weeks of income (i.e., 0.5 net liquid assets-to-income). Values are truncated at -10 and 10. Data sources: SHIW-BI Italy, EFF Spain.

B.2.2. Spain

For Spain, we use data from the *Encuesta de Presupuestos Familiares* (EPF), conducted by the *Instituto Nacional de Estadistica* (INE), available at an annual frequency since 1997. We use data for the period 2006-2018, which use a consistent methodology. Panel (b) of Figure B1 compares the dynamics of per capita disposable income and total consumption from the microlevel data with their counterparts from national accounts for our period of analysis.

The original sample of the EPF for the period 2006-2018 contains 282,848 observations. We adopt a sample selection process similar to that for Italy, excluding observations that correspond to households in small locations, units in which the household's head age is below 25 or above 60 years, and observations with negative income or with an income-to-

[24]The implicit assumption is that they receive income at a monthly frequency. In addition to the liquid assets-to-income ratio, Kaplan *et al.* (2014) also consider the reported credit limit to identify hand-to-mouth households.

consumption ratio in the top 0.5% or bottom 0.5% of the distribution to ensure that our results are not driven by outliers. Table B2 details the observations dropped from each of these filters, which results in a sample of 137,703. Our analysis of consumption-income elasticities uses observations from consumption and income data during the peak and trough of the 2008-2013 crisis, involving 21,802 observations. We compute moments with these data using sample weights provided by the EPF unless otherwise noted.

Table B2: Sample Selection EPF-Spain

	Obs. Dropped	Obs. in Sample
All units, 2006-2018		282,848
Excluding residents in small locations	69,790	213,058
Excluding age < 25 or > 60	73,047	140,011
Excluding outliers	2,308	137,703
Crisis episode (2008 and 2013)		21,802

Notes: This table shows the number of observations resulting from our sample selection for the EPF-INE in Spain. The first line, *All units*, shows the original sample of units observed during the period 2006 to 2018. The following lines detail the set of observations dropped from different filters applied to the sample and the resulting number of observations. *Outliers* refer to observations with negative income or with an income-to-consumption ratio in the top 0.5% or bottom 0.5% of the distribution. More details on these filters can be found in the text. Data source: EPF-INE Spain.

Our empirical analysis in Section 2 focuses on concepts of consumption and income similar to those we used for Italy. For the computation of nondurable consumption expenditure, we follow criteria close to Fernandez-Villaverde and Krueger (2007) by identifying a four-level goods category of nondurable goods, durable goods, and services. The nondurables included are food expenditure at home and away, drinks, tobacco and narcotics, cleaning products, medication, fuel expenditure, personal care products, and clothing. Services include entertainment services, educational services, health services, transportation services, personal care services (e.g., hairdressing), maintenance, provision of energy and water, and miscellaneous services. Durable consumption includes purchases of vehicles and their parts, housing maintenance and expansion, furniture, housing rent payments, household and medical appliances, and other durable goods (e.g., jewelry). On the income side, one caveat is that the EPF does not provide separate information on after-tax income components. The survey's definition of after-tax income includes labor and self-employed income, pensions, unemployment benefits, other social transfers, rents from property, and financial income. Finally, as in the data for Italy, we residualize consumption and income variables using empirical model (9). We include in the vector $\mathbf{Z}_{it}$ a quadratic function of household head's age, gender of the household's head, an indicator of household head's education level (at most primary, first part of secondary, second part of secondary, at least some tertiary), an indicator of household size, and controls for the household's region of residence population size. The vector $\mathbf{D}_{it}$ includes the education and gender of the household's head and is interacted with linear time trends.

For our empirical analysis of Section 2.3, we complement the EPF with data from the Survey of Household Finances (EFF), an official survey undertaken by the Bank of Spain that provides detailed information on the asset and debt holdings of the Spanish resident population. The EFF provides joint data on wealth and income, which we use to identify households that are likely to have high levels of liquid assets, as further described below. The survey starts in 2002 and has a triennial frequency. The EFF is designed such that it provides a representative cross-sectional sample and a rotating panel. In addition, it oversamples high-wealth households. On average, the sample has approximately 6,100 observations per survey wave.

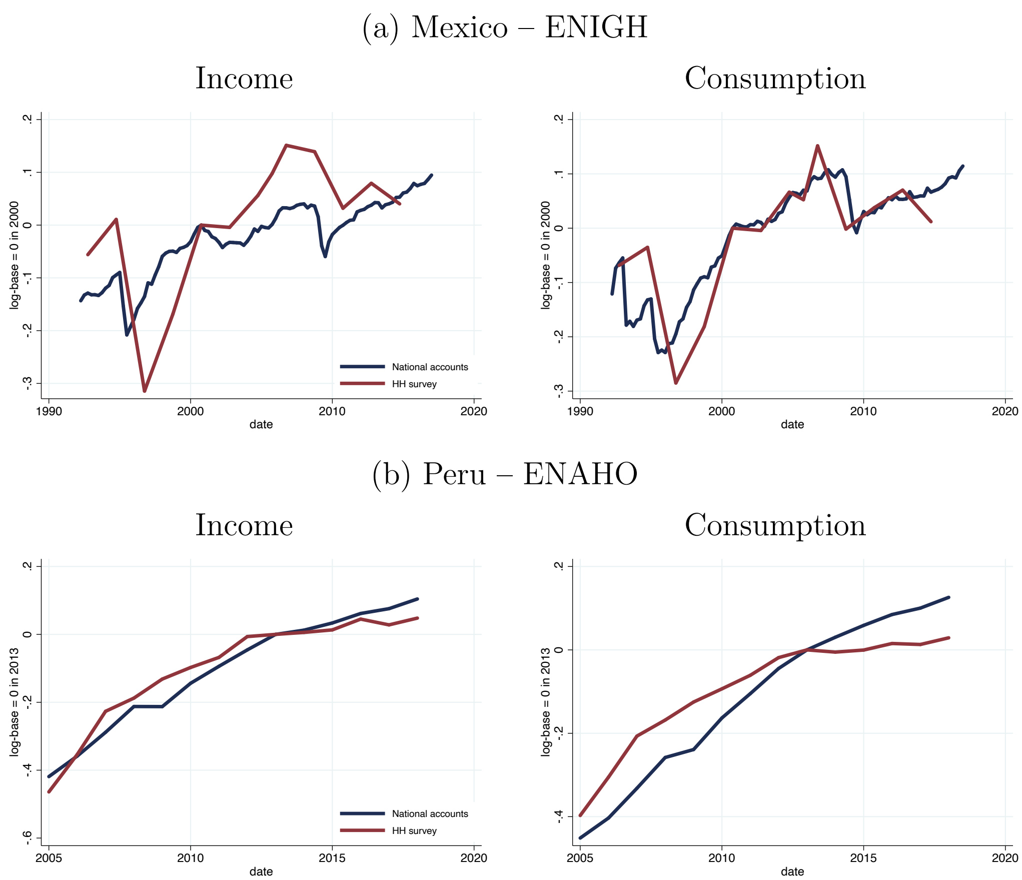
Using the EFF, we define total wealth as assets minus debt, where assets are composed of financial assets, business equity, and housing and other nonfinancial assets; debt is composed of housing debt, personal loans, credit card debt, and other debt. We define liquid assets as the sum of deposits/accounts usable for payments, public equity shares, fixed-income securities, mutual funds, and portfolios under management. From the liquid assets, we subtract credit card debt to compute net liquid asset holdings. Panel (b) of Figure B2 shows the distribution of net liquid assets relative to monthly income in Spain. We can observe that the distribution has a mass point of households with less than 2 weeks of income; these are the hand-to-mouth households under our simple criteria. We estimate the probability of being a hand-to mouth household based on the household's income and characteristics with the following empirical model:

$$\text{HtM}_{it} = f(X'_{it}\beta_t) + \varepsilon_{it}, \tag{10}$$

where HtM_{it} denotes a dummy variable that takes the value 1 if household i at survey in t is hand-to-mouth, and $X_{i,t}$ are characteristics of the household that can be identified in both the EFF and EPF. The characteristics of the household used for the imputations are ownership of business; house ownership; household size; household head's age, gender, and marital status; and the household's position in the income distribution. We estimate model (10) using EFF data. We then use the estimated coefficients and the income and characteristics of households in the EPF dataset to estimate the probability of a household in the EPF being hand-to-mouth. In our empirical analysis in Section 2.3 we identify high-liquidity households as those with a predicted probability smaller than 0.5 of being HtM using the estimated coefficients of model (10).

B.2.3. Mexico

Figure B3: Microlevel Data and National Accounts: Emerging Economies



Notes: This figure compares the microlevel data on per capita disposable income and total consumption expenditure from the surveys used in the empirical analysis in Section 2 with national accounts data (GDP and PCE). Panel (a) shows the data for Italy, corresponding to the SHIW, and Panel (b) shows the data for Spain, corresponding to the EPF-INE. These sources are further described in Sections B.2.3 and B.2.4. Sources for national accounts data are described in Section B1. Moments from the microlevel data are computed using sample weights.

For Mexico, we use data from the *Encuesta Nacional de Ingresos y Gastos de los Hogares* (ENIGH), conducted by the *Instituto Nacional de Estadística y Geografía* (INEGI), available at a biennial frequency with a uniform methodology from from 1992 to 2014 (except for the period 2004 to 2006, which is available annually). Panel (a) of Figure B3 compares the dynamics of per capita disposable income and total consumption from the microlevel data with their counterparts from national accounts for our period of analysis.

The original sample of the ENIGH for the period 1992-2014 contains 204,421 observations. We adopt a sample selection criteria similar to that used for Italy and Spain, and exclude observations corresponding to households in small locations, units in which the household head's age is below 25 or above 60 years, and observations with negative income or an income-to-consumption ratio in the top 0.5% or bottom 0.5% of the distribution to ensure that our results are not driven by outliers. Table B3 details the observations dropped from each of these filters, as well as excluding units with missing data on our variables of interest, which results in a sample of 108,194. Our analysis of consumption-income elasticities uses observations from consumption and income data during the peak and trough of crisis episodes, involving 13,122 observations for the 1992-1994 Tequila crisis and 27,038 observations for the 2006-2010 global financial crisis. We compute moments with these data using sample weights provided by the ENIGH unless otherwise noted.

Table B3: Sample Selection ENIGH-Mexico

	Obs. Dropped	Obs. in Sample
All units, 2006-2018		204,421
Excluding missing data	3,611	200,810
Excluding residents in small locations	56,626	144,184
Excluding age < 25 or > 60	34,727	109,457
Excluding outliers	1,263	108,194
Crisis episode 1 (1994 and 1996)		13,122
Crisis episode 2 (2006 and 2010)		27,038

Notes: This table shows the number of observations resulting from our sample selection for the ENIGH in Mexico. The first line, *All units*, shows the original sample of units observed during the period 1992 to 2014. The following lines detail the set of observations dropped from different filters applied to the sample and the resulting number of observations. *Outliers* refer to observations with negative income or with an income-to-consumption ratio in the top 0.5% or bottom 0.5% of the distribution. More details on these filters can be found in the text. Data source: ENIGH-INEGI Mexico.

