BANCA D'ITALIA
EUROSISTEMA

Temi di discussione

(Working Papers)

Information or persuasion in the mortgage market: the role of brand names

by Agnese Carella and Valentina Michelangeli

June 2021

Number 1340

BANCA D'ITALIA
EUROSISTEMA

Temi di discussione

(Working Papers)

Information or persuasion in the mortgage market: the role of brand names

by Agnese Carella and Valentina Michelangeli

Number 1340 - June 2021

The papers published in the Temi di discussione *series describe preliminary results and are made available to the public to encourage discussion and elicit comments.*

The views expressed in the articles are those of the authors and do not involve the responsibility of the Bank.

Editorial Board: Federico Cingano, Marianna Riggi, Monica Andini, Audinga Baltrunaite, Marco Bottone, Davide Delle Monache, Sara Formai, Francesco Franceschi, Adriana Grasso, Salvatore Lo Bello, Juho Taneli Makinen, Luca Metelli, Marco Savegnago.
Editorial Assistants: Alessandra Giammarco, Roberto Marano.

ISSN 1594-7939 (print)
ISSN 2281-3950 (online)

Printed by the Printing and Publishing Division of the Bank of Italy

INFORMATION OR PERSUASION IN THE MORTGAGE MARKET: THE ROLE OF BRAND NAMES

by Agnese Carella* and Valentina Michelangeli*

Abstract

The role, informative or persuasive, of brand names in driving purchasing decisions is very much under debate. We exploit the rebranding of a mortgage lender to analyse households' choice behaviour in response to brand popularity. Loan-level data on new mortgages suggest that (1) brand awareness reduces the equilibrium price of residential mortgage contracts and (2) the reduction mainly reflects consumers' selection of cheaper products due to better information. Our calibrated model implies an overall gain equal to 6 per cent of the initial loan amount and a roughly 10 percentage point increase in the share of households that shift to cheaper lenders.

JEL Classification: D12, D15, D83, G21, G51.
Keywords: brand, mortgages, household finance.
DOI: 10.32057/0.TD.2021.1340

Contents

* Bank of Italy, Directorate General for Economics, Statistics and Research.

1 Introduction[1]

How do consumers respond to brand name? The answer to this question is far from obvious. When shopping for a product, customers typically do not observe all options and have to find the one to their liking through search. They may first visit the seller whose name is more salient, and stop there if the deal they find is attractive enough to make searching not worthwhile to continue (Haan & Moraga-González 2011). Brand popularity might influence shopping behaviour in two ways. Either by increasing market knowledge, acting like a signaling device that reveals better alternatives to uninformed clients (Nelson 1970; Robert & Stahl 1993), or by creating spurious loyalty that persuades consumers into worse options (Braithwaite 1928; Robinson 1933).[2]

This paper addresses the dichotomy between brand persuasion and brand information in the Italian mortgage market and attempts to answer two main questions. First, whether popularity of the brand causes borrowers to select high-price lenders (persuasive effect), or to switch to less expensive ones (informative effect). Second, what is the value added of an informative brand name. Our contribution to the literature is twofold. On one side, we provide empirical evidence in support of the informative role of brand name. We exploit the rebranding of a mortgage lender under a more salient name in some Italian provinces, and show that superior awareness of the brand induces households' reallocation to low-price lenders, with an overall decrease in price dispersion. On the other side, we develop a structural model and quantify the welfare effects of informative brands in terms of lower search costs for the household and broader customer base for the financial intermediary. Our results set apart from previous empirical findings by Gurun et al. (2016), which document consumers' persuasion in the US subprime mortgage market, and instead are consistent

[1]We thank Daniel Paravisini for excellent comments and supervision. We also thank Michela Verardo, Vicente Cuñat, Juanita Gonzalez-Uribe, Martin Oehmke, Ulf Axelson, Liliana Varela, Cynthia Balloch, Christian Julliard, Dirk Jenter, Rajkamal Iyer, Cláudia Custódio, Emilia Bonaccorsi di Patti, Francesco Columba, Sabrina Pastorelli, Giovanni Guazzarotti, Martino Tasso, Riccardo Sabbatucci, and all seminar participants at the London School of Economics and the Bank of Italy for their help and suggestions. We thank Federica Ciocchetta for exceptional assistance in the construction of the dataset. The views expressed in this paper are solely the responsibility of the authors and should not be interpreted as reflecting the views of the Bank of Italy or anyone associated with this institution. All results have been reviewed to ensure that no confidential information is disclosed. All errors are our own.

[2]The debate has centered on consumer goods, for which artificial product differentiation can be attained along many dimensions (Telser 1964; Nelson 1974; Comanor & Wilson 1975; Cubbin & Domberger 1988), while minor attention has been given to homogeneous goods characterized by few observable characteristics. With respect to the mortgage market, the only piece of empirical evidence relates to the US, and specifically refers to the persuasive role of advertising in leading borrowers towards more expensive choices (Agarwal & Ambrose 2008; Gurun et al. 2016).

with earlier works by Bhutta et al. (2018) for the US and Allen et al. (2019) for Canada, presenting evidence of wide dispersion in the mortgage rate paid by households on identical loans.[3]

The Italian mortgage market has specific institutional features that differentiate it from others. In Italy, unlike Canada and the US, individual-based pricing and negotiation between the borrower and the lender are limited, thus all borrowers purchasing the same product pay close to the advertised rate (Gambacorta et al. 2019). Yet, this is not indicative of convergence towards the lowest price. Quite the opposite, price dispersion is material and overpayment concerns all borrower types (Carella et al. 2020).[4] Search costs, time constraints, brand loyalty, negotiation ability, they all offer a reasonable explanation for this (as in Allen et al. 2014a and in Allen et al. 2019), and they do even more so in a market, like the Italian one, dominated by traditional banks, where contracts are mainly settled at the physical branch.[5] It should also be noted that mortgages are complex products and some of their features might result obscure to households, or might require some degree of financial literacy and sophistication which they lack (Hall & Woodward 2012; **?**). This creates a demand for information and makes borrowers genuinely inclined to trust the intermediary with superior brand name. It also raises the question whether or not branding increases market knowledge and helps households choose the cheapest from a set of mortgage options.

Isolating the effect of brand name on consumers' behaviour is no easy task given the existence of several confounding factors (the macroeconomic scenario and the outlook of the financial sector, banks' policies and strategies, as well as borrowers' and lenders' characteristics). On top of that, individuals' choices over time are rarely observable, due to both confidentiality of this information and the absence of granular data. To tackle the first issue, we exploit variation in brand name induced by the rebranding of a mortgage lender in some Italian provinces. Our set-up closely resembles that of a natural experiment where nothing changes with the rebranding event, except for the name of the bank in those affected provinces. Parties involved are the subsidiary and the

[3]This rate differential translates into substantial upfront costs for the borrower, an important component of which is attributable to knowledge and search. Additional works include Agarwal et al. (2017), Alexandrov & Koulayev (2017) and McManus & Yi (2018) for the US, Allen et al. (2014a) for Canada, Iscenko (2018) for the UK, and Damen & Buyst (2017) for Belgium.

[4]Price dispersion in Italy is mainly driven by contract characteristics (in particular, the loan-to-value, the rate type and the maturity) and figures are comparable to those recorded in the US (Bhutta et al. 2018) and Canada (Allen et al. 2014a).

[5]In Italy, mortgages originated online were about 6 per cent of the total in 2015, though on the rise (Carella et al. 2020), while fintech lenders accounted for about 16 per cent of the US mortgage market (Buchak et al. 2018).

parent bank of a leading banking group in Italy. Importantly, they both follow the same pricing and offering policies, defined at the group headquarter level, and they each target specific Italian provinces, with no overlapping. The two banks belong to the group since January 2007, but have been operating with distinct brand names and identities until before August 2018 (rebranding event). At this time, the parent bank incorporates the subsidiary and replaces the brand with its own, more popular, one in all the provinces where the subsidiary is located (treated provinces). The event has no effect on the pricing and offering policies of the two banks (in fact, they are defined at the group headquarter level), but it increases consumers' awareness of the brand in provinces (treated) where the name of the subsidiary changes into the one of the parent, and becomes more famous. This rebranding constitutes our key source of exogenous variation in brand name across provinces, allowing us to identify the causal effect of brand popularity on households' choice of mortgage products. To overcome the second challenge, arising from limited information on individuals' mortgage choice, we count on the richness of our dataset, covering all new mortgage originations in Italy before and after the rebranding event. We take data from the Central Credit Register (CR) on mortgages originated in Italy over the period from 2018Q1 to 2018Q4.[6] To identify the treatment effect of brand name on the equilibrium price of mortgage contracts, we rely on a Difference-in-Differences design and compare the evolution of mortgage rates around the rebranding event (August 2018) in treated provinces versus remaining provinces not affected by the shock (control group). To make sure that findings are not artificially driven by underlying price trends, within the same group of treated provinces, we also look at what happens to the lender's main competitor (defined in terms of market share), which is not experiencing any rebranding. Our main result is that brand name reduces (by roughly 4 basis points)[7] the average equilibrium price of new mortgages issued by the rebranding lender in treated provinces, while it has no effect on the competitor lender.[8] Noteworthy, as the offer rate does not change, the encountered price reduction mainly reflects consumers' selection into less expensive products.[9] Although interesting, the above

[6]Throughout the analysis we focus on indebted borrowers with a previous lending relationship, and we either control for first-time borrowers or exclude them as they belong to a different sample.

[7]The reduction is quite relevant given an average annual percentage rate of about 2 per cent in Italy.

[8]This occurs because households switching to the rebranding lender come indistinguishably from all points of the transaction price distribution of its competitor, so that no aggregate effect emerges for the latter in equilibrium.

[9]Offer rates are observed from MutuiOnline and are not specific to online clients, but are the same as those offered at the physical branch and listed on the bank's website.

result is compatible with two different households' behaviours: either a pure substitution pattern in favour of the lender whose name is more salient, and regardless of its expensiveness, or a more efficient search, which translates into borrowers' reallocation towards low-price intermediaries. To discriminate between the two, and corroborate our claim that branding improves consumers' ability to select the cheapest option (informative branding), we compare actual transactions with concurrent market offers. We match contracted rates with rates posted over the same period through Italy's main online broker, MutuiOnline, and come up with a very detailed, quarterly, loan-level dataset accounting for all the most important features of both the contract and the borrower (mortgage rate, amount, loan-to-value, maturity, rate type, borrower's income, job type, age and location). Our merged dataset has fewer observations, but allows for significant improvements with respect to preceding works as we can exclude changes in the lenders' pricing and offering policies at the time of the event, and we can control for variables, previously not observable, that account for most of the variation in transacted rates (i.e. the mortgage maturity and the loan-to-value).[10] With such refinements at hand, we are able to track down households' response to brand name in all provinces, across all banks, and for any given mortgage product. Holding contract characteristics constant, we find that branding allows households at the top and middle of the transaction price distribution to obtain cheaper products. Most importantly, we show that households turn to the lender whose name is more popular only when the latter is also less expensive. That is, brand name allows to gather attention, but it does so only when combined with more competitive prices. We interpret this as evidence against brand persuasion: branding induces consumers to make more comparisons and, when there are lower prices, to choose the cheapest option.[11] We also find that brand popularity is mostly effective at switchers, that choose the rebranding bank for the first time, compared to old clients, that have a well established lending relationship with that bank. This further validates our thesis that an informative channel is at play. Intuitively, old clients already know the parent and for them the information effect is limited, while switchers are less aware and can fully enjoy the benefits of branding. The result is relevant because recourse to mortgage renegotiations has become quite popular in Italy, reaching 17 per cent of the new loans origination in 2018 (Attinà et al. 2020).[12]

[10] See also Carella et al. (2020); and for the UK Benetton (2018) and Robles-Garcia (2019).

