The Micro-Anatomy of Macro-Consumption Adjustments*

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Abstract

We study crises characterized by large adjustments of aggregate consumption, such as the Euro crisis and emerging-market sudden stops, through their microlevel patterns. We show that leading theories designed to explain aggregate consumption dynamics differ markedly in their cross-sectional predictions. While theories based on financial frictions predict that rich households with liquid assets should be able to smooth consumption during bad times, neoclassical theories predict that these agents would optimally adjust their consumption if crises severely affect their permanent income. Using microlevel data on several episodes of large aggregate-consumption adjustment, we document that rich households significantly adjust consumption relative to their income, consistent with the permanent-income hypothesis of consumption during crises. We discuss the implications of our findings for the effectiveness of stabilization policies targeting consumption during crises.

Keywords: Consumption dynamics, economic crises, international borrowing, sudden stops, business cycles, heterogeneous-agent models

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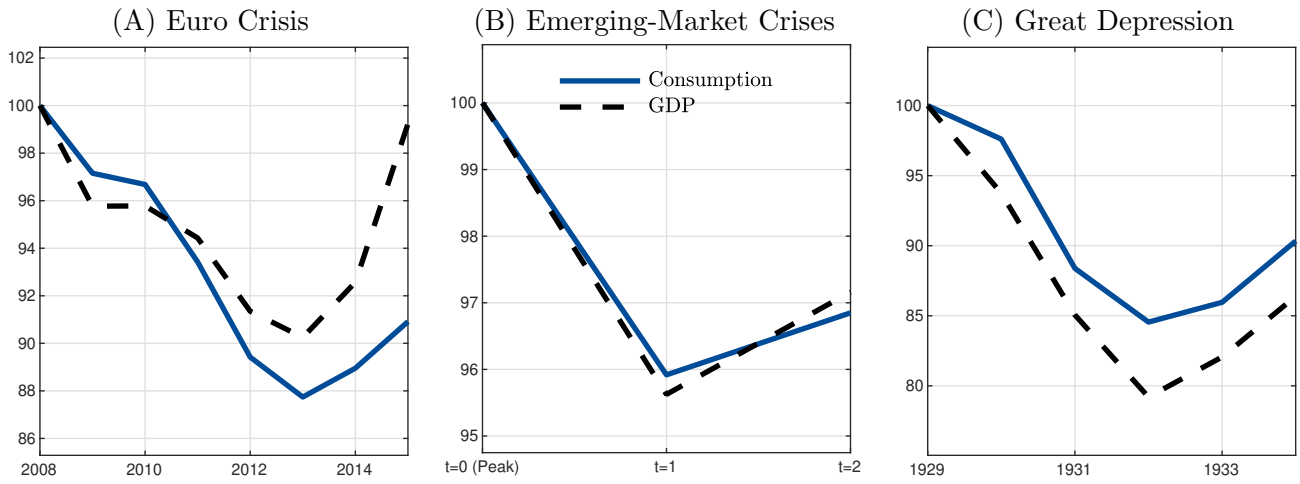
1. Introduction

The main crises in macroeconomic history tend to be characterized by large adjustments of aggregate consumption. Salient examples of these, depicted in Figure 1, include the recent Euro crisis, emerging-markets sudden stops, and the Great Depression. These episodes attracted significant attention from macroeconomists because of the lack of consumption smoothing relative to income, in apparent contrast to the predictions of canonical business-cycle theories.

Two main hypotheses have been proposed to date to explain the aggregate-consumption dynamics observed during these crises. One is a neoclassical view, which links consumption dynamics to changes in permanent income. This view argues that these crises involve a large contraction of households' permanent income, which leads to a sharp contraction of desired levels of consumption (Barro, 2006; Aguiar and Gopinath, 2007). Another view hinges on financial frictions, and argues that the tightening of credit market conditions prevents consumption smoothing during crises. For instance, theories based on collateral constraints argue that even transitory negative income shocks, when followed by a tightening of financial frictions, preclude households' consumption smoothing (see, for example, Mendoza, 2010; Eggertsson and Krugman, 2012). Distinguishing between these views plays a central role in policy design: While stabilization policies can be effective in the financial-frictions view of crises, their role is more limited when aggregate consumption dynamics is primarily driven by permanent income.

In this paper, we reassess this central debate in macroeconomics by studying the microlevel anatomy of large consumption adjustments. The central idea of the paper is that the two main classes of theories that explain aggregate consumption dynamics differ substantially in their microlevel cross-sectional predictions. On one hand, theories based on financial frictions predict that rich households with liquid assets should be able to smooth consumption, and experience a milder consumption adjustment during crises than would poor households. On the other hand, theories based on large and persistent fluctuations of income predict that rich households could experience large consumption adjustments during

Figure 1: Selected Episodes of Aggregate Consumption Adjustment During Crises



Notes: This figure shows the dynamics of real aggregate private consumption and real GDP for selected crises. Panel (A) shows the average of Greece, Italy, Ireland, Portugal, and Spain for the Euro crisis that started in 2008. Data source: WDI. Panel (B) shows the average of a set of 24 emerging market recession episodes since the 1980s that occurred during episodes of "systemic sudden stop," identified in Calvo and Ottonello (2016). Data source: WDI. Panel (c) shows the average of 16 Great Depression episodes starting in 1929, identified in Barro (2006). Data source: Barro and Ursua (2008). In all episodes, consumption and income are set to 100 at the peak before the recession.

crises, potentially similar to those of poor households. Using household microlevel data that cover several episodes of large consumption adjustment, we find that, consistent with the permanent-income view, households with high income and liquid assets adjust their consumption severely. This lack of consumption smoothing is ubiquitous across all types of households, which indicates that it would be hard to understand the dynamics of aggregate consumption in the absence of permanent income shocks during these episodes.

We begin by constructing a tractable heterogeneous-agent model of optimal consumption under income fluctuations in a small open economy. Households can borrow from the rest of the world using non-state-contingent bonds and face borrowing constraints. In addition, households face idiosyncratic income risk, which gives rise to heterogeneity that can be linked to the microdata. We then conduct two crisis experiments in this economy that capture the two main views on aggregate-consumption adjustments. The first experiment captures the permanent-income view of crises and consists of a permanent contraction in the

expected path of aggregate income. The second experiment captures the financial-frictions view of crises and consists of a transitory contraction in aggregate income accompanied by a tightening of borrowing constraints.

We show that these two views of crises differ sharply in their cross-sectional predictions. We first illustrate this with a particular case that can be solved analytically, and characterize the consumption responses of all households to a contractionary aggregate income shock. In the permanent-income-view experiment the consumption responses of all households have a unitary consumption-income elasticity. Since the aggregate shock is permanent, all households suffer a drop in their permanent income and adjust their consumption accordingly. This behavior stands in contrast to the consumption response of households in the financial-frictions-view experiment. In this case, consumption-income elasticities differ across households. Income-rich households display low elasticities that depend on the persistence of the aggregate shock. Income-poor households are more likely to be borrowing-constrained, and their consumption elasticities are determined by the tightening of the borrowing constraint during the crisis. Therefore, the behavior of income-rich households in response to an aggregate income shock differs across the two types of theories.

Motivated by the different predictions of the two views of aggregate consumption adjustments, we use microlevel expenditure and income data to document the cross-sectional patterns of consumption adjustment during these episodes. We focus on five episodes of large aggregate consumption adjustment over the last decades with available microlevel data on expenditure and income. The first two episodes are from the recent Euro crisis, a widely studied crisis in the international macro literature over the last decade. We focus on Italy and Spain, which were two countries at the epicenter that have available microlevel data on households' expenditure, income and assets. The other three episodes are from emerging-markets sudden stops. One corresponds to the Tequila crisis in Mexico, and the other two are the 2008-09 crises in Mexico and Peru, in the context of the global financial crisis. These episodes are also widely studied events in the sudden-stop literature and have available microlevel data. For each of these five crisis episodes, we measure consumption-income elasticities, from the peak to the trough of the crisis, for households with different levels

of income. All data sets contain disaggregated expenditure information, which allows us to measure nondurable consumption, and households' characteristics, which allow us to follow the standard practice in the consumption literature and residualize expenditure and income from observable characteristics.

Our main empirical result is the large consumption adjustment for top-income households. In all episodes, top-income households (e.g., top 10% or 5%) exhibit a consumption-income elasticity similar to or larger than the average consumption-income elasticity in the economy and close to 1. These large elasticities of high-income households are also observed within households with high levels of liquid assets and are ubiquitous: They are observed in young, middle-aged, and old households; households with different levels of education; households that are non-business owners and those that are; households engaged in all economic activities; and households in different geographic regions of the countries under analysis. Overall, our results indicate no consumption smoothing-type behavior for any household type, making it challenging to explain the microlevel household behavior during episodes of macro consumption adjustment based on tightening of credit conditions.

We then perform a quantitative analysis of the crisis experiments calibrated to the Italian economy. To facilitate the comparison between the two views, we perform the experiments as two different types of aggregate shocks that hit an economy with the same microlevel structure. The permanent-income-view experiment consists of a contraction on aggregate income that is expected to be of a permanent nature, with borrowing constraints unaffected. The financial-frictions-view experiment consists of a contractionary shock to aggregate income that is expected to be transitory but borrowing constraints are tightened as a consequence of the shock. In both cases, we parametrize the aggregate shocks to match the observed aggregate contraction in income and the average consumption-income elasticity in the episode. Therefore, both experiments are deliberately designed to explain the macro data.

Our main quantitative exercise consists of comparing the consumption-income elasticities along the income distribution for the two views of crises, with that observed in the data. In the Italian data, the crisis is characterized by a flat pattern of consumption adjustments,

with consumption-income elasticities close to one for all income deciles. These data patterns are in sharp contrast to model predictions under the financial-friction-view experiment in which there is a decaying pattern of elasticities along the income distribution, with richer households exhibiting more consumption smoothing. However, the data patters are closely aligned with predictions under the permanent-income-view experiment in which all households adjust their desired level of consumption in response to changes in their permanent income.

We conduct several extensions of our baseline model which shows that the comparison between crisis views and the data is robust to key features of the environment. First, we show that our results are robust to accounting for the observed negative revaluation of liquid assets that happened during the crisis, which is stronger for income-rich households and could in principle explain the large consumption adjustment of those households. Consistent with this result, in the data, we find that households with high and low wealth to income ratios exhibit similar consumption-income elasticities during crises. Second, we show that permanent-income view can also explain the patterns observed in emerging markets once we extend the model with non-homotheticities and account for the larger share of households close to subsistence levels of consumption observed in emerging economies, relative to the developed markets. We conclude that the permanent-income view of crises can go a long way in explaining both the macro- and micro-level patterns of consumption adjustment.

We argue that discerning between the views of macro adjustments has relevant implications for policy. We illustrate this by analyzing the effects of stabilization policies under the different crisis experiments. We show that the effects of these policies is significantly smaller under the permanent-income view of crises, than under the financial-frictions view. Our findings suggest the challenge that stabilization policies can face for dealing with crises that involve macro-consumption adjustments. To the extent that a large share of households optimally adjust their consumption in response to their lower expected path of income, fiscal transfers can be largely Ricardian.

Finally, it is worth stressing that the findings of our paper do not imply that financial frictions are not relevant for crisis dynamics. Rather, they suggest that their importance

can primarily come through how they persistently affect income, since the dynamics of consumption at the macro level can be largely understood through the permanent-income theory.

Related Literature Our paper contributes to three strands of the literature. First, to the literature that studies episodes of large aggregate consumption adjustments, which includes sudden stop episodes (Calvo, 1998, 2005; Calvo *et al.*, 2006); consumption disasters (Barro, 2006; Barro and Ursua, 2008); and economic depressions (Kehoe and Prescott, 2007). Methodologically, our paper is closer to papers that study micro-aspects of these episodes related to firm dynamics and misallocation, such as Gopinath and Neiman (2014) and Gopinath *et al.* (2017).[1] We contribute to this literature by analyzing the micro-anatomy during episodes of aggregate consumption adjustment, and argue how this can shed light on the theories that explain aggregate dynamics.

Second, our paper contributes the literature on international business cycles and capital flows (e.g., Backus *et al.*, 1992; Gourinchas and Rey, 2007). A central question in this area is whether financial integration and capital flows play a destabilizing role (e.g., Neumeyer and Perri, 2005; Mendoza, 2010; García-Cicco *et al.*, 2010) or help smooth consumption (e.g., Mendoza, 1991; Aguiar and Gopinath, 2007). We contribute to this literature by stressing that these two types of broad theories differ in their cross-sectional predictions, and showing that the micro patterns of consumption dynamics are in line with aggregate fluctuations driven by permanent shocks.

Finally, our paper is also related to the literature that studies households' heterogeneity. We build on the micro-level measurement used in this literature (see, for example, Blundell *et al.* 2008; Aguiar *et al.* 2020, and the work surveyed in Jappelli and Pistaferri 2017) as well as on macro models that incorporate households' heterogeneity (see, for example, Kaplan and Violante, 2018, and references therein). Methodologically, our paper is also related to recent work in this area using consumption microlevel data to inform macro theories (e.g.,

[1] Other related papers include Gourinchas *et al.* (2017) and Chodorow-Reich *et al.* (2019), who study the Greek economic depression, and Blaum (2019), Ates and Saffie (2020) and Castillo-Martınez (2020), who study firm dynamics during sudden-stop episodes.

Straub, 2018; Berger *et al.*, 2019). We contribute to this literature by analyzing the role of consumption heterogeneity in open economies.

The rest of the paper is organized as follows. Section 2 presents the theory and characterizes the consumption responses of households in response to an aggregate shock. Section 3 presents the empirical analysis. Section 4 performs a quantitative analysis of the baseline model and other model extensions. Section 5 analyzes the macroeconomic effects of stabilization policies. Section 6 concludes.

2. Theoretical Framework

In this section we lay out a model of large consumption adjustments with heterogeneous agents that serves as a guide to our empirical analysis.

2.1. Environment

We model a small open economy composed of a continuum of heterogeneous households. Each household has preferences defined over an infinite stream of consumption,

$$\mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t u(c_{it}), \tag{1}$$

where $u(\cdot)$ is increasing and concave, c_{it} denotes consumption of household i in period t, and $\beta \in (0,1)$ is the subjective discount factor. Each period, households receive an endowment of tradable goods y_{it}, given by

$$y_{it} = \mu_{it} Y_t, \tag{2}$$

where μ_{it} is the idiosyncratic component of endowment and Y_t is the aggregate endowment. We assume that μ_{it} is a stochastic process and, for the moment, we do not impose any structure to this process. We assume that Y_t follows a deterministic path, and study the

effects of unexpected aggregate shocks.[2]

Asset markets are incomplete, and households can save and borrow in a riskless bond that pays $1 + r$ in the following period, where r is the international interest rate. The household's budget constraint is given by

$$c_{it} = y_{it} + (1 + r)a_{it+1} - a_{it}, \tag{3}$$

where a_{it+1} are the household's i bond purchases in period t that pay in period $t+1$. Finally, we assume that households face the following borrowing constraint:

$$a_{it+1} \geq -\kappa f(Y_t), \tag{4}$$

where $\kappa > 0$, and $f(Y_t) \geq 0$ is a non-decreasing function. This general functional form associated to the borrowing constraint nests various cases commonly used in the literature. The case of $f(Y_t) = 1$ corresponds to a fixed debt limit typically used in Bewley models. The case of $f(Y_t)$ strictly increasing captures a financial amplification mechanism by which a recession tightens access to credit due to a fall in asset prices in general equilibrium. This mechanism has been widely studied in the macro-finance literature (see, for example, Kiyotaki and Moore, 1997; Bernanke *et al.*, 1999; Mendoza, 2010).