Our empirical analysis in Section 2 focuses on concepts of consumption and income similar to those we used for Italy and Spain. For the computation of nondurable consumption expenditure, we also follow criteria close to Fernandez-Villaverde and Krueger (2007). In particular, for nondurable consumption we include food expenditure at home and away, public transportation services, clothing, housing services (e.g., water and electricity supply), cleaning products, personal care products, health services, medication, fuel expenditure, communication services, cultural and entertainment services (e.g., movies), hotels and accommodation services, and other services (e.g., financial or insurance). Durable consumption includes household rent payments, household furniture, equipment and appliances, entertainment and communication equipment (e.g., cameras or phones), jewelry and art products, and vehicle and vehicle parts purchases. In Appendix A3 we use alternative definitions such as non-tradable (proxy as services) and tradable (proxy as durable and nondurable goods), or including rental income and durable consumption. On the income side, we focus on after-tax monetary nonfinancial income. Finally, as in the data for Italy and Spain, we residualize consumption and income variables using empirical model (9). We include in the vector $\mathbf{Z}_{it}$ a quadratic function of the household head's age, gender of the household's head, indicator of the household head's education level (low: less than primary completed; medium: at most secondary completed; high: at least one year of tertiary education), an indicator for each level of the household's size, and controls for the household's region of residence population size. The vector $\mathbf{D}_{it}$ includes the education and gender of the household's head and is interacted with linear time trends.

For our empirical analysis in Section 2.3, we identify households with liquid wealth through their asset income information. In particular, we define liquid asset holders as households that receive income or have expenditures from checking and savings accounts, stocks and bonds, and long-term deposits. Also, we consider households that hold liquid assets as those that retire/make deposits or change positions in bonds, stocks, or similar financial securities.

B.2.4. Peru

For Peru, we use data from the *Encuesta Nacional de Hogares* (ENAHO), conducted by the *Instituto Nacional de Estadística e Informatica* (INEI). The ENAHO survey is conducted annually since 1995, with its quality significantly improving after 2007.[25] Since 2007, the sample is constructed as a rotating panel of approximately 20% of the sample. The design of the survey is such that both samples, the panel and cross-sectional, are representative. Panel (b) of Figure B3 compares the dynamics of per capita disposable income and total consumption from the microlevel data with their counterparts from national accounts for our period of analysis.

The original sample of the ENAHO for the period 2004-2018 contains 398,138 observations. We adopt a sample selection similar to that for Italy, Spain, and Mexico, and exclude observations corresponding to households in small locations, units in which the household head's age is below 25 or above 60 years, and observations with negative income or with an income-to-consumption ratio in the top 0.5% or bottom 0.5% of the distribution to ensure that our results are not driven by outliers. Table B4 details the observations dropped from each of these filters, which result in a sample of 183,102 observations. Our analysis of consumption-income elasticities uses observations on consumption and income data during the peak and trough of the 2007-2010 crisis, involving 21,170 observations. We compute moments with these data using sample weights provided by the ENAHO unless otherwise noted.

[25] In particular, from 2007 onward the survey was improved through the MECOVI program, which was developed to improve statistical measurement in Latin America. The program is directed by the World Bank, Inter-American Development Bank (IADB), and Economic Commission for Latin America and the Caribbean (CEPAL).

Table B4: Sample Selection ENAHO-Peru

	Obs. Dropped	Obs. in Sample
All units, 2004-2018		398,138
Excluding residents in small locations	133,580	264,558
Excluding age < 25 or > 60	78,631	185,927
Excluding outliers	2,825	183,102
Crisis episode (2007 and 2010)		21,170

Notes: This table shows the number of observations resulting from our sample selection for the ENAHO in Peru. The first line, *All units*, shows the original sample of units observed during the period 2004 to 2018. The following lines detail the set of observations dropped by different filters applied to the sample and the resulting number of observations. *Outliers* refer to observations with negative income or with an income-to-consumption ratio in the top 0.5% or bottom 0.5% of the distribution. More details on these filters can be found in the text. Data source: ENAHO Peru.

Our empirical analysis in Section 2 focuses on concepts of consumption and income similar to those we used for Italy, Spain, and Mexico, focusing on nondurable monetary consumption and after-tax monetary nonfinancial income. The nondurable measure of consumption is computed by excluding expenditure on housing rent and household equipment (this includes vehicles and appliances) from the total consumption reported by the survey. The total monetary measure of income includes transfers (private and public), excludes taxes and rents from property, and includes labor and self-employed income. Thus, to construct the income measure we subtract from after-tax total monetary income the income received from rents from property. To compute the after-tax rents, we assume the same tax rate as the one implied by the after-tax and before-tax ratio of income reported by the survey. Finally, as in the data for the rest of the countries, we residualize consumption and income variables using empirical model (9). We include in the vector $\mathbf{Z}_{it}$ a quadratic function of household head's age, gender of the household's head, an indicator of household head's education level (less than primary completed; at most secondary completed; at least 1 year of tertiary education), an indicator of the household's size, and controls for the household's region of residence population size. The vector $\mathbf{D}_{it}$ includes the education and gender of the household's head and is interacted with linear time trends.

For our empirical analysis in Section 2.3, as in the case of Mexico, we identify households with liquid wealth through their asset income information. In particular, we define liquid asset holders as households that receive interest payments from bank deposits and income from a fixed income or dividends from direct holdings of stocks.

C. Omitted Proofs and Results

C1. Proof of Proposition 1

We start by showing the first result. Consider the permanently unconstrained households, for which the borrowing constraint never binds. The optimal consumption given by (4) simplifies to

$$c_{it} = ra_{it} + \frac{r}{1+r}\sum_{s=0}^{\infty}\frac{\mathbb{E}_t\left[\mu_{it+s}\right]Y_{t+s}}{(1+r)^s}. \tag{11}$$

It will be useful to characterize the elasticity of permanently unconstrained households in response to any aggregate shock, and then for the particular case of permanent shocks. The consumption-income elasticity in response to an aggregate shock is given by

$$\frac{\frac{\partial c_{it}}{\partial Y_t}}{\frac{\partial y_{it}}{\partial Y_t}}\frac{y_{it}}{c_{it}}.$$

The marginal propensity to consume is given by

$$\frac{\frac{\partial c_{it}}{\partial Y_t}}{\frac{\partial y_{it}}{\partial Y_t}} = \frac{\frac{r}{1+r}\sum_{s=0}^{\infty}\frac{\mathbb{E}_t[\mu_{it+s}]\frac{\partial Y_{t+s}}{\partial Y_t}}{(1+r)^s}}{\mu_{it}}. \tag{12}$$

This implies that the elasticity is given by

$$\frac{\frac{\partial c_{it}}{\partial Y_t}}{\frac{\partial y_{it}}{\partial Y_t}}\frac{y_{it}}{c_{it}} = \frac{\frac{r}{1+r}\sum_{s=0}^{\infty}\frac{\mathbb{E}_t[\mu_{it+s}]\frac{\partial Y_{t+s}}{\partial Y_t}}{(1+r)^s}}{\mu_{it}}\frac{\mu_{it}Y_t}{\left(ra_{it} + \frac{r}{1+r}\sum_{s=0}^{\infty}\frac{\mathbb{E}_t[\mu_{it+s}]Y_{t+s}}{(1+r)^s}\right)}. \tag{13}$$

Taking limits when $r \to 0$ and using the assumption that $Y_{t+s} = Y_t$ for $s \geq 0$ yields $\varepsilon_{cy} = 1$.

Now consider constrained agents. The consumption of a constrained household is given by

$$c_{it} = \mu_{it} Y_t + (1+r) a_{it} + \kappa f(Y_t).$$

It will be useful to characterize the elasticity of constrained households for any $f(Y_t)$, and then for the particular case of $f(Y_t) = 1$. The marginal propensity to consume of this household is given by

$$\frac{\frac{\partial c_{it}}{\partial Y_t}}{\frac{\partial y_{it}}{\partial Y_t}} = \frac{\mu_{it} + \kappa f'(Y_t)}{\mu_{it}}. \tag{14}$$

The consumption-income elasticity is given by

$$\frac{\frac{\partial c_{it}}{\partial Y_t}}{\frac{\partial y_{it}}{\partial Y_t}} \frac{y_{it}}{c_{it}} = \frac{\mu_{it} + \kappa f'(Y_t)}{\mu_{it}} \frac{\mu_{it} Y_t}{\mu_{it} Y_t + (1+r) a_{it} + \kappa f(Y_t)}. \tag{15}$$

In this case we have that $f'(Y_t) = 0$. Additionally, by evaluating the elasticity at $a_{it} = -\kappa f(Y_t)$ and taking the limits when $r \to 0$, we obtain $\varepsilon_{cy} = 1$.

C2. Proof of Proposition 2

We start by showing the first result. The consumption-income elasticity of a permanently unconstrained household is given by (13). Using the assumption that $Y_{t+h} = \rho Y_t + (1-\rho) Y_{ss}$ for $h \geq 1$, the elasticity is given by

$$\frac{\frac{\partial c_{it}}{\partial Y_t}}{\frac{\partial y_{it}}{\partial Y_t}} \frac{y_{it}}{c_{it}} = \frac{\frac{r}{1+r} \sum_{s=0}^{\infty} \frac{\rho^s \mathbb{E}_t[\mu_{it+s}]}{(1+r)^s}}{\mu_{it}} \frac{\mu_{it} Y_t}{\left(r a_{it} + \frac{r}{1+r} \sum_{s=0}^{\infty} \frac{\mathbb{E}_t[\mu_{it+s}](\rho^s Y_t + (1-\rho^s) Y_{ss})}{(1+r)^s} \right)}.$$

Using the fact that $Y_t < Y_{ss}$, this expression is increasing in ρ. Additionally, taking the limits when $r \to 0$, we obtain that $\varepsilon_{cy} < 1$ and $\varepsilon_{cy} \to 0$ when $\rho \to 0$.