[11] This interpretation is in line with models of optimal consumer search by Ozga (1960) and Stigler (1961), in which branding reduces consumers' search costs by conveying information on product's existence, price and quality.

[12] With the 2008 Bersani Law, households are allowed to modify their contract terms and, specifically, reduce

With this empirical evidence in mind, we derive a life-cycle model and quantify the effect of brand name on consumers' search costs and households' transition across lenders. Our model is well calibrated to replicate main features of the Italian household sector and to match the level of dispersion in the price of mortgage products encountered in the data. We focus on previously indebted borrowers and their choice of either remaining with the current financial intermediary, or moving to a different one with a lower price.[13] Moving requires some initial searching effort and determines all the future streams of mortgage payments to be made by the borrower. More precisely, if the household puts zero effort (say, because time constraints or search costs are too high), she ends up paying mortgage instalments at a premium for the entire duration of the loan.[14] In each period, the household also makes consumption and portfolio choices under uncertainty about survival probabilities, income realizations and capital returns.[15] We compare two different scenarios. In the first one (no rebranding), households are exposed to the same brand before and after the event. In the second one (rebranding), households are exposed to the subsidiary brand before the event, and to the parent brand after. We rank intermediaries in terms of price (high, medium and low) and derive the transition matrices of borrowers across lenders with different rankings. Then, we let households reallocate from one intermediary to the other according to the transition probabilities observed in affected provinces before (control scenario) and after (treatment scenario) the lender takes on a more popular name.[16] Following the event, the share of households that move to an intermediary with a lower price increases by more than 9 percentage points (from 16 per cent to roughly 26 per cent). For our model to replicate this figure, the corresponding decline in

the mortgage instalments without paying any additional extra costs. This lead to an acceleration in mortgage renegotiations, particularly pronounced since 2015.

[13] In Italy, mortgage renegotiations account for about 17 per cent of new loans origination in 2018 (Attinà et al. 2020).

[14] The premium could reflect consumer's inertia, inattention, loyalty, lack of information or other search frictions (Delgado-Ballester & Munuera-Alemán 2001; Banerjee & Bandyopadhyay 2003; White & Yanamandram 2004; Lewis & Soureli 2006; Su 2009; De Clippel et al. 2014; Ericson 2014; Miravete & Palacios-Huerta 2014; Andersen et al. 2015; Matějka & McKay 2015; Seenivasan et al. 2016; Ho et al. 2017; Ozdemir et al. 2020).

[15] Including these sources of uncertainty is necessary to replicate within the model the limited share of households investing in risky assets that we observe in the data.

[16] Our calibration delivers initial values for borrowers' overpayments and search costs that match those of related studies for other countries. Bhutta et al. (2018) estimate a gap between the 10th and 90th percentile mortgage rate that US borrowers with the same characteristics obtain for identical loans equal to 54 bps, of which 26 bps (i.e. 1.2% of the average US loan) are attributable to knowledge and shopping (search costs account for 0.9% of the average Italian loan in our model and they also lead to overpayment by the borrower). Allen et al. (2019) find that search frictions reduce consumers' surplus by 12 dollars a month in the Canadian mortgage market, and 50% of them are ascribable to search costs (this percentage is at least 30% according to our calibration).

consumers' search costs amounts to 330 euro (or 0.3 per cent of the average Italian loan).[17] This lump-sum reduction captures the direct benefit for the household, namely time saved in searching for information and other monetary costs not incurred to visit the physical branch or to contact the bank's representative (say, by phone or mail). To get a comprehensive estimate of the total value added for the borrower, one should also include savings in the monthly instalments attained by moving to a cheaper lender and collected throughout the duration of the mortgage. Taking those into account, the household gains more than 6 per cent of the initial loan amount, equivalent to 7,200 euro for an average Italian mortgage contract. Moreover, price dispersion goes down more in treated than in untreated provinces, and the difference (1 basis point) is consistent with the treatment effect documented in the data.

Understanding the relationships between brand name and the price of mortgages is important both because of the central role played by mortgage debt in households' credit landscape,[18] and because of trends that are currently shaping the Italian banking sector and that may, in turn, alter the intensity of local branding. In particular, our paper suggests that consolidation of small banks under a single name could have a positive impact on the lender's ability to reach potential clients similar to the one induced by an increase in consumers' incentive to seek information through the awareness mechanism. However, the informative effect would only arise if consolidation also implies the simultaneous rebranding of the lender under a more popular name.

Related Literature. Although the literature acknowledges the important role of brand name on consumers' choice, the nature of this role is still not clear (Bagwell et al. 2007; Della Vigna 2009; Della Vigna & Gentzkow 2010). As economists struggle to reach consensus, there are three main views. According to the predominant one, branding is *persuasive*, for it creates spurious product differentiation and instills brand loyalty, which both distort competition and persuade consumers into bad choices (Braithwaite 1928; Kaldor 1950; Comanor & Wilson 1975; Thaler & Sunstein 2008; Gurun et al. 2016). In contrast to that, branding increases market knowledge and reduces search costs under the *informative* view, thereby allowing consumers to find better products (Ozga 1960; Stigler 1961; Telser 1964; Nelson 1974; Robert & Stahl 1993). The third possibility is that

[17] The average mortgage in Italy has 120,000 euro amount, 20-year maturity, 60% LTV and 200,000 euro house value.
[18] Mortgages represent the main liability for Italian households, accounting for over 50% of their financial debt.

branding enters consumers' preferences in a way that is *complementary* to consumption and without changing consumers' preferences, but rather by influencing their behavior through both information and social prestige (Lancaster 1966; Stigler & Becker 1977; Nichols 1985). This paper adds to the debate on the role of brand name and provides empirical evidence in favour of the informative view. We bring together the literature on price dispersion for homogeneous goods (Allen et al. 2014a; Allen et al. 2014b; Allen et al. 2019) with the one on mortgage choices under imperfect consumers' information (Agarwal & Ambrose 2008; Gurun et al. 2016), and conclude that brand awareness leads to lower variation in the price of comparable mortgages. We enrich our analysis with a theoretical framework that well explains our empirical findings and that can be used to quantify the welfare effects of brand popularity. Along these lines, our paper also contributes to the literature on housing and portfolio choice within a life-cycle model (Liu et al. 2003; Cocco 2005; Gomes & Michaelides 2005; Cocco et al. 2005; Barro 2006; Alan 2012; Campbell & Cocco 2015). Finally, we complement existing approaches in household finance that study the determinants of mortgage choice under the assumption that the resulting contract reflects households' preferences (Mian & Sufi 2011; Hall & Woodward 2012; Fuster & Vickery 2013; Campbell & Cocco 2015; Foá et al. 2015; Hurst et al. 2016). In doing that, we are the first to exploit data on product offers from an online broker (the only source of information on the mortgage loan-to-value currently available in Italy) as to account for variability in the equilibrium mortgage price associated with the loan-to-value. More broadly, this work also relates to the emerging literature on how technology changes financial intermediation and price setting (Cavallo 2017; Basten et al. 2018; Fuster et al. 2018; Gorodnichenko et al. 2018; Hertzberg et al. 2018; Bartlett et al. 2019; Basten et al. 2019).

The rest of the paper proceeds as follows. Section 2 outlines some stylized facts about the Italian residential mortgage market, including anecdotal evidence on the rebranding event, and describes our main data sources. Section 3 provides supportive evidence to the argument that the rebranding exclusively affects consumers' awareness of the brand. Section 4 states the identification and estimation strategy, and discusses the main empirical findings. Section 5 presents the model assumptions and the calibration results. Section 6 concludes.

2 Rebranding Event and Data

2.1 The Rebranding Event

We look at variation in brand name induced by the rebranding of a leading banking group in Italy. The group owns several subsidiary banks active in different provinces, with no overlapping. The pricing and offering policies of each subsidiary are laid down by the parent and are common to all group components.[19] Actors taking part to the rebranding are the group parent bank and one group subsidiary. The latter joined the group in January 2007, as a result of a merger operation, but kept its own brand name (different from the parent's one). Few years later, in August 2018, the parent bank absorbs the subsidiary and replaces its brand. The brand of the subsidiary is decommissioned. This within-group incorporation only concerns provinces targeted by the subsidiary, whose name *de facto* becomes the one of the parent and inherits its much greater popularity. Nothing else changes as a result of the incorporation in terms of both policy implemented by parties involved, and resulting menu of product choices available to the consumer. Throughout the paper, we refer to this event as the rebranding event. We define as treated the provinces exposed to the subsidiary brand before the event and to the parent brand after, and as control the remaining provinces not affected by the within-group incorporation and thus exposed to the same brand before and after the event. The variation in brand awareness induced by the rebranding of the lender under a more famous name allows us to evaluate which of the informative or persuasive view on branding can best explain patterns in our data. We claim that brand awareness increases market knowledge and, in so doing, favours less expensive choices.

2.2 Data

Our main data sources are confidential regulatory datasets collected by the Bank of Italy as part of its supervisory activities: the Central Credit Register (CR) and the Analytical Survey of Lending Rates (TAXIA). The CR contains information on loans, granted and utilized, and guarantees for each borrower whose aggregate exposure exceeds 30,000 euro. All financial intermediaries operating

[19] We can exclude that bank-level policies change after the event. According to the group's prescriptions for managing the Fund Transfer Price System (FTP), the principles and guidelines set forth by the parent must be consistent at consolidated level and implemented by all group subsidiaries.

in Italy have to report this information to the Bank of Italy on a monthly basis in order to comply with Italian banking regulation. TAXIA is a subset of the CR and contains quarterly data on the interest rates that banks charge to individual households on each newly issued mortgage loan. We match the two datasets at the borrower level and get comprehensive information on the universe of residential mortgage originations in Italy from 2018Q1 to 2018Q4. Over this period, for each mortgage, we observe details on the lender's identity, the contract (annual percentage rate or APR, loan amount, rate type, maturity),[20] and the borrower (location, age, gender and nationality). Table 1 summarizes the data. We observe about 125 thousand mortgage contracts, of which more than 90% are FRM and the remaining ones are ARM. Other mortgage typologies, such as mixed-rate mortgages (characterized by a part of the mortgage rate which is fixed and a part which is adjustable), or adjustable rate mortgages with a cap, or those allowing to reset the interest rate (similarly to the five year-ARM in the US), are either very rare or they do not exists at all. The average APR is around 2%, with some regional variation; the average loan amount is around 130,000 euro; the average loan maturity is 22 years. The mean borrower is 38 years old; more than 50% of the mortgagors are located in the North, 25.33% in Central Italy and the remaining 23.73% in the South.

