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Liquidity and Consumption: Evidence from Three Post-Earthquake Reconstruction Programs in Italy[†]

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In Italian regions hit by earthquakes, homeowners typically receive public funds to finance reconstruction. While these funds are strictly tied to reconstruction work, they are in part disbursed up front, leading to significant variation in cash on hand. We exploit this variation to study the effects of liquidity on relatively wealthy households' consumption. We find a large and significant response in the first year that homeowners receive the cash and provide evidence that this response is driven by illiquid households with bank debt. Instead, we find no evidence that consumption responds to funds paid directly to firms, thus leaving households' liquidity unaffected. (*JEL* E21, G51, H76, Q54, R31)

Recent studies offer theoretical and empirical support to the view that consumption demand is highly sensitive to changes in the availability of cash on hand, not only among relatively poor, presumably credit-constrained households but also among relatively wealthy ones. At the theoretical level, leading contributions have emphasized a specific role of cash on hand in determining the scope for and the extent of consumption smoothing by households that optimally keep a large proportion of their wealth in relatively illiquid assets, such as housing (Kaplan and Violante 2014). Correspondingly, a number of empirical studies have produced novel evidence in line with these theoretical developments, focusing on how consumption behavior varies by household (mortgage) debt and wealth (Mian and Sufi 2014; Misra and Surico 2014; Baker 2018; Jones, Midrigan, and Philippon 2018; Surico and Trezzi 2019). In this paper we contribute to the literature by providing direct evidence of the effects of the variation in liquidity on consumption. As in Gorea

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and Midrigan (2018), we focus our study on relatively wealthy households who potentially face difficulties in tapping home equity through loans or line of credit. Different from the literature, we consider case studies in which changes in liquidity are not associated with changes in net income and do not depend on prior access to credit (e.g., via credit cards).[1] We document a strong consumption response. The effects of liquidity variation are far from marginal and lead to changes in expenditure that are substantial relative to yearly household income.

We carry out our analysis using Italian microdata around three major Italian earthquakes affecting the Campania and Basilicata regions at the end of 1980, the Emilia Romagna region in 2012, and the Abruzzo region in 2009, respectively. The reason to consider this sample is that, in the wake of each of them, the government implemented programs giving relatively wealthy households—owner-occupiers—access to significant amounts of public funds to finance reconstruction and repair work on their housing units. So, at one and the same time, the earthquake (a random event) created the need for expenditure for repairs or rebuilding work but also entitled the homeowner households to public financial assistance covering the outlay. Since the funds paid out by these public programs were at best equal to the expenditure for reconstruction, they did not increase households' wealth relative to the preearthquake level.[2]

The specific features of the earthquake regions, as well as the modalities of implementing the public reconstruction programs, make the three case studies in our sample particularly suitable for the purpose of our study. First, at the time of the earthquakes in our sample, the stock of housing in the disaster region consisted mainly of old buildings not up to antiseismic specifications, such that luxury and ordinary housing was comparably vulnerable. Second, eligibility for funding was not related to households' income, liquidity, or wealth, nor was it determined by the homeowner's credit history. When, in our first case study, some homeowners were at first excluded by the funding program, this was due to technical and political factors with no systematic relation to the household's socioeconomic profile. Together, these points suggest that, for our purposes, the fund assignment mechanism can be taken as effectively random.

Third, in two of the earthquakes in our sample, the funds accrued directly to eligible households and, most notably, were transferred in large part—when not totally—before the reconstruction work started. As a result, homeowner households ended up with a substantial amount of (fungible) cash on hand. Effectively, the reconstruction programs turned an earthquake into a one-time random event that converted part of their housing wealth into liquidity: akin to random loans, households received up-front cash against the liability of a flow of precommitted disbursements over time. We can then exploit the fact that homeowners could use the cash for consumption, consistent with studies that isolate the effects of relaxing liquidity

[1] In these respects, the present paper differs from the literature on public subsidy and liquidity constraints, which studies the effects of the cash transfers that also raise households' disposable income.

[2] As explained below, the amount of public assistance to individual households was based on a technical and economic assessment of the work required to repair the damage to their primary home—regulated according to common standards and capped.

constraints, e.g., Gorea and Midrigan (2018).[3] Conversely, for one of the earthquakes in our sample, reconstruction funds were paid directly to firms carrying out the work, bypassing households. We can therefore contrast the results from the other two case studies with one in which, by the design of the public program, access to the reconstruction funds did not coincide with variations in households' liquidity at any point in time. In this case, we can study whether reconstruction funds nonetheless had an effect on consumption, independent of liquidity effects.

Crucial to our empirical strategy, the reconstruction program after the 1980 earthquake was targeted to residents in virtually the entire Campania region, but, for reasons explained in the body of the paper, it was initially restricted to only a small part of the quake-damaged zones in Basilicata. The program was extended to this region with a year's delay in 1982. This delay allows us to contrast the consumption behavior of homeowners with and without immediate access to public funds. That is, we are able to compare the variation in consumption among homeowner households who lived in the earthquake area and hence were exposed to the same disaster-related shocks but received cash payments in different years. To further ensure that we disentangle the effect of differences in liquidity across the two groups, our control group also includes nonhomeowners, who were not eligible for reconstruction funds but arguably benefited from general policy measures supporting of the area.

In the other two case studies, there was no delay in extending the program to different groups of homeowners. However, we can exploit panel information on household portfolio composition that was not available at the time of the first case study. This allows us to identify our treatment and control groups, depending on whether the homeowner households have a high or low ratio of liquid wealth to income and have bank debt. In addition, we can control for lagged values of consumption to allay the concern that nonparallel trends could bias our results.

For our investigation we use surveys by the Bank of Italy that provide detailed data on consumption, income, demographic, and housing tenure status at the household level. While these surveys do not specify the amount of reconstruction funds going to individual households, we can use the region of residence and housing tenure status (owner-occupier versus nonhomeowner) to identify the group of potential eligible households. Given that, we provide evidence on liquidity constraints through an intention to treat study design. The baseline empirical specification is a double difference-in-difference regression model where we exploit variability relative to the households' housing tenure status and either region of residence (as an indicator of the time of access to the reconstruction program in our first case study) or liquidity conditions (in the other two case studies). Once again, we ensure that both our treated and control groups were affected by the earthquake as a control for the direct effect of the earthquake on households' behavior.

Our main results are as follows. In our first quasi-experiment, the earthquake in the South of Italy, we find that, upon receiving the funds, nondurable consumption by homeowner households rises by a full 15 percent relative to the control group. This is in relation to funding that we estimate at about one-third of the average yearly

[3] These authors build a quantitative life cycle model calibrated to the US economy to assess the relevance of constraints that preclude homeowners from tapping home equity.

household income in the region. In the Emilia Romagna study, we show that the relative consumption of homeowner households with access to the disaster assistance program rises significantly—by about 22 percent—but only among households with mortgage debt and low liquid assets. Finally, in the third case study on the Abruzzo earthquake, we find evidence that when the reconstruction funds go directly to firms, the consumption of homeowner households is unaffected, independent of their portfolio liquidity and mortgage debt. Overall, our results—that liquidity-constrained households increase their nondurable expenditures significantly after accessing the reconstruction funds—lend support to the hypothesis that the positive consumption response is specifically driven by variations in liquidity.

Before proceeding, we should stress that in our analysis, the unit of observation for consumption, income, liquidity, debt, and residence and housing tenure status is the household. While in the text we may refer to "homeowner households" as "homeowners" for short, the analysis is always conducted at the household level, not at the individual level.

Related Literature.—Our paper naturally relates to contributions investigating how consumption responds to variation in liquidity associated to changes in borrowing limits. In addition to Gorea and Midrigan (2015), already discussed above, Gross and Souleles (2002) shows that the response to an increase in the supply of credit—i.e., a rise in credit card limits—is greater for households close to their credit utilization limit. Aydin (2015) finds that credit availability has a large and significant effect on spending, although the effect is not necessarily limited to credit constrained consumers. Further evidence is provided by Gross, Notowidigdo, and Wang (2016).[4] The nature of our case study enables us to explore liquidity effects in a similar vein, without, however, conditioning them on prior access to credit by the household.

