Consumption and Public Transfer: Evidence from Italian Quakes*

Antonio Acconcia, Giancarlo Corsetti, and Saverio Simonelli

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Abstract

The random shock of natural disasters causes exogenous housing wealth losses and illiquidity, but also leads government to set up transfer programmes financing housing repair work. Exploiting three earthquakes in Italy as quasi-experiments, we show that the payment of cash transfers to homeowners in compensation for the housing repair costs raises households’ consumption of nondurables. We show that this effect is stronger and statistically significant for homeowners with a low level of liquid-wealth-to-income ratio, but absent when repair services are provided in kind — i.e., when the government money is transferred directly to firms. Our study contributes to the recent literature on the dynamic of the consumption demand by households that are “wealthy-hand-to-mouth” (see e.g. Kaplan et al., forthcoming), emphasizing micro-evidence in line with the main predictions of the theory.

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*Acconcia: Department of Economics and Statistics, University of Naples Federico II, Via Cintia, 80126 Napoli, Italy, and CSEF (e-mail: antonio.acconcia@unina.it); Corsetti: Faculty of Economics, Cambridge University, Sidgwick Avenue, Cambridge, CB3 9DD, and CEPR (e-mail: gc422@cam.ac.uk); Simonelli: Department of Economics and Statistics, University of Naples Federico II, Via Cintia, 80126 Napoli, Italy, and CSEF (e-mail: saverio.simonelli@unina.it). We would like to thank Francesco Drago, Tullio Jappelli, Marco Pagano, seminar participants at the CSEF-IGIER Symposium on Economics and Institutions (CISEI), the 2013 meeting of the European Economic Association, the European University Institute, and LUSS for useful comments and discussions. Jasmine Xiao provided superb research assistance. Corsetti gratefully acknowledges the support by the Keynes Fellowship in Cambridge, and the Center for Macroeconomics.
1 Introduction

Under what conditions do public transfers raise consumption demand? According to conventional wisdom, transfers are most effective when targeted to credit-constrained households — a group whose weight in the population may be too small for their consumption response to transfers to produce significant aggregate effects. More recent literature has refocused on the larger group of households that are wealthy, but have a large fraction of their wealth in illiquid assets — the so-called “wealthy-hand-to-mouth” (Kaplan et al., forthcoming). Correspondingly, the focus of the policy and theoretical debate has shifted to the extent to which illiquidity — at different levels of income and wealth — determines the response of demand to transfers in a distressed economy (see Broda and Parker, 2014; Jappelli and Pistaferri, 2012; Misra and Surico, 2013, among others).

In this paper, we contribute empirical evidence to this debate, by studying the consumption behavior of homeowners in areas hit by a quake, who received cash or tax compensation for repairing damages to their housing. Focusing on earthquakes as quasi-experiments has key advantages. On the one hand, just like crises, natural disasters result in wealth losses and rising illiquidity: earthquakes damage buildings and infrastructure, reducing housing wealth while at the same time jeopardizing the real estate market — hence making housing wealth more illiquid. On the other hand, the random shock of a quake generally leads the government to devote a large share of government financial aid to transfer programmes in support of reconstruction. These transfers typically aim to compensate homeowners, who are relatively wealthy but may not be liquid, for the costs of fixing the housing damages. To the extent that transfers are set in proportion to the costs of repair work and thus finance anticipated expenditures, their potential effect on consumption is likely to reflect primarily their effects on the liquidity of the households’ portfolios.

In our study, we exploit three natural disasters that occurred in Italy between 1980 and 2012, for which we have detailed household-level information from the Bank of Italy Surveys: the 1980 quake in the South of Italy, mainly hitting the regions of Campania and Basilicata; the 2009 quake in Abruzzo, with devastating effects on the city of L’Aquila; and the 2012 quake in Emilia. While the choice of these case studies is mainly driven by data availability, each of them has specific characteristics that help to shed light on different aspects of our main question. In the case of the 1980 quake in the South of Italy, the government made cash readily available to homeowners for housing repair work in significant amounts — up to 10 million of 1981 Italian lire, approximately equal to 26,000 of 2014 euros. The programme was at first restricted to residents in Campania and a small area in Basilicata; but it was extended after a year to cover the whole quake area in the Basilicata region. Thus, we can exploit the institutional features of government interventions to build multiple control groups, differentiated by (i) residential status (owner-occupiers versus tenants), and (ii) residence within and outside the quake area (which determine the access to transfer); as well as by (iii) residence within and outside the region entitled to transfers in either the
first or the second year after the disaster (which determines the timing of cash payments to households). In the case of the 2012 quake in Emilia, there was no delay in extending transfers to different groups of homeowners. Yet, we can exploit accurate information about the households’ portfolio compositions, and group households according to a high and a low liquid-wealth-to-income ratio, and with or without bank debt, which is a proxy for mortgage. Finally, the 2009 quake in Abruzzo is relevant to our study, insofar as homeowners were entitled to public support to cover the costs of housing repair work, but the government reimbursed the firms in charge of reconstruction directly. In all three cases, to avoid the risk of confusing consumption/saving choices with expenditures required to replace household items damaged in the earthquake, we focus on the response of nondurable consumption as our main variable of interest.