We complement this data with information at the contract level on mortgage offers available from the leading online broker in Italy, MutuiOnline (MO).[21] MO data are available on a monthly basis since March 2018. Banks working with MO are 30 and they include the 10 largest banks in the country, accounting for about 70% of total mortgage originations.[22] House value is fixed at 200,000 euro, and mortgage amount varies with the LTV. Each month we observe the APR, if any, that participating banks are willing to offer to roughly 85,000 perspective profiles, constant over time. Each profile is defined by a combination of the following borrower and contract characteristics: borrower type (first-time home buyer or remortgager), location (borrower location is assumed to be the same as the one of the house), age (30 or 40 years), income (2000 or 4000 monthly net income), job type (fixed-term employee, employee with permanent contract or self-employed), mortgage LTV at origination (50, 60, 80 or 85 per cent), original maturity (10, 15, 20 or 30 years) and rate type

[20] The CR contains information on the residual maturity of the loan. To recover the original maturity, we use the French amortization method. A full description of the estimation methodology is provided in Annex A.

[21] This information is adequate for a broad assessment of the Italian mortgage market because mortgages are almost entirely granted by banks and other financial intermediaries tend not to participate at all.

[22] These are the intermediaries we are left with as we keep the sample constant throughout our observation period.

(fixed or adjustable). Contract terms offered by banks via the platform are binding, provided that the information submitted by the borrower in the online application is accurate. Rates offered online are representative of the real market and have a high predictive power for the actual price of fixed-rate mortgages at the individual bank level (Carella et al. 2020). This alleviates potential concerns about the lender posting teaser rates through the broker, and reassure us on the reliability of our dataset. Tables B.1.1 and B.1.2 in Annex B.1 summarize these data. Although the Italian mortgage market is characterized by relatively homogeneous and plain-vanilla products, data from the online platform exhibit a significant degree of dispersion in the rate that lenders offer for identical loan and borrower types. Much of this dispersion (adjusted R-squared higher than 80 per cent) is explained by the mortgage LTV, maturity and rate type (Fig. C.1 in Annex C).[23] Holding contract characteristics constant, the average price dispersion is 10 basis points according to MO; while the average differential from the minimum price that an identical borrower, in the same market and on the same day, obtains for a mortgage with the same characteristics (LTV, maturity and rate type) is 54 basis points, corresponding to 1,000 euro of extra interests, or 4 per cent of the total interests payments made over the entire duration of the loan.[24]

Finally, we include information on selected bank balance sheet items (total assets, marketing expenses, cost-to-income ratio, capital ratio, liquidity ratio, non-performing loans ratio, risk-weighted assets and return on assets) from Supervisory Reports and banks' balance sheets; data on the distribution of physical branches by bank and province available from the Statistical Database of the Bank of Italy; and the brand popularity index from Google Trend. Overall, the combination of these five sources of information provides us with a very rich, loan-level dataset that is ideal for analyzing the effects of branding on households' choice behaviour. This paper is the first to exploit these combined datasets to address the role of brand name in the Italian residential mortgage market.

[23] This pattern holds across different countries, including the US and the UK (Michelangeli & Sette 2016; Benetton 2018; Robles-Garcia 2019).

[24] All estimates are based on 2018 data from MO and considering an average annual percentage rate from the Credit Register of about 2 per cent, a 20 year maturity mortgage with 60 per cent LTV and 200,000 euro house value, in line with the empirical evidence based on the Survey on Italian Household Income and Wealth (SHIW).

3 Descriptive Analysis

We hereby provide supporting evidence to the claim that the rebranding does not alter the choice set of the consumer, who keeps choosing among the exact same menu of mortgage products and prices. The rebranding group operates in several provinces through different individual banks, each of which follows the same offering and pricing policy defined at the headquarter level.[25] Figure B.2.1 in Annex B.2 relies on data from the online platform to illustrate the offering policy of banks belonging to the rebranding group. In particular, in each province, the map shows the number of products offered by the individual bank responsible for that province. We identify 32 products in total, where each product is a combination of the characteristics that account for the main source of variation in the offered APR: the mortgage LTV, the maturity and the rate type. Product differentiation is the same for each bank belonging to the group, and there is no geographical overlapping among them. To be precise, the parent brand targets dark blue provinces with 32 out of 32 potential products; the subsidiary brand targets bright blue provinces, with 32 out of 32 products as well; other subsidiary brands target the remaining light blue provinces and they offer the same 32 out of 32 products too. White provinces are those where the group does not make any online offer. As for the pricing policy, Figure B.3.1 in Annex B.3 displays the APR offered by the rebranding group in treated provinces before and after the rebranding event for different combinations of rate type, maturity and LTV. Before the red line we observe the APR offered by the subsidiary brand, after the red line the subsidiary brand is replaced by the parent brand and we observe the APR offered by the latter. There is clearly no jump between the APR offered by the two in treated provinces and, more in general, across all provinces: Figure B.3.2 in Annex B.3 depicts minor or no misalignment at all between the average APR across provinces offered by the subsidiary brand (solid line, available until incorporation) and by the parent brand (dashed line), for different combinations of rate type, LTV and maturity level. A second set of supportive evidence comes from the distribution of physical branches by province. Table D.1 in Annex D.1 documents the delta in both the number and the share of physical branches across provinces for the rebranding lender before and after the event. We find no evidence in the data that physical branches are increasing following the rebranding. In fact,

[25] All group subsidiaries must follow the fund transfer pricing guidelines set by the parent bank and very minor misalignments are allowed.

the delta is zero for most provinces and, if anything, is negative, meaning that the parent is almost entirely replacing branches previously owned by the subsidiary, with no meaningful effect at the group level. Hence, data from the digital platform confirms that households in treated provinces after the rebranding face the same choices in term of listed products and prices from the parent brand after the event as from the subsidiary brand before the event.[26] At the same time, physical presence of the group on the territory is not strengthening, ruling out the possibility that the equilibrium outcome reflects changes in market power due to the rebranding strategy.

Actually, the main difference concerns consumers' knowledge of the bank, from small subsidiary to big parent, and her awareness of the associated brand, from low to high. Table 2 reports bank characteristics for the second quarter of 2018 (the last quarter preceding the event of study). Although the two belong to the same group, total assets endowment is much smaller for the subsidiary than for the parent brand; while marketing expenses (in absolute terms) and cost-to-income ratio suggest that the parent brand both invests more in advertising, and it is more efficient at doing so through a better management of operating costs. Capital, liquidity and profitability ratios also differ between parent and subsidiary. As for the lender's main competitor in treated provinces, bank characteristics are, instead, comparable to those of the parent bank. To proxy brand popularity, we extract the index of search volume by region from Google Trend. For given brand name, the index captures individual search behaviour within Google browsers and YouTube, excluding repeated search from same borrower over close periods of time. The index measures relative brand popularity compared to the highest point (a value of 100 is the peak popularity of the term, whilst a value of 50 means that the term is half as popular) and it is often used to monitor marketing and brand performances. More generally, it can be thought of as an indicator of relative ease with which consumers expect to find content online. Figure D.1 in Annex D.1 compares the level of popularity in treated provinces for the parent and the subsidiary brand. As expected, the parent enjoys superior brand popularity (this is true both at the regional and the national level). In other words, although the pricing and offering policies do not change, when the rebranding occurs the consumer becomes more aware of the brand and she might so choose it. Interestingly, search volume for the subsidiary brand does not go to zero immediately after the event, possibly reflecting consumers' inertia or

[26] While we don't have data on cross-selling strategies, we observe no change with respect to products that are complementary to mortgages, such as insurances.

curiosity.

In the following section we address the main question of the paper, namely whether branding is effective at gathering consumers' attention, and whether it does so in a purely persuasive fashion (e.g., by creating deceptive brand loyalty), or rather by correcting for market inefficiencies due to imperfect households information.

4 Empirical Analysis

4.1 Estimation and Identification

Equilibrium mortgage price. We exploit variation in brand popularity across provinces induced by a within-group incorporation event to identify the causal effect of brand name on the equilibrium price of mortgage contract. We rely on a Difference-in-Differences methodology (DID henceforth) to compare the evolution of mortgage price around the rebranding event (August 2018) in provinces with different exposure to brand name. The rebranding is implemented through the incorporation into the parent bank of a wholly-owned group subsidiary, and the simultaneous rebranding of the subsidiary under the parent brand. As the parent enjoys superior popularity, brand awareness increases in provinces exposed to the subsidiary brand before the event and to the parent brand after. Crucially, the within-group incorporation does not imply any policy change, as parties involved already respond to the same headquarter, and it does not alter the choice set of the consumer, who still face the same menu of products and prices offered. Instead, it affects consumers' perception of the financial intermediary through awareness of the corresponding brand.

We look at the equilibrium mortgage price to address the main question of the paper: does branding persuade consumers to enter expensive mortgages or does it provide information that allow them to pick cheaper products?[27] We run our analysis using two different benchmark criteria. The first one is at the province level, and it compares the evolution of mortgage price in provinces where the brand becomes more salient after the event against provinces where brand awareness remains constant throughout the sample period. We estimate the following regression equation:

$$Y_{jimt} = \beta_0 + \beta_1 POST_t + \beta_2 Treated + \beta_3 (POST_t \times Treated) + X_i + Z_m + \varepsilon_{jimt} \tag{1}$$

[27] In Annex E.1 we also present results on how brand awareness affects market share. We show that the rebranding lender gains market share following the event and that the effect is statistically significant for treated provinces.

where j indexes the lender, i the borrower, m the mortgage contract and t the quarter. The main outcome variable is the APR on newly originated mortgage contracts. The time dimension of the DID is the dummy $POST$, which is one starting from the third quarter of 2018 and zero before. The cross-sectional dimension, $Treated$, is a dummy equal to one for provinces directly affected by the rebranding and zero for remaining unaffected provinces. Identification of the effect of branding is achieved because the rebranding brings an exogenous source of variation in consumers' brand awareness across provinces, without altering the lenders' pricing policy. We control for contract and borrower characteristics to mitigate for potential selection bias: X_i is a vector of borrower characteristics (age, gender, nationality, a dummy for past default and one for first time borrowers), Z_m is a vector of contract characteristics (mortgage amount, maturity and rate type). The effect of interest is captured by the regression coefficient on the interaction between $POST$ and $Treated$. The second criterion is at the lender level in treated provinces. It evaluates the outcome for the rebranding lender against its main competitor, not changing name. The regression we estimate is:

$$\begin{aligned} Y_{jimt} = \beta_0 + \beta_1 POST_t + \beta_2 Treated + \beta_3 (POST_t \times Treated) + \delta_1 Rebranding_j \\ + \delta_2 (POST_t \times Rebranding_j) + \delta_3 (Treated \times Rebranding_j) \\ + \gamma_1 (POST_t \times Treated \times Rebranding_j) + X_i + Z_m + \varepsilon_{jimt} \end{aligned} \tag{2}$$

where j indexes the lender, i the borrower, m the mortgage contract and t the quarter. $Rebranding$ is a dummy equal to one for the rebranding lender and zero for the competitor. Other variables are as previously defined. The coefficient of interest is γ_1 , which controls for the possibility that the treatment effect is driven by underlying price trends in treated provinces. If that were the case, trends should be affecting both the competitor and the rebranding lender equally, and the difference between the two should not be significant.[28]