Our evidence is also in line with empirical findings stressing heterogeneity in consumption behavior depending on households' debt and wealth. Using the methodology proposed by Blundell, Pistaferri, and Preston (2008), Kaplan, Violante, and Weidner (2014) finds that wealthy hand-to-mouth households have a high marginal propensity to consume out of transitory changes in income—a finding that is corroborated by Cloyne and Surico (2017) on a UK sample using a "narrative approach." Surico and Trezzi (2019) finds that an increase in housing taxes led to a significant reduction in expenditure by owner-occupiers with mortgages. Baker (2018) shows that heterogeneity in consumption elasticity to income shocks can be explained entirely by credit and liquidity. Moreover, according to Mian and Sufi (2014), an increase in house prices strongly affects the consumption of low-income households, who aggressively borrow against housing equity, but has virtually no effect on high-income households.

[4] In general, robust evidence on the consumption impact of changes in credit conditions is hard to produce given the well-known difficulty of identifying supply and demand conditions: lenders may increase supply because they anticipate strong demand; conversely, households may demand more credit in anticipation of large purchases. In our quasi-experiments, entitlement to funds is driven by the random occurrence of a natural disaster, which attenuates these endogeneity concerns.

In two critical dimensions, our main finding—that the consumption of illiquid households rises significantly in the year they receive the public funds—also resonates with many works on US countercyclical stimulus programs in 2001 and 2008, suggesting that (i) households spend a nonnegligible share of the cash transfers (on nondurable goods) and (ii) there is significant heterogeneity in consumption responses, owing to differences in homeowners' relative liquidity and indebtedness. These studies include Agarwal, Liu, and Souleles (2007), which shows that the strongest response comes from households who are likely to be liquidity constrained ex ante, as well as Broda and Parker (2014) and Parker et al. (2013), which conclude that the 2008 stimulus had a substantial effect only in the quarter when households received their rebates.[5] In these studies, like ours, consumption varies far more than the permanent income hypothesis would suggest.

Finally, early work by Sawada and Shimizutani (2008) exploits natural disasters as quasi-experiments in consumption behavior; using survey evidence, these authors find that consumption is not smoothed by those households that considered themselves (ex post) to have been credit constrained at the time of the disaster, without however disentangling a specific role for "cash on hand," which is the main focus of our study.

The rest of the paper is organized as follows. Section I presents the data and empirical strategy. Section II is devoted to the 1980 earthquake case study, with an account of facts, institutional features, study design, econometric specification, and results. Following the same outline, Section III covers the 2012 earthquake in Emilia Romagna and the 2009 earthquake in Abruzzo. Section IV concludes. An Appendix documents the sequence of administrative acts by which reconstruction funds were allocated in Campania and Basilicata and shows the results from additional exercises we carry out in reference to this case study.

I. Data and Empirical Strategy

Our study relies on the Bank of Italy's Survey of Households' Income and Wealth (SHIW), which provides detailed information on disposable income, consumption, housing tenure status, and number of components of the households, as well as the employment status, education, and age of the householder. For the years of our first case study (the early 1980s), the SHIW provides repeated cross-sectional data for about 4,000 households representative of the Italian population. For the years of the other two earthquakes in our sample, the SHIW also includes a panel of households and detailed portfolio information.

Unfortunately, the SHIW does not collect household-level information on damages due to earthquakes or benefits from earthquake-related public programs, precluding the possibility of assessing any reaction to the reconstruction funds at the household level. Thus, our estimate cannot be compared to estimates of partial equilibrium microelasticity of consumption to public transfers. However, since the reconstruction funds are targeted to owner-occupiers in the (officially declared)

[5] Previous evidence on financing constraints at household level was provided by Jappelli (1990) and Jappelli, Pischke, and Souleles (1998), among others.

earthquake area, we can use housing occupancy status and residence to identify the population of households that are eligible to receive financial help, including those who effectively benefit from the program. For this reason, our empirical investigation relies on an intention-to-treat analysis. We provide evidence on the average variation in consumption for the entire target group of the program, relative to the control group.

There are key differences in the way public reconstruction programs were implemented across our case studies that we exploit in our empirical models. A common feature of our 1980 and 2012 earthquake case studies is that the government entitled owner-occupiers with damaged housing units to financial help that was parameterized to the costs of rebuilding or repair. The funds were disbursed by local banks, which opened specific credit lines, and made available to households, in part or in totality, before the realization of the reconstruction work. As this translated into an up-front availability of cash on hand, de facto access to these funds relaxed any liquidity constraint when trying to borrow against household equity.

A notable feature specific to the 1980 earthquake in Irpinia is that the early access to the reconstructions funds was initially limited to a subgroup of eligible households. We can thus exploit the difference between the early and late recipients of the funds to create a control group of owner-occupiers with the same characteristics (wealth and exposure to the earthquake shock) of the treatment group—except for the time of their first exposure to the treatment. The comparison is designed to pick up the impact effect of a rise of liquidity.

Relative to the 1980 case study, in the other two (more recent) cases in our sample, there was no delay in implementation in the program we can exploit in our study, but we have a richer set of household-level information on liquidity and mortgage debt. Moreover, we can exploit the (rotating) panel dimension of the dataset. In these case studies, we compare the variation of consumption before and after the earthquake across liquid and illiquid owner-occupiers residing in the region, who were eligible to receive reconstruction funds. This allows us to control for wealth variation induced by the earthquake and the reconstruction program. We also compare liquid and illiquid owner-occupiers relative to the same groups living in the regions adjacent to the disaster area.

A crucial difference between the 2009 earthquake in Abruzzo and the two other case studies is that the government did not transfer funds to households to pay contractors but instead directly paid the firms carrying out the reconstruction work. This enables us to investigate whether household consumption responds to reconstruction funds when the public program differs in one key dimension—namely, whether it translates into a rise in cash on hand at the household level in addition to financing reconstruction services, or it only takes care of the latter with no effect on households' liquidity in the short run.

In light of these observations, it should be clear that throughout our study we derive causal estimates always using double difference-in-differences, exploiting household status and region of residence before and after the access to the public reconstruction program. In all our regression models, the control group consists of households who reside in regions hit by the earthquake. The control group includes both owner-occupiers (eligible for reconstruction funds) and nonhomeowners

(who are not eligible for reconstruction funds). The owner-occupiers are included in the control group either in the years before and after they receive the first injection of cash transfers (in the first case study) or in the same year when liquid (in the other two case studies). It is important to stress that both our treatment and control groups are exposed to any direct and indirect general-equilibrium effect induced by the earthquake in addition to the equilibrium effects of public interventions, including the reconstruction fund program. This is key for our causal estimation quantifying the specific effects on consumption attributable to the disbursement of public reconstruction funds and the associated variation in households' liquidity.

The study design allows us to overcome a number of concerns related to the exclusion restriction that could rise in a difference-in-difference analysis. The damage produced by earthquakes as large as the ones in our sample are conspicuous at the local level. Earthquakes may well have direct or indirect effects on consumption beyond those related to the public reconstruction program. On the one hand, earthquakes typically generate a negative supply shock, namely the destruction of physical/infrastructure capital, correlated with firms' exit and a drop in production. On the other hand, reconstruction work generates new jobs and earning opportunities, increasing the demand for local workers and locally produced goods and services, with a positive effect on output and incomes in the earthquake area. So while private incomes can be expected to change in the aftermath of an earthquake, the sign of the income change is a priori ambiguous.[6] As already stated, we always compare our treatment group with control groups consisting of residents in the earthquake area—both groups facing a similar economic environment. In addition, to further control for any consumption effects of possible variation in income, we include household income among the regressors.

By the same token, to the extent that an earthquake destroys furniture and appliances, households may have to replace them (earlier than required by normal wear and tear). Such material damage may result in a rise in private expenditure irrespective of reconstruction funds. And while this argument applies mainly to durable goods, it could possibly also extend to some nondurable items (e.g., clothing). Again, our study design, by which the control group consists of residents in the disaster area, allows us to control for household expenditures driven by the replacement of essential household goods. In any case, to minimize the risk of confusing households' consumption/saving with replacement expenditures, we use nondurable consumption—which does not include extraordinary maintenance of the home—as our dependent variable. When data are available, we also conduct robustness exercises, further distinguishing nondurable expenditure on food and nonfood items.

Finally, we always include in our regressions a variety of indicators to control for household-specific differences in consumption expenditure, such as the household size and the age, education, and employment status of the householder, as well as a

[6] Some empirical studies have found that earthquakes have a nonnegative impact on average economic activity and growth (see Cavallo and Noy 2010, Hochrainer 2009, and Noy 2009). Porcelli and Trezzi (2014) contrast the negative supply effects of an earthquake with the positive multiplier effects of public works and tax cuts in the earthquake regions of Italy.

proxy for the size of the municipality. We report from the start that our main conclusions do not hinge on the presence of these controls.