Our main results are as follows. For the 1980 case study in Campania and Basilicata, we show that, on average, the consumption of homeowners rose in the years after the quake, at the time when they can access the transfer. Relative to the control group, homeowners in the quake area spent 12 percent more on nondurable goods upon receiving the transfers — in the first year after the quake in the Campania region, and in the second year in the Basilicata region (initially excluded from the programme), respectively.

We are especially interested in verifying whether these differences depend on the liquidity of households’ wealth, but this information was not collected in the Bank of Italy Surveys for the years around the 1980 quake. Nevertheless, we can shed light on this issue using data from the 2012 Emilia quake. For this case study, we show that the consumption response to transfers by homeowners with a low liquid-wealth-to-income ratio was 17 percent higher in the quake region relative to the control group, defined by illiquid homeowners in the neighboring Italian regions. By contrast, we detect no significant difference in consumption for the relatively liquid homeowners. Similar results follow from applying our model to the subsamples of homeowners with and without bank debt/mortgage.

Our third result suggests that homeowners’ consumption does not necessarily respond to the in-kind equivalent of cash transfers. As in the other two cases, the Law regulating public interventions in the aftermath of the 2009 quake in Abruzzo made public support available to homeowners whose housing units were damaged by the quake. However, unlike the other two cases, the government did not transfer cash to households. Instead, the cash was accrued directly to firms carrying out the housing repair work. For the 2009 quake, we find no evidence that consumption growth rates were different across owner-occupiers with different levels of illiquid wealth-to-income ratio.

In carrying out our empirical exercises, we extend the methodology by Johnson et al. (2006), generalizing it to the case of multiple control groups. We base our empirical work on the Bank of Italy Surveys, that provide details on consumption, after-tax incomes, and information on the households’ region of residence, the residential status, the number of components, age, education, and employment. In the years around the 1980 quake in the South of Italy, the Surveys only report repeated cross-sectional data; for the later quake episodes, we can count on a
panel, as well as on detailed information about households’ portfolios.

Studies of fiscal stimulus packages in the US suggest that households spend a non-negligible share of a cash transfer — up to 25 percent — in the quarter in which they receive it (Agarwal et al., 2007; Jappelli et al., 1998; Johnson et al., 2006; Parker et al., 2013; Shapiro and Slemrod, 2009). Our result, that the consumption of owner occupiers in Campania and Basilicata rises in the year in which the transfers are paid out, resonates with these findings. Our empirical analysis of the 1980 quake is related to contributions (Johnson et al., 2006; Lusardi et al., 2011; Parker et al., 2013; Souleles, 1999), that use lags in the transfer payment as an instrument to detect liquidity effects on consumption. We also make use of lags in the provision of transfers, relying on the delayed inclusion of Basilicata in the programme. However, this paper differs from the literature on nationwide stimulus programme, because general-equilibrium issues in the transmission of fiscal policy — for instance, the anticipation of higher taxation in the future, or potential effects of fiscal stimulus on market interest rates — are not relevant here. The transfers accruing to the quake regions were not financed by regional taxes. The earthquakes had negligible effects on bond prices and policy rates at national level.

A growing literature is exploiting natural disasters as quasi-experiments. Closely related to our study is an earlier work on the 1995 quake in Kobe, Japan, that also analyses households consumption (Sawada and Shimizutani, 2008). These authors focus on the different behavior across households, depending on whether they were credit-constrained before the disaster. Unlike our study, however, these authors proceed under the presumption that illiquidity among homeowners would be empirically irrelevant in their sample. Work by Porcelli and Trezzi (2014) contrasts the negative supply effects of a quake, with the positive multiplier effects of public work and tax cuts in the quake regions in Italy. In relation to these studies, using our 1980 case study, we are able to derive a useful result documenting an adverse economic impact of the quake on consumption and income uncertainty. Namely, we show that the 1980 quake resulted in a significant drop (between -12 and -10 percent) in the nondurable consumption of non-homeowners, who were excluded from the targeted transfer programme. We also document a significant rise in the variability of disposable income — an indicator of income uncertainty (see Dardanoni (1991)) —, to set up indicators of income uncertainty based on the variability of disposable income.— in the two regions.