The household's problem is to choose state-contingent plans $\{c_{it}, a_{it+1}\}_{t=0}^{\infty}$ to maximize (1) subject to the budget constraint (3), the borrowing constraint (4), and the laws of motion that characterize the income stochastic process.

This model setup is well-suited to conduct crisis experiments that capture two central views of macro consumption adjustments. On the one hand, by varying only aggregate income we can capture theories that have attributed the large response of aggregate consumption during crises to changes in permanent income (as in, for example, Barro, 2006; Aguiar and Gopinath, 2007). On the other hand, by tightening borrowing constraints together with income, we can capture the view that attributes macro consumption adjustments

[2] As we show later, our results are unaffected if we study an economy with aggregate risk in which Y_t also follows a stochastic process.

to debt-deflation theories through which recessions reduce the value of collateral and tighten access to borrowing (as in, for example, Mendoza, 2002, 2010). We define these two crisis experiments in the context of our model below, and study the cross-sectional implications of these two views.

2.2. Consumption Dynamics During Output Contractions: An Analytical Case

To obtain an analytical characterization of individual consumption responses, in this section we make the following parametric assumptions.

Assumption 1a. *The period utility is given by* $u(c) = ac - bc^2$*, where* $a, b > 0$.

Assumption 1b. $\beta(1+r) = 1$.

The main results do not rely on these assumptions. In Section 4, we relax them and show that the quantitative results are aligned with the analytical characterization of this section. Given these assumptions, the Euler equation simplifies to

$$c_{it} = \mathbb{E}_t \left[c_{it+1} \right] - \lambda_{it},$$

where λ_{it} is the Lagrange multiplier associated to the borrowing constraint (4). Solving for consumption iterating forward we obtain

$$c_{it} = \underbrace{ra_{it}}_{\substack{\text{flow from} \\ \text{liquid assets}}} + \underbrace{\frac{r}{1+r}\mathbb{E}_t \left[\sum_{s=0}^{\infty} \frac{y_{it+s}}{(1+r)^s} \right]}_{\text{flow from permanent income}} - \underbrace{\frac{r}{1+r}\mathbb{E}_t \left[\sum_{s=0}^{\infty} \frac{\lambda_{it+s}}{(1+r)^s} \right]}_{\text{value of binging constraint in the future}} . \tag{5}$$

The optimal unrestricted consumption includes a flow from initial assets (first term) and a flow from the net present value of the permanent income (second term). The presence of the borrowing constraint may preclude attaining this level of consumption if there is a positive probability of a binding constraint in the future (third term).

Permanent-income view We first study a permanent aggregate income shock that does not affect the borrowing constraint, which we label the permanent income view of crises

(*PI view*). In this experiment, all households suffer a proportional drop in their permanent income. Hence, the optimal response for all households is to adjust consumption by approximately the same proportion as the drop in income.

We formalize this result in the following proposition that characterizes the consumption behavior of all households when the interest rate is sufficiently small. This condition on the interest rate allows for an analytical characterization by ensuring that the households' income that comes from liquid assets is sufficiently small. Later, in Section 4 we relax this assumption and find that the quantitative results are in line with the characterization of this particular case. Define the consumption-income elasticity as $\varepsilon_{cy} \equiv \lim_{r \to 0} \frac{\partial c_{it}}{\partial y_{it}} \frac{y_{it}}{c_{it}}$.

***Proposition* 1.** *Suppose that κ is sufficiently large, $f(Y_t) = 1$ and that aggregate income is at its steady-state level Y_{ss}. Assume that in period t the economy experiences an unexpected shock to aggregate income that is expected to be permanent, i.e., $Y_{t+h} = Y_t < Y_{ss}$. The optimal consumption response to this aggregate income shock has $\varepsilon_{cy} = 1$, for all μ_{it}.*

Proof. See Appendix A □

The proposition states that there are unitary consumption-income elasticities in response to a permanent aggregate income shock, for all households. The condition of the interest rate being sufficiently small ensures that the households' income that comes from liquid assets is sufficiently small. We come back to analyze the role of income from liquid assets in the Sections 3 and 4.

Financial-frictions view We then study a mean-reverting aggregate income shock that also tightens the borrowing constraints, which we label the financial-frictions view of crises (*FF-view*). In this case, the consumption response of households to a mean-reverting income shock is heterogeneous. While unconstrained households are able to smooth their consumption adjustment in response to the income shock, the households that are borrowing-constrained have to adjust their consumption as their credit access is tightened.

We formalize this result in the following proposition. Denote the elasticity of the borrowing constraint to aggregate income as $\varepsilon_{fY} \equiv f_Y(Y) \frac{Y}{f(Y)}$. Additionally, define constrained

households as those with $a_{it+1} = -\kappa f(\mu_{it}, Y_t)$, and permanently unconstrained households as those with $\lambda_{it+s} = 0$, for all $s \geq 0$ in equation (5).

***Proposition* 2.** *Suppose that aggregate income is at its steady-state level Y_{ss}. Assume that in period t the economy experiences a shock to aggregate income that is expected to be mean-reverting, i.e., $Y_{t+h} = \rho Y_t + (1-\rho)Y_{ss}$, with $0 < \rho < 1$.*

1. *The consumption-income elasticity of a constrained household i is increasing in the income elasticity of the borrowing constraint, i.e., $\varepsilon_{cy} = g_i(\varepsilon_{fY})$, with $g_i' > 0$. Additionally, when evaluated at initial debt at the borrowing constraint, $\varepsilon_{cy} \geq 1$.*

2. *The consumption-income elasticity of permanently unconstrained households has $\varepsilon_{cy} < 1$, decreasing in ρ and $\varepsilon_{cy} \to 0$ when $\rho \to 0$.*

3. *If μ_{it} is mean-reverting, the households with low (high) enough μ_{it} are constrained (permanently unconstrained).*

Proof. See Appendix A □

This proposition states that the consumption-income elasticity of constrained households is determined by the elasticity of the borrowing constraint to aggregate income. If access to credit tightens during a recession –in the model this would correspond to a high ε_{fY}– constrained households need to adjust their consumption by more than their drop in income. In contrast, the consumption-income elasticity of unconstrained households is smaller, and close to zero if the aggregate shock is transitory. The proposition also argues that, under the additional assumption of μ_{it} being mean-reverting, the households with low (high) enough idiosyncratic income are more (less) likely to be borrowing-constrained.

The case a high ε_{fY} captures the key mechanism through which financial-frictions models can account for episodes of large consumption adjustments. These theories endogenize how these episodes have associated contractions in asset prices, which tighten access to credit through a lower value of collateral (see, for example, Mendoza, 2010). The key difference is that prior theories, by working under the representative-agent framework, were able to

account for aggregate consumption patterns with this mechanism. What we stress in our heterogeneous-agents theory is that, if present, this mechanism is more likely to affect the agents that are close to the borrowing constraint.

Distinguishing between the two views A corollary of this analysis is that the prediction consumption responses across the distribution of households differ across theories, particularly for the income-rich households. Under the PI view, the consumption-income elasticity of the income-rich households is as large as the average elasticity, while under the FF view, it is lower than the average elasticity.

3. Empirical Analysis

We now document households' micro-level patterns during episodes of large adjustments of aggregate consumption. Section 3.1 describes the sample of episodes, data, and measurement strategy. Section 3.2 describes our main empirical results. Section 3.3 presents additional empirical analysis and discusses alternative interpretations of the results.

3.1. Data Description

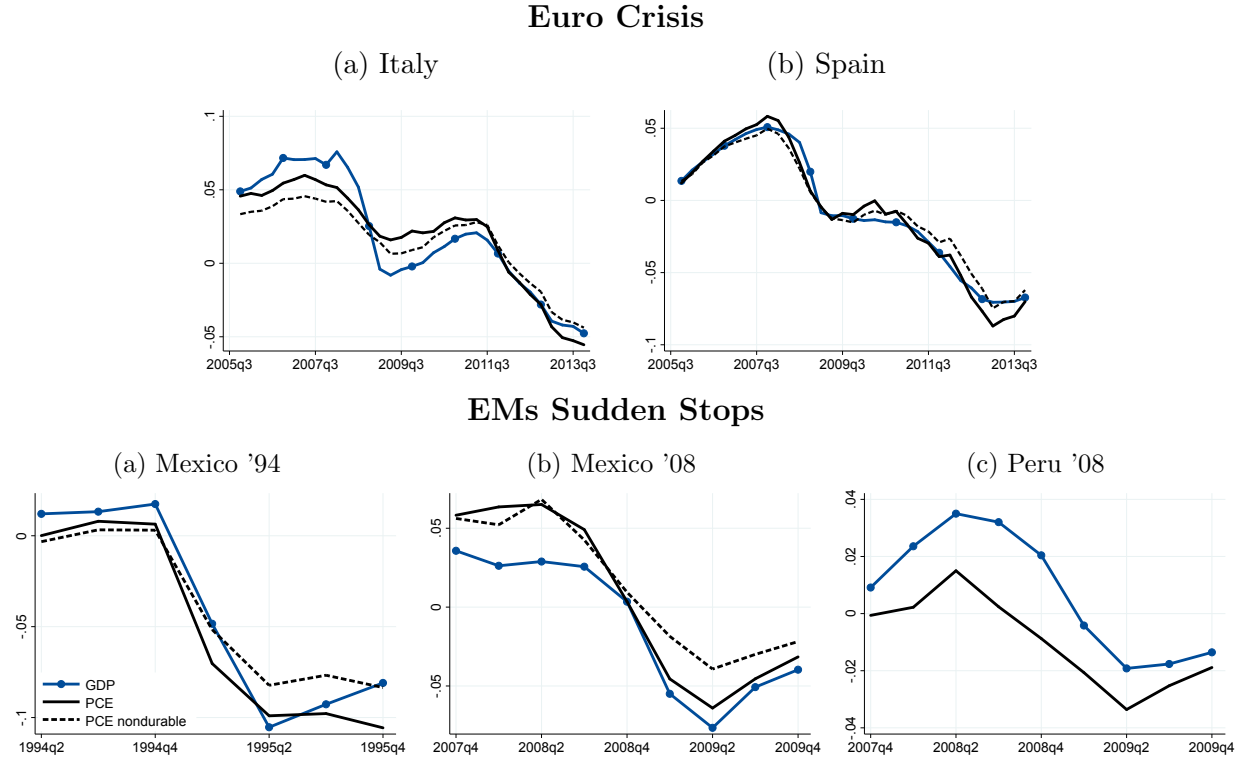
Sample of episodes and data sources Our empirical analysis includes five episodes of large adjustment of aggregate consumption, two episodes from the Euro crisis, and three episodes from emerging markets that have been identified in the literature of sudden stops.

The European countries included in the analysis are Italy and Spain, which have been at the epicenter of the Euro crisis. Panels (a) and (b) of Figure 2 depict the dynamics of output and consumption during these two episodes, with similar large adjustments of consumption and output. Both countries have rich microdata on households' expenditure and income, along with households' asset positions. In the case of Italy, these data come from a single consolidated survey (*Survey on Household Income and Wealth*). In the case of Spain, they come from two surveys collected by the National Statistical Institute and the Bank of Spain (*Encuesta de Prespuestos Familiares* and *Encuesta Financiera de las Familias*). Appendix

B provides a detailed description of variables, frequency, and coverage of the data.

The emerging economies included in the analysis are Mexico and Peru. These Latin American economies feature three widely studied episodes in the literature of sudden stops: the Mexican 1994 Tequila crisis and the 2008 recession in the context of the global financial crisis which affected both Mexico and Peru. Figure 2 shows that in all episodes, aggregate consumption exhibits sharp adjustments, tracking the dynamics of output.[3] For Mexico, the data come from the survey *Encuesta Nacional de Ingresos y Gastos de los Hogares*, and for Peru, from the survey *Encuesta Nacional de Hogares*.

Figure 2: Episodes Included in the Empirical Analysis: Macro-Consumption Adjustment



Notes: All variables are in per capita terms and log difference with respect to pre-crisis trend. Nondurable consumption includes nondurable goods and services. Further details in Appendix B. Data sources: OECD, FRED, INE Spain, INEGI Mexico, and INEI Peru.

[3]In these crises, Mexico experienced recessions with contractions of output above 10 p.p. from peak to trough relative to trend. Peru did not experience a contraction in output but a strong growth reversal. Before the global financial crisis, output per capita was growing at annual rates of around 6%–7%, but during the crisis growth reversed to 0%.

Measurement We are interested in analyzing the consumption-income elasticity for households with different incomes (as in our theoretical framework in Section 2). For this, we follow standard practices in the consumption literature (e.g., Blundell *et al.*, 2008) and residualize the measures of consumption and income by projecting these variables onto households' observable characteristics: number of family members, number of children in the household, gender, age, education of the household head, and geographic dummies (for details, see Appendix B.2). We also include time trends to detrend the series. Our baseline measure focuses on monetary nondurable consumption and monetary nonfinancial after-tax income; we analyze other categories of consumption and income in the robustness analysis.

Our theoretical results in Section 2, show that a useful statistic to distinguish between different theories of aggregate consumption adjustments is the consumption-income elasticity for different households in response to the aggregate shock. In the data, consumption and income move in response to aggregate and idiosyncratic shocks. To isolate the movements in response to the aggregate shock, we compute consumption-income elasticities by averaging consumption and income for households in different income groups. To the extent that the idiosyncratic component of these variables can be averaged out in each group, this statistic approximates the theoretical object of interest. More specifically, we measure consumption-income elasticities of households in income group j as $\hat{\varepsilon}^{j}_{cy} = \frac{\Delta_h \log \bar{c}_{j,\tau+h}}{\Delta_h \log \bar{y}_{j,\tau+h}}$, where $\bar{c}_{j,t} \equiv \frac{1}{n_{j,t}} \sum_{i \in \mathcal{I}_{j,t}} c_{i,t}$ and $\bar{y}_{j,t} \equiv \frac{1}{n_{j,t}} \sum_{i \in \mathcal{I}_{j,t}} y_{i,t}$ denote, respectively, the average (residualized) consumption and income of households in income group j in period t; $\mathcal{I}_{j,t}$ is the set of households in income group j; $n_{j,t}$ is the number of households in this group; τ is the peak of output during the episode; and h is the time interval of the output peak and trough in the episode.[4]

In Appendix C we also analyze other statistics, including the marginal propensity to consume and the average and median elasticities (for countries with available panel data)

[4]For each of the five episodes, we measure consumption-income elasticity in the window from the peak to trough of the aggregate detrended income constructed from survey data. The resulting dates are 2006 to 2014 for the Italian Euro Crisis; 2008 to 2013 for the Spanish Euro crisis; 1994 to 1996 for the Mexican Tequila crisis; 2006 to 2010 for the Mexican GFC; and 2007 to 2010 for the Peruvian GFC. These dates are also aligned with the evolution of aggregate output from national accounts, with the caveat that the survey from Mexico is available biannually.

for our sample of crises. As we show in that section, we focus on consumption-income elasticities based on averages across income groups because it is a particularly useful statistic to distinguish between macro theories of consumption.

3.2. Consumption Adjustment Across the Income Distribution

Panel (a) of Table 1 provides summary statistics of the adjustments in income, consumption, and the consumption-income elasticity, comparing the average across all income deciles with those of the top income decile. In all crisis episodes, income and consumption exhibits an average negative adjustment. The average elasticity across episodes ranges from 0.73 to 1.19, with a mean across episodes of 0.91. This implies large adjustments of consumption relative to income in these episodes, consistent with the behavior reported in the macro data. The main takeaway from this table is that income-rich households exhibit high consumption-income elasticities, which are close to the average consumption-income elasticity across all households. These range from 0.78 to 1.15, with a mean across episodes of 0.98. Therefore, income-rich households exhibit little consumption smoothing–a finding that appears to challenge the FF view of crises presented in Section 2, in which the consumption income-elasticity of income-rich households is lower than the average elasticity. However, the reported adjustment of income-rich households is consistent with the PI view of crises, in which their consumption-income elasticity is the same as the average.