II. Consumption and the Early Access to Reconstruction Funds

Our first case study bears on the major earthquake in the South of Italy on November 23, 1980. This affected two Italian regions, Campania and Basilicata, with a combined population of about 6 million (11 percent of the national population). About 350,000 houses collapsed or were seriously damaged, and a much greater number suffered less serious damage (*Commissione Parlamentare di Inchiesta* 1991).[7]

At the time, the Civil Protection Agency—the institution in charge of coordinating and organizing disaster relief—was not instituted (it only came into existence in 1992). The response capability to a disaster was very limited: it took days for the emergency relief teams just to reach some of the municipalities. Indeed, a few days after the earthquake, the President of the Republic, in a TV address, vigorously denounced the failures and shortcomings of public institutions in assisting the earthquake victims.[8]

These institutional failings had two major consequences that are relevant to our study. First, to circumvent the problem of inadequate capacity for direct public reconstruction activities, the government decided to speed up reconstruction by involving households and private firms in a decentralized fashion.[9] From 1981 to 1984 (the period covered by our empirical investigation), the Italian government budgeted the equivalent of 28.5 percent of the earthquake area GDP in 1981 (8 trillion Italian lire) for "reconstruction." Nearly half went to support households, financing private contractors to repair and build housing units (see *Commissione Parlamentare di Inchiesta* 1991). Notably, the experience from this earthquake also motivated and guided the design of similar programs in later decades after the creation of the Civil Protection Agency.

Second, in order to release reconstruction funds, the government laid down strict technical requirements, but specialized personnel able to verify these requirements were in short supply. This general lack of resources for these technical surveys in an extensive and relatively inaccessible territory translated into a severe underestimation of the time needed to complete the process. It took many months to survey the whole earthquake area and compile the full list of municipalities covered by the earthquake law—it was not completed until twelve months later. Technical difficulties in turn interacted with political factors. The regional government in Campania was closely politically aligned with the central government, and this helped to

[7] The earthquake caused 2,743 casualties.

[8] "In 1970 the Italian Parliament enacted laws regulating emergency interventions in case of natural disasters. I now realize that these laws were never translated into practice, as no implementing regulations have ever been issued. I ask myself: if the emergency centers created by these laws were there, why didn't they work? How is it possible that 48 hours after the earthquake, there is no sign of their presence in the area?"—televised message to the nation by Sandro Pertini, November 27, 1980 (own translation).

[9] The overall response deployed a variety of instruments, such as immediate emergency assistance, temporary tax relief for residents, and exemption of young people from compulsory military service (see Cipollone and Rosolia 2007).

determine the timing of the surveys in the two regions and the early inclusion of the municipalities in Campania under the earthquake law, already at the start of 1981 or by summer at the latest. The Appendix provides some details on the lengthy process of revising the list of eligible municipalities.

A. *Institutional Setting and Study Design: Treatment and Control Groups*

The specific modalities of the reconstruction program are key to the design of our empirical study. The following provides a brief but detailed description. The reconstruction law (Law 219/81) precisely identified which households were eligible for the reconstruction funds as owner-occupiers residing in a predetermined list of municipalities. The program was targeted to primary residences; second and vacation homes only qualified for a small subsidy. The funds were strictly tied to work required to "restore habitability" of primary residences, covering up to 110 square meters of repair work, equal to the median size of housing units in the area. More extensive repair work and any improvement or enlargement relative to the preearthquake state of the house were to be at the expense of the homeowner. The amount of funding was set according to certified estimates of the costs of repairing earthquake-related damages. These estimates were produced by technical personnel employed by the municipalities working in coordination with both local and central authorities and based on preset engineering and economic standards. There was limited freedom in selecting firms, and there was a government list of prequalified (usually local) firms. The work had to be done according to preset standards and had to be documented.

It is worth stressing that, as emphasized by the parliamentary committee of inquiry into criminal infiltration and corruption in the reconstruction period, the initial phase (1981–1984) was relatively free of the problems that plagued the area later on (*Commissione Parlamentare di Inchiesta* 1991). The committee documented that in the early 1980s, public funds were actually allocated in line with the rules and costs assessed according to technical parameters.[10]

Housing units included in the programs were classified according to the scale of damage into three categories: (i) collapsed, (ii) seriously damaged, and (iii) mildly damaged units. The owners of category (iii) houses were paid the entire amount of reconstruction funds up front. Those in the first two categories received one-fourth of the total up front upon applying to the funds and the rest over time upon documenting expenditures and presenting detailed progress reports (Law 219/81).

The intensity of the earthquake and the level of destruction were comparable in the Campania and Basilicata regions—the epicenter in fact was on the border. Yet as noted, by mid-1981, virtually all the municipalities in Campania were included in the program. Of the region's 549 municipalities, 337 were already included by

[10] In the late 1980s, the government initiated an extensive inquiry into corruption and criminal activities around the management of public funds for reconstruction (*Commissione Parlamentare di Inchiesta* 1991). The parliamentary committee of inquiry pointed out that, in general, illegal practices were limited in the first phase of reconstruction activities before 1984, when most of the funds were targeted to individual households with very restrictive criteria. Instead, they became widespread in the second phase, when the funds were employed to finance a vast program of public works.

January, and another 205 were included by the end of May. In the Basilicata region, only the municipalities right at the epicenter were included in the list compiled in the first half of 1981. The law extending the program to the rest of the Basilicata municipalities affected by the disaster was not passed until November 13, 1981. As a result, given the timing required to implement the law, actual disbursements began in different calendar years in the two regions. Since both the earthquake and the program extension 12 months later occurred near the end of the calendar year, we can treat 1980, 1981, and 1982 as defining, respectively, the preearthquake period, an interim period when only Campania homeowners were entitled to funding, and a final period in which Basilicata homeowners too were eligible.

The fact that the reconstruction program was initially targeted to residents in Campania and was extended to Basilicata region with a one year delay is a unique quasi-experimental feature of our first case study. Because of this feature, we can specify a double difference-in-difference empirical specification wherein we compare two groups of homeowners (owner-occupier) residing in the earthquake areas depending on whether they have early or late access to funds, as well as groups of households (nonhomeowners) without access to funds also residing in the earthquake area.[11] We should stress that the reconstruction funds were subject to a widespread public debate. Because of this debate, while Basilicata residents received funds only in 1982, the extension of the official disaster area was largely anticipated throughout 1981, especially from the summer months on. Hence, if the timing of the news about the program extension was to be considered an important driver of consumption, we should expect some positive response in Basilicata already in 1981—say, households could have borrowed in anticipation of receiving financial support in 1982. As shown below (and further discussed in the Appendix), the differences in consumption between Campania and Basilicata residents in 1981, as well as the changes in the consumption of Basilicata residents between 1981 and 1982, are at odds with a significant role of anticipation effects. Rather, they most naturally reflect variations in cash on hand, consistent with the relevance of constraints preventing households from extracting liquidity from housing equity.

It is worth stressing once again that the 1980–1984 surveys collect much less information than later surveys. In particular, for our first case study, we can only rely on repeated cross sections. This raises potential concerns about possible shifts in the composition of our control group after the earthquake. One may expect an earthquake to strengthen the incentives for households to move out of the region. Mobility may be high among poorer households and renters, who are less tied to the region than households with local property, as well as among richer households, who may find it easier to sustain the costs of moving. To provide some evidence on this matter, we analyze the evolution of the population in the two disaster regions. As shown in Table 1, we find no significant change in population around the year of the earthquake—a finding that lessens the above concern. As additional evidence, in Table 2 we look at mean values of key household characteristics—disposable income, wealth, family size, age, education, employment status, and profession—by

[11] About one-half of total households are owner-occupiers.

TABLE 1—EVOLUTION OF POPULATION

	Campania	Basilicata
1975	9.45	1.10
1976	9.47	1.10
1977	9.51	1.10
1978	9.55	1.09
1979	9.58	1.09
1980	9.61	1.09
1981	9.64	1.08
1982	9.66	1.08
1983	9.71	1.08
1984	9.74	1.08
1985	9.78	1.08

Notes: The table reports the population in the area affected by the 1980 earthquake from 1975 to 1985. Values are expressed as percentage points of Italian population.

