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Determinants of the conditional probability that a household has informal loans given liquidity constraints regarding access to credit banking channels

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ABSTRACT

We use a semiparametric bivariate probit model to explore the determinants of the conditional probability that a household has informal loans given objective or subjective liquidity constraints regarding access to credit through banking channels. In our empirical study, we use Italian microdata on household income and wealth covering the 1995–2014 period. Our results emphasize that the most important trigger factors influencing the conditional probability of interest are debts in the form of both mortgage(s) and loan(s) and the unemployment status of the household head. Other trigger factors include a young age of the household head, residence in a large municipality, no home ownership (paying rent or free use), an equivalent income lower than 10,000 Euro, and a ratio of liquid assets to net annual income very close to zero. Understanding the factors associated with a household's probability of taking out informal loans is important to gain knowledge about a phenomenon that is not tracked by official statistics. This knowledge is also useful to practitioners and policy-makers interested in providing new tailored financial services or solutions for reducing poverty risk.

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1. Introduction

A household can decide to finance its consumption from a variety of sources, including labour income, accumulated monetary wealth, monetary inheritance or borrowing (e.g., Rubaszek and Serwa, 2014; Zanin, 2016b). Households that decide to borrow can often choose among the following options in obtaining a loan: (a) formal credit (i.e., from a financial institution) or informal credit (i.e., from a network of friends or relatives) as a preferred solution or unique choice; (b) informal loans as a substitute for formal channels when liquidity constraints are a factor (see also Benvenuti et al., 2015 and references therein); and (c) complementarity between both formal and informal credit. In developed countries, the banking system represents the main channel of access to credit for households (e.g., Modigliani and Brumberg, 1954; Friedman, 1956; Benvenuti et al., 2015). Unsurprisingly, the literature on the forms of financial intermediation for such countries is thus rich in studies both that reveal the factors associated with the entry and sustainability of households regarding bank credit and that explore events such as unemployment that trigger increased probabilities of default or delays in the re-payment of debt (e.g., Banasik et al., 2003;

Aristei and Gallo, 2016; Tian et al., 2016; Thomas et al., 2016). Other studies have documented the difficulties that some families face in finding lenders in the presence of adverse selection and moral hazard, as these factors can lead to information asymmetry between borrowers and lenders (e.g., Berger et al., 2011; Benvenuti et al., 2015; Agarwal et al., 2016). In this regard, when issues such as liquidity constraints preclude access to bank credit, informal channels can play an important role for households seeking credit. Informal lenders are likely to be able to gather more information about such a household than financial institutions, which can contribute to reducing problems involving both adverse selection and moral hazard (e.g., Ghatak, 1999; Giné, 2011; Lee and Persson, 2016). Notably, households that seek loans from networks of friends or relatives frequently encounter either benefits and pitfalls.

As a non-exhaustive list, the **benefits** include the following possibilities:

1. Obtaining loans without security (or without physical collateral) or with less security than is required by banks, as informal loans benefit from 'social collateral' typically associated with kinship and/or friendship between the lender and borrower (Karaivanov and Kessler, 2015).
2. Obtaining interest-free loans or loans at lower rates than can be found in the banking system.

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3. Repaying informal lenders more flexibly than formal lenders.
4. Obtaining loans faster and more easily than through formal credit channels because informal lenders often do not require an assessment process (in terms of time and bureaucracy) that is as onerous as that required from a formal lender.

Among the **pitfalls** are the following factors:

1. Informal lenders have limited resources, particularly in comparison to financial institutions.
2. Borrowers may not have an available network of friends or relatives to lend money.
3. The borrower's default can jeopardize lender–borrower kinship ties or friendship (Karavanov and Kessler, 2015).

The literature on informal loans has mainly focused on case studies of households in developing countries (e.g., Madestam, 2014). To the best of our knowledge, few studies have focused on developed countries in this regard, and most of these have focused on Italy (e.g., Benvenuti et al., 2015). Among the available studies, Benvenuti et al. (2015) provided some of the initial interesting evidence regarding the relationships between liquidity constraints and informal loans in Italy. These authors considered the following two typologies of liquidity constraints, in particular: (a) the household has applied for a loan or a mortgage and has been rejected by a financial intermediary (objective event traceable from financial institutions); or (b) the household had considered applying for a loan or mortgage from a financial institution, but decided against it based on the belief that it would be rejected (subjective event not traceable from financial institutions). Their empirical analysis was performed using a Bank of Italy survey on household income and wealth. Notably, the survey represents an important point of reference for long-term analyses of informal transfers because information is available from 1995. Examining the 1995–2012 period, the authors used both a fully parametric linear and logit model and found a positive and statistically significant relationship between liquidity constraints and informal loans.