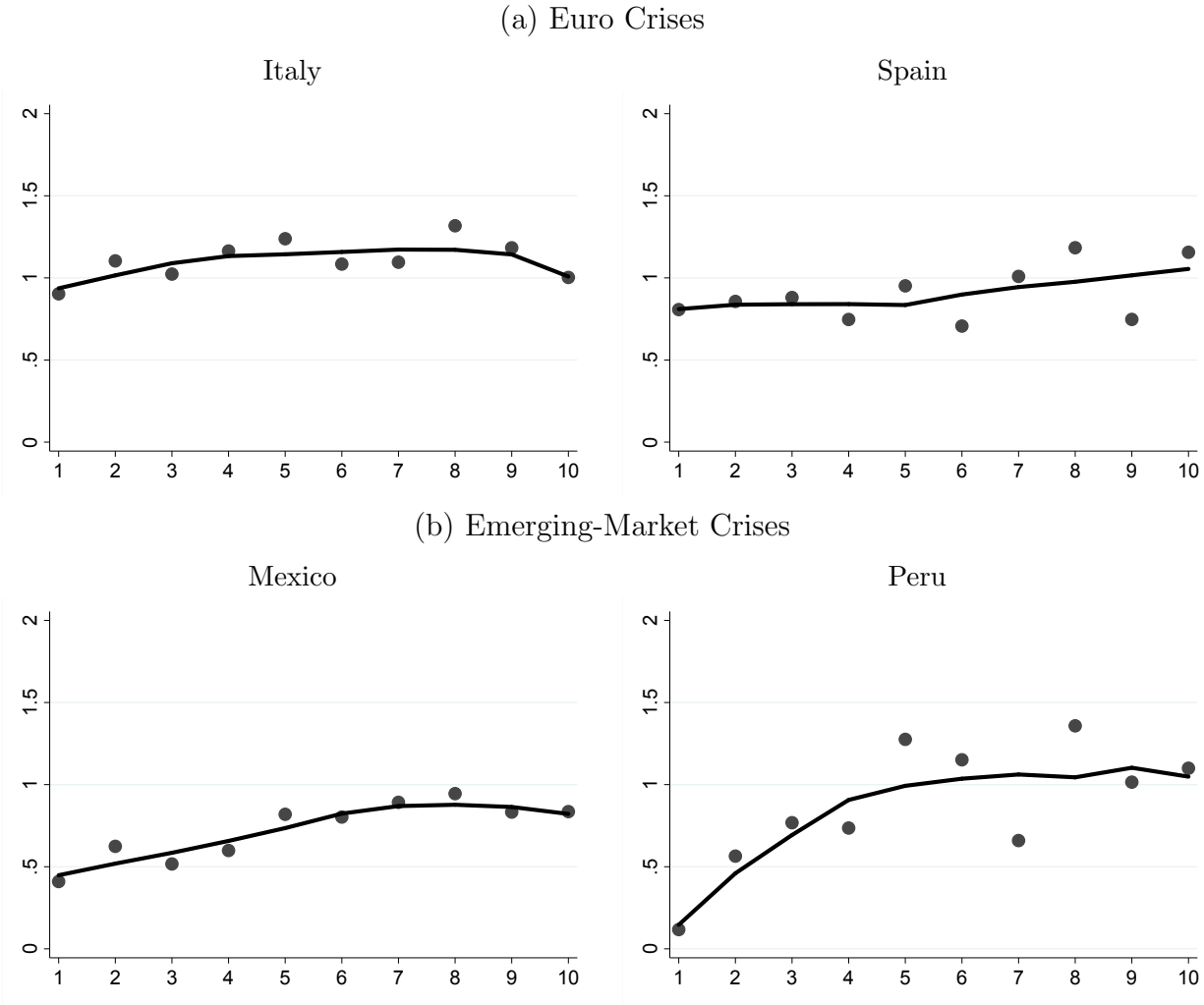
Table 1: Consumption-Income Elasticities: Average and Top-Income Households

		Euro Crises		Emerging-Market Crises			Average
		Italy	Spain	Mexico '94	Mexico '08	Peru '08	
All Households							
$\Delta \log Y$	Average	-0.15	-0.15	-0.38	-0.16	-0.09	-0.19
	Top-Income	-0.08	-0.12	-0.42	-0.19	-0.13	-0.19
$\Delta \log C$	Average	-0.18	-0.15	-0.29	-0.11	-0.08	-0.16
	Top-Income	-0.08	-0.14	-0.33	-0.17	-0.14	-0.17
Elasticity	Average	1.19	0.97	0.77	0.73	0.90	0.91
	Top-Income	1.00	1.15	0.78	0.89	1.10	0.98
Households with Liquid Assets							
$\Delta \log Y$	Average	-0.11	-0.13	-0.40	-0.12	-0.30	-0.21
	Top-Income	-0.12	-0.11	-0.43	-0.18	-0.21	-0.21
$\Delta \log C$	Average	-0.13	-0.13	-0.33	-0.07	-0.20	-0.17
	Top-Income	-0.12	-0.16	-0.35	-0.14	-0.19	-0.19
Elasticity	Average	1.15	1.00	0.83	0.65	0.68	0.86
	Top-Income	1.00	1.51	0.81	0.81	0.87	1.00
N Observations		7,060	21,802	13,138	27,105	21,170	90,275

Notes: Top-Income households are those in the highest decile of income. Income (Y) and consumption (C) are residualized from households' observable characteristics and time trends (see empirical model (7) in Appendix B for details). Elasticities are calculated as the ratio of the log change in consumption to the log change in income. Income categories are constructed using the residual income of the households. Income is defined as monetary after-tax nonfinancial income. Consumption includes nondurable goods and services. Further details in Appendix B. Data sources: SHIW-BI Italy, EPF-INE Spain, ENIGH-INEGI Mexico, ENAHO-INEI Peru.

Figure 3 complements this analysis by showing the consumption-income elasticity for different income deciles during the different crisis episodes. Panel (a) shows that Italy and Spain, during the Euro crisis, exhibit a flat pattern for consumption-income elasticity across the income distribution: For all deciles, consumption-income elasticities are close to one. This pattern of consumption-income elasticity is remarkably aligned with the prediction of the PI-view, derived analytically in Proposition 1 and studied quantitatively in the next section. Panel (b) shows the patterns of adjustments during emerging-market sudden stops. In these cases, the consumption-income elasticity is increasing in the income level. In Section 4.3, we show that the differential pattern of emerging markets can be explained in the context of the PI view of crises, if we extend the model to non-homothetic preferences and account for the share of households that are close to subsistence levels of consumption in these economies.

Figure 3: Consumption-Income Elasticities Across the Income Distribution



Notes: Income and consumption are residualized from households' observable characteristics and time trends (see empirical model (7) 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. Income is defined as monetary after-tax nonfinancial income. Consumption includes nondurable goods and services. Income and consumption are deflated by aggregate CPI index. Elasticities 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.

Appendix Table C.1 shows that the results presented so far are robust to several variants in the baseline measurement of the variables of interest. Panel (a) extends the baseline measures of elasticities for households in the top 5% of the income distribution. Panel (b) reports the elasticities without residualizing consumption and income (as described before,

our baseline measurement residualizes consumption and income from households' observable characteristics, following Blundell *et al.* (2008)). Panel (c) reports elasticities when we include all of the monetary components of consumption and income (our baseline measure excludes durable consumption and financial income). Finally, Panel (d) reports elasticities when all monetary and nonmonetary components of consumption and income are included (our baseline excludes nonmonetary components). In all of these variants we find results similar to those in the baseline, with income-rich households exhibiting high consumption-income elasticities similar to the average elasticity across income deciles.

3.3. Additional Empirical Results

Liquid assets The challenge our empirical results raise for the FF view of crises is that income-rich households, who in principle could smooth consumption, seem to choose not to do so. We further strengthen this point by analyzing the consumption adjustment of households with substantial amounts of liquid assets. In the spirit of Kaplan *et al.* (2014), we identify high-liquidity households as those with liquid assets that exceed 2 weeks of their income. For details on the method used to identify high-liquidity households in each country, see Appendix B. Panel (b) of Table 1 shows that income-rich income households with liquid assets exhibit a consumption-income elasticity of one, and close to average elasticity. This corroborates the claim that our results are not driven by the behavior of the "wealthy hand-to-mouth."

Another important point linked to asset holdings, is that if households have sufficiently high levels of wealth, their consumption adjustment during crises could reflect changes in the returns on wealth. Appendix Table C.2 shows that the elasticity of households with low income-to-wealth ratios, whose primary source of income is arguably not the returns on wealth, also exhibit elasticities close to one.

Consumption baskets So far our analysis has focused on aggregate measures of non-durable consumption for all households. Motivated by the fact that households with different levels of income have different consumption baskets, we analyze consumption-income

elasticities for narrower and more comparable consumption baskets. In particular, Tables C.3 and C.4 report the elasticities for durable and non-durable, luxury and non-luxury and tradable and non-tradable goods. Appendix B.2 provides a definition of each of the consumption categories. Although results indicate heterogeneous elasticities across consumption categories–e.g., luxury goods have larger elasticities than non-luxury goods–overall we do not find consistently different elasticities between income-rich households and average elasticity.

Another dimension that heterogeneous consumption baskets introduce is the differential price dynamics these baskets may have during crises, as documented by Cravino and Levchenko (2017). Table C.5 reports consumption-income elasticities using deflators specific to each income decile, and show results similar to the baseline with high consumption-income elasticities for income-rich households.

Where are the smoothers? Given the lack of consumption smoothing for the top-income households documented in previous subsections, we now ask more broadly whether there exists any type of household in the data that exhibits the consumption-smoothing behavior that a model with transitory aggregate shocks would predict. Tables 2 report consumption-income elasticities for households with different levels of education, age, sector, geographic location, and business ownership. We find high consumption-income elasticities for young, middle-aged, and old households; for households with low and high levels of education; for households that are non–business owners and for those that are; for households working in all economic activities; and for households living in all geographic regions of the countries we analyze. We conclude the empirical section by asking the question: If macro crises of aggregate consumption adjustment are driven by transitory shocks, where are the households' smoothers these models predict?

Table 2: Where are the Smoothers?
Consumption-Income Elasticities by Households Characteristics

	Euro Crises		Emerging-Market Crises			Average
	Italy	Spain	Mexico '94	Mexico '08	Peru '08	
Age Groups						
≤ 35	1.22	0.79	0.71	0.70	1.05	0.87
$35 >$ and ≤ 50	1.30	0.96	0.82	0.76	0.93	0.96
> 50	0.96	1.19	0.77	0.69	0.69	0.87
Education Level						
Low	1.31	0.91	0.77	0.70	1.32	1.00
High	1.10	1.02	0.70	0.75	0.76	0.87
Firm Ownership						
Yes	1.49	1.74	0.69	0.96	1.32	1.24
No	1.13	0.93	0.79	0.59	0.83	0.86
Home Ownership						
Yes	1.41	1.05	0.80	0.70	0.87	0.97
No	0.92	0.80	0.65	0.76	0.80	0.79
Geographic Location						
Large Population	1.43	0.87	0.82	0.78	0.81	0.94
Low Population	0.95	1.10	0.68	0.59	0.98	0.86
Sector						
Primary	1.10	0.92	0.71	0.68	0.77	0.87
Industry	1.13	0.92	0.75	0.68	0.79	0.85
Services	1.19	1.03	0.80	0.75	0.97	0.99
N Observations	7,060	21,802	13,138	27,105	21,170	90,275

Notes: This table shows consumption-income elasticities by age, education, ownership, geography, and sector. Elasticities are calculated as the ratio of the log change in consumption to the log change in income. Income and consumption are residualized from households' observable characteristics and time trends (see empirical model (7) in Appendix B for details). Income is defined as monetary after-tax nonfinancial income. Consumption includes nondurable goods and services. Age, education, and sector are from the household head. Categories are constructed such that they are comparable across countries. Industry is composed of manufacturing and construction sectors. Further details in Appendix B. Data sources: SHIW-BI Italy, EPF-INE Spain, ENIGH-INEGI Mexico, ENAHO-INEI Peru.

4. Quantitative Analysis

So far, our comparison of two views of crises has been qualitative. In this section, we perform a quantitative analysis of the model and contrast its predictions with observed data. We show that the permanent income view of crises can account for the observed patterns of

consumption adjustment, and this is robust to various model extensions.

4.1. Quantitative Strategy

Our quantitative strategy proceeds in two steps. We first calibrate the steady state of the model described in Section 2, to match key features of the micro data. Second, we introduce aggregate shocks that capture the macro dynamics in each of the two views of crises. We focus on unexpected aggregate shocks that hit the same economy in the steady state, which facilitates comparison of two views of crises. In Appendix D, we show that similar results are obtained if we analyze economies with aggregate risk. Our main calibration is for Italy, which is the country in our sample with the richest micro data. In Section 4.3 we also perform the quantitative analysis for an emerging economy.

Steady-state calibration A period is a year. For functional forms, we pick a CRRA, period utility $u(c) = c^{1-\gamma}/(1-\gamma)$, and an autoregresive idiosyncratic income in logs

$$\ln \mu_{it} = \rho_\mu \ln \mu_{it-1} + \sigma_\mu \epsilon_{it}, \qquad \epsilon_{it} \sim N\left(-\frac{\sigma_\mu}{2(1+\rho_\mu)}, 1\right).$$

In the steady state, since there are no aggregate shocks, we normalize $f(Y_{ss}) = 1$. Our model then features six parameters, $\{\beta, \gamma, r^*, \kappa, \rho_\mu, \sigma_\mu\}$, whose values are detailed in Table 3. In the calibration, we fix the coefficient of relative risk aversion to $\gamma = 2$ and the annual risk-free rate to $r^* = 0.01$, which are standard values used in the literature. We estimate the parameters that drive the idiosyncratic income process, ρ_μ and σ_μ, using micro-level data and obtaining values of $\rho_\mu = 0.94$ and $\sigma_\rho = 0.18$. We then calibrate the discount factor β and the fixed borrowing limit κ to target key moments in the data: The average wealth-to-income ratio, the proportion of hand-to-mouth consumers, and the Gini coefficient of wealth. Values for these data moments are detailed in Table 4. The model approximates these moments fairly well with $\beta = 0.93$, $\kappa = 0.25$.

Table 3: Model Parameters

Parameter		Value
Dicount factor	β	0.93
Risk aversion coefficient	γ	2.00
Risk free interest rate	$r*$	0.01
Persistence of idiosyncratic income	ρ_μ	0.94
Volatility of idiosyncratic income	σ_μ	0.18
Borrowing constraint	κ	0.25

We assess the model's ability to reproduce certain untargeted moments related to the distribution of liquid wealth and income. Table 4 reports a set of moments in the data which are well approximated in the model.

Table 4: Targeted and Untargeted Moments

Variable	Model	Data
Targeted		
Wealth-to-Income ratio	0.91	0.92
Hand-to-Mouth share	0.34	0.36
Gini index wealth	0.61	0.72
Non-Targeted		
Wealth share bottom 75	-0.01	0.17
Wealth share top 10	0.71	0.63
Wealth share top 5	0.49	0.49
Gini index income	0.31	0.34
Income share bottom 75	0.48	0.56
Income share top 10	0.25	0.23
Income share top 5	0.16	0.13

Notes: This Table compares model-simulated moments with those observed in the data. Wealth-to-Income ratio refers to the average ratio of liquid wealth to annual income. Hand-to-Mouth share refers to the share of households with liquid assets that are less than two weeks of income. Data source: HIW-BI Italy.