The rest of the paper is organized as follows. Section 2 presents the 1980 quake case study, discussing the effects of the quake on consumption growth and income uncertainty. Section 3 describes the econometric methodology and results. Section 4 motivates and discusses the other two case studies — the 2009 quake in Abruzzo and the 2012 quake in Emilia. Section 5 concludes.
2 The 1980 quake in the South of Italy: economic and institutional setting

Our first case study is on the major earthquake that hit a large area in the South of Italy at the end of 1980. In this section we pursue two goals. First, we provide institutional details on the government response to the shock, from which we build our empirical identification strategy. Second, we illustrate the impact of the quake on consumption growth and income uncertainty in the area. In the next section we will present our main results for the case study.

2.1 The government response to the quake

The large quake that hit the South of Italy on November 23, 1980 affected mainly two regions, Campania and Basilicata, with a total of 5 million inhabitants (approximately 10 percent of the Italian population). Its effects were devastating: about 120,000 buildings either collapsed or were seriously damaged; the quake caused about 3,500 fatalities.

In addition to granting all residents a temporary tax relief, the government implemented a massive programme aimed at speeding up reconstruction. Namely, owner-occupiers of ‘slightly damaged’ housing units were entitled to receive up to 10 million of Italian liras (approximately equivalent to 26,000 euros in 2014) to ‘restore habitability’ (Act n. 80 by Special Representative of the Government).

Between 1981 and 1983, the Italian government mobilized resources equivalent to about 3 percent of the 1981 GDP in Campania (3,945 billion of 1981 Italian liras), and 75 percent of the total was targeted to rebuild private dwellings (Commissione Parlamentare).

Two features of the transfer programme are key to the design of our study. First, the transfers were strictly targeted to owner occupiers, with the transfer amount set in relation to the cost of repairing quake-related damages of housing units. The cash was therefore provided as compensation for expenses to be sustained by the household. Second, the programme was extended to different areas in the quake regions at different times. Namely, all municipalities in Campania were included in the programme by mid 1981. Out of 549 municipalities in Campania, 337 were included already in January; this number rose to 542 by May 22, 1981. In the Basilicata region, however, only municipalities right at the epicenter were initially included. The law extending the transfer programme to all Basilicata municipalities hit by the quake (comparably with Campania) was passed only on November 13, 1981. As a result, the payment of transfers in the two regions took place in two different calendar years. Since the quake hit the Basilicata municipalities with an intensity and level of destruction comparable to Campania municipalities, the delay in their inclusion in the programme mainly reflected some randomness in the political process. Note that the date of the quake (end of 1980) and the date of the programme extension (end of 1981) allow us to use yearly data for 1980, 1981, and 1982 to capture the pre- and post- quake response to consumption, and distinguish between early and late access to transfers.
2.2 The effects on consumption growth and income uncertainty

While quakes may be expected to produce economic distress through a number of channels, the empirical literature usually fails to uncover negative effects on average economic activity and growth (See Cavallo and Noy, 2009; Hochrainer, 2009; Noy, 2009). In this subsection, we exploit the characteristics of our case study to quantify indicators of economic distress in our sample. First, we estimate the effects of the quake on households’ consumption of non-durables, controlling for income and excluding the subsample of households entitled to transfers. Second, we provide an estimate of the effects of the quake on income uncertainty. Together, our results are consistent with the hypothesis that, given income, consumption falls in reaction to rising uncertainty.

To assess the response of consumption to the quake, we focus on the subsample of non owner-occupiers, as a way to purge our estimates from the potential effects of the cash transfers. Owner- and Non owner-occupiers differ in that the latter did not receive reconstruction money, but were also unlikely to be exposed to housing wealth losses (unless they owned housing units in the quake region distinct from their main residence). Yet, both groups arguably faced a similar economic environment (see below), and benefitted from a number of policies aimed to contain the distress produced by the quake, including the temporary tax relief extended to all residents in the quake area.

We estimate a diff-in-diff model for households with residential status of ‘tenant’ that live in the quake area, versus tenants living in the regions adjacent to the quake area (Lazio, Abruzzo, Molise, Apulia and Calabria). The model is specified as follows:

\[ C_{i,t} = \alpha_r + \lambda_t + \beta \times Quake + \delta Y_{i,t} + \gamma X_{i,t} + e_{i,t} \]  

(1)

where \( C_{i,t} \) is nondurable consumption expenditures by household \( i \) in year \( t \); \( \alpha_r \) and \( \lambda_t \) are region- and time-specific fixed effects; \( Quake \) is a dummy that is equal to one in 1981 for the regions hit by the quake; \( Y_{i,t} \) denotes disposal income; \( X_{i,t} \) denotes a vector of control variables, accounting for a number of characteristics of the head of the household \( i \).

Results are shown in Table 1. As apparent from the Table, tenants reduce consumption of non-durables by as much as 10 percent between 1980 and 1981. This result is robust to including individual controls (compare Columns 1 and 2 in the Table), and becomes stronger when we exclude older heads of households from the sample, as they may be less affected by prospective developments in the labor market and economic activity (Column 3).