Household choice. We now focus on household's choice behaviour as to shed lights on how brand name attracts consumers. More precisely, whether it does so by lowering search costs, and allowing them to find cheaper products (informative branding), or by creating spurious brand loyalty and persuading them into more expensive choices (persuasive branding). We combine data on

[28]To confirm coherency of our results with standard prediction from economic theory, in Annex E.2 we repeat regressions 1 and 2 using the log amount of mortgage debt (at the contract level) as dependent variable, and look at the impact of rebranding on the equilibrium quantity of mortgage contracts originated. We show that mortgage credit issued by the rebranding lender in treated provinces increases following the event, consistently with a downward sloping demand.

originated mortgage contracts with data on mortgage offered from the digital platform so to exploit full information on the composition of the consumer's choice set. We match the two datasets at the product level (lender, rate type, maturity, province, and APR). To address concerns about deceptive or unrealistic offers, we keep only quotes that are actually realized in equilibrium. This drastically reduces the number of observation at hands, but it also keeps the measurement error down to the minimum. Importantly, the matching with MO data allows us to get information on the mortgage LTV, which would otherwise not be available.[29] We group homogeneous mortgages contracts into bins, where each bin is a combination of LTV, maturity and rate type, and there are 32 possible combinations in total (defined as before).[30] For each previously indebted borrower we observe the equilibrium product choice, which includes her choice of the current lender and the current contract, and we also observe the identity of the lender she borrowed from since 2000, together with the price offered today by that lender in the same province, at the same time and within the same bin. Next, we rank banks from higher to lower mortgage price within each bin, and study households' transition across lenders in response to the rebranding shock. We assume that cheaper mortgages are, all else equal, better products from the perspective of the consumer, and we expect households to switch to cheaper lenders if the brand is informative, and to be driven into more expensive choices if the brand is persuasive. For each already indebted borrower, we exploit information on her previous lending relationship and estimate the treatment effect of rebranding on both the probability that she switches lender (3), and the probability that she switches from a more to a less expensive lender (4).

$$Switcher_{jit} = \beta_0 + \beta_1 POST_t + \beta_2 Treated + (POST_t \times Treated) + W_{jt} + X_i + \zeta_m + \varepsilon_{jit} \tag{3}$$

where j indexes the lender, i the borrower, m the mortgage contract and t the quarter. $Switcher_{jit}$ is the probability that borrowers originate a mortgage with a lender they have not borrowed from since 2000.[31] W_{jt} is a matrix of bank characteristics, which includes a measure of size (log total assets), capital ratio (tier 1 capital to total assets), liquidity ratio (cash plus deposits to the central bank and government bonds to total assets) and NPL ratio (net non-performing loans to total loans). X_i is a vector of borrower characteristics (age, gender, nationality, a dummy for past default and

[29] A full description of the LTV inference is provided in Annex C.

[30] The grouping reflects the characteristics that account for the main source of variation in the offered APR (Figure C.1 in Annex C).

[31] For each already indebted borrower, we observe the identity of her previous lenders over the past 18 years. If none of these corresponds to her current lender, we set $Switcher_{jit}$ equal to one, zero otherwise.

one for first time borrowers) and ζ_m are bin fixed-effects. $POST$ and $Treated$ are defined as before.

$$\begin{aligned} Low_{jit} = {} & \alpha_0 + \alpha_1 High_{j-1,i,t} + \alpha_2 Medium_{j-1,i,t} + \beta_1 POST_t + \beta_2 Treated + \beta_3 POST_t \times Treated \\ & + \gamma_1 POST_t \times High_{j-1,i,t} + \gamma_2 Treated \times High_{j-1,i,t} + \gamma_3 POST_t \times Treated \times High_{j-1,i,t} \\ & + \delta_1 POST_t \times Medium_{j-1,i,t} + \delta_2 Treated \times Medium_{j-1,i,t} + \delta_3 POST_t \times Treated \times Medium_{j-1,i,t} \\ & + W_{jt} + X_i + \zeta_m + \varepsilon_{jit} \end{aligned} \tag{4}$$

where j indexes the lender, i the borrower, m the mortgage contract and t the quarter. High, Medium and Low are dummies defined according to the 2018 distribution of newly originated mortgage contracts, and reflect the current (j) and previous ($j-1$) lender's ranking in terms of APR within each bin.[32] $POST$, $Treated$, W_{jt}, X_i and ζ_m are as previously defined.

The above specification, however, does not account for the possibility that branding is always attractive, and either an informative or a persuasive effect arises depending on whether the lender is low or high-price. To demonstrate that the relationship between branding and the expensiveness of mortgage contracts is not spurious, we exploit variation in the lender's ranking within bin and estimate the treatment effect of brand name on households' unconditional probability of choosing it:

$$\begin{aligned} Rebranding_{jit} = {} & \alpha_0 + \alpha_1 High_{jit} + \alpha_2 Medium_{jit} + \beta_1 POST_t + \beta_2 Treated + \beta_3 POST_t \times Treated \\ & + \gamma_1 POST_t \times High_{jit} + \gamma_2 Treated \times High_{jit} + \gamma_3 POST_t \times Treated \times High_{jit} \\ & + \delta_1 POST_t \times Medium_{jit} + \delta_2 Treated \times Medium_{jit} + \delta_3 POST_t \times Treated \times Medium_{jit} \\ & + W_{jt} + X_i + \zeta_m + \varepsilon_{jit} \end{aligned} \tag{5}$$

where j indexes the lender, i the borrower, m the mortgage contract and t the quarter. $Rebranding_{jit}$ is a dummy equal to one for contracts originated by the rebranding lender and zero otherwise. All other variables are as before. Finally, our claim that the benefit of branding consists in the lowering of search costs for households that are not aware of each product's existence boils down to saying that a positive effect does not arise for borrowers that are already informed. To test this, we split the sample into old client, which are already indebted borrowers with a previous lending relationship with the parent brand, and switchers, which are already indebted borrowers that go to the parent

[32] We divide the within-bin distribution of the APR at the bank-level into three equal segments. We then assign each current and previous lender a ranking reflecting their APR positioning within the bin (Low if the APR is smaller than or equal to the 33th percentile, Medium if the APR is between the 33th and the 66th percentiles, High if the APR is greater than or equal to the 66th percentile).

brand for the first time since 2000, and we estimate regression 5 separately for the two sub-samples. In all regressions, as standard in the literature, we cluster errors at the province level, allowing for the possibility that model errors in the same province (namely, some unobserved components within clusters) are correlated, while model errors in different provinces are assumed to be uncorrelated.

4.2 Estimation Results

Equilibrium Mortgage Price. The DID identifying assumption is that the APR would have evolved according to a parallel trend in provinces with higher and lower brand awareness, had the rebranding not been implemented. While this assumption is not directly testable, Figure 1 provides visual inspection that, prior to the rebranding, the APR trends similarly across provinces with different levels of brand awareness. Figure 2 shows the average APR across all new mortgages issued by the rebranding and the competitor lender in treated provinces before and after the event (red line). We observe an average reduction in the equilibrium APR for mortgages originated by the rebranding lender after the event, while the APR on mortgages originated by the competitor lender continues on an increasing path ongoing from before. The DID estimator (Equation 1) shows that the rebranding strategy reduces the equilibrium APR on mortgages issued by the lender in treated provinces, and the effect survives after conditioning for loan and borrower characteristics (Table 3, columns 1 and 2). This, together with evidences presented in Section 3 (that the offering and pricing policies of the rebranding lender are not affected by the within-group incorporation), suggests that the rebranding shock induces consumers' selection into less expensive choices. As for the competitor lender (Equation 2), who is not experiencing any change in brand popularity, we find no effect on the price of mortgage contracts originated in treated provinces after the event (Table 3, column 3). Hence, households switching to the rebranding lender come indistinguishably from all points of the transaction price distribution of the competitor lender, so that no aggregate effect arises for the latter.[33] Also, the treatment effect is not driven by underlying price trends in treated provinces. If that were the case, trends should be affecting both the competitor and the rebranding lender equally and the difference between the two should not be significant. The coefficient for the interaction *POST*, *Treated* and *Rebranding* is significant, ruling out this possibility (Table 3, column 4). In

[33]Table E.3.3 in Annex E.3 shows no statistically significant difference in the ranking of their previous intermediary for borrowers that switch to the rebranding lender.

fact, the treatment effect becomes stronger after netting out the evolution of price for the competitor lender, actually increasing in treated provinces (Figure 2).

Household choice. Results presented so far already denote some kind of households' selection into cheaper products due to the rebranding. In what follows, we investigate patterns of such selection to show that this is unlikely to reflect pure substitution behaviours by the household in favour of the lender whose name is more salient, and instead it mirrors a better understanding of the most convenient option and a higher incentive to reallocate towards less expensive intermediaries. Unlike before, the matching with MO allows us to effectively control for contract and borrower characteristics and confirms that, following the rebranding, households in treated provinces are, *ceteris paribus*, more likely to pick the lender with the lowest price (Equation E.3.1 and Table E.3.1 in Annex E.3). As previously argued, because the price offered does not change, this result is attributable to consumers' selection into less expensive contracts. To actually conclude that a selection outcome arises because the rebranding shock increases consumers' search for more convenient deals, we study households' choice among lenders with different price ranking. In Equation 3, we find a positive and significant treatment effect of rebranding on the probability that previously indebted borrowers switch to a new lender (Table 4). Specifically, the two triple interactions in Equation 4 are positive and significant, meaning that households in treated provinces after the rebranding are more likely to switch from a previous lender now offering a high or medium price to a current lender now offering a low price (Table 5).

Nevertheless, one could still argue that the informative effect of branding arises in our setting only because the lender whose brand is more salient also happens to be the one with the lowest price. If the lender were expensive, the result would be reversed and branding would be persuasive. To shut down this criticism, and validate the hypothesis that consumers' reallocation occurs because branding induces search for cheaper options, Equation 5 exploits variation in the lender's price ranking across offers.[34] The idea being the following: if brand is informative, households should select the rebranding lender only when the latter makes low-priced offers and abstain from doing so when it ranks high or medium. We estimate the treatment effect of brand name on the probability of

[34]Table E.3.2 in Annex E.3 illustrates that the price ranking of the rebranding lender is not always constant, which makes it possible to disentangle households' response to brand name depending on the competitiveness of the offer.

choosing the rebranding lender and find that households do not fully substitute. In fact, they refrain from doing so for products where the rebranding lender is less competitive (the two triple interaction terms in Table 6 are both negative and significant). While we cannot rule out the possibility that a persuasive effect arises in the long term, this result suggests the brand helps consumers, at least initially, taking cheaper, and presumably more informed, decisions. Sample split between old clients and switchers shows that the probability of choosing the rebranding lender increases only for those who have never borrowed from the parent, as they are likely less aware of the brand (Table 7).[35]

Lastly, in Annex E.4, we document a decrease in price dispersion by province across all bins (between standard deviation) and within the same bin (within standard deviation) (Tables E.4.1 - E.4.4) and find a negative 1 basis point and significant treatment effect of rebranding on price dispersion in treated provinces (Equation E.4.1 and Table E.4.6). As the searching process becomes more efficient, there might be less scope for discretionary price setting by the lender, and dispersion in the price of homogeneous products may go down, consistently with the law of one price and the hypothesis that branding ameliorates market inefficiencies due to imperfect consumers' information.