We now show the second result. The elasticity of a constrained household is given by

(15), or equivalently,

$$\frac{\frac{\partial c_{it}}{\partial Y_t}}{\frac{\partial y_{it}}{\partial Y_t}}\frac{y_{it}}{c_{it}} = \frac{\frac{y_{it}}{\kappa f(Y_t)} + \varepsilon_{fY}}{\frac{y_{it}+(1+r)a_{it}}{\kappa f(Y_t)} + 1},$$

where ε_{fY} is the elasticity of the borrowing constraint to aggregate income. It follows that the individual elasticity is an increasing function of ε_{fY}, since the denominator is positive. Additionally, by evaluating the elasticity at $a_{it} = -\kappa f(Y_t)$ and taking the limits when $r \to 0$, we obtain

$$\varepsilon_{cy}|_{a_{it}=\kappa f(Y_t)} = 1 + \frac{\kappa f(Y_t)}{y_{it}}\varepsilon_{fY} > 1.$$

Finally, we show the last statement of the proposition. We need to show that if μ_{it} is mean-reverting, households with high enough μ_{it} are permanently unconstrained. For this, it suffices to show that there exists a large enough μ_{it} such that the households never hit the borrowing constraint, even if they receive the lowest possible endowment in all periods going forward. Recall that the level of unconstrained consumption c_{it}^{unc} is given by (11). It can be verified that if μ_{it} is mean-reverting (i.e., $\mathbb{E}_t[\mu_{it+1}] = \rho_\mu \mu_{it} + (1-\rho_\mu)\overline{\mu}$), then $\frac{\partial c_{it}^{unc}}{\partial \mu_{it}} \leq 1$. Denote the minimum level of income as $\underline{y}$. Then there exists a cutoff level of income such that if current income is larger than this value, the household can ensure the level of unrestricted consumption. This level of income is given by

$$\tilde{y}_{it} = c_{it}^{unc} - (1+r)a_{it} + \sum_{s=0}^{\infty} \frac{\left[c_{it}^{unc} - \underline{y}\right]}{(1+r)^s}.$$

If follows that if μ_{it} is large enough, then income is larger than this cutoff value and hence the household is unconstrained.

C3. Characterizations of MPCs

In this section we characterize the MPCs in response to both crisis experiments. We argue that MPCs depend on the properties of the stochastic process of the idiosyncratic component of income. Additionally, when the idiosyncratic component of income is mean-reverting, MPCs are decreasing in income under both crisis experiments. This result implies that MPCs are less useful in qualitatively distinguishing between the crisis views than consumption-income elasticities.

The following proposition characterizes MPCs under the permanent-income view of crises.

***Proposition* 3.** *Suppose that functional forms satisfy Assumption 1, and that μ_{it} is mean-reverting. Assume that in period t the economy experiences an unexpected shock to aggregate income that is expected to be permanent, i.e., $Y_{t+h} = Y_t < Y_{ss}$. Define the marginal propensity to consume of households when the interest rate is sufficiently small as $mpc \equiv \lim_{r \to 0} \frac{\partial c_{it}}{\partial \underline{y_{it}}}$. Additionally, define constrained and permanently unconstrained households as in Proposition 1.*

1. *For permanently unconstrained households mpc is decreasing in income.*

2. *For constrained households $mpc = 1$.*

Proof. We start by showing the first result. The MPC of permanently unconstrained households is given by (12), where $\frac{\partial Y_{t+s}}{\partial Y_t} = 1$, given that the aggregate shock is permanent. Additionally, since μ_{it} is mean-reverting, we have that $\frac{\frac{r}{1+r}\sum_{s=0}^{\infty}\frac{\mathbb{E}_t[\mu_{it+s}]}{(1+r)^s}}{\mu_{it}}$ is decreasing in μ_{it}. Combining these two properties yields the first result.

The second result follows from noting that the MPC of constrained households is given by (14), and under the permanent-income view of crises $f'(Y_t) = 0$. □

It is worth noting that the MPC of permanently unconstrained households is not 1 despite the aggregate shock being permanent. The reason is that given the multiplicative structure of income, the permanent aggregate shock does not imply a permanent shock to individual income when the idiosyncratic component is mean-reverting.

The following proposition characterizes MPCs under the credit-tightening view of crises.

***Proposition* 4.** *Suppose that functional forms satisfy Assumption 1, and that μ_{it} is mean-reverting. Assume that in period t the economy experiences a shock to aggregate income that is expected to be mean-reverting, i.e., $Y_{t+h} = \rho^h Y_t + (1 - \rho^h) Y_{ss}$, with $0 < \rho < 1$. Define the marginal propensity to consume of households, constrained and permanently unconstrained households as in Proposition 3.*

1. *For permanently unconstrained households mpc is decreasing in income.*
2. *For constrained households mpc is also decreasing in income.*

Proof. We start by showing the first result. The MPC of permanently unconstrained households is given by (12), where $\frac{\partial Y_{t+s}}{\partial Y_t} = \rho^s$, given that the aggregate shock is permanent. Additionally, since μ_{it} is mean-reverting, we have that $MPC = \frac{\frac{r}{1+r}\sum_{s=0}^{\infty}\frac{\mathbb{E}_t[\mu_{it+s}]\rho^s}{(1+r)^s}}{\mu_{it}}$ is decreasing in μ_{it}.

The second result follows from noting that the MPC of constrained households is given by (14), where $f'(Y_t) > 0$ under the credit-tightening view of crises. □

D. Additional Results of Quantitative Analysis

D1. Additional Figures and Tables

Table D1: Wealth Distribution in Italy: Summary Statistics

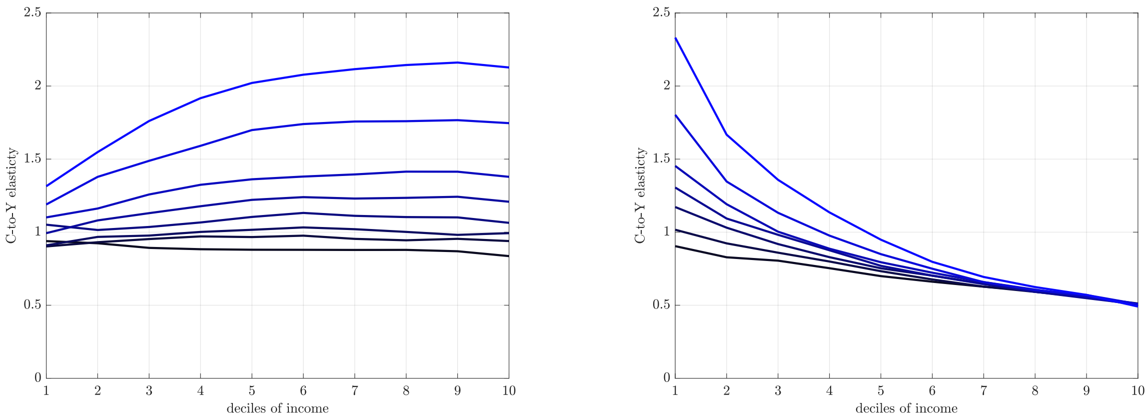
Variable	Liquid	Non-Liquid	Total
Wealth-to-income	0.87	7.20	8.06
Av. Wealth-to-income	0.68	7.20	7.88
Std. Dev. Wealth-to-income	1.92	14.53	15.01
Gini index wealth	0.78	0.67	0.68
Wealth share bottom 75	0.14	0.26	0.27
Wealth share top 10	0.65	0.49	0.48
Wealth share top 5	0.51	0.35	0.34
N Observations	17,349	17,349	17,349

Notes: This table compares moments of wealth distribution by category. The value is the average over the episode from 2006 to 2014, where the calculation for each year uses household survey weights. Wealth-to-income is the ratio of aggregate wealth to aggregate annual income by wealth category. Average Wealth-to-income is the average ratio of household wealth to annual income by wealth category. Income is defined as monetary after-tax nonfinancial income. Total wealth is the sum of the household's liquid wealth and non-liquid assets. Liquid assets are financial assets, which include deposits, bonds, stocks, mutual funds, and investment accounts, net of credit card debt. Non-liquid assets are real assets, which include real estate, business assets, and valuables. Data source: SHIW-BI Italy.

Figure D1: Model Analysis: Identification of Main Parameters

PI View Experiment
Persistence of Growth Shock (ρ_g)

CT View Experiment
Elasticity Financial Constraint-to-Y (ν)

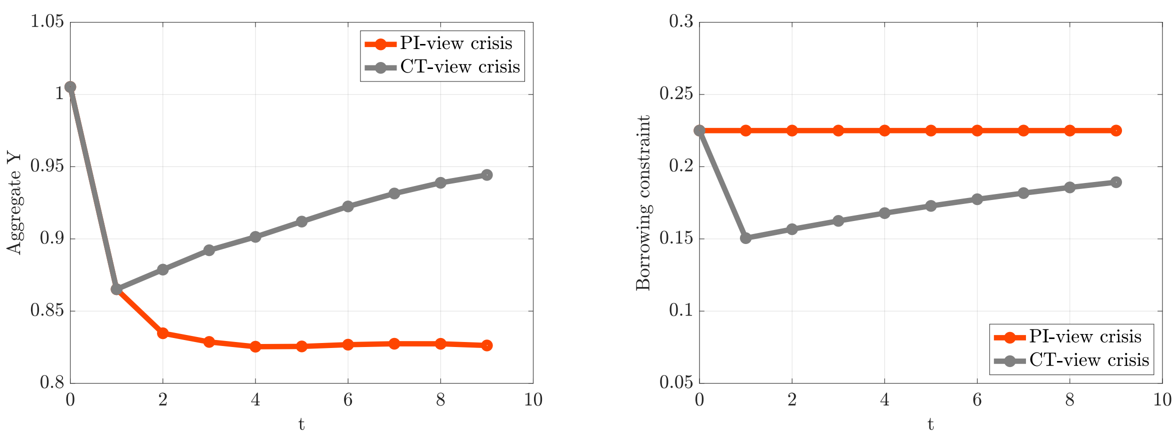


Notes: This figure shows the consumption-income elasticities in the calibrated model presented in Sections 3 and 4 and for different parameterizations of ρ_g and ν. From darker to lighter blue, the parameters grow larger.

Figure D2: Crisis Experiments: Aggregate Shocks

(a) Aggregate Income

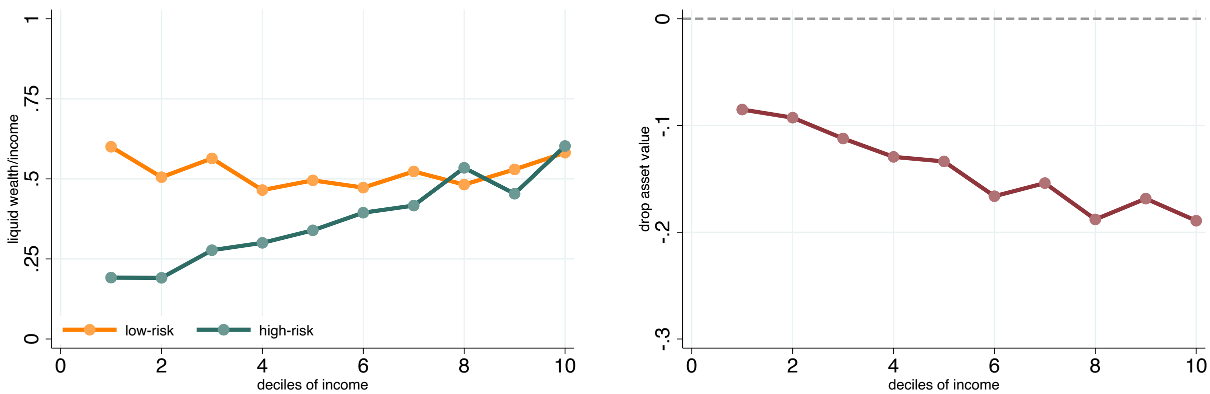
(b) Borrowing Constraint



Notes: This figure shows the path of aggregate income and borrowing constraints under each of the crisis experiments. The horizontal axis refers to years. For details of each experiment, see Sections 3 and 4.