As we control for variations in disposable income, one possible explanation for this result is the effect of an earthquake on income uncertainty. To investigate whether uncertainty rose after the quake, we compare measures of income variability before and after the disaster in Table 2. Based on Dardanoni (1991), among

\(^1\)A plausible hypothesis is that, a quake occurs, economic activity responds to two shocks: a negative supply shock, operating via the destruction of physical capital, associated with firms exit or drop in the level of production, and a positive demand shock driven by reconstruction activities (see e.g. evidence by Porcelli and Trezzi 2013).
others, we interpret changes in the variability of disposable income as evidence for changes in income uncertainty.\textsuperscript{2}

To construct our test, we contrast the sample of residents in the quake area with that of residents in the regions adjacent to the quake area. For each sample, we perform tests on the equality of the variance of disposable income in 1980 and 1981. The tests are applied directly to the households’ disposable income in the two years, or to the OLS residuals from regressing the households’ disposable income in 1980 and 1981 on several controls, including the age, education, employment status, and residential status of the householder, as well as the number of members in the households. Results are shown in Table 2. While the Table reports results for a sample including both tenants and homeowners, we stress that similar trends can be detected for each of these groups on its own.

The Table 2 makes it clear that the earthquake determined a significant rise in the spread of households’ income in the area hit by the earthquake. The first row of Table 2 shows the results of the F-test for the homogeneity of variances. The statistic of interest is related to the ratio of the two variances: under the null hypothesis the test statistic is equal to 1. As shown in the Table, the test statistic suggests that the variance of disposable income in the quake area is about three times higher in 1981 than in 1980. This is statistically significant at standard confidence levels. No evidence of rising variability emerges when the same test is applied to the control regions.

One drawback of the traditional F-statistic for the homogeneity of variances is its sensitiveness to the assumption that the data are drawn from an underlying Gaussian distribution. Levene (1960); Brown and Forsythe (1974) proposed a test statistic for equality of variance that is found to be robust under nonnormality. In the second row of Table 2 we report results of Levene’s test statistic (W0) for the equality of variances in 1980 and 1981. The third row considers the alternative proposed by Brown and Forsy (W50), which replaces the mean with the median in constructing the test-statistic. Results fully support our main conclusion based on the F-statistic.

Our main findings are illustrated graphically in Figure, which complements previous formal evidence by looking at a longer time interval. The Figure shows the standard deviation of the disposable income (normalized by the corresponding mean) before and after the quake, considering four years before the quake (1977-1980) and three years after (1981-83). The diverging trends are apparent. These results suggest that the random shock of the earthquake determined an increase in income uncertainty for residents in the quake area.

\textsuperscript{2}Another potential factor weighing on tenants’ consumption is a possible worsening of the housing rental market. As the stock of housing was damaged by the quake, market forces may have put pressures on rents. There are however reasons to believe that this factor was weak. First, in the emergency the government provided free or subsidized housing to the displaced households (and rents were suspended when the housing units were not usable); second, and more importantly, the Law (“equo canone”) regulated and capped rents in the 1980s.
3 The response of Homeowners to transfers

In our study we aim to investigate the effects on households’ consumption of transfers to owner-occupiers of housing units damaged by a quake, to finance repair work. The interest in this exercise rests on the fact that housing wealth is not readily accessible for consumption smoothing purposes (especially in financially repressed economies, like the Italian regions in the years included in our sample), and its liquidity is most likely to fall during a natural disaster. Hence, a key effect of compensating households for the costs of housing damages with cash is that of raising the liquidity of households portfolios. This section first presents our study design and regression model, then discusses our main results.

3.1 Study design and econometric model

To build up our testing framework, we exploit the nature and timing of the implementation of the transfer programme. As discussed in the previous section, first, the transfer programme was targeted to owner occupiers, with the objective of restoring safety conditions in housing units damaged by the earthquake. Second, the programme was initially restricted to parts of the quake area, excluding most of Basilicata municipalities. At the end of 1981, it included all Basilicata municipalities. Hence, in our experiment, we can exploit differences in the access to cash transfers by households, depending on both housing status and region of residence.

The empirical model is as follows

\[ c_{i,t} = \alpha + \lambda_t + \beta_1 H S_s + \beta_2 T R_{r,t} + \beta_3 (H S_s \cdot T R_{r,t}) + \gamma X_{i,t} + u_{i,t}, \]  

(2)

where \( c_{i,t} \) is the log of nondurable consumption expenditures by household \( i \) in year \( t \); \( \lambda_t \) is a year fixed effect; \( H S_s \) is a dummy that is equal to one if the housing status \( s \) of the household is owner occupier; \( T R_{r,t} \) is a dummy that is equal to one in the year \( t \) when the region of residence \( r \) is included in the transfer programme; and \( X_{i,t} \) denotes a vector of further control variables describing the characteristics of the head of household \( i \), to be discussed below.