Source: ISTAT

TABLE 2—DIFFERENCE-IN-DIFFERENCES: HOUSEHOLD CHARACTERISTICS

	Size	Age	Education	Employed	Employee	Wealth	Income
Differences 1980	0.1	5.3	0.2	−2.8	−17.3	69,419.1	3,421.8
	(0.73)	(3.33)	(1.31)	(−0.54)	(−2.99)	(7.50)	(3.91)
Difference-in-differences 1980–1981	−0.2	0.7	0.1	−0.0	2.3	17,436.9	304.4
	(−0.64)	(0.32)	(0.50)	(−0.00)	(0.29)	(1.39)	(0.26)
Observations	669	669	669	669	669	669	669

Notes: For each characteristic listed in the headings, the first row of the table reports the results from testing mean differences between homeowners and nonhomeowners residing in the earthquake area in 1980. The second row of the table reports the result from testing difference-in-differences across the two groups over 1980 and 1981. Size is the number of household members; Age is the householder age; Education is an index of educational qualification (1 = none, 2 = elementary school, 3 = middle school, 4 = high school, 5 = bachelor's degree, 6 = postgraduate qualification); Employed is the percentage of employed householders; Employee is the percentage of employee among householders; Wealth is the value of total assets; Income is the net disposable income excluding income from financial assets. Monetary values are expressed as thousands of Italian lire. Standard errors are reported in parentheses.

comparing owner-occupiers and other households before and after the earthquake. As expected, we find that, on average, nonhomeowner households have less wealth and lower income than homeowners as well as a lower percentage of employees among householders. However, these differences are quite stable through time: the difference-in-difference estimates are insignificantly different from zero.

B. *Main Results*

We pool data for the Campania and Basilicata regions and estimate the following empirical model:

$$(1)\quad C_{i,r,t} = \alpha + \lambda_1 D_t + \lambda_2 D_r + \beta_1 HS_s + \beta_2 RF_{r,t} + \beta_3 \left(HS_s \cdot RF_{r,t}\right) + \gamma X_{i,r,t} + u_{i,r,t},$$

where $C_{i,r,t}$ is nondurable consumption expenditure by household i in region r and year t or its logarithm; HS_s (standing for "Housing Status") is a dummy equal to one

for owner-occupier; $RF_{r,t}$ ("Reconstruction Funds" Region) is a dummy indicating the year when households residing in the region r receive the funds—equal to one for households residing in Campania in 1981 and in Basilicata in 1982 and zero otherwise; D_r is a binary variable for region of residence (Campania or Basilicata) and D_t is a binary indicator equal to zero in 1981 and one in 1982; and $X_{i,r,t}$ is the vector of controls, including household disposable income and age, education, employment status, and sector of employment of the head of the household, as well as an index of the size of the municipality of residence. The binary variable D_r controls for time-invariant differences in consumption between regions. Most importantly, D_t takes care of national policies, cyclical factors, and changes in household expenditures that are side effects of the earthquake but unrelated to the reconstruction funds program.

Our coefficient of interest is β_3, attached to the interaction between housing status and regional access to funds, namely $HS_s \cdot RF_{r,t}$. This coefficient measures the difference in owner-occupiers' consumption in the year they gain access to the funds and the consumption of all other residents in the earthquake region, including nonhomeowner households (not entitled to reconstruction funds) and owner-occupiers who have not yet received the funds or have already received them (one year earlier).[12] As explained above, to the extent that the funds are compensation for prospective costs of repairs, β_3 accounts for the effect of a rise in short-run liquidity on consumption.

Results from estimating equation (1) are presented in Table 3. In panel A the dependent variable is the level of consumption, in panel B its logarithm. In columns 1 and 2, the control group consists of homeowners in Basilicata in 1981 (who receive reconstruction funds only in 1982), homeowners in Campania in 1982 (the year after they gain access), and nonhomeowners residing in the earthquake area. In column 3 we drop the nonhomeowners from the sample and, hence, HS_s and $RF_{r,t}$ from the regression model.

The specification of column 1 includes only region and year dummies; the specification in column 2 and 3, the full set of controls. The specification in column 3, without nonhomeowners, also includes the full set of controls.

Column 1 shows that on average, in the year when they gain access to the funds, homeowners spend 1 million Italian lire (the equivalent to about €2,000 in 2016) more than the control group on nondurable goods. This amounts to a 15 percent increase in consumption demand (see column 1, panel B).[13] Remarkably, our esti-

[12] Observe that if the variables D_r, HS_s, and $RF_{r,t}$ are dropped from our specification, our empirical model becomes similar to the baseline specification adopted by Parker et al. (2013), wherein a dummy variable is used to represent the stimulus payment. If, instead, we drop nonhomeowners (and the variable $RF_{r,t}$ and HS_s) from our specification, then the model becomes similar to that in Broda and Parker (2014) and in Parker et al. (2013). In this case, the coefficient β_3 would capture differences in consumption only across homeowners, and the identification would only rely on the delay with which homeowners in Basilicata's received reconstruction funds.

[13] Corresponding to a rise in nondurable expenditure, we detect evidence of a rise in durable expenditure, possibly reflecting the effects of earthquake-related damages to the stock of this good. In our dataset, information on total durable consumption is only available from 1980 on. However, we can obtain a longer record, using a subset of durable expenditures from the survey item *consumi reali*, for purchases of furniture, works of art, and the like. For *consumi reali*, we calculate the percentage of households that report a nonzero expenditure averaged over the four years before and after the earthquake, i.e., 1977–1980 and 1981–1984. Across these two periods, this percentage falls from 10.24 to 7.66 percent in the regions adjacent to the earthquake area; it rises from 8.66 to 12.55 percent in

Table 3—Consumption and Early Access to Reconstruction Funds

	(1)	(2)	(3)
Panel A. Nondurable consumption			
HS × *RF*	1,081.82	1,127.77	1,400.23
	(304.81)	(429.77)	(459.37)
RF (reconstruction funds region)		−255.23	
		(392.77)	
HS (housing status)		38.28	
		(362.57)	
Time fixed effects	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes
Controls	No	Yes	Yes
Adjusted R^2	0.17	0.45	
Observations	672	672	288
Panel B. log of nondurable consumption			
HS × *RF*	0.15	0.15	0.13
	(0.05)	(0.06)	(0.05)
RF (reconstruction funds region)		−0.06	
		(0.04)	
HS (housing status)		−0.02	
Time fixed effects	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes
Controls	No	Yes	Yes
Adjusted R^2	0.15	0.48	0.50
Observations	672	672	288

Notes: The table shows the response of homeowner households' nondurable consumption in the year when they get access to the reconstruction funds. The sample consists of homeowner and nonhomeowner households in Campania and Basilicata over the 1981–1982 time period in the first two columns, whereas it consists of homeowner households only in the last column. The left-hand-side variable is nondurable consumption in panel A and its logarithm in panel B. The variable *HS* (for housing status) is a dummy that is equal to one for homeowners; *RF* (for reconstruction funds) is a dummy that is equal to one if the region is covered by earthquake law. Controls refer to covariates for disposable income (or its logarithm in panel B); the number of household members (or its logarithm in panel B); the number of household earners; the age of the head of household; imputed rent as a share of disposable income; a full set of dummies for whether the head of household is the main income earner, the human capital, and occupations of householders; irregular inflows of money; and the population of the municipalities. Heteroskedasticity-robust standard errors are reported in parentheses.

mates are *not* sensitive to adding controls: the effects are similar in magnitude in column 1 and column 2.

Nonhomeowners are not eligible for reconstruction funds, and they do not face the need to finance the repair and reconstruction work on the housing units. The reason to include them in our study is to control for potential confounding effects from earthquake-related shocks affecting all residents in the region. These include, for instance, the effects of many public programs implemented in the disaster area over and above the reconstruction fund program. In column 2, the variable *HS* specifically allows the average consumption of homeowners to differ, upon receiving the

the earthquake area. Hence, there is a 50 percent increase in the earthquake area relative to the control group. The effect is stronger for owner-occupiers than others.

public funds, from nonhomeowners residing in the area. The last column suggests that our main conclusion does not depend on the inclusion of the nonhomeowners in the control group. In fact, the point estimate of the coefficient remains quite stable when nonhomeowners are dropped from the sample (and the variables *HS* and *RF* are dropped from the set of controls).[14]

To give a sense of the economic relevance of the reconstruction fund program in the absence of direct information from the survey results, we rely on official sources to calculate the total and average amounts paid out to households.[15] Unfortunately, no single official source offers consolidated amounts of the cash payments paid in the first years after the earthquake, which are only a fraction of the total funds eventually granted to households. We combine data on applications for funds with estimates of the costs of repair and reconstruction by category of housing. According to official estimates (*Commissione Parlamentare di Inchiesta* 1991), the number of collapsed or severely damaged housing units amounted to 352,000 units—a bit less than half the total number of homeowners in the disaster area. On average their proprietors were eligible for 29 million lire, about one-fourth of which (7 million) was paid up front. Hence, we can estimate that, in the aftermath of the earthquake (1981–1982), the owner-occupiers as a group received up to 2.5 trillion lire. In addition, we need to include the extra funds that went to the owners of units that suffered only mild damage, about one trillion lire. This brings our estimate of the total funds paid out to eligible households in 1981–1982 to 3.5 trillion lire. The Italian census of 1981 puts the number of homeowners in the earthquake area at about 800,000, which gives an average disbursement of 4.5 million lire per household, roughly one-third of average household income at the time, equivalent to €9,000 in 2016.