5 The Model

5.1 Model Assumptions

We model households' choice of financial intermediary upon taking a new mortgage to quantify the impact of brand name on consumers' search costs. We restrict the analysis to indebted households with an already established relationship with a lender, and we exclude first-time borrowers. The former are the ones facing the highest costs of switching to a new intermediary, and are naturally more inclined to accept higher mortgage rates. When taking a mortgage (which could be a refinancing of a previous loan, as well as a new loan for house purchase), the household can either remain with the current lender, or put effort to find a cheaper one. This effort choice entails some initial search costs and affects the household's life-time savings accumulation and consumption levels.

The timing of the events is as follows. The household enters at period $t = 40$, observing her cash-on-hand and her current period financial intermediary, and makes her effort choice. In the

[35] Old clients are already indebted borrowers that have a previous lending relationship with the parent brand. Switchers are already indebted borrowers that go to the parent brand for the first time since 2000.

initial period, she can decide to take a new mortgage from her current financial intermediary, or to exert positive effort in looking for a new one that offers a cheaper price. In all the subsequent periods, for the entire duration of the mortgage, the household pays a mortgage instalment that depends on her initial choice of the financial intermediary. In each period, the household also chooses consumption C_t and the fraction of the remaining cash-on-hand to invest in the risky asset α_t. After those decisions are made, shocks to risky assets' return, labor income and survival are realized, and next period wealth is determined.

In the baseline model, we assume that the house value is fixed at 200.000 euro, the LTV equals 60%, the maturity is 20 years (which capture the median values in Italy), and the mortgage rate type is fixed (around 80% of new Italian mortgages are fixed-rate).

Household's Preferences. Let $S_t = \{X_t, H_{t-1}\}$ denote the household vector of state variables, where $t = 40, ..., T$ is household's age and T is set to 100; $X_t = W_t + Y_t$ is cash-on-hand, which includes wealth at the beginning of period t and labor income; H_t is the household's financial intermediary. Households' preferences are described by a standard CRRA utility function in consumption and the household maximizes her expected lifetime utility:

$$U(C_t) = \frac{C_t^{1-\gamma}}{1-\gamma} \tag{6}$$

where γ is the coefficient of relative risk aversion. In the final period, the household consumes all her wealth and does not receive any utility from leaving a bequest to her heirs.

Household's Income. We follow the labor income process in Cocco, Gomes, and Maenhout (2005). Before retirement, household i's labor income, Y_{it}, is exogenously given by:

$$log(Y_{it}) = f(t) + v_{it} + \epsilon_{it} \tag{7}$$

where t indexes the household's age, $f(t)$ is a deterministic function of age, ϵ_{it} is an idiosyncratic temporary shock distributed as $N(0, \sigma_\epsilon^2)$, and v_{it} is given by:

$$v_{it} = v_{it-1} + u_{it} \tag{8}$$

where u_{it} is distributed as $N(0, \sigma_u^2)$ and it is uncorrelated with ϵ_{it}. Hence, log labor income is the sum of a deterministic component, which is calibrated to replicate hump-shaped earnings over the

lifecycle, and two random components, one transitory and one persistent. Retirement income is a constant fraction of permanent labor income in the last working-year.

Financial assets. There are two financial assets. The first one is a riskless asset with gross real return $R_F = 1 + r_F$. The second one is a risky asset with gross real return $R_t = 1 + r_t$. As in Cocco, Gomes, and Maenhout (2005), the excess premium, namely the difference between the gross real return on the risky asset and the gross real return on the safe asset, is:

$$R_{t+1} - R_F = \mu_r + \iota_{t+1} \tag{9}$$

where μ_r is the mean excess premium and ι_{t+1} is the innovation to the excess premium distributed as $N(0, \sigma_\iota^2)$. B_t and S_t denote the amount of safe and risky assets held by the household at time t, such that:

$$S_t \geq 0, B_t \geq 0, \forall t. \tag{10}$$

Equation 10 implies that the household cannot short-sell any of these financial assets.

5.2 The Household's Optimization Problem

In the first period, the household takes the effort choice decision. If she exerts positive effort ($e > 0$), the Bellman equation is:

$$V(S_{it}, e > 0) = \max_{C_{it}, \alpha_{it}} U(C_{it}) + \beta sp(it+1) E_t V(S_{it+1}) \tag{11}$$

where next period wealth is given by:

$$W_{it+1} = R_{t+1}(W_{it} + Y_{it} - C_{it} - M(H_t) - Q) \tag{12}$$

$M(H_t)$ is the mortgage instalment that depends on the financial intermediary, which here is the one offering the lowest price; Q reflects the search costs that are paid only in the initial period, including those to get information on the lender; β is the discount factor; and $sp(it+1)$ the survival probability at age t. If she exerts zero effort ($e = 0$), she remains with the previous financial intermediary, the search costs are equal to zero and the Bellman equation boils down to:

$$V(S_{it}, e = 0) = \max_{C_{it}, \alpha_{it}} U(C_{it}, H_{it}) + \beta sp(it+1) E_t V(S_{it+1}) \tag{13}$$

where next period wealth is given by:

$$W_{it+1} = R_{t+1}(W_{it} + Y_{it} - C_{it} - M(H_t)) \tag{14}$$

Moreover, the following conditions always hold:

$$C_{it} \geq C_{min}, 0 \leq \alpha_{it} \leq 1 \tag{15}$$

meaning that household's consumption must be positive and above a minimum level, and the share invested in risky assets must be in between 0 and 1. In the initial period, the households chooses the effort level that delivers the maximum between $V(S_{it}, e > 0)$ and $V(S_{it}, e = 0)$. In the following periods until maturity, the household chooses consumption and the share of portfolio to invest in the risky asset, subject to uncertainty over survival, income and returns on financial assets.

5.3 Solution Method

The model is solved using numerical techniques (Judd 1998). Specifically, we rely on value function iterations starting from the final life period and moving backward until age 40. In the last period, a terminal value function is obtained for each combination of the state variables. That function acts as a continuation value function. In each previous period and for each vector of state variable, the household chooses her consumption and share of risky assets. As consumption and portfolio choices are continuous variables, we use cubic spline interpolation to evaluate the function outside the grid. Mortgage instalments are fixed for the mortgage duration and depend on the price ranking of the bank. In the initial period, the household makes a discrete choice over effort: she can exert positive effort and choose the financial intermediary that offers the lowest price, or she can exert zero effort and remain with the current financial intermediary. This effort decision depends on the maximum value of the value function associated with each grid point of the vector of state variables in the initial period. We implement grid search to select over the possible choices and rely on the quadrature based method (Tauchen & Hussey 1991) to approximate the return on risky assets.Once the model is solved and the policy functions are obtained, we simulate 3,000 households of age 40 and we use the computed policy functions to obtain households' choices over time.

5.4 Parameterization

We draw from several data sources to assign parameter values to our model (see Table 8). We use the Survey on Household Income and Wealth (SHIW) from the Bank of Italy for mortgage characteristics and income; ISTAT for survival probabilities and minimum consumption; OECD for replacement rates and for computing equivalent consumption; Mediobanca for return on risky assets; Credit Register and MO (CR-MO) data for mortgage rate offered by banks with different price ranking. We exclude first-time borrowers and restrict the sample to individuals older than 40 years in order to capture indebted households looking for a new mortgage. As mortgage choices and subsequent payment of the instalments typically occur during the household's working age, we abstract from considerations about retirement medical costs, moving costs, and bequest preferences. The final SHIW sample consists of about 2,500 households. We combine this with our matched CR-MutuiOnline dataset (CR-MO), and then compare empirical evidences with model predictions.

Preference and demographic parameters. Following standard values in the literature of portfolio choice, we fix the risk aversion parameter γ to 5 and the discount factor to 0.96. The bequest parameter θ is set to zero, and households are assumed to consume all their wealth before dying. Survival probabilities are based on ISTAT data and refer to the average values for the Italian population in each year.

Income. We use SHIW data to estimate Equation 7, according to which household labor income is given by a function of age and income shocks. Labor income includes working income, workers compensation and transfers, but not capital income. We carry our estimation on the sample of indebted households aged 40 to 65, without distinguishing them based on their education level or marital status. This because around 80% of households in our sample have high school degree and are married, thus if we were to split by education or marital status the estimation would count on a very limited number of observations. We estimate the parameters for the variance of the persistent and the transitory shock using the approach described in Blundell et al. (2008). Households retire at age 65. The replacement rate is taken from OECD data and equals 91.8%.[36]

[36]This implies that after retirement households receive a constant annual income equal to 91.8% of their income in the last working period.

Financial markets. We define as safe assets the sum of deposits and short-term government bonds, and as risky assets other bonds, stocks, managed assets, foreign bonds, and residual assets. For the return on the risky assets, we use Mediobanca data since 1950. We compute the real stock return starting from the index of total stock return deflated by the consumer price index, while the return on safe assets is computed using the nominal return on Italian one-period bonds (BOT) deflated by the consumer price index to obtain real returns. The excess premium is given by the difference between the real return on risky assets and the real return on safe assets in each period. The mean return on safe assets is $r_F = 0.012$, the mean excess premium μ is 0.049, and the standard deviation of the innovation to excess premium σ_ι is 0.26. We define as event risk a rare event that has a low probability of happening, but to which is associated a significant reduction in the return of risky assets. We assume that when the event risk occurs, the stock return equals its mean minus two-standard-deviation, which corresponds to a stock return lower than -40%. To assess the validity of this assumption, we consider two datasets covering the years between 1950 and 2010: *"Indice Annuale dei corsi della Borsa Italiana"* by Mediobanca, and the "Milan Comit Global - DS Total Return Inde" (DSRI). The probability of an event risk is assumed to be equal to 0.05.

Consumption floor. According to ISTAT data, the level of absolute poverty varies according to both the number of household's components and the geographic area. Among households aged 18 to 59, it ranges from a minimum of about 600 euro per month for a single household living in the South, and a maximum of about 1,150 euro per month for a married couple living in the North.[37]. To capture this heterogeneity, we assume a minimum consumption floor C_{min} of about 850 euro per month

Financial intermediaries and price of mortgages. We focus on characteristics of the average mortgage in Italy. Based on SHIW data, the average LTV is 60% and the average mortgage amount is 120,000 euro (which implies a house value of 200,000 euro). We consider three types of financial intermediaries classified according to their price ranking: Low, Medium and High, to which the model imputes their respective offered mortgage rate as taken from the CR-MO dataset. We consider the average rate for fixed-term contracts with LTV less than or equal to 60% and 20 years maturity,

[37]Data from "La misura della povertá assoluta," ISTAT 2018, adjusted for inflation.

which reflects a safe profile. Within this bin (or combination of LTV, maturity and rate type), we observe some degree of price dispersion: the low rate equals 1.87%, the middle rate equals 2.03%, the high rate equals 2.37%. We exploit the French amortization formula, quite standard in Italy, to compute the mortgage instalments for each of the three types of lender over the duration of the mortgage. Households are not allowed to change bank after the first period, which is a reasonable as we are not considering changes in the interest rates at the macro level. Households at age 40 have all the necessary information to make a choice that would affect the remaining years of their life.