The main effect of interest is the interaction between the housing status \( (H S) \) and the region’s access to the programme \( (TR) \). The coefficient \( \beta_3 \) measures the consumption growth of owner-occupiers in the quake area, when they are granted access to cash transfers (1981 in Campania and 1982 in Basilicata), relative to the rest of the households in the quake area. Under the plausible assumption that housing wealth is illiquid, and in light of the fact that access to cash transfers is a compensation for the cost of repairing material damages, \( \beta_3 \) can be interpreted as a liquidity effect on consumption.

In our model, the variable \( H S \) controls for differences in wealth and life-cycle between tenants and owner-occupiers. The variable \( TR \) controls for region-specific shocks that may conflate with the effects of liquidity transfers. The combination of these variables plays a key role in our identification. It is possible that the common shock of the quake coincides with different idiosyncratic shocks in each
region. Without controlling for both housing status and the regional access to the transfer programme, we would miss key information for disentangling these different shocks. For instance, it so happens that, while hit by the quake, in 1980 the Basilicata region also started to benefit from oil extraction, with positive effects on the average consumption of its residents.

Finally, we include a year fixed effect, that takes care of changes in the level of income uncertainty because of the quake. The vector of controls, $X_{i,t}$, includes disposable income and number of components of the household, the age and the level of education of the householder, as well as information about employment status.

Observe that, if tenants were dropped from our sample, our empirical specification would be similar to the one adopted by Johnson et al. (2006); Broda and Parker (2014). Under this specification, the identification would rely only on the delay of including Basilicata in the transfer programme, due to institutional and political factors. Alternatively, if we focus on each of the two regions in isolation, the empirical model would boil down to a standard diff-in-diff, identifying liquidity effects by comparing tenants and owner-occupiers before and after the quake.

We base our analysis on data drawn from the Bank of Italy Surveys of Household Income and Wealth (SHIW) in the years 1980-1984. These surveys provide repeated cross-sectional data for about 4,000 households, representative of the Italian population. They provide microeconomic data on consumption, wealth, after-tax income, as well as information on the components of the households, such as age, education, and employment. Key variables of interest for our study are the region of residence and the residential status. In our sample years, households in the quake area amounted to about 10 percent of the national sample; of these, roughly $1/2$ are owner-occupiers. Relative to owner-occupiers, tenants tend to be younger, less educated, more likely to be employed in the manufacturing sector or unemployed.

### 3.2 Results

The results from estimation of (2) are shown in Table 3. The first column suggests that, excluding disposable income and all other controls, the consumption of nondurable goods by homeowners in municipalities benefitting from a transfer is 18 percent higher relative to the control group. Controlling only for either disposable income (second column) or for the full set of controls (third column), our estimate of $\beta_3$ is 12 percent.

Under the realistic, maintained assumption that housing wealth is illiquid, and in light of the fact that cash transfers is made accessible as compensation for the cost of repairing housing damages, we interpret this result as lending support to the idea that consumption rises in response to a rise in the degree of liquidity of wealth.

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As already mentioned, information on financial wealth was not collected in the first years of the SHIW.
4 The role of illiquid wealth: additional evidence from two Italian quakes

In our first quasi-experiment, we find that owner-occupiers significantly respond to transfers that cover costs of housing repair. This result leaves at least two issues open. First, a rise in average consumption may conceal differences within the group of homeowners. It may well be that transfers had minimal impact on the unconstrained households with liquid wealth, but had significant impact on households with a low ratio of liquid wealth to income of bank debt. Unfortunately, the early years of the Bank of Italy Surveys do not allow us to refine our 1980 sample along these lines. Recent surveys, instead, include information on portfolio composition and liquidity. A second important issue is whether the provision of housing repair services in kind may also have an effect on consumption that is comparable to the effect of cash transfer to households to finance those services. After all, in either case, the goal of government interventions is to compensate households for the cost of housing repair work.

Among the earthquakes hitting Italy since the 1980, two episodes qualify as complementary quasi-experiments that we can use to address each of these issues in turn. The first is the earthquake hitting the Emilia region in 2012; the second is the quake hitting the area around L’Aquila in the Abruzzo region in 2009. As an extension of our work, in what follows we exploit these cases to shed additional light on the transmission mechanism through which transfers may affect demand.