As discussed above, Table 1 indicates that in the year when they receive cash payment from the reconstruction fund program, the average expenditure on nondurable consumption by owner-occupiers was about one million lire higher than that by the control group. One million lire of additional consumption out of an average transfer of 4.5 million lire implies an average impact MPC out of liquidity of 22 percent. This estimate is in the ballpark of estimates of the liquidity effects on consumption based on studies relying on variation in the supply of credit. By way of example, looking at the consumption response to changes in debt driven by an increase in credit card limits, Gross and Souleles (2002) concludes that the average MPC out of liquidity ranges between 10–14 percent (higher for households already near the credit limits when these are lifted), while Aydin (2015) reports an average estimate of about 20 percent. Gross, Notowidigdo, and Wang (2016) finds that the MPC increases substantially during a downturn and is positively correlated with the local unemployment rate—a situation of macroeconomic distress that may characterize the local economy in the period following the earthquake.

[14] In the results discussed so far, we have pooled observations from two regions. Since the regions have different populations, it is possible that one of them might exert a disproportionate influence on the results. In the Appendix, we provide evidence that this is not the case by looking at the evolution of homeowners' consumption region by region.

[15] As noted before, the SHIW does not have information on reconstruction funds.

C. *Homeowners' Consumption over a Multiyear Horizon*

By design, reconstruction funds are compensation for a prospective expenditure, the cost of repair or rebuilding—whereas both this expenditure and the funds granted against it are jointly caused by the random event of the earthquake. We should logically expect any impact rise in consumption in response to variation in cash on hand to fade away over a multiyear horizon as reconstruction proceeds and households finance its costs.

To investigate this issue, we cannot rely on a comparable quasi-experimental setting as in our estimate of the consumption response to reconstruction fund. While we cannot pursue causal inference, we can nonetheless produce some relevant evidence by comparing the change in the consumption of homeowners in the disaster area with that of homeowners residing outside this area over different time horizons.

In what follows, we draw on the reports on reconstruction activities after the earthquake to distinguish between two periods: two years when households apply for reconstruction funds and start to receive at least part of them in cash (1981–1982) and the following two years when the bulk of private housing reconstruction work takes place (1983–1984). As control areas we use either the rest of Italy or the regions adjacent to the disaster area—the latter provides a relatively more homogeneous sample. Since our conclusion does not depend on the definition of the control group, for brevity we only report the comparison with adjacent regions.

We adopt the following difference-in-difference regression model:

$$C_{i,t} = \alpha + \eta_t + \delta A_i + \mu QUAKE_{i,t} + \gamma X_{i,t} + \varepsilon_{i,t}, \tag{2}$$

where $C_{i,t}$ is either nondurable consumption expenditure or its log; $QUAKE_{i,t}$ identifies owner-occupiers residing in the disaster area in different periods, as detailed below; η_t is the time fixed effect; A_i is a dummy taking value one in the disaster area and zero elsewhere; and $X_{i,t}$ is the vector of controls defined above, after equation (1).

Based on this model, we carry out three exercises. In the first, we analyze the change in consumption between 1980 and the postearthquake adjustment period 1981–1984 ($QUAKE_{i,t}$ equals one for 1981–1984). In the second, we compare consumption in 1980 with 1981–1982, the years when the program was implemented and households gained access to the funds ($QUAKE_{i,t}$ equals one for 1981–1982). In the last exercise, we compare owner-occupiers' consumption in 1981–1982 and 1983–1984, the core period of reconstruction work ($QUAKE_{i,t}$ equals one for 1983–1984, and 1981–1982 is the base period). Table 4 shows results for each exercise twice: in panel A, the dependent variable is the level of consumption; in panel B, its logarithm.

The results from these exercises are consistent with the hypothesis underlying our study design. First, homeowners in the disaster area *do not* increase their consumption over the four-year reconstruction horizon relative to the control group. Averaged over 1981–1984, the nondurable consumption of homeowners in the disaster area does not differ significantly from 1980. It is worth pointing out that this finding helps to allay one potential concern, namely that these funds constituted a sort of gift, i.e., they were overgenerous relative to the actual cost of repair or rebuilding.

Table 4—The Medium-Run Evolution of Consumption after the Earthquake

	(1)	(2)	(3)
Panel A. Nondurable consumption			
QUAKE	143.43	635.11	−1,044.96
	(279.91)	(288.43)	(317.68)
Time fixed effects	Yes	Yes	Yes
Quake area fixed effects	Yes	Yes	Yes
Controls	Yes	Yes	Yes
Adjusted R^2	0.56	0.56	0.56
Observations	3,601	1,987	3,083
Panel B. log of nondurable consumption			
QUAKE	0.03	0.06	−0.7
	(0.03)	(0.04)	(0.03)
Time fixed effects	Yes	Yes	Yes
Quake area fixed effects	Yes	Yes	Yes
Controls	Yes	Yes	Yes
Adjusted R^2	0.70	0.68	0.67
Observations	3,601	1,987	3,083

Notes: The table shows the results of difference-in-difference models by comparing homeowners in the disaster area with homeowners who reside in adjacent regions (south of Italy and Lazio). Columns 1 and 2 compare, respectively, nondurable consumption in the periods 1981–1984 and 1981–1982 with nondurable consumption in 1980. Column 3 compares consumption in the period 1981–1982 with that in 1983–1984. *QUAKE* identifies homeowners in the earthquake area in 1981–1984 (first specification), 1981–1982 (second specification), or 1983–1984 (third specification). All regressions contain a dummy for the earthquake area, year-specific dummies, and the full set of controls as in Table 3. Heteroskedasticity-robust standard errors are reported in parentheses.

Second, there are differences across subperiods in line with our main causal estimates: compared to 1980, nondurable consumption in the earthquake area (relative to that outside the area) rises in 1981–1982—when the reconstruction fund program starts and households gain access to cash—and then drops sharply in the reconstruction period, 1983–1984. The initial increment is around 6–7 percent (column 2)—the increase is statistically significant in the level specification of the model, or when the control group includes homeowners in all Italian regions. Consistent with the result in column 1, the initial increment is followed by a pronounced contraction in 1983–1984, which is statistically significant whatever the specification or control group considered.

For comparison, we have also estimated an equation similar to equation (2) for the subgroup of nonhomeowners during the 1980–1981 period and found some evidence of a contraction in consumption. We investigated whether the fall in nonhomeowners' consumption could reflect a worsening of the housing rental market. As the stock of housing is damaged by the earthquake, one may expect market forces to put pressure on rents. This explanation turned out to be weak in our case study. First, after the earthquake, the government provided free or subsidized housing to the displaced households; second, the law ("Equo Canone") regulated and capped rents in the 1980s. In any case, we have seen that our main results are robust to excluding nonhomeowners from our control group.[16]

[16] Further evidence on the present case study is reported in the Appendix.

III. Heterogeneity in the Consumption Response

In our first quasi-experiment, we have seen that owner-occupiers as a group respond significantly to receiving funds for home repair work. This is evidence in line with the hypothesis that consumption rises in response to variation in liquidity, even when households are relatively wealthy (homeowners). In this section, we use the other two case studies in our sample to dig into two specific dimensions of this hypothesis. The first is the extent to which the consumption response may be heterogeneous across groups of homeowners. Reconstruction funds can be expected to have a smaller impact on households that are not liquidity constrained relative to households whose wealth is concentrated on a nonliquid asset (housing).

The second issue is whether consumption responds differently to reconstruction funds depending on whether cash is transferred up front to the households for them to use when purchasing reconstruction services, as opposed to no initial cash transfer—as is the case when the public program channels funds directly to the firms that, once selected by the households, carry out the reconstruction work.

A. *The Earthquake in Emilia Romagna*

Compared with our first case study, the earthquake that struck Emilia Romagna in 2012, though strong, was less destructive and more concentrated geographically. The disaster damaged 30,000 houses in an area comprising 15 percent of the region's municipalities. In the aftermath of the earthquake, the central government identified 53 municipalities as beneficiaries of reconstruction funds with the Decree Law 74/2012. Article 3.1 (a) set out the following modalities of implementation: households were given access to bank loans guaranteed by the state and tax credit covering the cost of these loans (Decree Law 95/2012).