5.5 Model Results

We evaluate predictions of our model against real data, and quantify the search costs paid by the households before and after the rebranding event. The main statistics for the Italian economy are reported in Table 9. As initial condition, we assign households to three types of financial intermediaries (high, medium or low price) according to their pre-rebranding distribution from the CR-MO dataset: almost 33% of households have a low-price lender, 45% of them have a medium-price one, and the remaining 22% have a high-price one. For statistics on labor income, annual consumption and portfolio choices we rely on SHIW data. The model is able to deliver median values for annual income and annual consumption that closely mirror those observed in the real data: annual labor income is just above 40 thousand euro, annual consumption is around 28 thousand euro. To mirror true data on the share of households with risky assets, we account for tail risks in their return. This makes risk-averse households less inclined to take on risky investments and delivers a share of around 20 per cent, in line with the one observed in the data. A model without tail risks would convey a much higher share because the average return on the risky asset exceeds that on the safe asset.

We use the model to predict our two main variables of interest: the degree of dispersion in the price of homogeneous mortgage contracts (measured as the standard deviation in the mortgage rates) and the search costs faced by the household when choosing a financial intermediary. We exploit borrowers' transition matrices across lenders derived from our combined CR-MO dataset, which reflect the household's probability to either remain with her time $t = 0$ lender, or to move to a better one at time $t = 1$. One obvious difficulty is to identify better and worse lenders. In fact, some households might value more non-financial conditions (such as speediness) than financial ones; while some others might be rationed by all banks but the chosen one. In this paper, we abstract from reasons that could induce households to move to a more expensive intermediary, and we assume

that less expensive products are, all else equal, better products from a rational consumer in an economy without frictions. Hence, households with a low-price intermediary never switch.[38] Our model delivers a standard deviation of 23 bps, which is consistent with the value observed in the data before any rebranding event occurs (24 bps). Table 10 presents our main results.

We consider two different scenarios. The first one ("no-rebranding") captures what happens in untreated provinces, under the assumption that they are comparable with treated ones before the rebranding.[39] To calibrate search costs, we let households reallocate according to the transition matrices observed in treated provinces before the event: about 50% of them do not move; while almost 17% switch to a low-price lender. The initial amount of search cost consistent with this reallocation is 1,080 euro (0.9% of the average loan amount), similar to the estimates provided by Bhutta et al. 2018 for the US.[40] Price dispersion decreases to 19 bps.

The second scenario ("rebranding") captures what happens in treated provinces, and we let households reallocate from one intermediary to the other according to the transition matrices observed in those provinces after the event. Price dispersion decreases from 23 bps (initial value at time $t = 0$) to 18 bps (post-treatment value at time $t = 1$). Both values very well replicate the ones observed in the data (price dispersion in treated provinces is about 24 bps before the rebranding, 19 bps after). The share of households that do not move shrinks to 40%, and the share of those moving to a cheaper lender exceeds 25%.[41] The search cost consistent with this reallocation drops by 30 per cent, to 750 euro, which recalls a previous finding by Allen et al. (2019).[42]

By comparing the above two scenarios, we can also quantify the treatment effect on consumers' search costs and price dispersion due to the rebranding. According to the model, branding leads to a 330 euro decrease in search costs paid by the household at the beginning of the period. This accounts for potential transportation costs to visit a branch, other financial outlays sustained to get information on a new lender (for example, phone calls or interned), non-monetary costs

[38] This is not a very strong assumption: according to CR-MO data, only a minor share of households move to a lender offering a higher price than their current one.

[39] This is the closest possible to a parallel trend assumption and allows for homogeneity within our model.

[40] They estimate upfront costs for the borrower attributable to shopping or knowledge equal to about 1.2% of an average loan.

[41] As a corollary, households with low-price have higher income on average, in line with the SHIW. Among those that switch to cheaper lenders, the share that invest in risky assets drops by 9%. Aggregate investors' riskiness decreases because households are risk-averse, and they limit tail risk exposure to attain their target consumption level.

[42] They find that 50% of search frictions are specifically due to search costs.

(search effort, time devoted to shopping around, inconvenience experienced to avail a product, and psychology costs like the fear of rejection), while it does not include savings accrued from lower monthly payments also attained when shifting to a cheaper lender. Counting them in would lead to a total benefit for the household of 6% of the initial loan amount, corresponding to more than 7,200 euro.[43] Moreover, the APR standard deviation goes down both in untreated and treated provinces, but the decrease is more pronounced (precisely by 1 basis point) for the latter, consistently with our estimated treatment effect of brand name on price dispersion (Table E.4.6, Annex E.4).

6 Conclusions

Many markets are characterized by imperfect consumers' information with respect to product alternatives. Our analysis focuses on the role that brand popularity plays in correcting distortions linked to this imperfection. Using a unique dataset that combines information on mortgage offers from the main Italian online broker, and mortgage originated from the Credit Register over the period 2018Q1 to 2018Q4, we study the relationship between brand name and the price of mortgage contracts obtained by households. We exploit variation in brand name across provinces induced by a within-group rebranding event that involves one of the leading mortgage lender in Italy. The set of evidence collected in this paper is inconsistent with brand persuasion, for which lenders exploit brand name to drive uninformed consumers into expensive choices, and instead supports the informative view that brand induces households' reallocation towards cheaper mortgages. It does so by increasing awareness of potential improvements in products offered, while also reducing the extent to which borrowers overpay relative to the rates available on the market. Yet, the limited time horizon does not exclude the possibility that lenders exploit the information effect and gain market share in the short term, to then steer consumers into expensive choices in the longer term. We derive a life-cycle model that accounts for households' choice of financial intermediary. Our model is well calibrated on Italian data and quantifies a decline in consumers' search costs following the rebranding equal to 330 euro, which does not contradict previous results. Adding in the savings from lower mortgage instalments for borrowers that move to cheaper lenders, and whose share after the rebranding increases by roughly 10 per cent, the total gain for the household amounts to 6 per

[43] Estimates are obtained considering an average Italian mortgage, and moving from high (2.36%) to low APR (1.87%).

cent of the average Italian loan. Our conclusions well relates to today's policy issues and suggests that if bank consolidation brings better offers, under price competition, those improvements are best attained when consolidating banks rely on the more popular brand to reach less informed clients.

References

Agarwal, S. & Ambrose, B. W. (2008). "Does it pay to read your junk mail? evidence of the effect of advertising on home equity credit choices".

Agarwal, S., Amromin, G., Chomsisengphet, S., Landvoigt, T., T. Piskorski, A. S., & Yao, V. (2017). "Mortgage Refinancing, Consumer Spending, and Competition: Evidence From the Home Affordable Refinance Progra". *NBER Working Paper*, (21512).

Alan, S. (2012). "Do disaster expectations explain household portfolios?". *Quantitative Economics*, 3(1), 1–28.

Alexandrov, A. & Koulayev, S. (2017). "No Shopping in the U.S. Mortgage Market: Direct and Strategic Effects of Providing Information".

Allen, J., Clark, R., & Houde, J. (2014a). "Price dispersion in mortgage markets". *The Journal of Industrial Economics*, 62(3), 377–416.

Allen, J., Clark, R., & Houde, J. (2014b). "The Effect of Mergers in Search Markets: Evidence from the Canadian Mortgage Industry". *American Economic Review*, 104(10), 3365–96.

Allen, J., Clark, R., & Houde, J. (2019). "Search Frictions and Market Power in Negotiated-Price Markets". *Journal of Political Economy*, 127(4), 1550–98.

Andersen, S., Campbell, J. Y., Nielsen, K., Kasper, M., & Ramadorai, T. (2015). "Inattention and inertia in household finance: Evidence from the Danish mortgage market".

Attinà, C. A., Franceschi, F., & Michelangeli, V. (2020). "Modelling households' financial vulnerability with consumer credit and mortgage renegotiations". *International Journal of Microsimulation*, 13(1), 67–91.

Bagwell, K., Armstrong, M., & Porter, R. (2007). "The Economic Analysis of Advertising". *Handbook of Industrial Organization*, 3, 1701–1844.

Banerjee, B. & Bandyopadhyay, S. (2003). "Advertising Competition Under Consumer Inertia". *Marketing Science*, 22(1), 131–144.

Barro, R. J. (2006). "Rare disasters and asset markets in the twentieth century". *The Quarterly Journal of Economics*, 121(3), 823–866.

Bartlett, R., Morse, A., Stanton, R., & Wallace, N. (2019). "Consumer-Lending Discrimination in the FinTech Era". (25943).

Basten, C., Guin, B., & Koch, C. (2018). "How do banks and households manage interest rate risk? Evidence from mortgage applications and banks' responses". *Bank of England Staff WP*, (733).

Basten, C., Guin, B., & Koch, C. (2019). "The Geography of Mortgage Lending in Times of FinTech". *Swiss Finance Institute Research Paper*, (39).

Benetton, M. (2018). "Leverage Regulation and Market Structure: An Empirical Model of the UK Mortgage Market".

Bhutta, N., Fuster, A., & Hizmoy, A. (2018). "Paying Too Much? Price Dispersion in the US Mortgage Market". *FEDS Working Paper*, (pp. 2020–062).

Blundell, R., Pistaferri, L., & Preston, I. (2008). "Consumption Inequality and Partial Insurance". *American Economic Review*, 98(5).

Braithwaite, D. (1928). "The Economic Effects of Advertisement". *Economic Journal*, 38(149), 16–37.

Buchak, G., Matvos, G., Piskorski, T., & Seru, A. (2018). "Fintech, regulatory arbitrage, and the rise of shadow banks". *Journal of Financial Economics*, 130(3), 453–483.

Campbell, J. Y. & Cocco, J. (2015). "A model of mortgage default". *The Journal of Finance*, 70(4), 1495–1554.

Carella, A., Ciocchetta, F., Michelangeli, V., & Signoretti, F. (2020). "What can we learn about mortgage supply from online data?". *Questioni di Economia e Finanza (Occasional Papers) 583, Bank of Italy, Economic Research and International Relations Area.*

Cavallo, A. (2017). "Are Online and Offline Prices Similar? Evidence from Large Multi-Channel Retailers". *The American Economic Review*, 107(1), 283–303.

Cocco, J. F. (2005). "Portfolio choice in the presence of housing". *The Review of Financial Studies*, 18(2), 535–567.

Cocco, J. F., Gomes, F., & Maenhout, P. (2005). "Consumption and portfolio choice over the life cycle". *The Review of Financial Studies*, 18(2), 491–533.

Comanor, W. S. & Wilson, T. A. (1975). "Advertising and Market Power". *Journal of Behavioral Economics*, 4(1), 201–204.

Cubbin, J. S. & Domberger, S. (1988). "Advertising and Post-entry Oligopoly Behaviour". *Journal of Industrial Economics*, 37(2).