4.1 The 2012 quake in Emilia and the 2009 quake in Abruzzo

The two new case studies include the strong quake that hit a large area of the Emilia region (together with smaller areas in the neighboring regions of Lombardia and Veneto) on May 20 and 29, 2012. This quake resulted in 11,000 damaged houses but a relatively low number of fatalities (27 in total) in 53 municipalities. In response to the quake, the central government channeled 2.4 billion of euros to support housing repairing activities. The bulk of the transfer programme in favor of homeowners took the form of a tax credit against housing repair costs, associated with a guarantee on bank loans. De facto, households could borrow from banks at low rates, and claim a tax credit for the cost of servicing their debt over time.\footnote{Public interventions are regulated by the Law D.L. 74/2012, subsequently modified by the Law D.L. 83 95 and 174 (art. 11) of 2012.}

Our third quasi-experiment consists of the quake that hit 57 municipalities in the Abruzzo region, especially the city of L’Aquila, causing serious damage to 10,000 buildings, and resulting in 309 fatalities. However, unlike other quakes, the reconstruction costs were reimbursed directly to the construction companies. In other words, the government directly paid firms that carried out reconstruction activities, rather than financing households. As a robustness exercise, we can thus check whether wealth illiquidity is still correlated with higher consumption growth.
in response to a transfer, if such transfer is not in cash but in kind.\footnote{Public interventions are regulated by the Law D.L. 39/2009 (28 April) for the emergency phase, and by the Law D.L. 195/2009 D.L. 83/2012 for the post-emergency phase.}

Relative to our first quasi experiment, these earthquakes have been less destructive, and more concentrated geographically. The reconstruction transfer programme was extended to 53 out of 348 municipalities in Emilia-Romagna region, and 57 out of 305 in Abruzzo — amounting to 15 and 19 percent of the municipalities in the two regions, respectively.\footnote{Arguably for these reasons, while official reports and studies suggest that the level of economic disruption has been quite severe at municipality level (see e.g. Porcelli and Trezzi 2014), we fail to detect a statistically significant impact on consumption and income uncertainty at regional level, analogous to our results in Section 2.2.}

In either case, the detailed information provided by Bank of Italy Surveys allows us to build measures of wealth illiquidity across households, identifying the group of “wealthy-hand-to-mouth.” One such measure is the ratio of liquid wealth to income. In particular, our main criterion to identify the “wealthy-hand-to-mouth” households in the SHIW sample is in line with the definition proposed by Kaplan et al. (forthcoming). In our exercise, these households hold a positive balance of illiquid wealth (real asset minus debt), and an average balance of liquid wealth which is less than 50 percent of the earnings in the year before the quake. In the data, we find that the subsample of agents with positive balance of illiquid wealth is de facto coincides the owner-occupiers. As an alternative definition, we also look at households with an outstanding bank debt, in most cases coinciding with a mortgage. In conclusion, we should also stress that the Surveys follow a panel of households, rather than reporting information for repeated cross-sections, which was the case around 1980.

4.2 Econometric model

In the years of the two new case studies, the Bank of Italy Surveys follow a panel of households, rather than reporting only information for repeated cross-section. Thus, we can focus on this panel, and use the growth rates of household consumption before and after the quake as our dependent variable. In both quasi-experiments, the econometric model takes the form

$$\Delta C_{i,t} = \alpha + \beta_1 \Delta C_{i,t-1} + \beta_2 \Delta Y_{i,t} + \beta_3 Q R + \gamma X_{i,t} + u_{i,t},$$

where $\Delta C_{i,t}$ is the growth rate of nondurable consumption expenditures by household $i$ between years $t-1$ and $t$; $\Delta Y_{i,t}$ is the rate of growth of income for the same household; $X_{i,t}$ is a vector of further control variables; $QR$ is a dummy that is equal to one for residents in the quake region. This will be Abruzzo when we run the model for the 2009 quake, and Emilia when we run the model for the 2012 quake.

As control group, we take residents in Liguria, Toscana and Umbria for the Emilia quake, and the South of Italy for the quake in L’Aquila. To assess the different responses of wealthy-hand-to-mouth, we split the sample into groups,
according to the definitions above, i.e., liquid vs. illiquid, or mortgage vs. no-mortgage.

4.3 Results

Results for the Emilia quake are shown in Table 4. The difference across the homeowners’ responses depending on their liquidity is striking. While the response of liquid households in the quake region is not significantly different from the response of the control group, consumption growth for the illiquid homeowners is 17 percent higher. We should note here that the 10 percent estimate we obtain as an average of consumption response across the two groups in the case of the 1980 quake in the South of Italy (see Table 3), appears to be consistent with the two separate estimates shown in Table 4.

A similar picture emerges when we split the sample of home-owner into two groups, depending on whether the households has bank debt, proxying for mortgage. In this case, the response of homeowners is quite strong — about 30 percent higher than those without a mortgage. A factor that may help explain this strong result is that the Law mandated a temporary suspension of mortgage payments benefitting residents in the Emilia quake area in the aftermath of the disaster. A similar high response characterizes the smaller subsample including illiquid homeowners with a bank debt.

As a robustness, we run a placebo, running the same regression model in which the dummy QR for Emilia is replaced with Tuscany. A placebo test is most appropriate in this case, because the limited weight of the quake area in the Emilia region may raise issues in whether our results are contaminated by general trends differentiating the consumption of illiquid owner occupiers, unrelated to the transfers. The results from this placebo test, shown in Table 5, suggests that the effect we find for Emilia are specific to the quake region.