Figure D3: Liquid Asset Revaluation in Italy

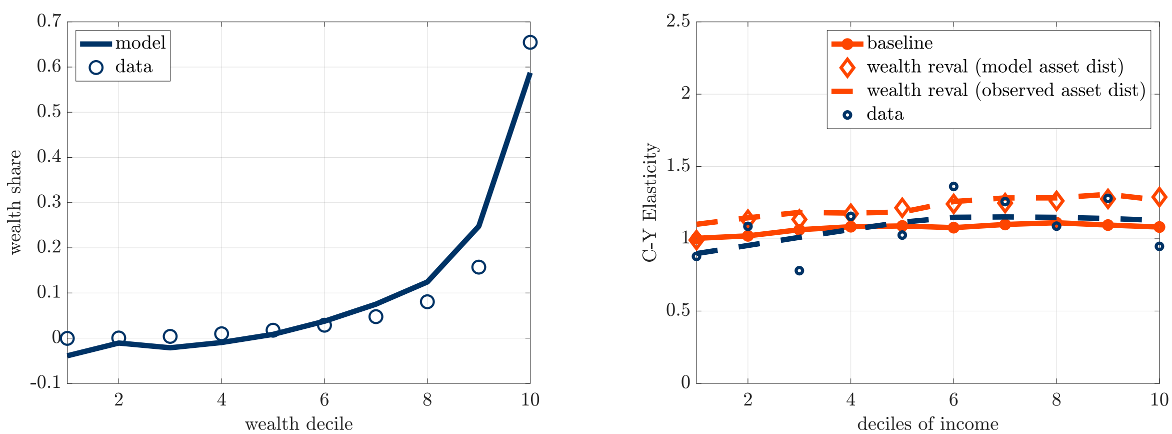
(a) Liquid Wealth Composition (b) Liquid Wealth Revaluation



Notes: Panel (a) shows the share of liquid assets for the period 1995 to 2016 split into low-risk and high-risk liquid assets. Low-risk liquid assets are deposits and high-risk liquid assets are government bonds, stock holdings, and other securities. Panel (b) shows the change in the value of liquid assets by income level. To calculate the change in the value we impute the observed changes in asset prices across liquid asset classes from peak-to-trough. Data sources: SHIW-BI Italy.

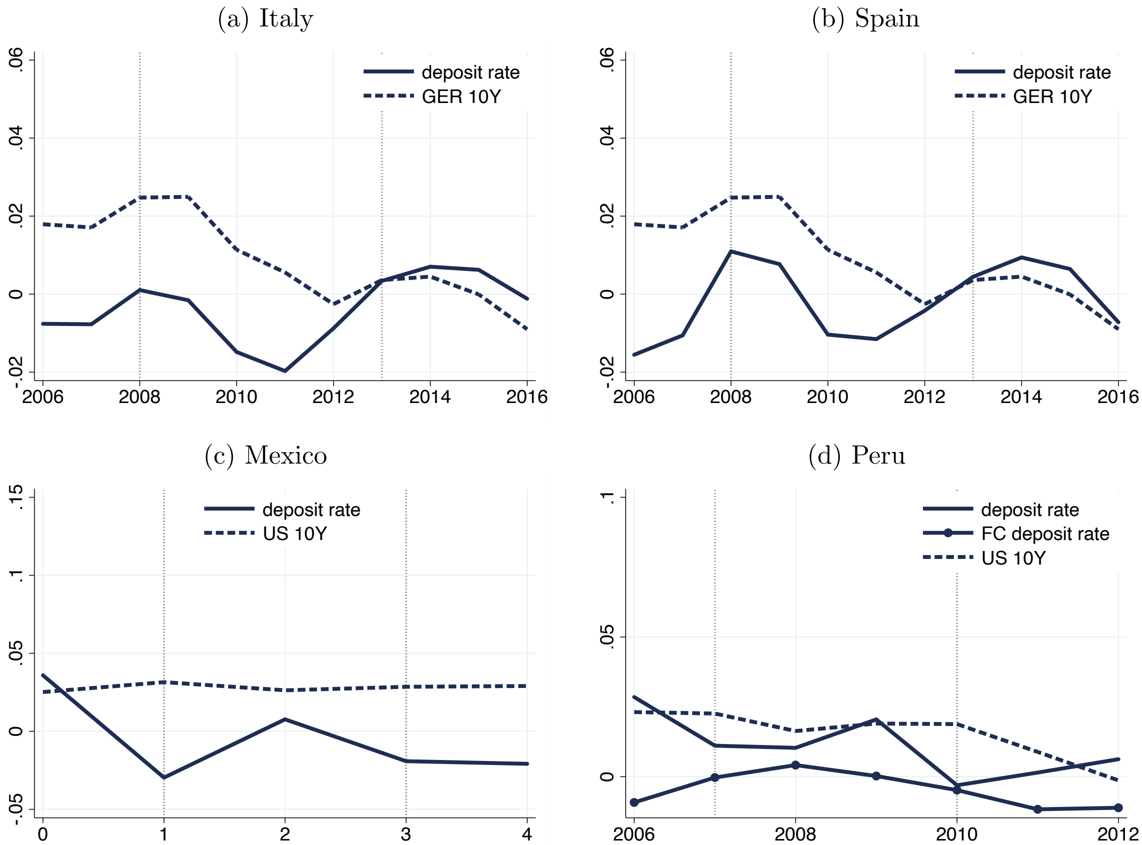
Figure D4: Consumption-income Elasticities with Wealth Revaluation

(a) Liquid Wealth Distribution (b) Consumption-income Elasticities



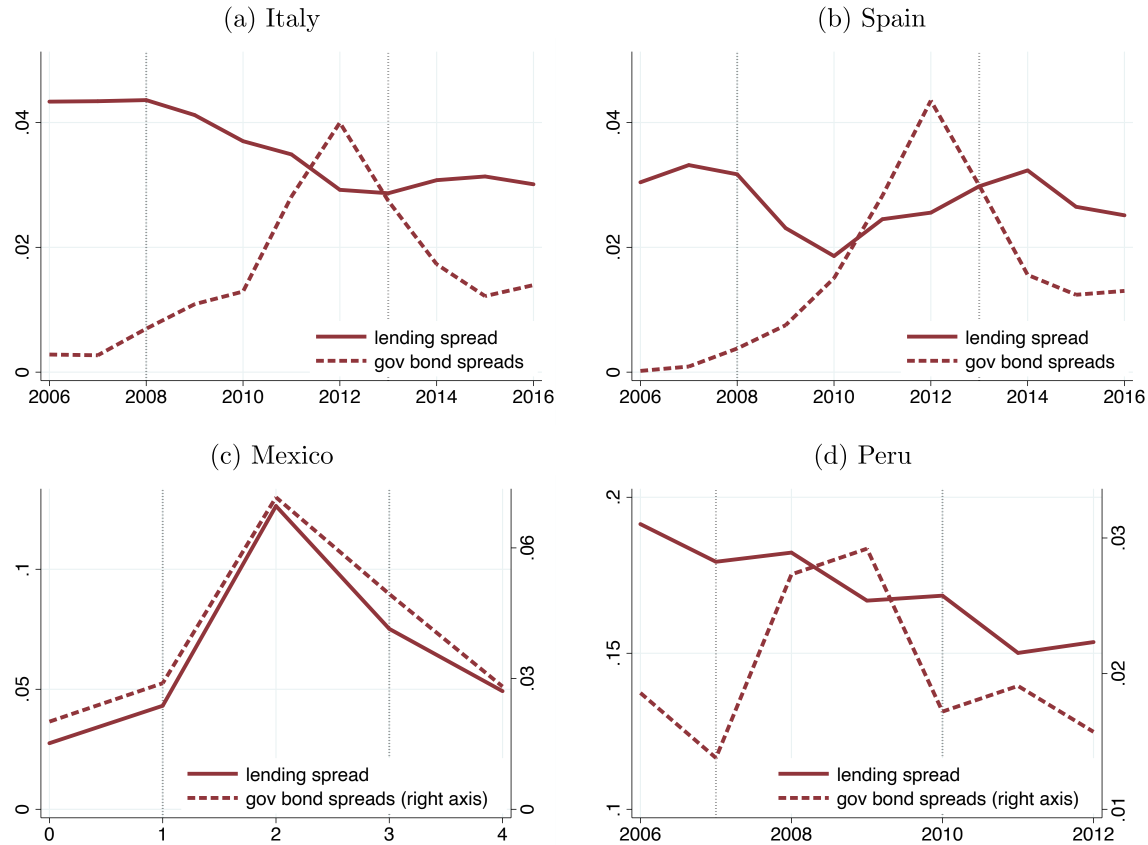
Notes: Panel (a) shows the liquid wealth share for different deciles of wealth in the model and the data. Panel (b) shows elasticities from the baseline PI experiment and the average elasticities of consumption to income evaluated in the model and the observed liquid wealth distribution with imputed observed wealth revaluations across income deciles (labeled "wealth reval (model asset dist)" and "wealth reval (observed asset dist)," respectively). Baseline elasticities are computed using average income and consumption by decile and are defined as the ratio of the log change in consumption to the log change in income. The dashed blue line corresponds to locally weighted smoothed data. Wealth revaluations for each income decile are calculated using observed bond and stock prices during the crisis and the liquid wealth holdings and composition. Further details can be found in Appendix B. Data sources: SHIW-BI Italy.