Crisis experiments We perform two experiments that capture the two views of crises described in the theory section, each as an unexpected aggregate shock. We design both experiments to mimic the same macro dynamics of the crises and study the implied untargeted micro-level responses. In both experiments, the economy at $t = 0$ experiences a contraction

in aggregate income of the same magnitude, ϵ_Y, which we calibrate to match the contraction of income during the crisis. The two experiments differ in the expected persistence of this shock, and in how it affects individuals' access to credit markets.

In the PI view of crises, the shock to aggregate income is expected to be of a permanent nature and borrowing constraints are unaffected. This experiment is close to that considered in Barro (2006) to explain consumption disasters and asset prices, and in Aguiar and Gopinath (2007) to explain the excess sensitivity of consumption in emerging economies. In particular, in this economy the expected evolution of aggregate income follows $\log Y_t = \log Y_{t-1} + \rho_g^t \epsilon_Y$. This means that the original shock is akin to a persistent shock to the growth rate, as in Aguiar and Gopinath (2007), and we calibrate its persistence, ρ_g, to match the aggregate consumption-income elasticity. Panel (a) of Figure C.2 shows how the persistence of the growth shock is identified by the aggregate consumption-income elasticity. The calibrated values are $\epsilon_0^g = -0.2$ and $\rho_g = 0.22$. Panel (a) of Figure C.1 shows the dynamics of aggregate income in this experiment.

In the FF view of crises, the shock to aggregate income is expected to be transitory but borrowing constraints are tightened as a consequence of the shock. In particular, in this experiment the expected evolution of aggregate income follows $\log Y_t = \rho_Y^t \epsilon_Y$, with $\rho_Y = 0.9$, the average persistence of output in the economy.[5] We parameterize the evolution of the borrowing constraint by $f(Y_t) = Y_t^\nu$. This parameterization captures theories of endogenous borrowing constraints that are at the heart of the financial-frictions view of crises, as in (Mendoza, 2002, 2010). We calibrate the sensitivity of the borrowing constraint to income, $\nu = 5$, to match the aggregate consumption-income elasticity. Panel (b) of Figure C.2 shows how the income elasticity of the borrowing constraint is identified by the aggregate consumption-income elasticity. Panel (b) Figure C.1 shows the evolution of income and the borrowing constraint in this experiment.

It is worth pointing out that the focus on unexpected aggregate shocks is aimed at facilitating the comparison between the two views of crises by analyzing different perturbations

[5]This persistence is estimated following the standard procedure in the business cycle literature of estimating an autoregressive process on detrended output at an annual frequency.

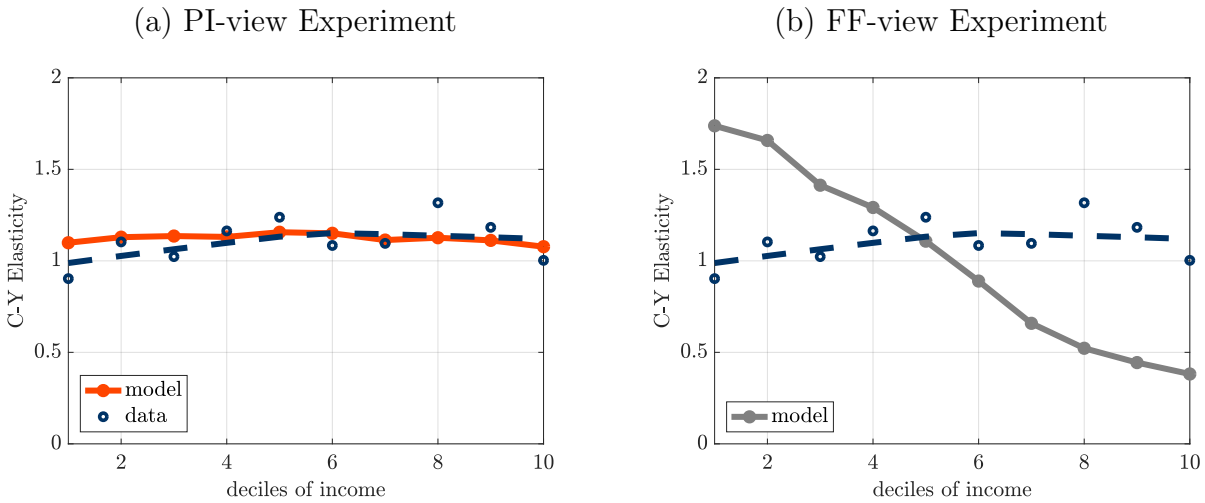
of an economy that has the same micro-structure. In Appendix D, we extend our analysis to economies with aggregate risk.

4.2. The Micro-Anatomy of Consumption Responses: Model and Data

We now analyze the cross-sectional implications for the behavior of consumption in each of the crisis experiments and compare them with the data. We replicate the same data statistics in the model-simulated data by computing consumption-income elasticities for different deciles in the initial period of the aggregate shock. We provide further details on these computations in Appendix D, and report the model's predictions for alternative ways to compute the consumption-income elasticities and obtain results similar to those reported in this section. We also report model's predictions for marginal propensities to consume– which, we argue, are not as informative as the elasticities for distinguishing between the different views of aggregate consumption crises.

Figure 4 shows how the crisis experiments significantly differ in their cross-sectional predictions. In the PI-view experiment, the elasticities are close to 1 for all income deciles, because the aggregate shock is permanent and affects the permanent income of all households. These elasticities are in line with those predicted in Proposition 1, even after relaxing the assumptions made for tractability. In the FF-view experiment, consumption-income elasticity is decreasing in households' income. This is because the tightening of borrowing constraints that occurs during the crisis is more likely to affect the consumption allocation of income-poor households, which were closer to the constraint before the shock. By contrast, income-rich households can smooth their consumption in response to their transitory negative income shock by using their assets or borrowing.

Figure 4: Consumption-Income Elasticities: Model Analysis



Notes: This Figure shows the consumption-income elasticities for different income deciles in the Italian crisis (described in Section 3), and in the crisis experiments of the model calibrated for Italy (described in Section 4). Panel (a) shows the permanent-income-view experiment and Panel (b) shows the financial-frictions-view experiment. Elasticities are computed using the average income and consumption by decile, and it is 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 4 also compares the model predictions with the data. The PI-view experiment is remarkably close to the data, particularly in its ability to predict the large consumption-income elasticities of income-rich households. In this dimension, the FF-view experiment faces a challenge in explaining the micro-level patterns. In the remainder of this section, we show that this challenge persists in alternative specifications of the model environment, which include accounting for liquid and iliquid wealth valuations and for allowing for alternative income processes and alternative preferences. We show that in these extensions, the predictions of the PI-view are still aligned with observed data. We conclude that the PI view can go a long way toward explaining the micro- and macro-level patterns of consumption during crises.

4.3. Model Extensions

Accounting for asset valuations One simplifying feature of our model is the availability of a riskless bond with which agents can save or borrow. While this can be a reasonable

representation of a large share of households in the economy, it is less so for households at the top of the income distribution. Income-rich households invest part of their financial assets invested in equities and risky bonds. During economic crises the prices of these assets tend to suffer significant contractions, causing negative wealth revaluations for the income-rich households. This, in turn, can potentially lead to large consumption-income elasticities among those households.

We include asset revaluations as an unexpected shock that affects households heterogeneously, depending on their portfolio of financial assets.[6] In particular, we now introduce wealth revaluation into each of the crisis experiments. In addition to the aggregate negative income shock and tightening of borrowing constraint (the later in the FF-view experiment) we now assume that households' wealth drops by $\Delta p_{it} a_{it}$, where we estimate Δp_{it} and a_{it} from observed data.

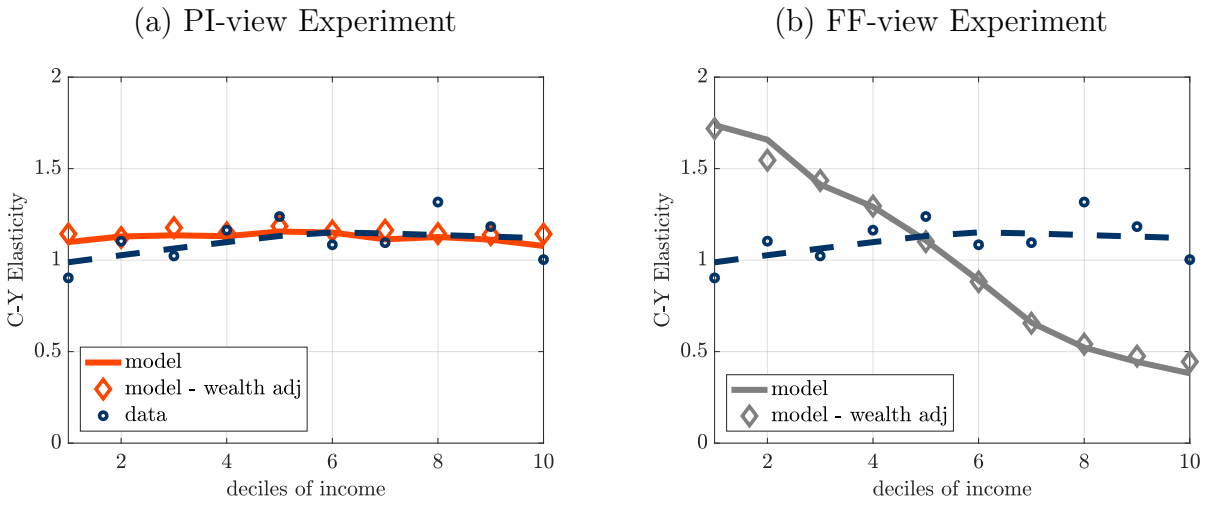
We take the level of initial financial wealth from the observed data. To estimate household-specific asset price changes, we first measure the portfolio of financial assets and separate assets into bank deposits, fixed income and mutual funds, and equity. We then compute the dynamics of the prices of these three asset classes. Given that the income-rich households have a larger incidence of equity in their wealth, they suffer larger wealth revaluations (see Panel (a) of Figure C.3). We then impose the estimated wealth revaluations as an unexpected drop in assets for each household, and compute consumption-income elasticities.

Figure 5 shows the model-implied consumption-income elasticities for households in different income deciles, after we incorporate asset valuations. The estimated drop in wealth valuation precipitates larger elasticities. However, the effects are quantitatively small. Only for households in the top income decile do we observe significantly larger elasticities compared with those predicted by the model without revaluation effects. The reason is that financial wealth is small relative to income. The average stock of financial wealth ranges between 20% and 30% of annual income for households in different income deciles (see Panel (b) of Figure C.3). This, combined with the fact that households optimally choose to consume a

[6] An interesting model extension, which goes beyond the scope of this paper, is to include a portfolio choice among different assets in our heterogeneous-agents model. Our approach is a good first estimate of how much extra drop in consumption asset valuations can precipitate.

flow out of their wealth, implies that the consumption effect of wealth revaluations is small, in spite of the revaluations being large. These exercises indicate that our main conclusions regarding the ability of the two views of macro crises to account for micro-level patterns is not affected by asset revaluations.

Figure 5: Model Extensions: Accounting for Asset Valuations



Notes: This figure shows the consumption-income elasticities for different income deciles in the Italian crisis (described in Section 3), and in the crisis experiments of the model calibrated for Italy (described in Section 4). Panel (a) shows the permanent-income-view experiment and Panel (b) shows the financial-frictions-view experiment. Each panel shows the baseline experiments, presented in Figure 4, and those in the model extended with asset revaluations. Elasticities are computed using the average income and consumption by decile, and it is 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.

Emerging markets and the role of non-homotheticities So far, our quantitative exercises have focused on the case of Italy. In this section, we study the extent to which our conclusions on the two views of crises extend to emerging markets. The case of emerging markets is interesting, because our empirical evidence regarding consumption-income elasticities along the income distribution, shown in Figure 3, indicate an increasing pattern, with rich income households adjusting more than the mean. Although in principle these patterns would be challenging for both models, we show that a simple extension that incorporates the non-hometicities can account for both the flat pattern in developed economies and the increasing pattern in emerging economies.

Our extended model with non-homoteticities features Stone–Geary preferences given by

$$u(c_{it}) = \frac{(c_{it} - \underline{c})^{1-\gamma}}{1-\gamma},$$

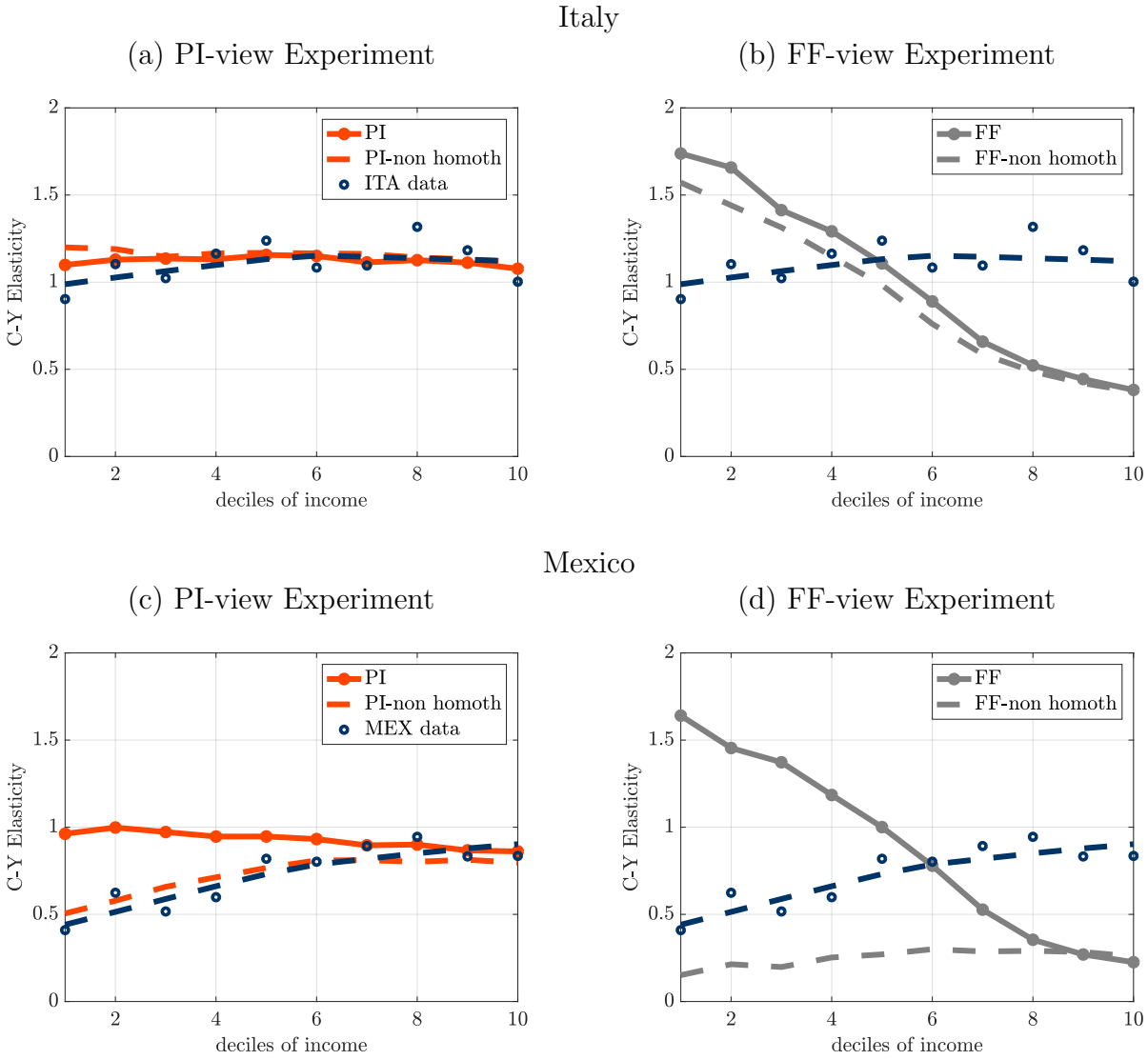
where $\underline{c}$ is a subsistence level of consumption. This source of non-homotheticities introduces a strong desire to smooth consumption for households with close-to-subsistence levels of consumption, and has therefore a chance of explaining why low-income households can exhibit low consumption-income elasticities. Moreover, this mechanism can be particularly relevant in emerging economies, in which there is a large share of households close to the subsistence level.