Therefore, in line with Broda and Parker (2012), our overall results lend support to the hypothesis that ‘wealthy hand-to-mouth’ significantly increase their consumption in response to transfers, while households with liquid wealth do not (see also Souleles 1999). Similar results apply to households with a mortgage, in line with Misra and Surico (2013).

As a final exercise, we run the model for the Abruzzo region around 2009, the year of the strong quake in L’Aquila. As already discussed, in this case the reconstruction intervention was organized with no cash transfers to households. Results are shown in Table 6. As apparent from the Table, we find no evidence of differential responses of homeowners consumption before and after the quake, regardless of the liquidity of their wealth.\footnote{This is not to say that transfers were ‘ineffective’ as regards demand and economic activity — but their assessment would require a study of firms dynamics operating in the area, and spillovers outside the quake area.}
5 Conclusion

In this paper we exploit natural disasters as quasi-experiments to provide empirical evidence on the consumption response to cash transfers by the relatively better-off but illiquid households. The main advantages of our study is that the random realization of quakes causes a rise in the illiquidity of housing wealth, while triggering programmes of public transfers in favor of homeowners commensurate to the costs of repairing housing damages. Using the households excluded from the programme as a control group, we can test whether the wealthy hand-to-mouth respond to these transfers in an economically significant way, obtaining results that are largely consistent with the literature.

Many effects of a quake are similar to those of large crisis, in terms of destruction of wealth and illiquidity. In response to a quake shock, it is plausible that a combination of rising illiquidity and income uncertainty motivates households to raise their buffer stocks in a precautionary manner: cash transfers or tax cuts reduce the need to cut consumption towards this goal. Note that households may save a large part of these transfers. In linearized models featuring Ricardian equivalence, a rise in saving would be evidence that transfers are ineffective. In models featuring illiquidity and precautionary savings, instead, a rise in saving does not prevent transfers from being effective against the counterfactual: consumption would fall in the absence of transfers.
References


Porcelli, Francesco and Riccardo Trezzi, “Shake me the Money!,” University of Cambridge, mimeo June 2014.


A Tables and Figures

Figure 1: 1980 Quake in Campania and Basilicata:
Differences in Income uncertainty
Table 1: 1980 Quake in Campania and Basilicata. The Effect on the Consumption of Tenants

<table>
<thead>
<tr>
<th></th>
<th>1980-81</th>
<th>1980-81</th>
<th>Age&lt;65</th>
<th>1981-83</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quake</td>
<td>-0.10**</td>
<td>-0.10**</td>
<td>-0.12**</td>
<td>-0.12***</td>
</tr>
<tr>
<td></td>
<td>(-2.92)</td>
<td>(-3.12)</td>
<td>(-3.02)</td>
<td>(-3.81)</td>
</tr>
<tr>
<td>X</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Observations</td>
<td>963</td>
<td>963</td>
<td>809</td>
<td>1508</td>
</tr>
</tbody>
</table>

Control regions are Abruzzo, Molise, Apulia and Calabria. * p < 0.05, ** p < 0.01, *** p < 0.001

Table 2: 1980 Quake in Campania and Basilicata. Testing Differences in Variability of Disposable Income before and after the Quake

<table>
<thead>
<tr>
<th></th>
<th>Disposable Income</th>
<th>Residuals</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Quake Area</td>
<td>Control Area</td>
</tr>
<tr>
<td>F</td>
<td>3.19</td>
<td>0.33</td>
</tr>
<tr>
<td></td>
<td>(0.000)</td>
<td>(0.000)</td>
</tr>
<tr>
<td>W0</td>
<td>15.74</td>
<td>30.18</td>
</tr>
<tr>
<td></td>
<td>(0.000)</td>
<td>(0.000)</td>
</tr>
<tr>
<td>W50</td>
<td>13.48</td>
<td>16.77</td>
</tr>
<tr>
<td></td>
<td>(0.000)</td>
<td>(0.000)</td>
</tr>
<tr>
<td>Controls</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

Note: The table shows results of tests on equality of variability of income, comparing 1981, the year just after the earthquake, with 1980. Columns under the headings Residuals are based on OLS residuals of the regression of income on a number of controls for households characteristics.
Table 3: 1980 Quake in Campania and Balicata. The Response of Consumption by Homeowners at the Time of Entitlement to Transfers