Figure D5: Safe Interest Rates during Crises Episodes



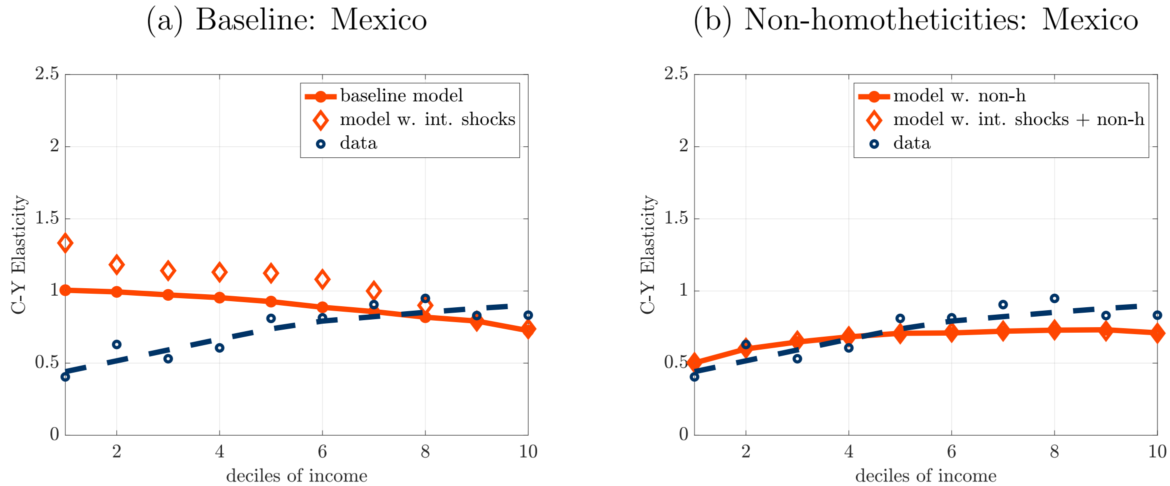
Notes: Panel (a) and Panel (b) show the real deposit rate in Italy and Spain, respectively, and the German government 10-year bond real rate. Panel (c) shows the real deposit rate in Mexico for the average of the Tequila and Global Financial Crises and the U.S. Treasury 10-year bond real rate. Panel (d) shows the real domestic and foreign currency deposit rate in Peru and the U.S. Treasury 10-year bond real rate. Domestic deposit rates are for households. Interest rates are in real terms and calculated deflating by ex post inflation. Data sources: IFS, Bank of Italy, Bank of Spain, Central Bank of Peru, FRED.

Figure D6: Risky Borrowing Interest Rates during Crises Episodes



Notes: The figures show domestic lending to deposit bank rates spread and the government bonds' spreads for each episode analyzed. Domestic lending and deposit bank rates are for households. Spreads are relative to 10-year German bonds for Italy and Spain and EMBI spreads for Mexico and Peru. Data sources: IFS, Bank of Italy, Bank of Spain, Central Bank of Chile, Central Bank of Peru, FRED.

Figure D7: Consumption-income Elasticities in PI View Model: Interest Rate Shocks



Notes: This figure shows the average consumption-income elasticities for different income deciles in the Mexican crises (described in Section 2) and the crisis experiments of the model calibrated for Mexico (described in Section 3). Panel (a) shows the elasticities in the model extended to include interest rate shocks. Panel (b) shows the elasticities in the model extended to include interest rate shocks and nonhomothetic preferences (described in Section 3). The interest rate shock is simulated such that it replicates the interest rate dynamics in Figures D5 and D6 for Mexico. Elasticities are computed using the average income and consumption by decile, and are defined as the ratio of the log change in consumption to the log change in income. The dashed line corresponds to the locally weighted smoothed data. Further details in Appendix B. Data sources: ENIGH-INEGI Mexico.

Table D2: Consumption Response to Policy: The Role of Hand-to-Mouth Households

	HtM	Non-HtM	Average
Scenarios			
Steady state	0.46	0.14	0.21
Transitory income shock	0.51	0.15	0.23
PI crisis	0.38	0.13	0.18
CT crisis	0.91	0.19	0.35

Notes: This table shows the marginal propensity to consume (MPC) from a one-time transfer for hand-to-mouth (HtM), non-hand-to-mouth (Non-HtM), and all households (Average) for different scenarios. MPCs are computed as the difference between consumption with and without the policy, divided by the transfer received. Statistics are computed for the baseline transfer policy. The MPC is computed when the policy is conducted in four alternative scenarios: in the steady state, during a transitory aggregate income shock without credit tightening, during the PI view crisis experiment, and during the CT view crisis experiment.

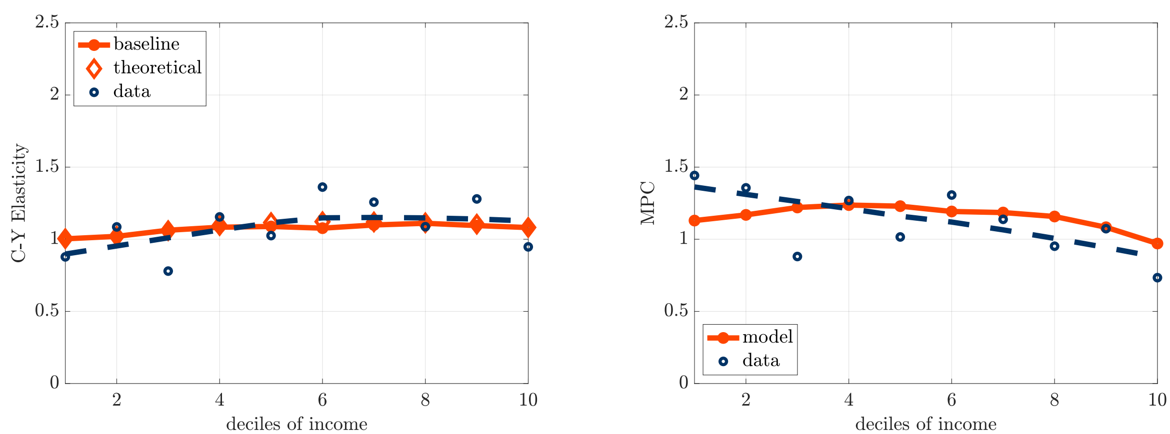
D2. Appendix for the PI View of Crises Model

D.2.1. Additional exercises with baseline model

Alternative Measures of Aggregate Responses In this section we analyze different measures of responses to the aggregate shocks. We first compare the baseline consumption-income elasticities in the model with the theoretical elasticities predicted in Section 3.1. The baseline elasticities in the model are computed by treating the model-simulated data in the same way as the observed data. We compute average consumption and income by deciles of income and then compute the elasticity as the ratio of the log change of these variables. The theoretical elasticities correspond to the individual consumption-income elasticities in response to the aggregate income shock, leaving the idiosyncratic component of income fixed. Panel (a) of Figure D8 shows similar results for both methods of computing the elasticities.

Figure D8: Consumption-income Elasticities in the Model: Alternative Measures

(a) Theoretical Elasticities (b) Marginal Propensities to Consume

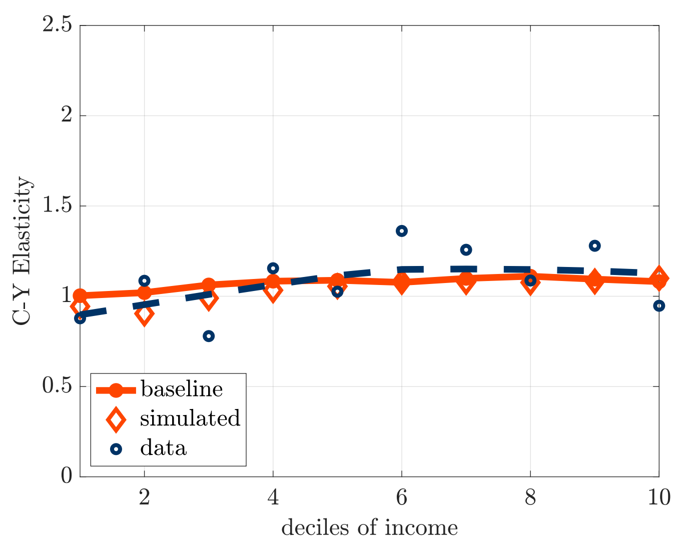


Notes: This figure shows different moments of consumption adjustment for different income deciles in the Italian crisis (described in Section 2) and the crisis experiment of the model calibrated for Italy (described in Section 3). Panel (a) shows the elasticities from the baseline PI experiment and the average elasticities computed directly from the policy function of consumption evaluated at the steady-state asset level and different levels of the idiosyncratic shock (labeled *theoretical*). Panel (b) shows the MPCs from the baseline PI experiment. Baseline elasticities are computed using the average income and consumption by decile, and are defined as the ratio of the log change in consumption to the log change in income. Baseline MPCs are defined are defined as the ratio of the level change in consumption to the level change in income. The dashed line corresponds to locally weighted smoothed data. Further details in Appendix B. Data source: SHIW-BI Italy.

Second, we analyze the marginal propensities to consume in response to the permanent aggregate shock. As shown in Panel (b) of Figure D8, the PI view crisis experiment exhibits a decreasing shape across the income distribution. This result is consistent with the theoretical analysis in Appendix C. Figure D8 also shows that the model is able to correctly fit the shape and level of these data moments.

Alternative crisis experiments This section analyzes an alternative crisis experiment that lasts for 6 years, which is the duration of the contraction in aggregate income during the Italian crisis. We compute this variant by introducing 6 consecutive negative income shocks with an expected persistence that is the same as in the baseline crisis experiment. That is, households face shocks for 6 consecutive years that are expected to be permanent. We then compute the consumption-income elasticities by computing the peak-to-trough change in log consumption and income. Figure D9 shows that the consumption-income elasticities preserve the same shape as in the baseline crisis experiment.

Figure D9: Consumption Response: Protracted Crisis Simulation



Notes: This figure shows the consumption-income elasticities simulating the same income path as in the data for Italy. Elasticities are computed using average income and consumption by decile, and are defined as the ratio of the log change in consumption to the log change in income. The dashed line corresponds to the locally weighted smoothed data. Further details in Appendix B. Data sources: SHIW-BI Italy.

Model with aggregate risk In this appendix we extend our baseline model to allow for aggregate shocks. We assume the aggregate endowment is subject to both trend and transitory shocks. In particular, we follow Aguiar and Gopinath (2007)[26] and assume that $Y_t = Z_t \Gamma_t$, where Z_t is the transitory component that follows the stochastic process

$$\ln Z_t = \rho_z \ln Z_{t-1} + \sigma_z \epsilon_t^z, \qquad \epsilon_t^z \sim N\left(-\frac{\sigma_z}{2(1+\rho_z)}, 1\right), \tag{16}$$

and $\Gamma_t = e^{g_t}\Gamma_{t-1}$ is a stochastic trend subject to shocks to the growth rate g_t that follow

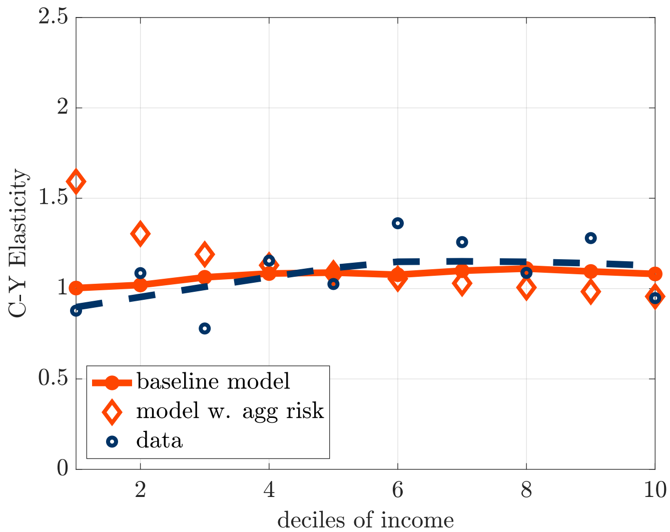
$$g_t = (1-\rho_g)\alpha_g + \rho_g g_{t-1} + \sigma_g \epsilon_t, \qquad \epsilon_t^g \sim N\left(-\frac{\sigma_g}{2(1+\rho_g)}, 1\right). \tag{17}$$

We parameterize the model for the Italian economy. The calibration targets the same moments as in our baseline calibration by calibrating the relative volatility of aggregate permanent and transitory shocks. We deliberately do not target individual consumption responses to a crisis, and leave this behavior as a means to test the validity of the theory in explaining the micro-anatomy of consumption adjustments.