We perform two calibrations of the extended model with non-homoteticities, one for Italy and the other for Mexico. In both calibrations we parameterize $\underline{c}$ to target the share of households that are close to the consumption subsistence level. We focus on a moment that we can measure similarly in the model and the data. In the data, countries report a share of households with income below its *indigence* level. In the model we set the value of $\underline{c}$ to the threshold of income that has the same share of households with income below that threshold. For Italy, we recalibrate the parameters of the model, β, κ to match the same statistics in our baseline calibration. For Mexico, we follow the same calibration strategy with details presented in Appendix D.

We then reproduce both crisis experiments in the two calibrated economies with non-homotheticities.[7] The results, shown in Figure 6, indicate that the model-predicted elasticities in the PI-view is aligned in the case of both Italy and Mexico with those observed in the data. The figure shows that non-homotheticties are particularly relevant in the case of Mexico to account for the increasing patterns observed in the data. In Italy, since the share of poor households is small (1% compared to 16% in Mexico, according to our measure), the results of the model with non-homotheticities are close to the baseline model.

[7]Following the baseline calibration strategy, in both economies we recalibrate the aggregate shocks to match the same targeted moments, namely, the aggregate consumption-income elasticity and the drop in aggregate income.

Figure 6: Model Extensions: Accounting for Non-Homoteticities



Notes: Panels (a) and (b) shows the consumption-income elasticities for different income deciles in the Italian crisis (described in Section 3), and in the crisis experiments of the model calibrated for Italy (described in Section 4). Panel (a) shows the permanent-income-view experiment and Panel (b) shows the financial-frictions-view experiment. Each panel shows the baseline experiments, presented in Figure 4, and those in the model extended with non-homotheticities. Panels (c) and (d) show identical variables for the Mexican crisis and for the model calibrated to Mexico. Elasticities are computed using the average income and consumption by decile, and it is 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 and ENIGH-INEGI Mexico.

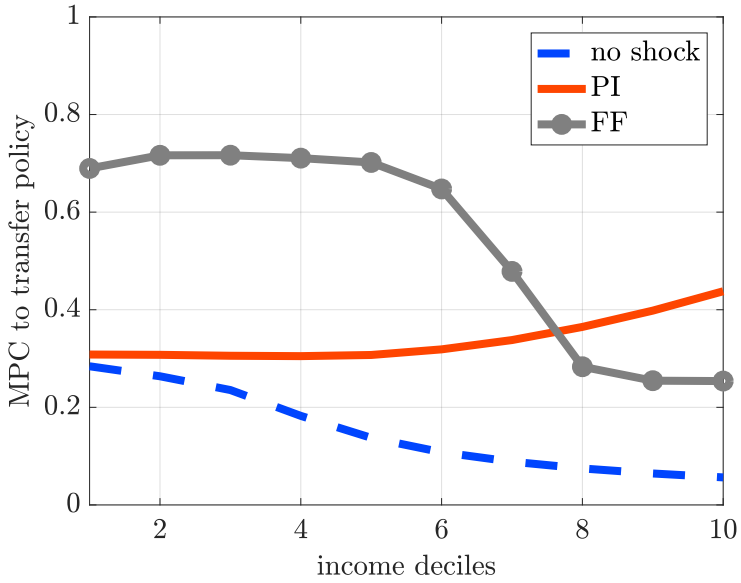
5. Policy Implications

In this section we assess the effects of stabilization policies through fiscal transfers under each of the crisis experiments. We consider the effects of a one-time transfer T_0 to households during the crisis period, financed with external public debt, and assume that after the crisis period the government levies a flat lump-sum tax on all households to repay the interest on public debt, i.e., $T_t = -T_0 r$ for all $t > 0$. In Appendix E, we provide more details on agents' optimization problems under these policies and show that our results are robust to alternative transfer schemes with different degrees of progressivity.

We study the response of households' consumption to this policy under the PI-view experiment and the FF-view experiment, and compare their effects to the effect this policy would have, starting from the steady state. The logic of this comparison is to analyze whether "stabilization policies," defined as policies that are conducted during crises, have a larger effect on consumption than they would during normal times. Figure 7 shows responses to the transfer for different households in the income distribution.[8] In all policy experiments, the consumption response is decreasing in the level of households' income, because the response is governed by the proximity of households to the borrowing constraint. In the PI-view, the response during crises is similar to the steady-state response. In the FF-view, the response during crises is larger than the steady-state response because the aggregate shock tightens the constraint. Overall, these results show remarkable differences in how effective stabilization policies are depending on the nature of crises, which highlights the relevance of distinguishing between the two views of crises for policy design.

[8] We define the consumption response as the percent difference in consumption with and without the policy.

Figure 7: Policy Analysis: Consumption Responses to Fiscal Transfers



Notes: The figure shows the marginal propensity to consume from a one time transfer across the income distribution. The blue dashed line corresponds to the MPCs when the policy is conducted in the steady state, the solid orange line corresponds to the MPCs when the policy is conducted during the PI-view crisis experiment, and the grey marked line when it is conducted during the FF-view crisis experiment.

6. Conclusion

In this paper, we studied the micro-level anatomy of crisis episodes characterized by large adjustments of aggregate consumption, including the recent Euro debt crisis and emerging-market sudden stops. These episodes have received wide attention in both policy and academic circles due to their lack of consumption smoothing, which is in sharp contrast to the predictions of canonical business-cycle theories.

Our starting point is the two main theories that have emerged from this fruitful but far from settled debate: One theory argues that negative income shocks are followed by tightening of financial frictions, which hamper these economies' consumption smoothing in bad times. The other theory argues that crises are characterized by large and persistent fluctuations in permanent income, which cause households to optimally adjust consumption even in the absence of a tightening of financial conditions. Constructing a heterogeneous-

agent version of these theories, we show that, while the two are similar in their aggregate patterns, they differ substantially in their microlevel cross-sectional predictions. We then use household micro-level data during several crisis episodes and find that, consistent with the permanent-income view, households with high income and liquid wealth severely adjust their consumption. Our findings do not imply that financial frictions are not relevant for crisis dynamics. Rather, they suggest that their importance can primarily come through how they persistently affect income, since the dynamics of consumption at the micro and macro levels can be understood a long way through the permanent-income view of crises.

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Appendices

A. Omitted Proofs and Results

A.1. Proof of Proposition 1

Since κ is sufficiently large, the borrowing constraint never binds, which implies that (5) simplifies to

$$c_{it} = ra_{it} + \frac{r}{1+r}\sum_{s=0}^{\infty}\frac{\mathbb{E}_t\left[\mu_{it+s}\right]\mathbb{E}_t\left[Y_{t+s}\right]}{(1+r)^s}. \tag{6}$$

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

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

where we used the assumption that $\mathbb{E}\left[Y_{t+s}\right] = Y_t$ for all $s \geq 0$. This implies that the elasticity is given by

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

Taking limits when $r \to 0$ and using again the assumption that $\mathbb{E}\left[Y_{t+s}\right] = Y_t$ yields $\varepsilon_{cy} = 1$.

A.2. Proof of Proposition 2

We start by showing the first result. Consider the consumption of a constrained household, which is given by

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

The marginal propensity to consume of this household is given by

$$\frac{\frac{\partial c_{it}}{\partial Y_t}}{\frac{\partial y_{it}}{\partial Y_t}} = \frac{\mu_{it} + \kappa f_Y(\mu_{it}, Y_t)}{\mu_{it}},$$

where f_Y denotes the derivative of f with respect to Y. The consumption-income elasticity is given by

$$\begin{aligned}\frac{\frac{\partial c_{it}}{\partial Y_t}}{\frac{\partial y_{it}}{\partial Y_t}} \frac{y_{it}}{c_{it}} &= \frac{\mu_{it} + \kappa f_Y(\mu_{it}, Y_t)}{\mu_{it}} \frac{\mu_{it} Y_t}{\mu_{it} Y_t + (1+r) a_{it} + \kappa f(\mu_{it}, Y_t)}, \\ &= \frac{\frac{y_{it}}{\kappa f(\mu_{it}, Y_t)} + \varepsilon_{fY}}{\frac{y_{it} + (1+r) a_{it}}{\kappa f(\mu_{it}, Y_t)} + 1}.\end{aligned}$$

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

$$\varepsilon_{cy}|_{a_{it} = \kappa f(\mu_{it}, Y_t)} = 1 + \frac{\kappa f(\mu_{it}, Y_t)}{y_{it}} \varepsilon_{fY} \geq 0.$$

We now show the second result. The elasticity of permanently unconstrained households is given by

$$\begin{aligned}\frac{\frac{\partial c_{it}}{\partial Y_t}}{\frac{\partial y_{it}}{\partial Y_t}} \frac{y_{it}}{c_{it}} &= \frac{\frac{r}{1+r} \sum_{s=0}^{\infty} \frac{\rho^s \mathbb{E}_t[\mu_{it+s}]}{(1+r)^s}}{\mu_{it}} \frac{\mu_{it} Y_t}{\left(r a_{it} + \frac{r}{1+r} \sum_{s=0}^{\infty} \frac{\mathbb{E}_t[\mu_{it+s}] \mathbb{E}_t[Y_{t+s}]}{(1+r)^s} \right)}, \\ &= \frac{\frac{r}{1+r} \sum_{s=0}^{\infty} \frac{\rho^s \mathbb{E}_t[\mu_{it+s}]}{(1+r)^s}}{\mu_{it}} \frac{\mu_{it} Y_t}{\left(r a_{it} + \frac{r}{1+r} \sum_{s=0}^{\infty} \frac{\mathbb{E}_t[\mu_{it+s}] \left(\rho^s Y_t + (1-\rho^s) \overline{Y} \right)}{(1+r)^s} \right)},\end{aligned}$$

where in the second line we use the assumption that $\mathbb{E}_t[Y_{t+h}] = \rho Y_t + (1-\rho)\overline{Y}$. Taking limits when $r \to 0$, we obtain that $\varepsilon_{cy} < 1$ and that $\varepsilon_{cy} = 0$ when $\rho = 0$.

Finally, we 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 (6). It can be verified that if μ_{it} is mean-reverting (i.e., $\mathbb{E}_t[\mu_{it+1}] = \rho_\mu \mu_{it} + (1 - \rho_m u)\overline{\mu}$), then

$\frac{\partial c_{it}^{unc}}{\partial \mu_{it}} \leq 1$. Denote the minimum level of income as $\underline{y}$, then there exist a cutoff level of income such that, if current income is larger than this value, then 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.

B. Data

B.1. Macro Data Description

For our aggregate analysis we use GDP as our measure of aggregate income, Personal Consumption Expenditure (PCE) and nondurable PCE including services as our aggregate consumption measures. To compute the aggregate series we log detrend each country-variable, i.e. $x_t^i = \ln(X_t^i) - \beta t$ for country i variable X, for a sample period consistent with the micro data sample period. For example, we detrend GDP of Mexico from 1992 to 2014 which are the dates we use for our micro data estimates.

Italy and Spain. National accounts data and annual population estimates are from OECD. GPD, PCE and nondurable PCE are in seasonally adjusted quarterly basis in chained volume terms at national reference year (LNBQRSA). To transform the series to per capita terms we interpolate linearly annual population. The detrending period for Italy is from 1995 to 2016 and for Spain is from 2006 to 2018.

Mexico. National accounts data is from OECD and annual population estimates from FRED. GDP is quarterly seasonally adjusted in real terms using national base year (VNBQRSA), while PCE and nondurable PCE are quarterly non-seasonally adjusted in real terms using national base year (VNBQR). We remove seasonal components of PCE and nondurable PCE using JDemetra+ X-12 ARIMA method. To transform the series to per capita terms we interpolate linearly annual

population. The detrending period is from 1992 to 2014.

Peru. National accounts and population data is from Instituto Nacional de Estadistica e Informatica of Peru (INEI-Peru). GDP and PCE are available on a seasonally adjusted quarterly basis in real terms at national base year since Q1.2007. To transform the series to per capita terms we interpolate linearly annual population. The detrending period is from 2004 to 2018. We combine the quarterly with annual frequency data, since annual data has a longer time coverage, to construct the quarterly frequency trend from 2004 to 2018.

B.2. Micro Data Description

In this section we describe the data sources, show the sample selection criteria and variable definitions for our baseline computations in Mexico, Peru and Spain. Our sample selection criteria and income/consumption definitions is as homogeneous as possible across countries-databases, and follows standard practices in the literature.[9] For robustness in Section C we also consider alternative definitions/samples.

B.2.1. Italy

Micro data from income, consumption and wealth in Italy is from the *Survey on Household Income and Wealth* (SHIW) public files elaborated by the *Bank of Italy*. We use data from 1995 to 2016 that is provided on a triannual basis from 1995 to 1998 and biannually onward. The SHIW provides detailed cross-sectional and panel data regarding Italian household's income, consumption and wealth patterns, jointly with their characteristics. The sample is representative of the population of the Italian households and is on average of 8,000 households per survey for our sample selection.

Our sample criteria includes households (i) with no missing characteristics such as household head age, education and sex, household composition, and geographical characteristics (eg. location size); (ii) with household's head age between 25 and 60 years old; (iii) with no income and consumption outliers. We consider outliers those households with negative income or with income-to-consumption ratio in the top 0.5% and bottom 0.5% of the distribution; (iv) that live in locations

[9]Examples are Blundell *et al.* (2008) or Aguiar *et al.* (2020) which has a closer criteria for the sample selection to ours. Both papers use panel data, therefore our sample selection criteria is slightly looser.

Table B.1: Sample Selection SHIW-Italy

Criteria	# dropped	# Observations
All		
1995-2016	0	86,729
Location > 5,000 residents	10,752	75,977
24 < Age < 61	32,472	43,505
No outliers	1,219	42,286
Episodes		
Euro Crisis (2006 & 2014)	35,226	7,060

Notes: we trim households consumption to income ratio larger at the top 0.5% and bottom 0.5% each year, and exclude observations with negative values of after tax income and consumption. Individual characteristics are from the household head. Data source: SHIW Italy.

with at least 5,000 residents.

Our baseline definition of household income is *after-tax monetary nonfinancial income*. Using the SHIW defines total income as the sum of labor and business income excluding in kind payments, and transfers received. We exclude monetary and nonmonetary rents. For consumption our baseline definition is *nondurable monetary consumption* that includes goods and services. In addition we use wealth data, we proxy *liquid asset* using the financial assets (deposits, securities, and credits) reported by the households. Finally, we define the hand-to-mouth households simply as those with less assets than 2 weeks of income.