<table>
<thead>
<tr>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$HS \times TR$</td>
<td>$0.18^{**}$</td>
<td>$0.12^{*}$</td>
</tr>
<tr>
<td></td>
<td>$(2.68)$</td>
<td>$(2.23)$</td>
</tr>
<tr>
<td>$HS$</td>
<td>$0.03$</td>
<td>$-0.15^{***}$</td>
</tr>
<tr>
<td></td>
<td>$(0.74)$</td>
<td>$(-4.86)$</td>
</tr>
<tr>
<td>$TR$</td>
<td>$-0.08^{*}$</td>
<td>$-0.09^{**}$</td>
</tr>
<tr>
<td></td>
<td>$(-2.02)$</td>
<td>$(-2.72)$</td>
</tr>
<tr>
<td>Income</td>
<td>$0.57^{***}$</td>
<td>$0.34^{***}$</td>
</tr>
<tr>
<td></td>
<td>$(21.04)$</td>
<td>$(10.69)$</td>
</tr>
<tr>
<td>$X$</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Observations</td>
<td>971</td>
<td>971</td>
</tr>
</tbody>
</table>

$t$ statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4: 2012 Quake in Emilia. Homeowners’s Consumption by Degree of Wealth Liquidity

<table>
<thead>
<tr>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liquid</td>
<td>Illiquid</td>
<td>No-Mortage</td>
<td>Mortgage</td>
<td>Ill. + Mort</td>
</tr>
<tr>
<td>EMILIA</td>
<td>$0.08$</td>
<td>$0.17^{*}$</td>
<td>$0.06$</td>
<td>$0.33^{*}$</td>
</tr>
<tr>
<td></td>
<td>$(0.99)$</td>
<td>$(2.17)$</td>
<td>$(1.00)$</td>
<td>$(2.61)$</td>
</tr>
<tr>
<td>gy</td>
<td>$0.38^{***}$</td>
<td>$0.28^{***}$</td>
<td>$0.34^{***}$</td>
<td>$0.38^{***}$</td>
</tr>
<tr>
<td></td>
<td>$(5.89)$</td>
<td>$(3.88)$</td>
<td>$(6.07)$</td>
<td>$(5.00)$</td>
</tr>
<tr>
<td>Observations</td>
<td>451</td>
<td>326</td>
<td>592</td>
<td>185</td>
</tr>
</tbody>
</table>

Control regions are Liguria, Tuscany and Umbria.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
### Table 5: 2012 Quake in Emilia. A Placebo Using Tuscany

<table>
<thead>
<tr>
<th></th>
<th>(1) Liquid</th>
<th>(2) Illiquid</th>
<th>(3) No-Mortage</th>
<th>(4) Mortgage</th>
<th>(5) Ill.+Mort.</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOSCANA</td>
<td>-0.01</td>
<td>0.07</td>
<td>0.03</td>
<td>0.09</td>
<td>0.01</td>
</tr>
<tr>
<td></td>
<td>(-0.10)</td>
<td>(1.07)</td>
<td>(0.48)</td>
<td>(0.72)</td>
<td>(0.05)</td>
</tr>
<tr>
<td>gY</td>
<td>0.33***</td>
<td>0.22**</td>
<td>0.29***</td>
<td>0.32**</td>
<td>0.25</td>
</tr>
<tr>
<td></td>
<td>(4.28)</td>
<td>(2.60)</td>
<td>(4.41)</td>
<td>(3.29)</td>
<td>(1.36)</td>
</tr>
<tr>
<td>Observations</td>
<td>288</td>
<td>240</td>
<td>395</td>
<td>133</td>
<td>55</td>
</tr>
</tbody>
</table>

*Control regions are Liguria and Umbria.*

*p < 0.05, **p < 0.01, ***p < 0.001

### Table 6: The 2009 Quake in Abruzzo. Homeowners’ Consumption by Degree of Wealth ‘Liquidity’.

<table>
<thead>
<tr>
<th></th>
<th>(1) Liquid</th>
<th>(2) Illiquid</th>
<th>(3) No-Mortage</th>
<th>(4) Mortgage</th>
<th>(5) Illiq.+Mort.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABRUZZO</td>
<td>0.05</td>
<td>0.05</td>
<td>0.09</td>
<td>-0.03</td>
<td>0.26</td>
</tr>
<tr>
<td></td>
<td>(0.47)</td>
<td>(0.77)</td>
<td>(1.72)</td>
<td>(-0.19)</td>
<td>(1.34)</td>
</tr>
<tr>
<td>gY</td>
<td>0.27***</td>
<td>0.13**</td>
<td>0.19***</td>
<td>0.14</td>
<td>0.16</td>
</tr>
<tr>
<td></td>
<td>(5.09)</td>
<td>(3.08)</td>
<td>(4.42)</td>
<td>(1.97)</td>
<td>(0.88)</td>
</tr>
<tr>
<td>Observations</td>
<td>341</td>
<td>522</td>
<td>670</td>
<td>193</td>
<td>76</td>
</tr>
</tbody>
</table>

*Control regions are the ones in the Center-South Italy.*

*p < 0.05, **p < 0.01, ***p < 0.001*