Specifically, by Article 3-bis, homeowners with an (officially certified) damaged unit were entitled to bank loans at low interest rates (because of the state guarantee) and offered the benefit of a multiyear tax credit covering both the principal and interest paid on these loans. In practice, households financed the cost of reconstruction work with the cash drawn from the bank and serviced their (low-cost) debt with tax savings over a number of years. According to the press and local sources, the program was implemented quite swiftly with limited or no delay in setting up the administrative procedure. According to official sources—see law D.L. 95/2012 3-bis—the reconstruction funds paid out via bank loans, largely devoted to residential reconstruction, amounted to €6 billion.

Study Design and Results.—The household finance surveys (SHIW) have much richer information in the years of our second and third case study relative to the years of our first case study. Two key features are worth stressing. First, recent surveys follow a panel of households. Thus, we can estimate our model in growth rates (as well as in levels). Second, they include a wide range of questions on household portfolios. Thus, we can refine the treatment group distinguishing households according to indicators of liquidity and debt.

Based on this information, we divide homeowners, defining a dummy variable *ILLIQUID-DEBT* that identifies wealthy hand-to-mouth homeowners. These are property owners who, before the earthquake (at the beginning of 2011) (i) held liquid assets (cash and bank deposits) amounting to less than 50 percent of their disposable income and (ii) had bank debt, e.g., had a mortgage. This definition draws on recent contributions to the literature on transfers. Specifically, the ratio of liquid wealth to income is in line with the definition proposed by Kaplan, Violante, and Weidner (2014) and the work by Misra and Surico (2014), who revisit the effect of US tax credit measures in recent years and show that the consumption of mortgage holders responds more strongly to these measures than liquid homeowners.

The Emilia Romagna earthquake occurred in the first half of a survey year (2012); information on consumption behavior over the year covered many months in the aftermath of the earthquake. We can thus use 2012 as a treatment year. As control areas, we used either the rest of Italy or the four regions adjacent to the disaster area, namely Liguria, Tuscany, Marche, and Umbria. In both cases, we exclude the regions of Lombardy and Veneto, since parts of these regions were also affected by the quake. The results are qualitatively identical for these different definitions of the control group.

We estimate the following double difference-in-difference specification:

$$\begin{aligned}(3)\qquad \Delta C_{i,t} \;=\; & \alpha + \beta_1 \mathit{EMILIA}_i + \beta_2 \mathit{ILLIQUID\text{-}DEBT}_i \\ & + \beta_3 \mathit{EMILIA} \times \mathit{ILLIQUID\text{-}DEBT}_i + \rho Z_{i,t} + \varepsilon_{i,t}.\end{aligned}$$

where $\Delta C_{i,t}$ is the two-year growth rate of nondurable consumption, and *EMILIA* and *ILLIQUID-DEBT* are dummies for households in the Emilia Romagna region and households characterized by low liquidity and bank debt, respectively. The vector of controls, $Z_{i,t}$, always contains the two-year growth rates of disposable income and the number of members of the household, the age of the head of household, the two-year variation in the number of household earners, and a full set of dummies for human capital of the householder, occupation of householder, population of the municipality where the household resides, and whether the householder is the main income earner. In some specifications we also add the lagged value of $\Delta C_{i,t}$.

The first column of Table 5 reports the results for our baseline, which compare owner-occupiers residing in Emilia Romagna and the four adjacent regions in the restricted control group. Relative to the consumption of liquid homeowners, the consumption of illiquid homeowners rises significantly more in the earthquake area than in the adjacent regions. The effect is economically and statistically significant. According to our point estimate, the difference in consumption is as high as 17 percent. The results in the second column of Table 5 show that our estimate is not sensitive to including lagged consumption growth. This is an important result, as it indicates that our estimates are not driven by possible differential trends in the consumption of illiquid homeowners unrelated to the reconstruction program. That is, the observed change in consumption is specific to the Emilia Romagna region in the aftermath of the earthquake. Also, our estimates remain significant, though their

Table 5—Consumption, Liquidity, and Reconstruction Funds

	ALL	ALL	*ILLIQUID-DEBT*	
			Yes	No
EMILIA	0.02	0.05	0.24	0.06
	(0.03)	(0.03)	(0.06)	(0.03)
ILLIQUID-DEBT	−0.06	−0.04		
	(0.04)	(0.04)		
ILLIQUID-DEBT × *EMILIA*	0.17	0.16		
	(0.07)	(0.06)		
Lag ΔC	No	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Observations	798	798	164	634
Adjusted R^2	0.10	0.28	0.44	0.26

Notes: The table compares the two-year growth rate (2010–2012) of nondurable consumption across homeowner households residing in Emilia Romagna and homeowner households residing in adjacent regions (Liguria, Tuscany, Marche, and Umbria). *EMILIA* is a dummy identifying households residing in Emilia Romagna. To split the sample according to liquidity and debt, we define the dummy *ILLIQUID-DEBT*, which equals one if at the beginning of the year before the earthquake, the homeowner household had a mortgage and its liquid assets were less than 50 percent of its disposable income. Controls refer to covariates for the two-year growth rates of disposable income, the number of household members, the age of the head of household, the two-year variation in the number of household earners, a full set of dummies for the human capital of the householder and whether the householder is the main income earner, occupation of the householder, and the population in the municipality where the household resides. In the last three specifications, we also add the lag of consumption growth rate to the baseline set of controls. Heteroskedasticity-robust standard errors are reported in parentheses.

magnitude drops slightly, when we extend the control group to include homeowners in all Italian regions (not shown).

In the last two columns of Table 5, we split the sample of homeowners into two groups according to our variable *ILLIQUID-DEBT* and estimate a difference-in-difference specification for each group. Hence, in the sample that includes only illiquid households, the control group is illiquid households outside of Emilia Romagna. As apparent by comparing the last two columns of Table 5, the main conclusion from our analysis is virtually unchanged.[17]

While the SHIWs do not collect information on expenditure on extraordinary maintenance work, the surveys provide a wealth of detailed information on expenditure on nondurable goods.[18] This allows us to dig deeper and provide evidence on which expenditure categories are the most responsive to reconstruction funds. Specifically, we distinguish between food and nonfood nondurable expenditure. Using each of these as dependent variables, we estimate again our empirical specification in growth rates. Table 6 reports the main results. For both expenditure categories, we find that illiquid owner-occupiers increase their consumption by more than

[17] If we estimate a regression in the level of consumption over 2010–2012, our estimated response is very much similar to that reported in Table 5.

[18] Nondurable consumption includes spending on both food and nonfood items. The following items are not included: (i) purchases of valuables, cars, maintenance, alimony, allowances, gifts, etc.; (ii) extraordinary maintenance of dwelling; (iii) rental of dwelling; (iv) mortgage installments; (v) life insurance premiums; and (vi) contributions to supplementary pension schemes. Note that the amount of expenses for extraordinary maintenance of all property owned by the household is not even part of the durable goods expenditures.

Table 6—Food and Other Nondurables

	Food *ILLIQUID-DEBT*		Other nondurables *ILLIQUID-DEBT*	
	Yes	No	Yes	No
EMILIA	0.15	0.07	0.31	0.05
	(0.06)	(0.03)	(0.10)	(0.05)
Lag ΔC	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Observations	164	634	162	625
Adjusted R^2	0.33	0.27	0.29	0.24

Notes: The table extends the results of Table 5 by splitting nondurable consumption into two subcategories, food and other nondurables. Differences in the number of observations with respect to Table 5 are due to missing values for consumption items.

liquid ones do. This difference, however, is much larger and statistically significant when the dependent variable is the nonfood component of nondurable consumption—it amounts to 25 percentage points.

In Table 7 we verify robustness of our results by changing the definition of illiquid households. We gradually reduce the liquidity-to-income threshold from 50 percent to 20 percent. We do not find any relevant effect of this change.[19]

Finally, in Table 8 we report evidence on debt and indebtedness of homeowners around the earthquake year. The main question is whether homeowners may have obtained liquidity independently of the reconstruction fund program by borrowing from a bank. As shown in the table, in both Emilia Romagna and the control area, the number of homeowners with debt remains quite stable over 2008 and 2012, consistent with the idea that homeowners in the earthquake area did not increase their private debt to finance the reconstruction works. If anything, the debt to income ratio among households in Emilia Romagna dropped relative to that in the control area—this ratio decreased from 1.35 to 1.21. In any case, our estimates regarding consumption and liquidity are not sensitive to adding changes in debt or previous debt positions to the set of controls.