Apart from income and consumption information we use demographic and geographical information of the households, and head of household characteristics. To aggregate variables across households and estimate the cross-sectional moments we use the household weights provided by the SHIW, if otherwise then we indicate so.

B.2.2. Spain

For Spain we use two different micro data sources. One that gives detailed information on household income and consumption, and the other one gives detailed information on asset holdings.

Income and Consumption Micro Data. The Encuesta de Prespuestos Familiares (EPF) is elaborated by the Instituto Nacional de Estadistica (INE) of Spain. The survey provides detailed micro data information on income, consumption and household's characteristics of Spanish households. This survey is delivered annually, and is available since 1997, but under a consistent new methodology since 2006. The EPF is representative of the Spanish households. The sample is on average of around 24,000 households per survey.

Table B.2: Sample Selection EPF-Spain

Criteria	# dropped	# Observations
All		
2006-2018	0	282,873
Location > 10,000 residents	69,794	213,079
24 < Age < 61	73,050	140,029
No outliers	2,321	137,708
Episodes		
Euro Crisis (2008 & 2013)	115,906	21,802

Notes: we trim households consumption to income ratio larger at the top 0.5% and bottom 0.5% each year, and exclude observations with negative values of after tax income and consumption. Individual characteristics are from the household head. Data source: EPF-INE Spain.

Our sample criteria includes households (i) that reside in locations with at least 10,000 residents; (ii) with household head's age between 25 and 60 years old; (iii) with no income and consumption outliers. Similar to Mexico and Peru, we consider outliers those households with negative income or with income-to-consumption ratio in the top 0.5% and bottom 0.5% of the distribution.

As explained in B.2.3 our baseline definition of income and consumption are *after-tax monetary nonfinancial income* and *nondurable monetary consumption* respectively. One major caveat of the EPF publicly available data is that income is not registered by separate components, therefore we are limited to their definition of total income (before and after tax). The survey definition of after-tax income includes labor and self-employed income, pensions, unemployment benefits, other social transfers, and rents from property. Even though we don't how much are the rents from property income, the survey registers which is the main source of income. Therefore, we exclude

households which main source of income are properties from rents. For the computation of the nondurable consumption we identify at a 4 level good category the nondurable goods, durable goods and services. Nondurables included are food expenditure at home and away, drinks, tobacco and narcotics, cleaning products, medication, fuel expenditure and personal care products and clothing.[10] Services include entertainment services, educational services, health services, transportation services, personal care services (e.g. hairdressing), maintenance, provision of energy and water, and other 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).

Apart from income and consumption information we use demographic and geographical information of the households, and head of household characteristics. As for the other countries, to aggregate variables across households and estimate the cross-sectional moments we use the household weights provided by the EPF, if otherwise then we indicate so.

Wealth Micro Data. The Survey of Household Finances (EFF) is an official survey undertaken by the Banco de España which provides detailed information on asset and debt holdings of the households in Spain. 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 over samples high wealth households which also improves the quality of the estimate of wealth given that wealth has a distribution that can be approximated by a thick right tail distribution. On average, the sample is around 6,100 observation per survey wave.

Using the EFF we define total wealth as assets minus debt, where assets are composed by financial assets, business equity, housing and other non-financial assets, and debt is composed by housing debt, personal loans, credit card debt and other debt. Also define liquid assets, following Kaplan *et al.* (2014), as the sum of deposits/accounts usable for payments, public equity shares, fixed-income securities, mutual funds and portfolios under management.

The EFF provides the liquid asset holdings across the income distribution and it's composition, and let us identify which households are hand-to-mouth.[11]

[10] Clothing is sometimes considered a semi-durable, but for simplicity we classify it as a nondurable for our calculations.

[11] For further details of our hand-to-mouth definition see Section B.4.

B.2.3. Mexico

Micro data from income and consumption is from the *Encuesta Nacional de Ingersos y Gastos de los Hogares* (ENIGH) public files elaborated by the *INEGI* from Mexico. This survey is available on a biannual basis from 1992 to 2014, except for the period 2004 to 2006 that is available annually, following an homogeneous methodology. The ENIGH provides detailed cross-sectional data regarding Mexican household's income and consumption patterns, jointly with their characteristics. The sample is representative of the population of households in Mexico and is on average of 18,000 households per survey.

Table B.3: Sample Selection ENIGH-Mexico

Criteria	# dropped	# observations
All		
1992-2014	0	227,862
Missing	3,616	224,246
$24 <$ age < 61	56,490	167,756
No outliers	2,238	165,518
Location $>$ 2,500 residents	44,356	121,162
Episodes		
Tequila (1992 & 1994)	108,024	13,138
GFC (2006 & 2010)	94,057	27,105

Notes: we include only observations that have complete information on sex, age and education of the household head. We trim households consumption to income ratio larger at the top 0.5% and bottom 0.5% each year, and exclude observations with negative monetary after tax income and monetary consumption. Data source: ENIGH-INEGI Mexico

Our sample criteria includes households (i) with no missing characteristics such as household head age, education and sex, household composition, and geographical characteristics (eg. location size); (ii) with household's head age between 25 and 60 years old; (iii) with no income and consumption outliers. We consider outliers those households with negative income or with income-to-consumption ratio in the top 0.5% and bottom 0.5% of the distribution; (iv) that live in locations with at least 2,500 residents.

Our baseline definition of household income is *after-tax monetary nonfinancial income*. Using the ENIGH defines total income as the sum of labor and business income, and transfers received.

We exclude rents from property that proxies to financial income to get our baseline measure of income. For consumption our baseline definition is *nondurable monetary consumption* that includes services and semi-durables as clothing. In the ENIGH we identify on a product level which goods are nondurable, semi-durable, and services follwing a criteria close to Fernandez-Villaverde and Krueger (2007). Nondurable consumption includes food expenditure at home and away, public transportation services, clothing, housing services (eg, water and electricity supply), cleaning products, personal care products, health services,medication, fuel expenditure, communication services, cultural and entertainment services (e.g. cinema), 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 C we use alternative definitions such as nontradable (proxy as services) and tradable (proxy as durable and nondurable goods), or including rent income and durable consumption.

Apart from income and consumption information we use demographic and geographical information of the households, and head of household characteristics. To aggregate variables across households and estimate the cross-sectional moments we use the household weights provided by the ENIGH, if otherwise then we indicate so.

B.2.4. Peru

The Encuesta Nacional de Hogares (ENAHO) household survey is elaborate by the Instituto Nacional de Estadística e Informática (INEI) of Peru. It is constructed such that it provides an accurate measure individual household income and consumption, jointly with other household characteristics. The survey begins in 1995, but it's quality has been improving over time. In particular, from 2007 onward the survey was significantly improved, sample selection among other dimensions, through the MECOVI program, which is a program developed to improve statistical measurement in Latin America.[12] The survey is conducted annually, but higher frequency information (quarterly) can be obtained. 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. On average around 26,000 households are interviewed en each wave.

[12]The program is directed by the World Bank, Inter-American Development Bank (IADB) and Economic Commission for Latin America and the Caribbean (CEPAL)

Table B.4: Sample Selection ENAHO-Peru

Criteria	# Dropped	# Observations
Cross Section Sample		
2004-2018	0	398,138
Urban Area	133,580	264,558
$24 <$ Age < 61	78,631	185,927
No outliers	2,825	183,102
Panel Sample		
2007-2018	0	338,164
Urban Area	110,799	227,365
$24 <$ Age < 61	68,829	158,536
Intermittent	105,187	53,349
Same HH head*	6,225	47,124
Same HH head marital status	6,537	40,587
Same family size	15,590	24,997
Outliers	968	24,029

Notes: we trim households consumption to income ratio larger at the top 0.5% and bottom 0.5% each year, and exclude observations with negative values of after tax income and consumption. Individual characteristics are from the household head. For the panel sample we exclude also households with atypical real income growth greater than 500% or lower than -80%. Data source: ENAHO-INEI Peru.

We construct two alternative samples. The first one is constructed to compute the cross-sectional moments, and the second one is for panel estimations. For the cross sectional sample, even though data quality improves from 2007 onward, we use information from 2004 to 2006 surveys such that we have some pre Global Financial Crisis information. Our sample criteria for the cross-section includes households (i) that reside in Urban areas as defined by the INEI; (ii) with household's head age between 25 and 60 years old; (iii) with no income and consumption outliers. We consider outliers those households with negative income or with income-to-consumption ratio in the top 0.1% and bottom 0.1% of the distribution. After doing the sample selection we remain with a sample of 21,170 observations for the GFC episode (2007 and 2010) in the cross section sample.

The panel sample is a sub-sample of the cross-sectional. Apart from the criteria used for the cross section we include households for which (i) the household head exists in consecutive years; (ii) household head is the same; (iii) household head marital status remains the same across time;

(iv) apart from the outliers of the cross section sample, we exclude households with increments in income grater than 500% and lower than -80%.

As explained in Section B.2.3 our baseline definition of income and consumption are *after-tax monetary nonfinancial income* and *nondurable monetary consumption* respectively. In the ENAHO, the total monetary measure of income includes transfers (private and public), excludes taxes, 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. On the other hand, the nondurable measure of consumption is computed by excluding expenditure on housing rent and household equipment (this includes vehicles and appliances) from he total consumption reported by the survey.

Apart from income and consumption information we use demographic and geographical information of the households, and household head. To aggregate variables across households and estimate the cross-sectional moments we use the household weights provided by the ENAHO. On the contrary, for our panel estimations we don't use the weights.

B.3. Residual Income and Consumption

In our baseline estimates we use the detrended residual of income and consumption as defined in Appendix B.2. Following the literature that estimates elasticities consumption to income shocks we assume that the income and consumption process provided by the survey data has the following form[13]

$$\ln\left(X_{i,t}\right) = \mathbf{Z}'_{\mathbf{i,t}}\beta + t\mathbf{D}'_{\mathbf{i,t}}\gamma + t\eta + \hat{x}_{i,t} \tag{7}$$

where X is either income or consumption of household i at period t, $\mathbf{Z}'_{\mathbf{i,t}}$ a vector of household characteristics (e.g. household head education or age), $\mathbf{D}_{\mathbf{i,t}}$ an indicator of certain household characteristics, and $\hat{x}_{i,t}$ is the detrended and residual of X. In our specification, apart from the standard predictable component $\mathbf{Z}'_{\mathbf{i,t}}\beta$, we include trend and group specific trends to detrend consumption and income. In our baseline estimations we use a similar set of characteristics across countries. We

[13]Notable examples of this literature are Blundell *et al.* (2008), Kaplan and Violante (2010), and Guvenen and Smith (2014).

proceed to list them:

Italy. We use a quadratic function of household head age, sex of household head, indicator of household head education level, and indicator for the NUTS 2 - Italy regions where the household members reside. We use trend specific for education and sex of the household.

Spain. We use a quadratic function of household head age, sex of household head, indicator of household head education level (low: at most primary; medium-low: first part of secondary; medium-high: second part of secondary; high: some tertiary at least), an indicator for each level of household size, and indicator for the Spanish autonomous community where the household members reside. We use trend specific for education and sex of the household.

Mexico. We use a quadratic function of household head age, sex of household head, indicator of household head 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 household size, and an indicator of the region size (small, medium or large). We use trend specific for education and sex of the household.

Peru. We use a quadratic function of household head age, sex of household head, indicator of household head 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 household size, and an indicator of the region area. We use trend specific for education and sex of the household, also we include a trend specific for 2004 to 2007.

B.4. Hand-to-Mouth

Following Kaplan *et al.* (2014) we define hand-to-mouth households as the ones that hold liquid assets that amount to less than 2 weeks of income.[14]

In consumption survey of Italy (SHIW) we observed directly the financial assets holdings which we use as a proxy of the liquid assets holdings. Using this definition of liquid assets then using

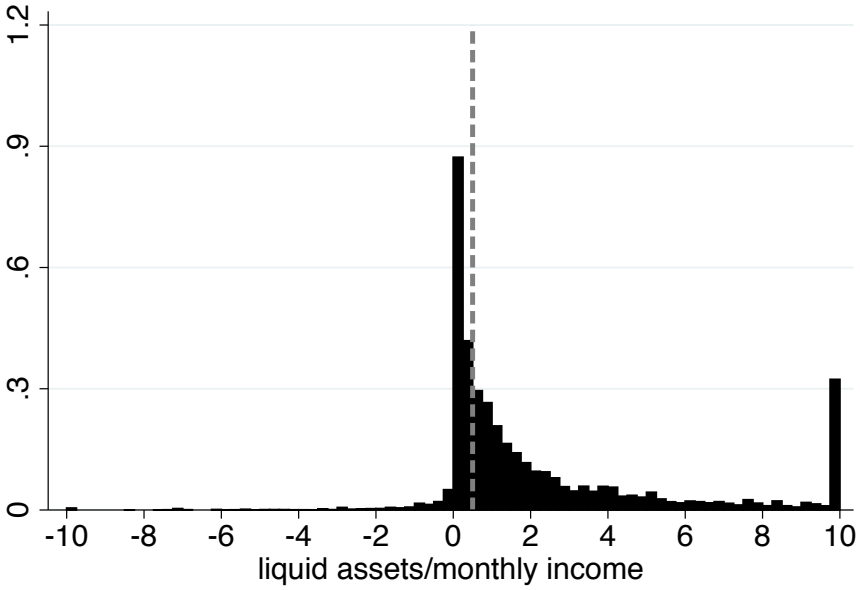
[14]The implicit assumption is that they receive income at a monthly frequency. In addition, to the liquid assets-to-income ratio, Kaplan *et al.* (2014) also consider the reported credit limit to identify the HtM households.

our simple criteria we can identify the hand-to-mouth households as those with less assets than 2 weeks of income.

On the other hand, income and consumption databases of Spain (EPF), Mexico (ENIGH) and Peru (ENAHO) don't provide direct information on assets holdings, in particular liquid wealth. Thus, we identify households that hold liquid assets *indirectly*. For Spain we use EFF-Spain (described in Section B.2.2), which provides comprehensive information on wealth holdings, to impute the probability of being hand-to-mouth in the consumption and income (EPF) survey. For Mexico and Peru we identify households with liquid wealth through their asset income information.

Using the EFF-Spain we can measure directly the holdings of liquid assets. In this survey 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 the net liquid asset holdings. Figure B.1 shows the distribution of net liquid asset relative to monthly income in Spain. We can observe that the distribution has a mass point of household with less than two weeks of income, this are the HtM households under our simple criteria.

Figure B.1: Net Liquid Asset-to-Monthly Income Distribution in Spain



Notes: 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. Vertical line corresponds to HtM cut-off of two weeks of income (i.e. 0.5 net liquid assets-to-income). Values are truncated at -10 and 10. Further details in the text. Data source: EFF Spain.

To impute the probability of being in the EPF survey we estimate the following functions

$$\text{HtM}_{i,t} = f(X'_{i,t}\beta_t) + \varepsilon_{i,t}$$

where $HtM_{i,t}$ indicates if household i at survey in t is hand-to-mouth, and $X_{i,t}$ are characteristics of the household that can be identified, both, in the EFF and EPF. The characteristics of the households used for the imputations are: ownership of business, house ownership, household size, age of HH head, sex of HH head, martial status, and income position. Finally, we identify high-liquidity households those that have a probability smaller than 0.5 of being HtM.

For the ENIGH-Mexico we define liquid asset holders as households which receive income or have expenditures from checking and savings accounts, stocks and bonds, and long-term deposits. Also we consider household that hold liquid assets as the ones which retire/make deposits or change positions in bonds, stocks or similar. For ENAHO-Peru we follow a very similar approach where we consider household that hold liquid assets as the ones that receive interest payments from bank

deposits and income from fixed income or dividends from direct holdings of stocks. The scope for Peru is more limited, which is very likely to underestimate these households relative to Mexico.