Figure D10 shows the consumption-income elasticities in the model with aggregate risk under the PI view crisis experiments, and compares it with the data and the baseline model. The main quantitative conclusions still hold in the model with aggregate risk.

[26] In their case, the exogenous processes are productivity shocks, whereas in our model the exogenous processes correspond to endowments, given our focus on consumption behavior.

Figure D10: Consumption-income Elasticities in the Model with Aggregate Risk



Notes: This figure shows the consumption-income elasticities for different income deciles in the Italian crisis (described in Section 2) and in the crisis experiments of the model calibrated for Italy (described in Section 3). It shows the experiment from the baseline model, presented in Figure D2 (labeled *baseline*), and that from the model with aggregate risk (labeled *aggregate risk*), described in Appendix D. Elasticities are computed using the average income and consumption by decile, and are defined as the ratio of the log change in consumption to the log change in income. The dashed line corresponds to locally weighted smoothed data. Further details in Appendix B. Data sources: SHIW-BI Italy.

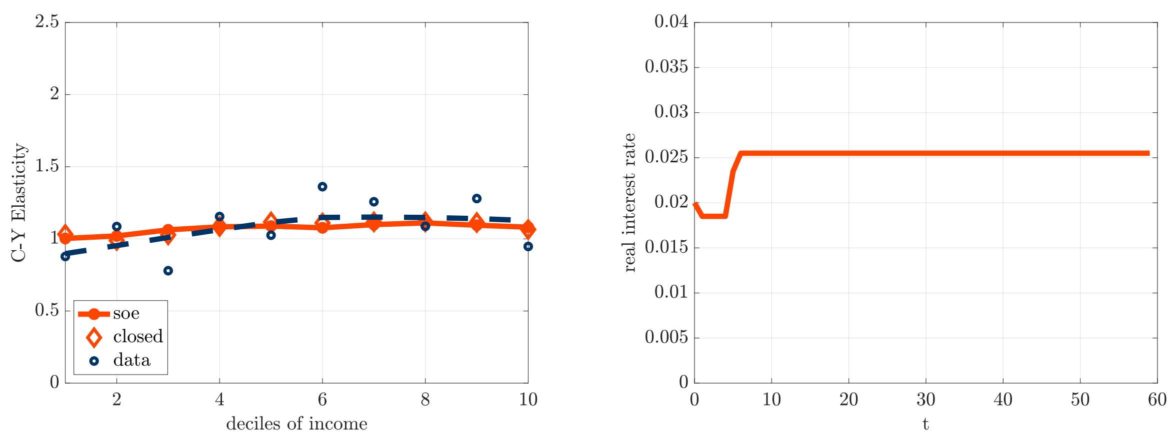
Closed-economy model In this section we consider the extension of a closed economy. There are two main differences with the baseline model. The first is that the interest rate on liquid assets r is endogenous. The second is that we introduce a constant level of government debt, B_g, and homogeneous lump-sum taxes, τ. In this variant of the model, asset market clearing implies $\int_i a_{it} = B_g$. This introduction of government debt allows the model to feature a realistic distribution of liquid assets for households. The introduction of taxes implies that y_{it} should now be interpreted as after-tax income in this version of the model.

We calibrate this model to feature the same steady state as the baseline model by setting B_g as the level of external assets in the steady state of the baseline economy. The difference with the closed economy is that during the crisis experiments, the level of government debt remains unchanged and the interest rate adjusts to clear the asset market.

Figure D11 shows the dynamics of the interest rates and the consumption-income elasticities under the PI view crisis experiment. In the closed economy, the interest rate increases to a permanently higher level. The reason is that households are permanently poorer and thus scale down their demand of liquid assets, which requires a permanently higher interest rate for a given level of government debt. The consumption-income elasticities are not very different from the open-economy version, suggesting that the endogenous effect of the interest rate is mild.

Figure D11: Consumption and Interest Rate Responses in a Closed Economy

(a) Consumption-Income Elasticities (b) Interest Rate



Notes: This figure shows the consumption-income elasticities in a closed economy. Panel (a) shows the experiment from the baseline model, presented in Figure D2 (labeled *soe*), and that from the closed economy model (labeled *closed*), described in Appendix D. Elasticities are computed using average income and consumption by decile, and are as the ratio of the log change in consumption to the log change in income. The dashed line corresponds to locally weighted smoothed data. Panel (b) shows the interest rate that closes the asset market at the initial steady state aggregate level of net assets holdings. Further details in Appendix B. Data sources: SHIW-BI Italy.

D.2.2. Additional details on PI view of crises model extensions

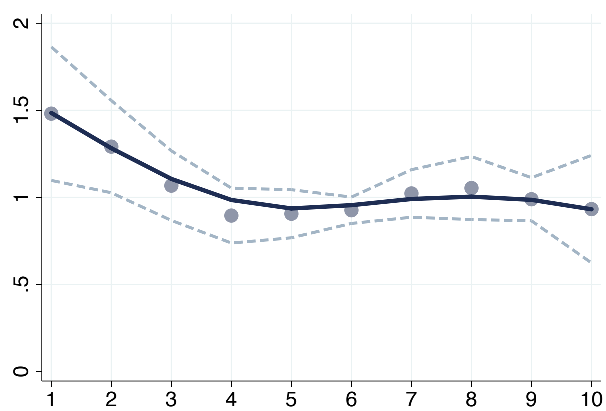
Model with heterogeneous loadings This section provides details on how we estimate the function $\Gamma(\mu_{it})$, which governs the heterogeneity in loadings to the aggregate income shock. We proceed in two steps. First, using the full time period for which we have microdata available, we estimate the following regression for each income decile:

$$\ln(y_{d,t+1}) - \ln(y_{d,t}) = \Gamma_d \left(\ln(Y_{t+1}) - \ln(Y_t)\right) + \varepsilon_{d,t+1},$$

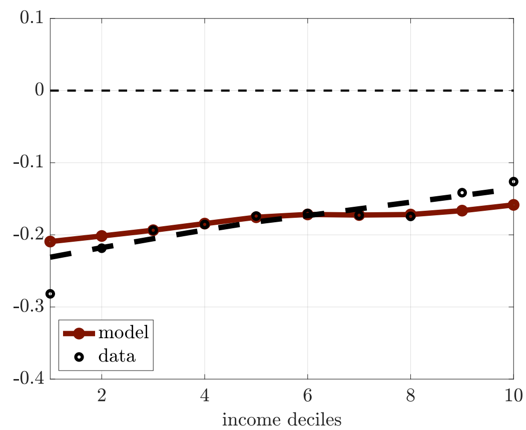
where $y_{d,t}$ is the average detrended income in decile d at time t, and Y_t is the aggregate detrended income. Second, we estimate a locally weighted smoothing function using the estimates Γ_d as inputs. Panel (a) of Figure D12 shows that the estimated function $\Gamma(\mu_{it})$ is decreasing, with higher loadings on the aggregate shock estimated for income-poor households. Panel (b) shows the heterogeneous impact of the crisis on each income decile in the data and in the model, which are close to each other. In this crisis episode, income-poor households suffer a greater impact of the crisis.

Figure D12: Loadings to Aggregate Income and Simulations

(a) Loadings by Decile



(b) Heterogeneous Impact of Crisis



Notes: Panel (a) shows the estimates Γ_d, i.e. loadings to aggregate income across the income distribution. The dots are point estimates, the line a locally weighted smoother, and the shadow the 95% confidence interval. The horizontal axis refers to income deciles. Panel (b) shows the simulated drop in income (orange line) in the model extended to include a heterogeneous income process and the observed drop in income (black dots). Data sources: SHIW-Italy.

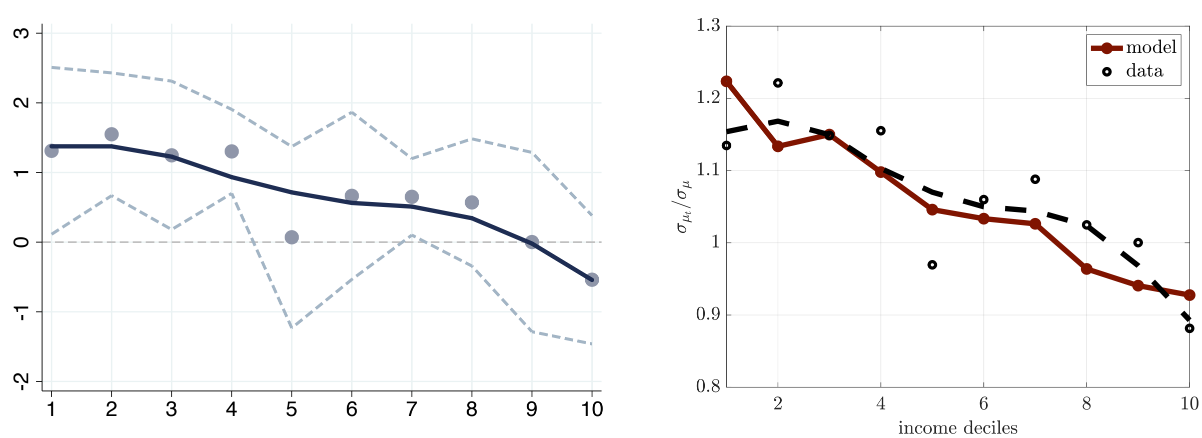
Model with uncertainty shock In this section we provide details on the model extension that features uncertainty shocks. The uniform increase in uncertainty is computed as the increase in the cross-sectional standard deviation of log income, which in the data increases from 0.54 in 2006 to 0.62 in 2014. In the case of heterogeneous increase in uncertainty, we follow a similar approach as in the model with heterogeneous loadings and estimate the following regression for each income decile:

$$\ln(\sigma_{d,t+1}) = \alpha_d + \Sigma_d \ln(\sigma_t) + \varepsilon_{d,t+1}, \tag{18}$$

where $\sigma_{d,t})$ is the standard deviation of log income in income decile d at time t, and σ_t is the standard deviation of log income using the entire sample of households. Second, we estimate a locally weighted smoothing function using the estimates Σ_d as inputs. Panel (a) of Figure D13 shows that the estimated function $\Sigma(\mu_{it})$ is decreasing, with higher loadings on the aggregate uncertainty shock estimated for income-poor households. Panel (b) shows the heterogeneous change in uncertainty on each income decile in the data and in the model, which are close to each other. In this crisis episode, income-poor households suffer a larger increase in uncertainty during the crisis.