Overall our results lend support to the hypothesis that wealthy hand-to-mouth households respond significantly to receipt of liquid funds—in line with the relevance of liquidity constraints—while liquid households behave consistently with the permanent income theory (see, for instance, Souleles 1999).[20]

[19] Since we do not have information on the credit limits of the households and how much additional credit households can count on, we cannot replicate the strategy by Kaplan and Violante (2014) to adjust the definition of hand-to-mouth households accordingly.

[20] Using the same methodology as for the earthquake in the South of Italy, we obtain an estimate of the impact MPC out of liquidity in the range 0.5–0.8 depending upon model specification. Arguably, as the earthquake occurred in a year of deep recession, the latter might have exacerbated the financial frictions and constraints faced by households (Gross, Notowidigdo, and Wang 2016).

Table 7—Further Results for Consumption and Liquidity

	Liquidity to income threshold		
	40 percent	30 percent	20 percent
EMILIA	0.23	0.27	0.24
	(0.06)	(0.07)	(0.08)
Lag ΔC	Yes	Yes	Yes
Controls	Yes	Yes	Yes
Observations	155	136	107
Adjusted R^2	0.42	0.45	0.45

Note: The table extends results of Table 5 (third column) by changing the liquid assets to income ratio defining illiquid households.

Table 8—Evolution of Debt around the Earthquake Year

	2008	2010	2012
Emilia Romagna			
Number of households	51	53	53
Debt	57,246.2	70,611.3	63,656.3
Debt to income	120.0	131.3	118.1
Control area			
Number of households	144	136	106
Debt	42,191.8	40,379.2	52,162.5
Debt to income	95.9	90.5	124.5

Notes: The table reports the number of homeowners indebted as well as the averages of debt and debt to income. Debt is defined as total liabilities to banks and financial companies.

B. *The Abruzzo Earthquake of 2009*

Our third and last quasi-experiment is brought in because it gives us a unique opportunity to determine whether households respond differently when they benefit from programs financing the costs of reconstruction services without having any access to cash payments.

The earthquake that hit the Abruzzo region in 2009 affected 57 of the 305 municipalities of the region. The epicenter was close to the city of L'Aquila, which suffered the most severe and pervasive damage. The earthquake caused serious damage to 10,000 buildings.[21] Also in this case, the area hit by the disaster benefited from a massive government reconstruction program.[22] Unlike the other programs examined in previous sections, however, the government funds were paid directly to the construction companies that carried out the reconstruction work, not to homeowners.[23]

As for the case of the Emilia Romagna case study, we use a double difference-in-difference empirical model comparing the consumption of liquid and

[21] The fatalities amounted to 309.

[22] Public interventions were regulated by Decree Law 39/2009 (28 April) for the emergency phase, and by Decree Laws 195/2009 and 83/2012 for the post-emergency phase.

[23] In sharp contrast with the 1980 earthquake, the Italian institutions—the Civil Protection Agency—had the technical and financial capability to intervene directly.

illiquid homeowners residing in the earthquake region to the consumption of those residing outside the region. SHIW data are available for 2008 and 2010—the year before and the year after the earthquake. Our empirical results are shown in Table 9. Different from the the other two case studies, we find no evidence of a relative rise in nondurable consumption by owner-occupiers in the earthquake region, whether liquid or illiquid.

In principle, the date when the earthquake occurred (April) leaves open the possibility that the impact consumption response may have been concentrated in 2009—which is not a survey year—with no lingering effect in 2010. While this is an important caveat, we observe that the result for Abruzzo is in line with our first case study—whereas the news about the program extension to Basilicata municipalities during the summer of 1981 did not produce any detectable positive effect on consumption in this region during the same year. The hike only took place when households received the cash in 1982.

The absence of a differential response in 2010 provides evidence consistent with the hypothesis that wealth illiquidity is not correlated with faster consumption growth if public support provides services in kind rather than services associated to the availability of (fungible) cash. In this sense, the results from our third and last case study in our sample complement and strengthen the conclusions from the other two.

IV. Conclusion

This paper sets out empirical evidence on the effects of liquidity on consumption demand. To do so, we exploit the quasi-experimental nature of public programs in support of homeowners residing in earthquake areas. In our case studies, households experience a significant rise in liquidity as a consequence of the random realization of a disaster that simultaneously causes house damages, hence the need to spend in reconstruction and repair and entitle households to reconstruction funds. Since these funds only compensate for the damages, they do not raise households' wealth. However, since funds are paid out in large part up front, they raise the households' cash on hand, hence the liquidity component of their wealth.

We find a statistically and economically significant increase in nondurable consumption by owner-occupiers in the year they receive the cash. We also find heterogeneity across groups of households. In the Emilia Romagna case study, for which we have detailed data on wealth, we find that consumption by liquid homeowners in the disaster area, who are eligible for reconstruction funds, is no different from that by homeowners outside the disaster area. By contrast, the consumption by illiquid households rises quite markedly—our point estimates of the difference in nondurable consumption ranges from 15 to over 20 percent. In the Abruzzo case study, where households do not receive any cash but only benefit from the program in terms of reconstruction services (the funds going directly to builders), we find no evidence of a differential consumption response. Neither liquid nor illiquid households change their consumption, relative to the control group, in response to the public program.

One important issued raised by our results is that many or most of the households in our dataset may have been credit constrained already before the occurrence

TABLE 9—CONSUMPTION AND IN-KIND RECONSTRUCTION FUNDS

	ALL	ALL	*ILLIQUID-DEBT*	
			Yes	No
ABRUZZO	0.03	0.06	0.00	0.07
	(0.04)	(0.04)	(0.20)	(0.04)
ILLIQUID-DEBT	0.03	0.03		
	(0.04)	(0.03)		
ILLIQUID-DEBT × *ABRUZZO*	−0.08	−0.05		
	(0.21)	(0.18)		
Lag ΔC	No	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Observations	861	861	158	703
Adjusted R^2	0.09	0.23	0.23	0.23

Notes: The table compares the biannual (2008–2010) growth rate of nondurable consumption across homeowner households residing in Abruzzo and other regions in the center-south of Italy. *ABRUZZO* is a dummy identifying households residing in Abruzzo. To split the sample according to liquidity and debt, we define the dummy *ILLIQUID-DEBT*, which equals one if at the beginning of the year before the earthquake, the homeowner household had a mortgage and its liquid assets were less than 50 percent of its disposable income. Controls refer to covariates for the two-year growth rates of disposable income, the number of household members, the age of the head of household, the two-year variation in the number of household earners, a full set of dummies for human capital of the householder and whether the householder is the main income earner, occupation of householder, and the population of the municipality where the household resides. In the last three specifications, we also add the lag of consumption growth rate to the baseline set of controls. Heteroskedasticity-robust standard errors are reported in parentheses.

of the earthquake. We might think of the reconstruction funds as a universal loan forced by the occurrence of the earthquake on every homeowner. Households with liquid wealth do not alter their consumption expenditure; households with illiquid wealth take advantage of the short-run availability of cash to bring their nondurable consumption forward in time. This conclusion would be consistent with the interpretation of the reconstruction program as a policy intervention that made housing wealth, so to speak, more liquid—that is, as if these households benefited from a temporary fall in the cost of extracting liquidity from their portfolios. Our contribution consists in documenting empirically the strength of the demand response to cash disbursements, which neither change the household's net income nor go to households manifestly at their borrowing limits.

APPENDIX

A. *The Evolution of the Earthquake Law in Favor of the Regions Struck by the Earthquake in the South of Italy*

The public program defining the state intervention in support of the reconstruction process was regulated by the "earthquake law," decree Law 776 of November 26, 1980 (converted into Law 874 of December 22, 1980). While many measures

were defined immediately after the disaster, the lengthy sequence of measures following the initial decree testifies to the complexity of the process:

(i) A government report at the end of December 1980 included an initial proposal for the list of municipalities, drawn on behalf of the government by the Regional Council of Campania. It listed only 339 municipalities, all in Campania.

(ii) Decree Law 19 of February 13, 1981 contained an article specifying that funds could also be given to granted quake-damaged households in municipalities not on the lists.

(iii) Law 128 of April 15, 1981 provided that a new list of municipalities would be issued by May 31 and also clarified some issues concerning the contributions for urgent reconstruction of damaged houses as recognized by Decree Law 776.

(iv) The Ministerial Decree of April 30, 1981, and the Prime Minister's Decree of May 22, 1981, officialized the area affected by earthquake. The area still excludes a large number of municipalities in Basilicata that will be included by November. This exclusion is publically debated through the summer.