C. Additional Figures and Tables

Table C.1: Consumption-Income Elasticities: Average and Top-Income Households, by Income and Consumption Definitions

		Euro Crises		Emerging-Market Crises			Average
		Italy	Spain	Mexico '94	Mexico '08	Peru '08	
a. Baseline							
$\Delta \log Y$	Average	-0.15	-0.15	-0.38	-0.16	-0.09	-0.19
	Top 10-Income	-0.08	-0.12	-0.42	-0.19	-0.13	-0.19
	Top 5-Income	-0.07	-0.13	-0.43	-0.22	-0.15	-0.20
$\Delta \log C$	Average	-0.18	-0.15	-0.29	-0.11	-0.08	-0.16
	Top 10-Income	-0.08	-0.14	-0.33	-0.17	-0.14	-0.17
	Top 5-Income	-0.10	-0.15	-0.30	-0.21	-0.16	-0.19
Elasticity	Average	1.19	0.97	0.77	0.73	0.90	0.91
	Top 10-Income	1.00	1.15	0.78	0.89	1.10	0.98
	Top 5-Income	1.53	1.12	0.71	0.96	1.07	1.08
b. Non-Residualized							
$\Delta \log Y$	Average	-0.14	-0.18	-0.40	-0.15	-0.12	-0.20
	Top 10-Income	-0.11	-0.14	-0.46	-0.20	-0.18	-0.22
	Top 5-Income	-0.10	-0.15	-0.48	-0.21	-0.18	-0.22
$\Delta \log C$	Average	-0.15	-0.21	-0.31	-0.07	-0.10	-0.17
	Top 10-Income	-0.10	-0.21	-0.40	-0.13	-0.19	0.21
	Top 5-Income	-0.07	-0.25	-0.39	-0.15	-0.18	-0.21
Elasticity	Average	1.09	1.18	0.77	0.48	0.80	0.87
	Top 10-Income	0.89	1.54	0.88	0.65	1.08	1.04
	Top 5-Income	0.77	1.60	0.82	0.72	1.04	0.99
c. Including All Monetary Items							
$\Delta \log Y$	Average	-0.14	-0.15	-0.37	-0.15	-0.09	-0.18
	Top 10-Income	-0.07	-0.12	-0.39	-0.18	-0.15	0.18
	Top 5-Income	-0.06	-0.13	-0.37	-0.21	-0.18	-0.19
$\Delta \log C$	Average	-0.21	-0.18	-0.28	-0.13	-0.08	-0.18
	Top 10-Income	-0.10	-0.18	-0.26	-0.18	-0.16	-0.18
	Top 5-Income	-0.11	-0.19	-0.23	-0.20	-0.17	-0.18
Elasticity	Average	1.52	1.18	0.76	0.88	0.86	1.04
	Top 10-Income	1.46	1.51	0.68	1.01	0.96	1.12
	Top 5-Income	1.90	1.44	0.61	1.00	1.08	1.21
d. Including All Monetary and Non-Monetary Items							
$\Delta \log Y$	Average	-0.15	-0.13	-0.37	-0.14	-0.09	-0.18
	Top 10-Income	-0.08	-0.10	-0.38	-0.18	-0.16	-0.18
	Top 5-Income	-0.08	-0.12	-0.37	-0.21	-0.19	-0.19
$\Delta \log C$	Average	-0.17	-0.16	-0.30	-0.13	-0.08	-0.17
	Top 10-Income	-0.10	-0.15	-0.27	-0.20	-0.16	0.18
	Top 5-Income	-0.11	-0.14	-0.25	-0.19	-0.19	-0.18
Elasticity	Average	1.18	1.16	0.81	0.88	0.87	0.98
	Top 10-Income	1.35	1.41	0.71	1.07	1.01	1.11
	Top 5-Income	1.40	1.18	0.66	0.89	0.98	1.02
N Observations		7,060	21,802	13,138	27,105	21,170	90,275

Notes: Details in text. Data sources: SHIW-BI Italy, EPF-INE Spain, ENIGH-INEGI Mexico, ENAHO-INEI Peru.

Table C.2: Consumption-Income Elasticities for Low and High Liquid Wealth Households

		Euro Crises		Average
		Italy	Spain	
Wealth-to-Income	Low	0.14	0.10	0.12
	High	0.99	0.36	0.68
$\Delta \log Y$	Low	-0.19	-0.12	-0.16
	High	-0.07	-0.20	-0.14
$\Delta \log C$	Low	-0.17	-0.13	-0.15
	High	-0.10	-0.19	-0.15
Elasticity	Low	0.94	1.02	0.98
	High	1.44	0.95	1.20
N Observations		4,778	17,984	22,762

Notes: Sample is limited to households with positive liquid wealth. Low households are the ones with liquid assets to income ratio (W/Y) lower than the median and High households are the ones with (W/Y) higher than the median. Wealth-to-Income is the median ratio of liquid wealth to annual income. Data sources: SHIW-BI Italy, EPF-INE Spain, ENIGH-INEGI Mexico, and ENAHO-INEI Peru.

Table C.3: Consumption-Income Elasticities: Durable and Non-durable Goods

		Euro Crises		Emerging-Market Crises			Average
		Italy	Spain	Mexico '94	Mexico '08	Peru '08	
$\Delta \log Y$	Average	-0.15	-0.15	-0.38	-0.16	-0.09	-0.19
	Top 10-Income	-0.08	-0.12	-0.42	-0.19	-0.13	-0.19
Non-Durable							
$\Delta \log C$	Average	-0.18	-0.15	-0.29	-0.11	-0.08	-0.16
	Top 10-Income	-0.08	-0.14	-0.33	-0.17	-0.14	-0.17
Elasticity	Average	1.19	0.97	0.77	0.73	0.90	0.91
	Top 10-Income	1.00	1.15	0.78	0.89	1.10	0.98
Durable							
$\Delta \log C$	Average	-0.30	-0.18	-0.13	-0.22	-0.19	-0.20
	Top 10-Income	-0.25	-0.22	0.03	-0.29	-0.21	-0.19
Elasticity	Average	2.05	1.21	0.33	1.42	2.12	1.43
	Top 10-Income	3.27	1.86	-0.07	1.48	1.71	1.65
N Observations		7,060	21,802	13,138	27,105	21,170	90,275

Notes: Details in text. Data sources: SHIW-BI Italy, EPF-INE Spain, ENIGH-INEGI Mexico, and ENAHO-INEI Peru.

Table C.4: Consumption-Income Elasticities: Tradable/Non-tradable and Luxury/Non-luxury Goods

		Emerging-Market Crises		Average
		Mexico '94	Mexico '08	
$\Delta \log Y$	Average	-0.38	-0.16	-0.27
	Top 10-Income	-0.42	-0.19	-0.31
Tradable				
$\Delta \log C$	Average	-0.23	-0.06	-0.15
	Top 10-Income	-0.14	-0.16	-0.15
Elasticity	Average	0.60	0.41	0.51
	Top 10-Income	0.33	0.81	0.57
Non-Tradable				
$\Delta \log C$	Average	-0.37	-0.26	-0.32
	Top 10-Income	-0.40	-0.27	-0.34
Elasticity	Average	0.98	1.66	1.32
	Top 10-Income	0.95	1.38	1.17
Luxury				
$\Delta \log C$	Average	-0.36	-0.31	-0.34
	Top 10-Income	-0.29	-0.33	-0.31
Elasticity	Average	0.94	1.97	1.46
	Top 10-Income	0.69	1.73	1.21
Non-Luxury				
$\Delta \log C$	Average	-0.26	-0.05	-0.16
	Top 10-Income	-0.23	-0.09	-0.16
Elasticity	Average	0.67	0.34	0.51
	Top 10-Income	0.55	0.48	0.52
N Observations		13,138	27,105	40,243

Notes: Details in text. Data sources: SHIW-BI Italy, EPF-INE Spain, ENIGH-INEGI Mexico, and ENAHO-INEI Peru.

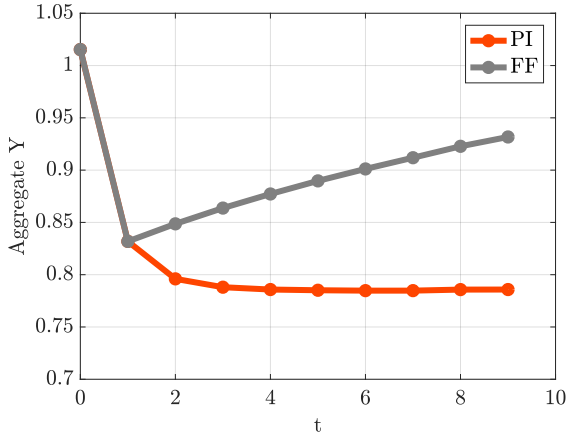
Table C.5: Consumption-Income Elasticities Adjusted by Inflation Heterogeneity

		Emerging-Market Crises			Average
		Mexico '94	Mexico '08	Peru '08	
Average - Top-Income Inflation		2.0%	0.9%	1.3%	1.4%
$\Delta \log Y$	Average	-0.38	-0.16	-0.09	-0.21
	Top-Income	-0.42	-0.19	-0.13	-0.25
$\Delta \log C$	Average	-0.29	-0.11	-0.08	-0.16
	Top-Income	-0.33	-0.20	-0.13	-0.22
Elasticity	Average	0.77	0.73	0.90	0.80
	Top-Income	0.78	1.02	1.05	0.95
N Observations		13,138	27,105	21,170	61,413

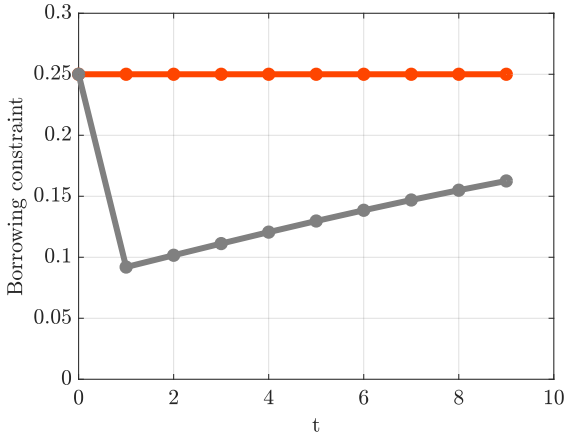
Notes: The difference between the average inflation and the top-income household's inflation is computed using log-differences from the peak (CPI = 100) to trough of each episode. Income is deflated using baseline CPI and consumption decile specific CPI constructed using the decile's consumption basket. Data sources: SHIW-BI Italy, EPF-INE Spain, ENIGH-INEGI Mexico, and ENAHO-INEI Peru.

Figure C.1: Crisis Experiments: Aggregate Shocks

(a) Aggregate Income



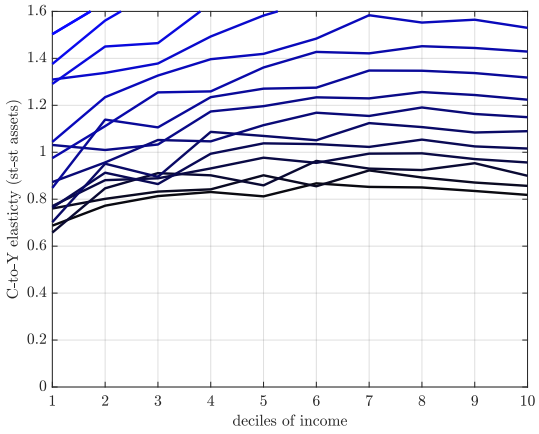
(b) Borrowing Constraint



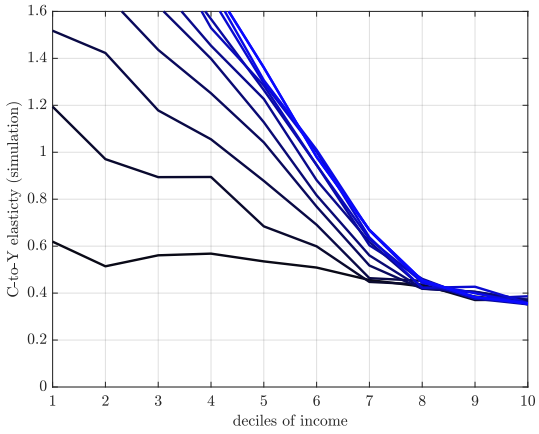
Notes: This Figure shows the path of aggregate income and borrowing constraints under each of the crisis experiments. The horizontal axis refers to years. For details in each experiment see Section 4.

Figure C.2: Model Analysis: Identifcation of Key Parameters

(a) PI - Experiment
Persistence of Growth Shock (ρ_g)



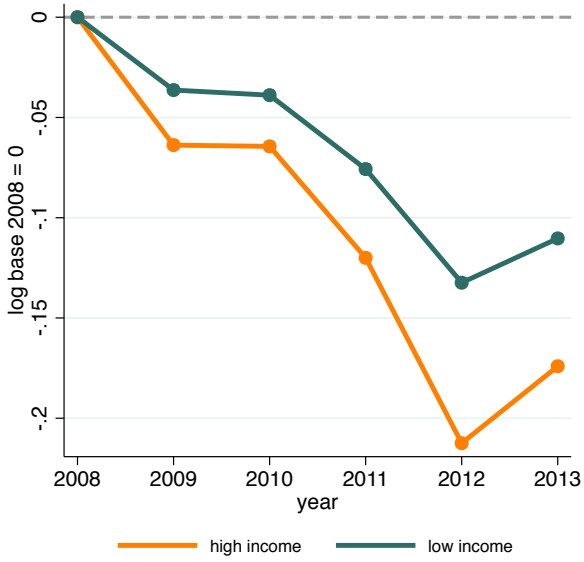
(b) FF - Experiment
Elasticity Financial Constraint-to-Y (ν)



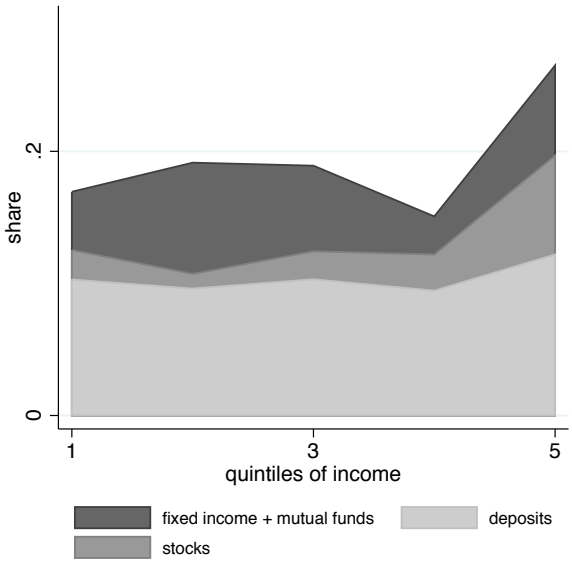
Notes: This Figure shows the consumption-income elasticities in the calibrated model presented in Section 4 for different parametrizations of ρ_g and ν. From darker to lighter blue the parameters are larger.

Figure C.3: Wealth Revaluation During the Euro Crisis

(a) Wealth Revaluation by Income



(b) Liquid Wealth to Income Ratios



Notes: Panel (a) shows the estimated wealth revaluation during the Euro crisis, for top 10 (orange) and bottom 10 (green). To construct these we use the pre-crisis wealth composition of households across the income distribution. Panel (b) shows the ratio of liquid wealth to annual income for different income deciles. Further detail on the data in Appendix B.