Damen, S. & Buyst, E. (2017). "Mortgage Shoppers: How Much Do They Save?". *Real Estate Economics*, 45(4), 898–929.

De Clippel, G., Eliaz, K., & Rozen, K. (2014). "Competing for consumer inattention". *Journal of Political Economy*, 122(6), 1203–1234.

Delgado-Ballester, E. & Munuera-Alemán, J. L. (2001). "Brand trust in the context of consumer loyalty". *European Journal of marketing*.

Della Vigna, S. (2009). "Psychology and Economics: Evidence from the Field". *Journal of Economic Literature*, 47(2), 315–72.

Della Vigna, S. & Gentzkow, M. (2010). "Persuasion: Empirical Evidence". *Annual Review of Economics*, 2(1), 643–669.

Ericson, K. (2014). "Consumer inertia and firm pricing in the Medicare Part D prescription drug insurance exchange". *American Economic Journal: Economic Policy*, 6(1), 38–64.

Foá, G., Gambacorta, L., Guiso, L., & Mistrulli, P. E. (2015). "The Supply Side of Household Finance". (531).

Fuster, A., Plosser, M., Schnabel, P., & Vickery, J. (2018). "The Role of Technology in Mortgage Lending". (836).

Fuster, A. & Vickery, J. (2013). "Securitization and the fixed-rate mortgage". (594).

Gambacorta, L., Guiso, L., Mistrulli, P. E., Pozzi, A., & Tsoy, A. (2019). "The Cost of Steering in Financial Markets: Evidence from the Mortgage Market".

Gomes, F. & Michaelides, A. (2005). Optimal life-cycle asset allocation: Understanding the empirical evidence. *The Journal of Finance*, 60(2), 869–904.

Gorodnichenko, Y., Sheremirov, V., & Talavera, O. (2018). "Price Setting in Online Markets: Does IT Click?". *The Journal of the European Economic Association*, 16(6), 1764–1811.

Gurun, U., Matvos, G., & Seru, A. (2016). "Advertising Expensive Mortgages". *Journal of Finance*, 71(5), 2371–2416.

Haan, M. A. & Moraga-González, J. L. (2011). "Advertising for Attention in a Consumer Search Model". *The Economic Journal*, 121(552), 552–579.

Hall, R. E. & Woodward, S. E. (2012). "Diagnosing Consumer Confusion and Sub-optimal Shopping Effort: Theory and Mortgage Market Evidence". *The American Economic Review*, 102(7), 3249–3276.

Hertzberg, A., Liberman, A., & Paravisini, D. (2018). "Screening on Loan Terms: Evidence from Maturity Choice in Consumer Credit". *Review of Financial Studies*, 31(9), 3532–3567.

Ho, K., Hogan, J., & Morton, F. S. (2017). "The impact of consumer inattention on insurer pricing in the Medicare Part D program". *The RAND Journal of Economics*, 48(4), 877–905.

Hurst, E., Keys, B. J., Seru, A., & Vavra, J. (2016). "Regional Redistribution through the US Mortgage Market". *The American Economic Review*, 106(10), 2982–3028.

Iscenko, Z. (2018). "Choices of dominated mortgage products by UK consumers". *Financil Conduct Authority, Occasional Paper 33*.

Judd, K. L. (1998). "Numerical Methods in Economics". *MIT Press Books*, 1(0262100711).

Kaldor, N. V. (1950). "The Economic Aspects of Advertising". *Review of Economic Studies*, 18(1), 1–27.

Lancaster, K. J. (1966). "A New Approach to Consumer Theory". *Journal of Political Economy*, 74(2), 132–157.

Lewis, B. R. & Soureli, M. (2006). "The antecedents of consumer loyalty in retail banking". *Journal of Consumer Behaviour: An International Research Review*, 5(1), 15–31.

Liu, J., Longstaff, F., & Pan, J. (2003). "Dynamic asset allocation with event risk". *The Journal of Finance*, 58(1), 231–259.

Matějka, F. & McKay, A. (2015). "Rational inattention to discrete choices: A new foundation for the multinomial logit model". *American Economic Review*, 105(1), 272–98.

McManus, Doug, L. L. & Yi, M. (2018). "Why Are Consumers Leaving Money On The Ta- ble?". *Freddie Mac Economic Housing Research Insight*.

Mian, A. & Sufi, A. (2011). "House Prices, Home Equity-Based Borrowing, and the U.S. Household Leverage Crisis". *The American Economic Review*, 101(5), 2132–2156.

Michelangeli, V. & Sette, E. (2016). "How does bank capital affect the supply of mortgages?".

Miravete, E. J. & Palacios-Huerta, I. (2014). "Consumer inertia, choice dependence, and learning from experience in a repeated decision problem". *Review of Economics and Statistics*, 96(3), 524–537.

Nelson, P., . (1970). "Information and Consumer Behavior". *Journal of Political Economy*, 78, 311–329.

Nelson, P., . (1974). "Advertising as Information". *Journal of Political Economy*, 82(4), 729–754.

Nichols, L. M. (1985). "Advertising and Economic Welfare". *The American Economic Review*, 75(1), 213–218.

Ozdemir, S., Zhang, S., Gupta, S., & Bebek, G. (2020). "The effects of trust and peer influence on corporate brand—Consumer relationships and consumer loyalty". *Journal of Business Research*.

Ozga, S. A. (1960). "Imperfect Markets Through Lack of Knowledge". *Quarterly Journal of Economics*, 74(1), 29–52.

Robert, J. & Stahl, D. O. (1993). "Informative Price Advertising in a Sequential Search Model". *Econometrica*, 61(3), 657–686.

Robinson, J. (1933). "Economics of Imperfect Competition". *London: MacMillan and Co.*.

Robles-Garcia, C. (2019). "Competition and Incentives in Mortgage Markets: The Role of Brokers".

Seenivasan, S., Sudhir, K., & Talukdar, D. (2016). "Do store brands aid store loyalty?". *Management Science*, 62(3), 802–816.

Stigler, G. J. (1961). "The Economics of Information". *Journal of Political Economy*, 69(3), 213–225.

Stigler, G. J. & Becker, G. S. (1977). "De Gustibus Non Est Disputandum". *The American Economic Review*, 67(2), 76–90.

Su, X. (2009). "A model of consumer inertia with applications to dynamic pricing". *Production and Operations Management*, 18(4), 365–380.

Tauchen, G. & Hussey, R. (1991). "Quadrature-Based Methods for Obtaining Approximate Solutions to Nonlinear Asset Pricing Models". *Econometrica*, 59(2), 371–396.

Telser, L. G. (1964). "Advertising and Competition". *Journal of Political Economy*, 72(6), 537–562.

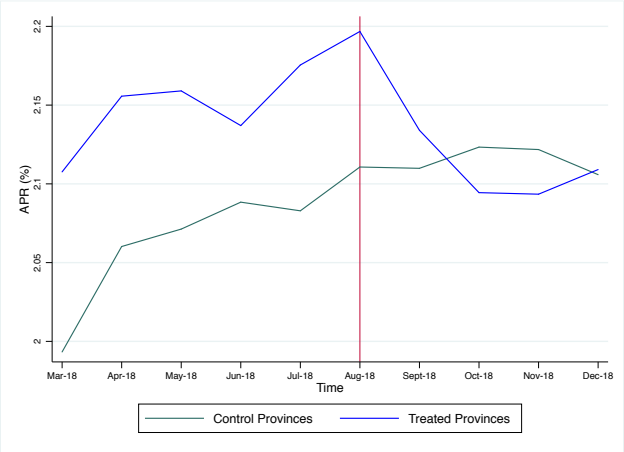
Thaler, R. H. & Sunstein, C. R. (2008). "Nudge: Improving Decisions about Health, Wealth, and Happiness". *Constitutional Political Economy*, 19(4), 356–36.

White, L. & Yanamandram, V. K. (2004). "Why customers stay: reasons and consequences of inertia in financial services". *Managing Service Quality: An International Journal*.

7 Figures

Equilibrium Mortgage Price

Figure 1: Visual inspection of parallel trend assumption



Note: The chart plots the APR on all new mortgage contracts originated by the rebranding group in treated and control provinces in the period from March 2018 to December 2018. The red line denotes the month of the rebranding event. The blue line denotes treated provinces. The green line denotes control provinces. Treated provinces are those exposed to the subsidiary brand before the event and to the parent brand after. Control provinces are remaining unaffected provinces, exposed to the same brand before and after the event. *Source:* CR and TAXIA. Note: The

Figure 2: APR on originated mortgage contracts in treated provinces

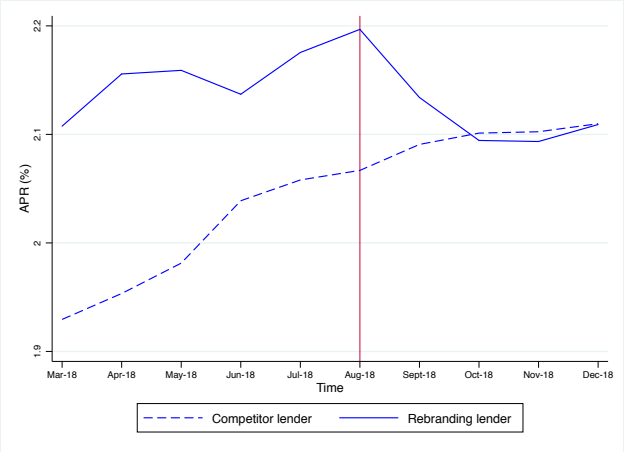


chart plots the average APR on all new mortgage contracts originated in treated provinces by the rebranding and by the competitor lender (both at the group level) in the period from March 2018 to December 2018. Treated provinces are those exposed to the subsidiary brand before the event and to the parent brand after. The red line denotes the month of the rebranding. *Source:* CR and TAXIA.

8 Tables

Descriptive Statistics

Table 1: Summary Statistics: originated mortgage contracts (All Sample)

VARIABLES	Obs	Mean	Std. Dev.	Min	Max
Mortgage amount (€)	125,916	131,155	43,022	80,000	300,000
Fixed-rate (%)	115,573	2.12	0.61	0.36	6.84
Adjustable-rate (%)	10,343	1.75	0.77	0.28	6.24
Mortgage maturity	125,916	22	5.51	10	30
Borrower age	125,916	38	6.44	18	50
Mortgage rate by location					
North-West	42,220	2.07	0.64	0.28	6.43
North-East	24,588	2.02	0.63	0.32	6.84
Center	28,605	2.11	0.60	0.44	6.72
South	30,503	2.16	0.63	0.40	6.37

		Percentage share
Rate type	Fixed-rate	91.79
	Adjustable-rate	8.21
Borrower sex	Male	61.96
	Female	38.04
Borrower nationality	UE	96.73
	Extra-UE	3.27
Borrower location	North-West	31.55
	North-East	19.39
	Center	25.33
	South	23.73

Note: The table reports summary statistics for new mortgage contracts originated in Italy in the period from 2018Q1 to 2018Q4. *Source:* CR and TAXIA.