We will extend the Benvenuti et al. (2015) study from the following perspectives:

- First, we include the micro-data that refer to 2014 to enrich the descriptive analysis of the time series of informal loans and liquidity constraints. Specifically, we have decided to consider the same liquidity constraints as Benvenuti et al. (2015).
- Second, we estimate the conditional probability that a household has taken out informal loans given liquidity constraints by considering the possible dependence between the two events. Conditional probability is an interesting measure of the probability of an event 'A' given that another event 'B' has occurred. This measure is appealing when using cross-sectional data because a temporal or causal relationship between event 'A' (informal debt) and event 'B' (liquidity constraints) is not required. To achieve this aim, we specify a flexible bivariate probit model, as proposed by Radice et al. (2016). Such a modelling method let us explore the possible non-linear dependence between the variables of interest using several copula functions, whereas the relationship between continuous covariates and response is modelled using a penalized spline approach. In a classic, fully parametric modelling method, continuous covariates typically enter the model as linear, polynomial, or categorical terms based on the *a priori* assumptions imposed by the researcher. However, the correct functional form is rarely known *a priori*, and there is a risk that the model will incur incorrect specifications, which in turn can lead to inconsistent parameter estimates (e.g., Zanin, 2015). Splines thus represent a valid solution when the functional shape is not known *a priori*, while the penalty prevents overfitting.

- Third, using the proposed flexible bivariate probit model, we provide novel empirical evidence for the factors associated with the probability that a household has objective or subjective liquidity constraints.
- Fourth, we produce evidence regarding the marginal effects of the selected explanatory variables on the outcomes of interest, particularly the effects that such factors have on the conditional probability that a household has taken out informal loans given liquidity constraints (or not). We have included in the models some new explanatory variables not considered in the studies discussed above. These variables include the ratio between liquid assets and net annual income, the equivalent income, the ratio between the unemployment rate at the regional level and the unemployment rate at the national level, and the typology of formal debt (if present).

Improving knowledge in this manner might help practitioners from banks and insurance companies to assess the characteristics of households that are likely to be interested in new tailored financial services. For example, insurance companies might want to assess the potential market for an insurance policy tailored to informal transfers (loans) to cover creditors against borrower default. Economists, sociologists and policy-makers might be interested in the sphere of informal loans to improve knowledge about the management of family budgets, including poverty issues.

The remainder of this article is organized as follows. In Section 2, we present the microdata used for the proposed analysis. In Section 3, we briefly describe the econometric model, and we discuss the main results in Section 4. Section 5 provides the main conclusions of the study.

2. Data

The Bank of Italy conducts a biennial national survey of household income and wealth using a structured questionnaire to collect information about the socio-demographic characteristics of household members, labour conditions, income sources, wealth composition, and debt, among other data. Since 1995, the questionnaire has included a section covering informal loans. The cross-sectional data used in our analysis consider the 1995–2014 period. The microdata consist of a sample of 79,137 households (approximately 8,000 households for each survey). We restricted our analysis to the sample of households with a household head between 20 and 95 years of age because of the small number of observations outside of this age range. The household questionnaire was addressed to a person of reference (typically the household head), who responded on behalf of all the household members. Below, we describe the variables of primary interest.

2.1. Informal loans and liquidity constraints

In this section, we describe the variables used to determine the conditional probability that a household has informal loans given liquidity constraints regarding access to banking channels to credit.

Informal loans from friends or relatives: The survey includes a question regarding the presence of debts among Italian households in the form of informal loans. Specifically, the question asks, "At the end of the last year, did the household have any debt owed to relatives or friends?" Based on this question, we defined a binary variable with a value of 1 if the household declared any debts with friends or relatives and 0 otherwise. Plot (a) in Fig. 1 shows that the percentage of households with informal loans was decreasing from 1995 to 2002. Beginning in 2002 (the year in which the Euro became the official currency in Italy), we observe a progressive return to growth in the group of families

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