Figure D13: Heterogeneous Changes in Income Dispersion and Simulations

(a) Loadings by Decile (b) Heterogeneous Impact of Crisis



Notes: Panel (a) shows the estimates of the function across the income distribution using specification (18). The dots are point estimates, the line a locally weighted smoother, and the dotted lines indicate the upper and lower bounds of the 95% confidence interval. The horizontal axis refers to income deciles. Panel (b) shows the ratio between the income dispersion in the trough relative to the peak in the data and model. The dotted line indicates the observed values, the dashed line a locally weighted smoother of the observations, and the solid (maroon) line corresponds to the model simulation. Data source: SHIW-Italy.

Model with nonhomotheticities Table D3 shows the parameterizations of the model with nonhomotheticities in the calibrations for Italy and Mexico. The calibration of the baseline model for Mexico uses the same parameters as the model with nonhomotheticities with the exception of $\underline{c}$, which is set to zero. Table D4 shows targeted and untargeted moments for the Mexican calibration.

Table D3: Model with Nonhomotheticities: Italy and Mexico

Parameter		Italy	Mexico
Country-Specific			
Discount factor	β	0.90	0.91
Persistence of idiosyncratic process	ρ_μ	0.88	0.97
Volatility of idiosyncratic process	σ_μ	0.26	0.18
Financial constraints	κ	0.23	0.18
Assigned Parameters			
Risk-aversion coefficient	γ	2.00	2.00
Risk-free interest rate	$r*$	0.02	0.02
Nonhomothetic			
Consumption subsistence level	$\underline{c}$	0.04	0.36

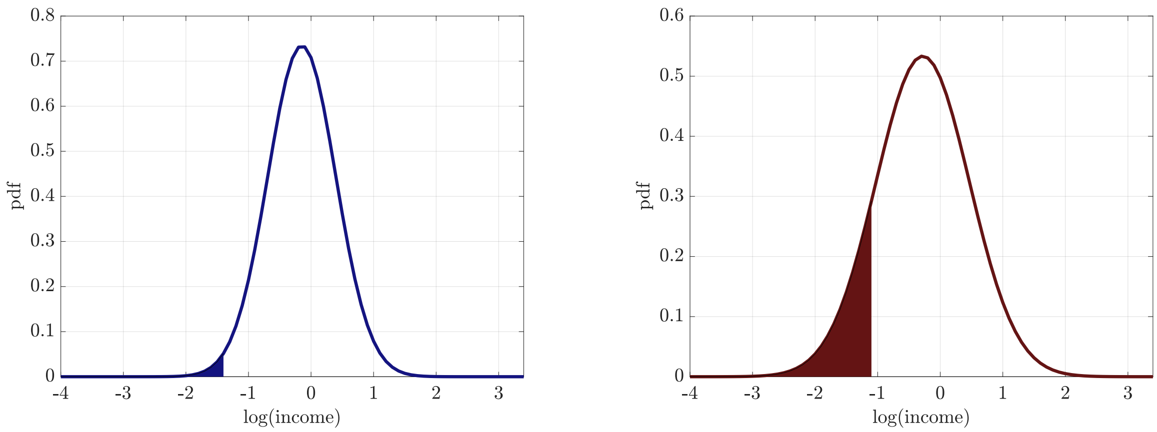
Table D4: Model Goodness of Fit: Mexico

Variable	Model	Data
Targeted		
Gini index income	0.43	0.43
No liquid assets	0.55	0.55
Share below subsistence	0.16	0.16
Non-Targeted		
Income share bottom 75	0.51	0.50
Income share top 10	0.36	0.28
Income share top 5	0.24	0.18

The key moment that makes the calibration of Mexico and Italy different is the share of households with income below the indigence level, which is 1.4% in Italy and 15.7% in Mexico. In the model the subsistence level of consumption is set to match these two rates. Figure D14 shows the distribution of income in both calibrations and the share of households with income below the subsistence level of consumption.

Figure D14: Model Extensions: Income Distribution and Subsistence Level of Consumption

(a) Italy (b) Mexico



Notes: This figure shows the distribution of log income in the calibrated model for Italy and Mexico. Shaded areas indicate the population with an income below the indigence level. We define the indigence level using the World Bank 5.5 USD/day PPP 2011 poverty line. For Mexico, the average poverty level is 15.7% from 1992 to 2018, and for Italy the average is 1.4% from 1995 to 2014. The distribution of income is approximated using a log-normal distribution that matches the model's steady-state income distribution. Further details in Appendix B. Data source: World Bank.

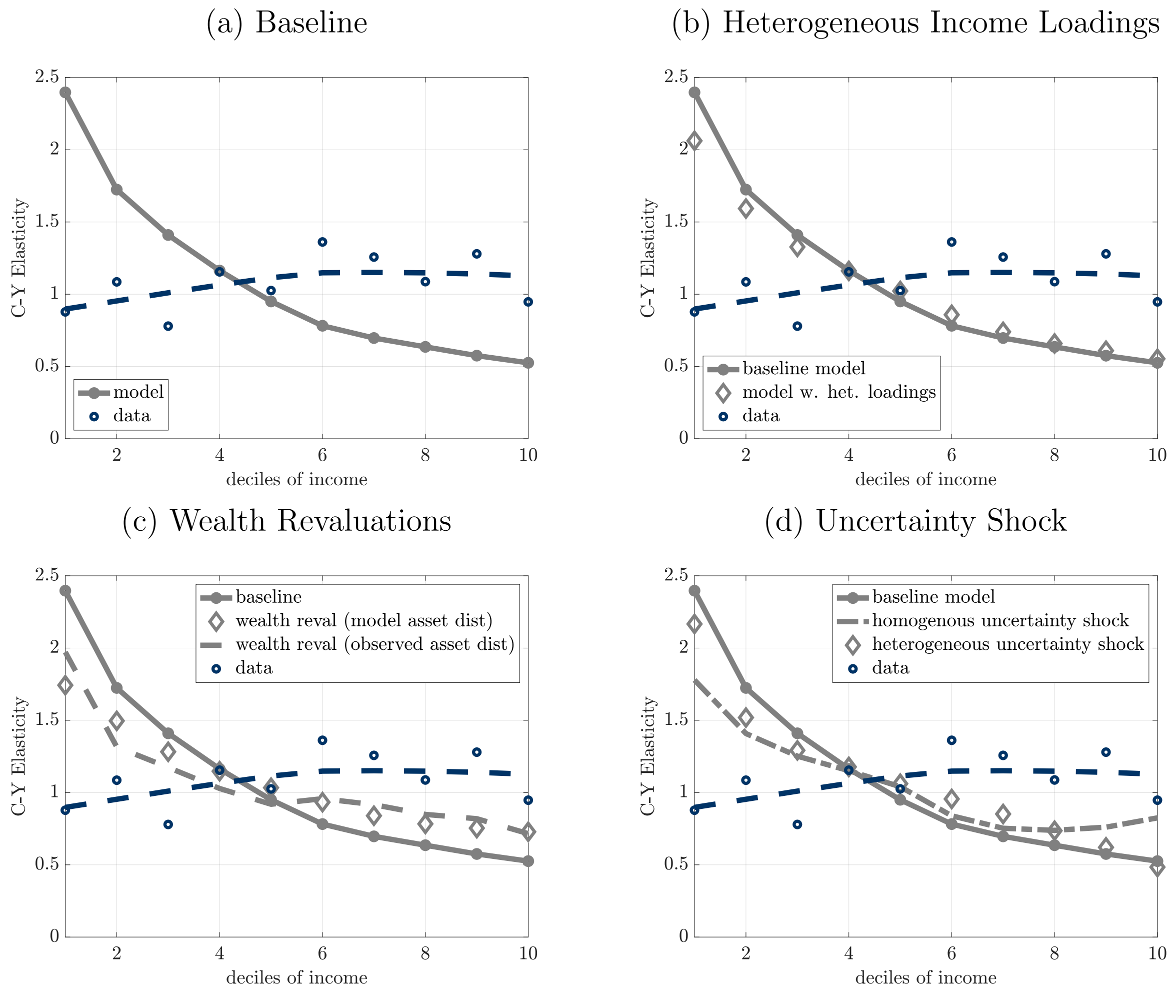
D3. Appendix for the CT View of Crises Model

D.3.1. Model extensions and additional exercises

This section discusses model extensions and additional exercises for the baseline CT view of crises model, presented in Section 4.1. First, we show that the conclusions from the baseline CT view of crises model extend to all model extensions considered for the PI view of crises model presented in Section 3.3, namely, accounting for: (i) the differential loadings that households have on the aggregate income shock; (ii) the observed negative revaluations of liquid assets; and (iii) the observed increase in the dispersion of households' idiosyncratic income. For each of these extensions, we consider the same formulation as for the PI view of crises model (detailed in Section D.2.2) and recalibrate the sensitivity of the borrowing constraint to income, ν, to match the aggregate consumption-income elasticity. Figure D15 shows the predicted cross-sectional consumption adjustments in response to the CT crisis experiment under the different model extensions and compares them with the consumption adjustments observed in the data. Similar to the baseline model, in response to this crisis experiment, consumption-income elasticities are decreasing in households' income. It follows that under all of these variants, the CT view of crises still has difficulty explaining why income-rich households adjust as much as the average.

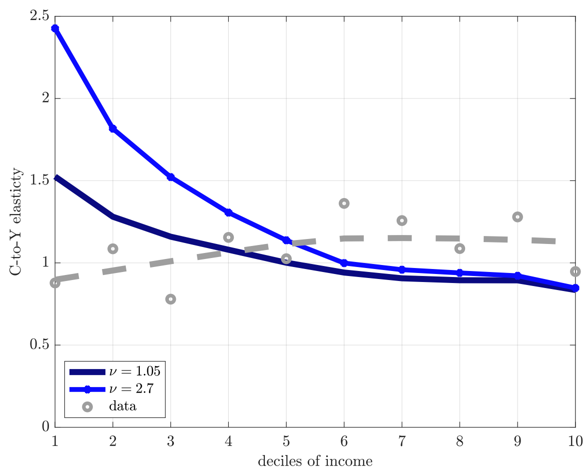
Second, we consider a crisis experiment with a tightening of borrowing constraints accompanied by a permanent aggregate income shock. Figure D16 shows the predicted cross-sectional consumption adjustments in response to a crisis experiment that features an aggregate permanent shock to income with $\rho_g = 0$ and alternative values for the sensitivity of the borrowing constraint to income, ν. The results show that setting the sensitivity of the borrowing constraint to income to that from the baseline CT view experiment ($\nu = 2.7$) leads to consumption-income elasticities for the top-income deciles close to those observed in the data, but overestimates the consumption-income elasticities at the bottom of the income distribution. Decreasing the sensitivity of the borrowing constraint to income has little effect on the consumption-income elasticities of top income deciles—which are less likely to be affected by the tightening of borrowing constraints—but brings the consumption-income elasticities of low-income households closer to those observed in the data. The case in which borrowing constraints are close to being unaffected ends up being the parameterization that results in consumption-income elasticities closer to those observed in the data across the income distribution.