(v) On November 6, 1981, an official document drafted by the Prefecture of the Province of Potenza (Basilicata)—forwarded by the Ministry of the Interior to the Prime Minister's office—endorsed the considerations formulated by the President of the Basilicata concerning the need to complete the process of identifying of the regional municipalities affected by the disaster.

(vi) The Decree of the Council of Ministers of November 13, 1981 (following further inspections) added the entire province of Potenza to the list of eligible municipalities.

B. *List of Variables*

In the following we report the main variables used in our study and mean values relative to a number of characteristics of households or householders in our sample before and after the earthquake.

They are nondurable consumption, net disposable income, number of household members, number of household earners, age of the head of household in years, and imputed rents relative to net disposable income, as well as a full set of dummies for

- whether the head of household is the main income earner;
- education of the householder: none, elementary school, middle school, high school, bachelor's degree, postgraduate qualification;
- main employment (householder), branch of activity: agriculture; manufacturing, building, and construction; wholesale and retail trade, lodging, and catering services; transport and communication; services of credit and insurance

TABLE A1—HOUSEHOLD CHARACTERISTICS

	Homeowner			
	1980		1981	
	Yes	No	Yes	No
Panel A. Campania				
Size	3.7	3.6	3.8	3.8
Age	54.9	48.3	53.1	47.9
Education	2.9	2.7	3.0	2.5
Employed	75.2	80.3	70.2	70.0
Employee	44.8	63.9	43.9	56.3
Wealth	84,975	15,399	113,457	15,616
Income	11,196	8,070	15,395	10,643
Observations	105	147	114	213
Panel B. Basilicata				
Size	4.1	4.0	4.0	4.7
Age	53.3	55.6	56.9	47.2
Education	1.7	1.6	2.0	2.7
Employed	87.0	79.2	64.0	94.4
Employee	34.8	37.5	44.0	88.9
Wealth	85,185	16,788	65,907	46,830
Income	11,254	6,035	11,150	14,020
Observations	23	24	25	18

Notes: The table reports the mean of the characteristics of the households living in the area affected by the 1980 earthquake listed in the first column. Panel A refers to residents in Campania, panel B to residents in Basilicata. Results are reported by home ownership (homeowners and nonhomeowners) and year (1980 and 1981). Size is the number of household components; Age is the householder age; Education is an index of educational qualification (1 = none, 2 = elementary school, 3 = middle school, 4 = high school, 5 = bachelor's degree, 6 = postgraduate qualification); Employed is the percentage of employed householders; Employee is the percentage of employee among householders; Wealth is the value of total assets; Income is net disposable income excluding income from financial assets. Monetary values are expressed as thousands of Italian lire.

institutions; general government; real estate and renting services, other professional business activities, and other private and public services;
- main employment (householder), occupational status: blue-collar worker or similar, office worker or school teacher, manager, member of the arts or professions, sole proprietor; self-employed worker, including unpaid family workers;
- secondary employment, occupational status (see main employment occupational status);
- irregular inflows of income;
- population of municipality where the household lives: up to 5,000; 5,000–20,000; 20,000–50,000; 50,000–200,000; over 200,000 inhabitants.

C. *Further Evidence on the 1980 Earthquake*

In our empirical specification discussed in the text, we have pooled observations from two regions. It may be possible, however, that one region might exert a disproportionate influence on the results. We address this issue by estimating the following difference-in-difference model for each region separately:

$$C_{i,t} = \alpha_0 + \alpha_1 YEAR_t + \alpha_2 HS_s + \alpha_3 (HS_s \cdot YEAR_t) + \gamma X_{i,t} + u_{i,t},$$

Table A2—Consumption and Early Access to Reconstruction Funds, Further Evidence

	Campania		Basilicata	
	1980–1981	1981–1982	1980–1981	1981–1982
Panel A. Nondurable consumption				
HS × *YEAR*	1,114.9	−607.1	−1,988.4	3,704.0
	(330.4)	(457.5)	(1,109.2)	(1,704.1)
HS	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Adjusted R^2	0.41	0.43	0.77	0.73
Observations	579	599	90	73
Panel B. log of nondurable consumption				
HS × *YEAR*	0.14	−0.10	−0.02	0.40
	(0.06)	(0.06)	(0.20)	(0.20)
HS	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Adjusted R^2	0.50	0.49	0.79	0.77
Observations	579	599	90	73

Notes: The table shows the results from the difference-in-difference model comparing the behavior of homeowners and nonhomeowners before and after receiving reconstruction funds by region—the first two columns refer to Campania, the last two to Basilicata. Each sample always consists of both homeowners and nonhomeowners. The left-hand-side variable is nondurable consumption in panel A and its logarithm in panel B. *YEAR* is a dummy that equals one in 1981 (first and third columns) or 1982 (second and fourth columns) and zero otherwise. *HS* (for housing status) is a dummy that is equal to one for homeowners, owner-occupier. Controls are the same as in Table 3. Heteroskedasticity-robust standard errors are reported in parentheses.

where $YEAR_t$ is the time fixed effect, HS_s identifies the owner-occupier, and $X_{i,t}$ is the vector of control variables defined above. For each region we estimate the model for the period 1980–1981 ($YEAR_t$ is one for 1981) and 1981–1982 ($YEAR_t$ is one for 1982). The coefficient α_3 gauges the effects of the program in a region, estimating the change in the mean difference in consumption between homeowners and nonhomeowners in the first year of funding—1981 in Campania (relative to 1980) and 1982 in Basilicata (relative to 1981).

The estimates shown in Table A2 provide a sharper picture of the timing of the consumption response. In each region the consumption increase appears to be concentrated in the first year of funding. In 1981, in the almost immediate aftermath of the quake, only Campania homeowners raise consumption, while those in Basilicata actually reduce their consumption more than nonhomeowners. They raise their expenditure a year later in 1982 when the program is extended to their region—note that the point estimate is larger than in Campania.[24]

The point estimates of the initial decline and subsequent increase in consumption in Basilicata are large compared to Campania. To the extent that owner-occupiers started to repair the damage using cash out of their own pockets, at first they

[24] Results (not reported) are similar if we run the model with the log of consumption as dependent variable.

Table A3—Consumption and the Value of the House

	(1)	(2)
ABOVE × *YEAR*	−64.04	−0.03
	(501.39)	(0.09)
ABOVE	618.90	0.02
	(408.13)	(0.07)
YEAR	1,219.26	0.15
	(333.18)	(0.06)
Adjusted R^2	0.50	0.51
Observations	218	218

Notes: The table shows results from the difference-in-difference model for homeowners in Campania over the period 1980-81, wherein we split the sample of homeowners according to the value of the house. The left-hand-side variable is nondurable consumption (first column) or its logarithm (second column). *YEAR* is a dummy that equals one in 1981 and zero otherwise. *ABOVE* is a dummy that equals one for a homeowner living in a house whose value is above the median of the sample values. Controls are the same as in Table A2. Heteroskedasticity-robust standard errors are reported in parentheses.

presumably reduced nondurable consumption. But the interpretation of this result hinges crucially on the degree of confidence that households may have already had in 1981 about the extension of the public program to their region. If they were reasonably certain in anticipating access to reconstruction funds in 1982, the pattern detected in the data would be entirely attributable to liquidity variation.

In the most general specification of the model, we control for the size of the municipality of residence. Campania has two coastal cities, Naples and Salerno, that are much larger than any other city in the earthquake area. In principle, the behavior of residents and/or the modalities of the reconstruction process areas in these metropolitan areas may have been qualitatively different from that in smaller towns and rural areas. In light of this observation, it is useful to verify that our results are not overly influenced by the inclusion of the two large cities in our sample. We therefore reestimate the empirical models of Table A2 for Campania, dropping Naples and Salerno. As the two cities are roughly the same distance from the epicenter—farther away than all the other municipalities in the sample— our check restricts the treatment area to municipalities that are both more homogeneous in size and arguably more exposed to the shock (since they are closer to the epicenter). In all our model specifications, the point estimates are very close to those obtained for the full sample. For instance, the rise in consumption is about 13 percent when we exclude residents of the two large cities; it comes down somewhat for the specification in level, from 1.114 million to 888,000 Italian lire (results not reported).

Since reliable information on the magnitude of damages at the household level is not available, we cannot properly look at how consumption changes according to the size of the liquidity shock. However, to provide some evidence on this issue, we close the analysis by splitting our sample of owner-occupiers in Campania according to the median value of the house under the assumption that larger houses are prone to higher values of the damages. As shown in Table A3, we do not find any difference between the two groups in terms of consumption change.

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