D. Quantitative Analysis: Further Results

D.1. 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),[15] and assume that $Y_t = Z_t \Gamma_t$, where Z_t is the transitory component which follows the stochastic process

$$\ln Z_t = \rho_z \ln Z_{t-1} + \sigma_z \epsilon_t^z, \qquad \epsilon_t^z \sim N\left(-\frac{\sigma_z}{2(1+\rho_z)}, 1\right), \tag{8}$$

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

$$g_t = (1-\rho_g)\alpha_g + \rho_g g_{t-1} + \sigma_g \epsilon_t, \qquad \epsilon_t^g \sim N\left(-\frac{\sigma_g}{2(1+\rho_g)}, 1\right). \tag{9}$$

Finally, we parametrize the borrowing constraint function as $f(Y_t) = Y_t^\nu$, with $\nu > 0$. Next section shows the de-trended version of the households' recursive problem with aggregate risk.

We parametrize the model following two main calibrations of the Italian economy. The first calibration, which we label *PI*, assumes $f(Y_t) = 1$ and targets the same moments as in our baseline calibration by calibrating the relative relevance of aggregate permanent and transitory shocks. The second calibration, labeled *FF*, focuses on the economy with aggregate transitory shocks and calibrates the borrowing constraint to target the same aggregate moments. We deliberately do not target individual consumption responses to a crisis, and leave this behavior as a means for testing the validity of both theories in explaining the micro-anatomy of consumption adjustments.

[15] 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.

D.1.1. De-trended Recursive Problem

This section derives the de-trended version of the households' recursive problem. Denote $\hat{x} = \frac{x}{\Gamma_{-1}}$ for any variable x. Guess $V(b, \mu; z, g, \Gamma_{-1}) = v(\hat{b}, \mu; z, g)\Gamma_{-1}^{1-\gamma}$. Then

$$v(\hat{b}, \mu; z, g)\Gamma_{-1}^{1-\gamma} = \max_{b'} \Gamma_{-1}^{1-\gamma} \frac{\hat{c}^{1-\gamma}}{1-\gamma} + \beta \mathbb{E}\left[v(\hat{b}', \mu'; z', g')\Gamma^{1-\gamma}\right] \tag{10}$$

$$= \max_{b'} \Gamma_{-1}^{1-\gamma} \frac{\hat{c}^{1-\gamma}}{1-\gamma} + \beta e^{(1-\gamma)g} \Gamma_{-1}^{1-\gamma} \mathbb{E}\left[v(\hat{b}', \mu'; z', g')\right] \tag{11}$$

which confirms guess of objective function. Now we derive the relevant budget set

$$\begin{aligned}
\hat{c}\Gamma_{-1} &= e^{\mu}\hat{Y}\Gamma_{-1} + q\Gamma_{-1}e^{g}\hat{b}' - \Gamma_{-1}\hat{b}, \\
\Gamma_{-1}e^{g}\hat{b}' &\leq \kappa e^{\mu}\hat{Y}\Gamma_{-1}, \\
\hat{Y}\Gamma_{-1} &= e^{z}\Gamma_{-1}e^{g}, \\
g' &= (1-\rho_g)\mu_g + \rho_g g + \sigma_g \epsilon^g, \\
z' &= \rho_z z + \sigma_z \epsilon^z, \\
\mu' &= \rho_\mu \mu + \sigma_\mu \epsilon^\mu.
\end{aligned}$$

Therefore, the de-trended recursive problem becomes

$$v(\hat{b}, \mu; z, g) = \max_{b'} \frac{\hat{c}^{1-\gamma}}{1-\gamma} + \beta e^{(1-\gamma)g} \mathbb{E}\left[v(\hat{b}', \mu'; z', g')\right] \tag{12}$$

subject to

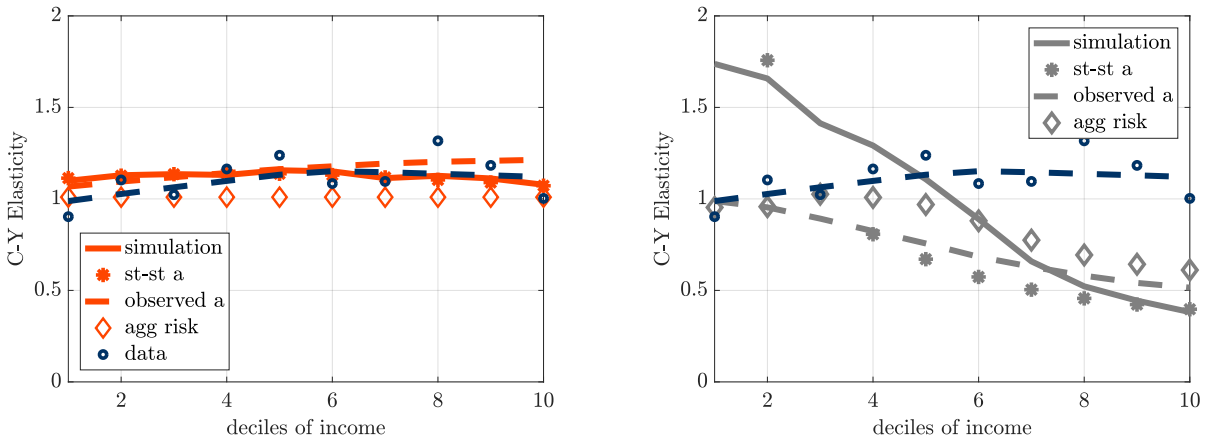
$$\begin{aligned}
\hat{c} &= e^{\mu}e^{z}e^{g} + qe^{g}\hat{b}' - \hat{b}, \\
\hat{b}' &\leq \kappa e^{\mu}e^{z}, \\
g' &= (1-\rho_g)\alpha_g + \rho_g g + \sigma_g \epsilon^g, \\
z' &= \rho_z z + \sigma_z \epsilon^z, \\
\mu' &= \rho_\mu \mu + \sigma_\mu \epsilon^\mu.
\end{aligned}$$

D.2. Alternative Measures of Aggregate Responses

In this section we analyze different measures of response to the aggregate shocks. We compute the elasticities using simulated data from the model with aggregate and without aggregate risk. In addition, we compute the elasticity by calcuating the changes in the policy function of consumption across the income distribution standing at the steady state level of assets and at the observed level of assets. Figure D.1 shows that the shape of the response is robust for both views under any of these measures.

Figure D.1: Consumption-Income Elasticities: Alternative Exercises

(a) PI-view Experiment (b) FF-view Experiment

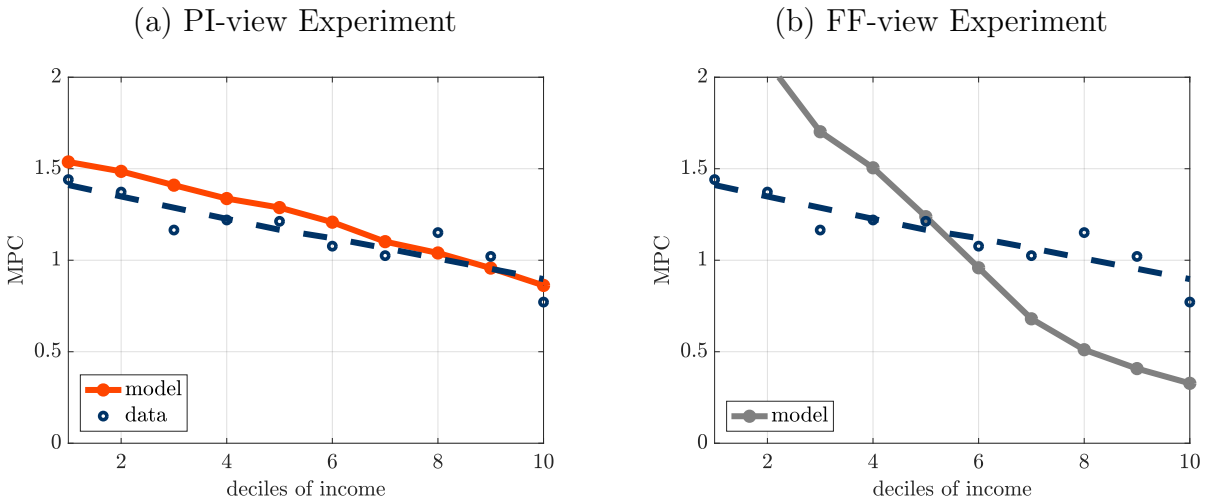


Notes: This Figure shows the consumption-income elasticities for different income deciles in the Italian crisis (described in Section 3), and in the crisis experiments of the model calibrated for Italy (described in Section 4). Panel (a) shows the permanent-income-view experiment and Panel (b) shows the financial-frictions-view experiment. Each panel shows the baseline experiments, presented in Figure 4 (labeled *simulation*), and additional measures. *st-st a* correspond to elasticities computed directly from the policy function of consumption evaluated at the steady-state asset level, and different levels of the idiosyncratic shock. *Observed a* correspond to elasticities computed directly from the policy function of consumption evaluated at the observed asset level, and different levels of the idiosyncratic shock. *agg risk* correspond to the elasticities in the model with aggregate risk, described in Appendix D. Elasticities are computed using the average income and consumption by decile, and it is 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.

Moreover, we compute the marginal propensity to consume (MPC) from the aggregate shocks instead of the C-to-Y elasticity. As showm in figure D.2 both experiments exhibit a decreasing shape across the income distribution hence the MPC measure is arguably less useful to distinguish between views. Also figure D.2 shows that the model is able to fit the MPC and elasticity, both,

shape and level for the PI-experiment.

Figure D.2: MPCs: Model Analysis



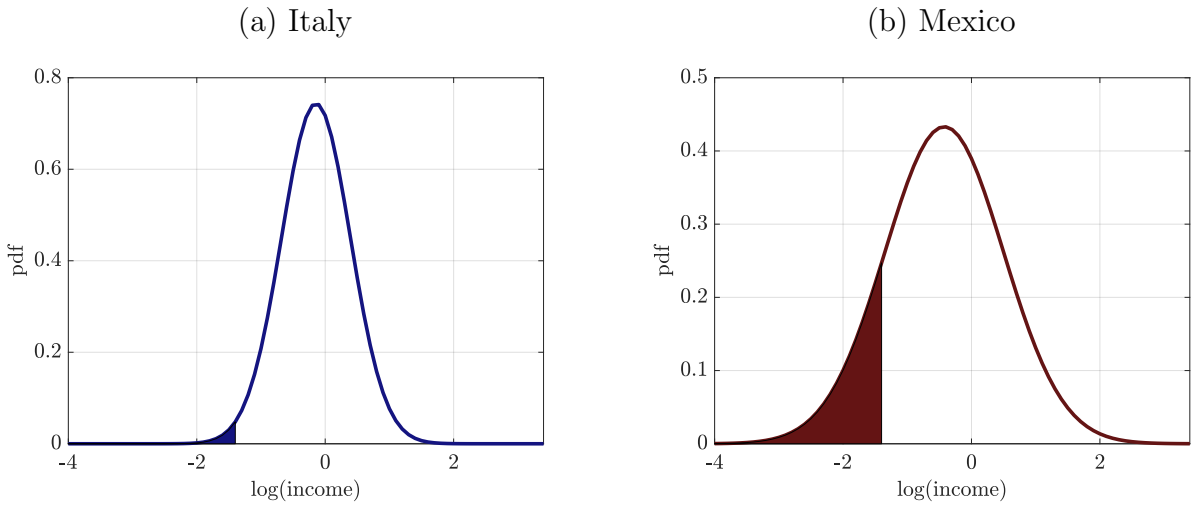
Notes: This Figure shows the marginal propensities to consume (MPCs) for different income deciles in the Italian crisis (described in Section 3), and in the crisis experiments of the model calibrated for Italy (described in Section 4). Panel (a) shows the permanent-income-view experiment and Panel (b) shows the financial-frictions-view experiment. MPCs are computed using the average income and consumption by decile, and it is defined as the ratio of the change in consumption to the 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. Additional calibrations

Table D.1: Model with Non-homotheticities: Italy and Mexico

Parameter		Value	
		Italy	Mexico
Common			
Risk aversion coefficient	γ	2.00	2.00
Risk free interest rate	$r*$	0.01	0.01
Financial constraints	κ	0.25	0.25
Country Specific			
Dicount factor	β	0.93	0.90
Persistence of idiosyncratic process	ρ_μ	0.94	0.98
Volatility of idiosyncratic process	σ_μ	0.18	0.18
Subsistence level of consumption	$\underline{c}$	0.04	0.26

Figure D.3: Model Extensions: Income Distribution and Subsistence Level of Consumption



Notes: This Figure shows the distribution of log income in the calibrated model for Italy and Mexico. The shaded areas indicate the measure of 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 1995-2014. 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 sources: World Bank.

E. Policy Experiments: Further Results

E.1. Policies with Different Progressivities

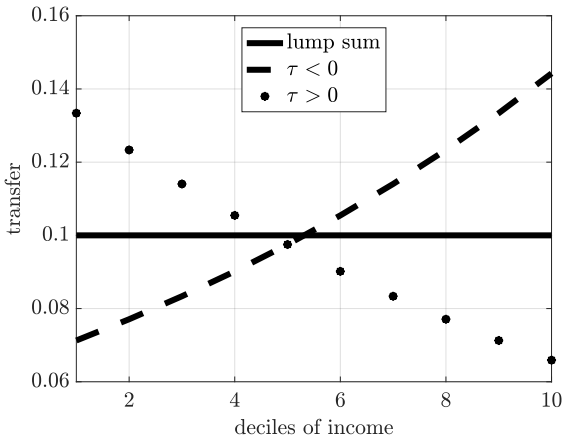
We now study the effects of stabilizations policies analyzed in Section 5, which differ in the degree of progressivity. In particular, we consider an initial transfer that takes the form of

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

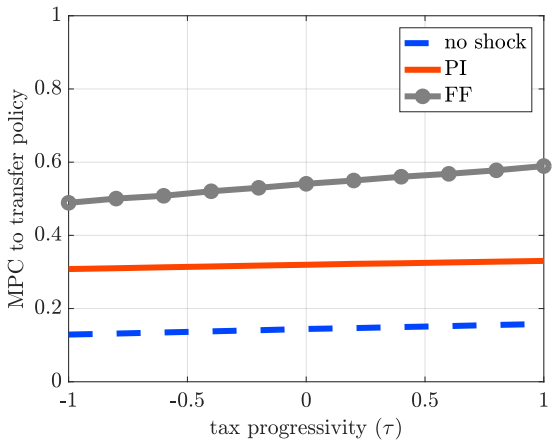
where the subindex 0 indicates the crisis period, X controls the scale of the program, and τ controls the progressivity. When $\tau < 0$ the transfer is regressive (i.e., larger transfers to income-rich households); when $\tau > 0$ it is progressive; and when $\tau = 0$ it corresponds to a flat lump-sum transfer analyzed in Section 5 (see Panel (a) of Figure E.1). 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 E.1: Policy Analysis: Fiscal Policies with Varying Progressivity

(a) Initial Transfers by Progressivity



(b) Aggregate Response by Progressivity



Notes: Panel (a) the income transfer each that households in different income deciles receieve 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 transfers, for different degrees of progressivity. The blue dashed line corresponds to the MPCs when the policy is conducted in the steady state, the solid orange line corresponds to the MPCs when the policy is conducted during the PI-view crisis experiment, and the grey marked line when it is conducted during the FF-view crisis experiment.

Panel (b) of Figure E.1 depicts the response of aggregate consumption for fiscal programs that have the same scale but differ in their progressivity, and shows similar than our baseline experiment. In all policies, a highier 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 FF-view crisis experiment, as 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.