Figure D15: Consumption-income Elasticities under the CT View Crisis Experiment



Notes: This figure shows the consumption-income elasticities for different income deciles in the Italian crisis (described in Section 2) and in the crisis experiments of the model calibrated for Italy (described in Section 4). Panel (a) shows the elasticities in the baseline model. Panel (b) shows the elasticities in the model extended to include heterogeneous income processes. Panel (c) shows the elasticities in the model extended with asset revaluations evaluated at the model's and observed liquid wealth distribution. Panel (d) shows the elasticities in the model extended with homogeneous and heterogeneous uncertainty shocks. Elasticities are computed using average income and consumption by decile, and are defined as the ratio of the log change in consumption to the log change in income. The dashed line corresponds to the locally weighted smoothed data. Further details in Appendix B. Data sources: SHIW-BI Italy.

Figure D16: Consumption-income Elasticities under Combined Crisis Experiment



Notes: This figure shows the consumption-income elasticities for different income deciles in the Italian crisis (described in Section 2) and in the crisis experiments of the model calibrated for Italy that combines a permanente income for $\nu = 2.7$ (value in CT experiment calibration) and $\nu = 1.05$ that matches the observed average elasticity. For both, the permanent shock has $\rho_g = 0$. Elasticities are computed using average income and consumption by decile, and are defined as the ratio of the log change in consumption to the log change in income. The dashed line corresponds to the locally weighted smoothed data. Further details in Appendix B. Data sources: SHIW-BI Italy.

D.3.2. Model with income-based borrowing constraints

In this version of the model we consider a borrowing constraint of the form

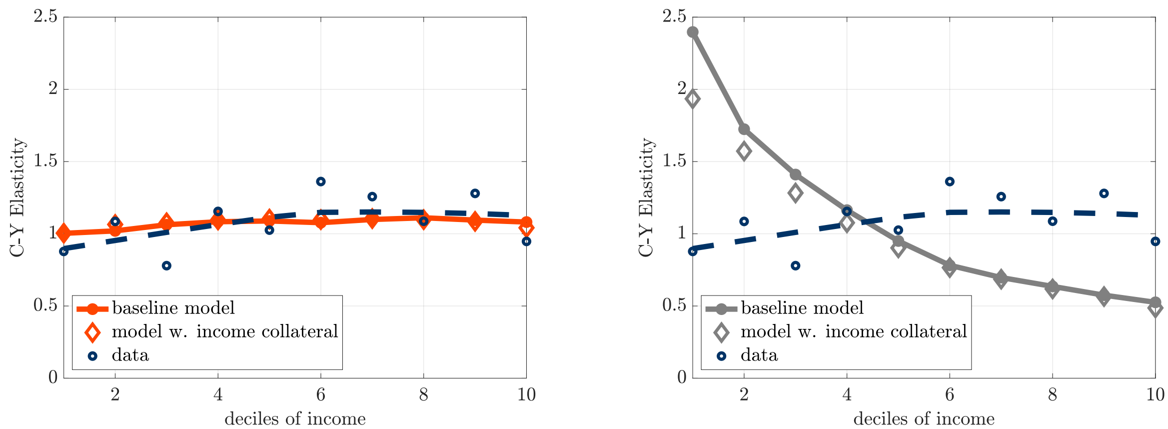
$$a_{it+1} \geq -\kappa \mu_{it} f(Y_t).$$

As we show below, this form of constraints maps onto constraints in which households can pledge part of the value of their income, which in turn depends on equilibrium prices. We parameterize this version of the model following a similar calibration strategy to the baseline model, and analyze the effects of both crisis experiments in this model.

Figure D17 shows the consumption-income elasticities in this version of the model under both crisis experiments, which are very similar to the baseline ones. This is because even if idiosyncratic income can affect the borrowing constraint, it is the aggregate component of the borrowing constraint that tightens during crises.

Figure D17: Consumption-income Elasticities: Income-based borrowing constraints

(a) PI View Experiment (b) CT View Experiment



Notes: This figure shows consumption-income elasticities using an extension of the model that includes idiosyncratic income as part of the collateral. Panels (a) and (b) show the elasticities for the permanent-income view experiment and credit-tightening view experiment respectively. Elasticities are computed using average income and consumption by decile, and are the ratio of the log change in consumption to the log change in income. The dashed line corresponds to the locally weighted smoothed data. Further details in Appendix B. Data sources: SHIW-BI Italy.

Mapping with income-dependent borrowing constraints Now we show that this form of collateral constraint maps income-based borrowing constraints as in Mendoza (2005). Consider a heterogeneous-agents version of an endowment economy with tradable and non-tradable goods. The household's problem is given by

$$\max_{\left\{c_{it}^T, c_{it}^N, a_{it+1}\right\}_{t=0}^{\infty}} \sum_{t=1}^{\infty} \beta^t u(c_{it})$$

$$\text{s.t.} \quad c_{it}^T + p_t c_{it}^N = \mu_{it}\left(Y_t^T + p_t Y^N\right) - a_{it+1} + (1+r)a_{it},$$

$$a_{it+1} \geq -\kappa \mu_{it}\left(Y_t^T + p_t Y^N\right),$$

$$c_{it} = \left[\omega\left(c_{it}^T\right)^{1-1/\xi} + (1-\omega)\left(c_{it}^N\right)^{1-1/\xi}\right]^{\frac{\xi}{\xi-1}}$$

where p_t is the relative price of non-tradable goods; μ_{it} is the idiosyncratic component of income that scales both the tradable and non-tradable endowment; Y_t^T is the aggregate tradable endowment; and Y^N is the aggregate non-tradable endowment, which we leave constant. Adding the households' intratemporal first-order conditions and using market clearing for non-tradable goods, we obtain an expression for the equilibrium price of non-tradable goods as a function of aggregate quantities

$$p_t = \frac{1-\omega}{\omega} \left(\frac{\int c_{it}^T \, \mathrm{d}i}{Y^N} \right)^{\frac{1}{\xi}}.$$

Using this expression, we can express the borrowing constraint as $a_{it+1} \geq -\kappa \mu_{it} f_t(Y_t)$, where

$$f_t(Y_t) \equiv Y_t^T + \frac{1-\omega}{\omega} \left(\int c_{it}^T \, \mathrm{d}i \right)^{\frac{1}{\xi}} \left(Y^N\right)^{1-\frac{1}{\xi}},$$

which maps onto our income-based formulation of the borrowing constraint. Additionally, this function is increasing in Y_t^T if $\frac{\partial c_{it}^T}{\partial Y_t^T} \geq 0$.

D4. Additional results on policy analysis

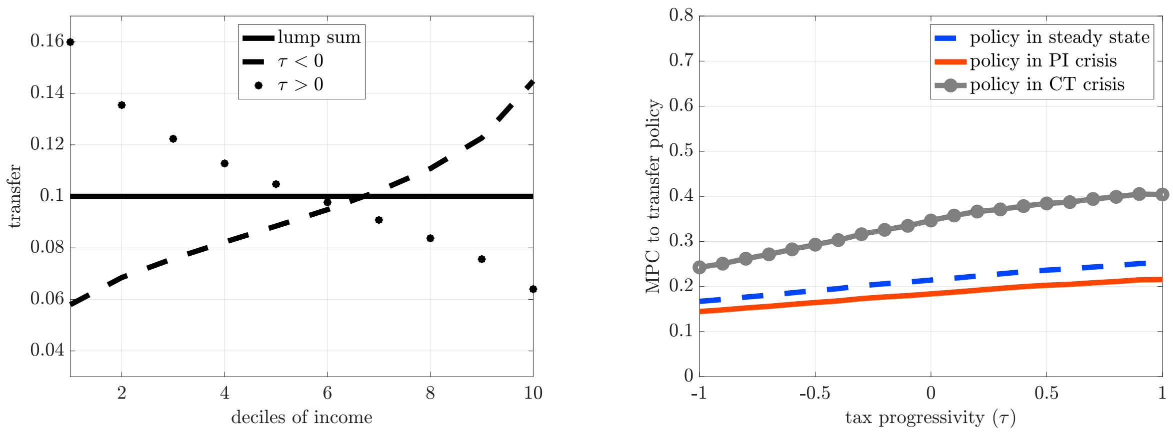
We now study the effects of the stimulus policies analyzed in Section 4.2, which differ in the degree of progressivity. In particular, we consider an initial transfer that takes the form

$$T_0(\mu_{it}) = X e^{\tau \mu_{it}},$$

where the subindex 0 indicates the crisis period, X controls the scale of the program, and τ controls the progressivity. When $\tau < 0$, the transfer is regressive (i.e., larger transfers to income-rich households); when $\tau > 0$ it is progressive; and when $\tau = 0$ it corresponds to the flat lump-sum transfer analyzed in Section 4.2 (see Panel (a) of Figure D18). Since we are interested in comparing programs with the same scale and varying progressivity, we set $X \int e^{-\tau \mu} \mathrm{d}\phi(\mu) = \eta$, where $\phi(\mu)$ is the cdf of idiosyncratic income.

Figure D18: Policy Analysis: Fiscal Policies with Varying Progressivity

(a) Initial Transfers by Progressivity (b) Aggregate Response by Progressivity



Notes: Panel (a) shows the income transfer each household in different income deciles receives for different policies that differ in their degree of progressivity τ. Panel (b) shows the ratio of the change in aggregate consumption to the aggregate fiscal transfer for different degrees of progressivity. The dashed blue line corresponds to the MPCs when the policy is conducted in the steady state, the solid orange line to the MPCs when the policy is conducted during the PI view crisis experiment, and the gray line to the MPCs when it is conducted during the CT view crisis experiment.

Panel (b) of Figure D18 depicts the response of aggregate consumption for fiscal programs that have the same scale but differ in their progressivity, and shows results similar to our baseline experiment. In all policies, higher progressivity leads to a larger effect on aggregate consumption, because it implies redistribution from low- to high-MPC households. In the PI view crisis experiment, the effects are still similar to those in the steady state. However, in the CT view crisis experiment, because the aggregate shock leads to a tightening of the borrowing constraint that is more relevant for low-income households, the effects of increasing progressivity on aggregate consumption are larger.