Table 2: Bank characteristics before rebranding (2018Q2)

VARIABLES	Units	Subsidiary Brand	Parent Brand	Competitor Brand
Total assets	bln euro	5.98	536	437
Marketing expenses	mln euro	0.08	81	77
CTI	% of net income	68.9	41.2	43.6
T1 ratio	% of total assets	14.5	15.3	25.1
NPL ratio	% of total loans	17.0	14.0	13.3
Liquidity Ratio	% of total assets	0.80	3.60	10.4
RWA	% of total assets	29.3	49.1	46.1
ROA	% of total assets	0.00	0.52	0.68

Note: The table compares selected bank's balance sheet items for the subsidiary, parent and competitor banks at the latest available date before the rebranding event. For marketing expenses the latest values available from the subsidiary bank's balance sheet is as of December 2017. All other items are as of 2018 Q2. *Source:* Supervisory Reports and banks' balance sheets.

Equilibrium Mortgage Price

Table 3: Brand name on the equilibrium mortgage APR

	Rebranding Lender		Competitor Lender	All Contracts
	(1)	(2)	(3)	(4)
VARIABLES	Mortgage APR	Mortgage APR	Mortgage APR	Mortgage APR
POST	0.0293***	0.0423***	0.0163***	0.0241***
	(0.00495)	(0.00352)	(0.00465)	(0.00498)
Treated	0.0862**	0.00890	-0.105***	-0.119***
	(0.0338)	(0.0239)	(0.0186)	(0.0219)
POST × Treated	-0.0373*	-0.0356**	0.0102	0.0136
	(0.0199)	(0.0144)	(0.00915)	(0.0108)
Branches		0.0452	-0.147	-0.0351
		(0.126)	(0.156)	(0.114)
Rebranding				-0.116***
				(0.0158)
POST × Rebranding				0.0180***
				(0.00594)
Treated × Rebranding				0.148***
				(0.0381)
POST × Treated × Rebranding				-0.0529**
				(0.0235)
Contract characteristics	N	Y	Y	Y
Borrower characteristics	N	Y	Y	Y
Observations	65,107	63,665	60,068	123,723
R-squared	0.001	0.625	0.684	0.628

Standard errors clustered at the province level in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: Linear regression model. In columns (1) and (2) the dependent variable is the annual percentage rate on mortgage contracts originated by the rebranding group. In column (3) the dependent variable is the annual percentage rate on mortgage contracts originated by the competitor group. In column (4) the dependent variable is the annual percentage rate on both mortgage contracts originated by the rebranding and the competitor lender (both at the group level). *Rebranding* is a dummy equal to one for the lender implementing a rebranding strategy and zero for the competitor lender. *POST* is a time dummy equal to one starting from the third quarter of 2018 and zero before. *Treated* is a dummy variable equal to one for provinces directly affected by the rebranding and zero for remaining unaffected provinces. *Branches* is the lender's share of physical branches by province. Contract characteristics include mortgage amount, rate type and maturity. Borrower characteristics include age, gender, nationality, a dummy for past default and one for first-time borrowers. Data are quarterly.

Household Choice

Table 4: Household's probability of switching lender

VARIABLES	(1) Switching	(2) Switching	(3) Switching
POST	-0.0860***	-0.0633***	-0.0616***
	(0.0160)	(0.0164)	(0.0162)
Treated	-0.206***	-0.260***	-0.301***
	(0.0445)	(0.0538)	(0.0514)
POST × Treated	0.238***	0.243***	0.267***
	(0.0604)	(0.0604)	(0.0650)
Branches		-0.236	-0.220
		(0.147)	(0.138)
Bin FE	Y	Y	N
Bank characteristics	N	Y	Y
Borrower characteristics	N	Y	Y
Observations	3,236	3,145	3,145
R-squared	0.053	0.211	0.187

Standard errors clustered at the province level in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: Linear probability model. The dependent variable is a dummy for indebted borrowers that originate a mortgage with a lender they have not borrowed from since 2000. *POST* is a time dummy equal to one starting from the third quarter of 2018 and zero before. *Treated* is a dummy variable equal to one for provinces directly affected by the rebranding and zero for remaining unaffected provinces. *Branches* is the lender's share of physical branches by province. Bins are combinations of mortgage LTV, maturity and rate type. Bank characteristics include size, capital ratio, liquidity ratio and NPL ratio. Borrower characteristics include age, gender, nationality, and a dummy for past default. First-time borrowers are excluded. Data are quarterly.

Table 5: Household's transition to cheaper lenders

VARIABLES	(1) Current Low	(2) Current Low	(3) Current Low	(4) Current Low	(5) Current Low	(6) Current Low
Previous High	-0.264**	-0.273**	-0.250**	-0.281**	-0.290**	-0.253**
	(0.0463)	(0.0481)	(0.0693)	(0.0542)	(0.0552)	(0.0618)
Previous Medium	-0.289***	-0.288***	-0.193*	-0.311***	-0.309***	-0.196*
	(0.0285)	(0.0233)	(0.0611)	(0.0322)	(0.0285)	(0.0634)
Branches	-0.170*	-0.0573	-0.0726	-0.154	-0.0510	-0.0689
	(0.0684)	(0.0635)	(0.0922)	(0.108)	(0.0726)	(0.0937)
POST		-0.0376	0.0209		-0.0251	0.0509
		(0.0401)	(0.0559)		(0.0406)	(0.0467)
Treated		-0.181*	0.0268		-0.200	0.00934
		(0.0769)	(0.0969)		(0.0963)	(0.122)
POST × Treated		0.172**	-0.0962		0.187**	-0.0901
		(0.0353)	(0.0888)		(0.0528)	(0.107)
Previous High × POST			-0.0219			-0.0444
			(0.0600)			(0.0466)
Previous High × Treated			-0.250*			-0.243*
			(0.103)			(0.0896)
Previous High × POST × Treated			0.215*			0.203*
			(0.0843)			(0.0781)
Previous Medium × POST			-0.145			-0.174
			(0.114)			(0.0998)
Previous Medium × Treated			-0.347*			-0.364*
			(0.123)			(0.133)
Previous Medium × POST × Treated			0.548**			0.586**
			(0.166)			(0.152)
Bin FE	Y	Y	Y	N	N	N
Bank chacacteristics	Y	Y	Y	Y	Y	Y
Borrower chacacteristics	Y	Y	Y	Y	Y	Y
Observations	3,145	3,145	3,145	3,145	3,145	3,145
R-squared	0.262	0.228	0.233	0.245	0.210	0.217

Standard errors clustered at the province level in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: Linear probability model. The dependent variable is a dummy equal to one if the current lender is low-price and zero otherwise. High, Medium and Low are dummies defined according to the 2018 distribution of newly originated mortgage contracts, and reflect the current and previous lender's ranking in terms of APR within bin. Bins are combinations of mortgage LTV, maturity and rate type. *POST* is a time dummy equal to one starting from the third quarter of 2018 and zero before. *Treated* is a dummy variable equal to one for provinces directly affected by the rebranding and zero for remaining unaffected provinces. *Branches* is the lender's share of physical branches by province. Bank characteristics include size, capital ratio, liquidity ratio and NPL ratio. Borrower characteristics include age, gender, nationality, and a dummy for past default. First-time borrowers are excluded. Category excluded is the previous lender with Low price ranking. Data are quarterly.

Table 6: Household's choice of rebranding vs competitor lender (unconditional probability)

VARIABLES	(1) Rebranding	(2) Rebranding	(3) Rebranding	(4) Rebranding	(5) Rebranding	(6) Rebranding
High	-0.364***	-0.661***	-0.445*	-0.444***	-0.741***	-0.448
	(0.0336)	(0.0285)	(0.183)	(0.0345)	(0.0174)	(0.216)
Medium	0.183***	-0.429**	-0.319	0.152***	-0.441*	-0.277
	(0.0321)	(0.127)	(0.201)	(0.0316)	(0.150)	(0.209)
Treated	-0.309***	-0.620***	-0.237**	-0.396***	-0.709***	-0.237**
	(0.0585)	(0.0683)	(0.0470)	(0.0605)	(0.0496)	(0.0525)
POST	0.0250	-0.715***	-0.321**	0.0462*	-0.698***	-0.261**
	(0.0230)	(0.0469)	(0.0788)	(0.0246)	(0.0419)	(0.0639)
POST × Treated	0.119*	0.620***	0.252**	0.128*	0.666***	0.226*
	(0.0659)	(0.0757)	(0.0675)	(0.0734)	(0.0651)	(0.0751)
High × POST		0.766***	0.477**		0.791***	0.500**
		(0.0684)	(0.108)		(0.0519)	(0.128)
High × Treated		0.665***	0.407**		0.709***	0.406**
		(0.0688)	(0.0904)		(0.0496)	(0.114)
High × POST× Treated		-0.653***	-0.525**		-0.760***	-0.591*
		(0.0786)	(0.136)		(0.0682)	(0.201)
Medium × POST		1.203***	0.574*		1.195***	0.506
		(0.146)	(0.234)		(0.172)	(0.248)
Medium × Treated		0.608***	0.305**		0.632***	0.276**
		(0.0628)	(0.0613)		(0.0518)	(0.0794)
Medium × POST× Treated		-0.805***	-0.427**		-0.869***	-0.397**
		(0.0965)	(0.107)		(0.0611)	(0.121)
Branches			0.0711*			0.0764*
			(0.0297)			(0.0323)
Bin FE	Y	Y	Y	N	N	N
Bank chacacteristics	N	N	Y	N	N	Y
Borrower chacacteristics	N	N	Y	N	N	Y
Observations	3,718	3,718	3,718	3,718	3,718	3,718
R-squared	0.197	0.428	0.689	0.120	0.359	0.672

Standard errors clustered at the province level in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: Linear probability model. The dependent variable is a dummy equal to one for mortgage contracts originated with the rebranding group and zero otherwise. High, Medium and Low are dummies defined according to the 2018 distribution of newly originated mortgage contracts, and reflect the current lender's ranking in terms of APR within bin. Bins are combinations of mortgage LTV, maturity and rate type. *POST* is a time dummy equal to one starting from the third quarter of 2018 and zero before. *Treated* is a dummy variable equal to one for provinces affected by the rebranding and zero otherwise. *Branches* is the lender's share of physical branches by province. Bank characteristics include size, capital ratio, liquidity ratio and NPL ratio. Borrower characteristics include age, gender, nationality, and a dummy for past default. First-time borrowers are excluded. Category excluded is the lender with Low price ranking. Data are quarterly.

Table 7: Household's choice of rebranding vs competitor lender (conditional probability)

	Old clients		Switchers	
	(1)	(2)	(3)	(4)
VARIABLES	Rebranding	Rebranding	Rebranding	Rebranding
High	-0.267***	-0.240***	0.0502	0.0264
	(0.0681)	(0.0714)	(0.0989)	(0.104)
Medium	-0.0576	-0.0597	0.0910**	0.0864**
	(0.0493)	(0.0456)	(0.0348)	(0.0354)
Time	0.122***	0.121***	-0.119***	-0.111***
	(0.0310)	(0.0299)	(0.0271)	(0.0259)
Treated	-0.181***	-0.204***	-0.338***	-0.329***
	(0.0456)	(0.0468)	(0.108)	(0.104)
POST × Treated	-0.0739	-0.0830	0.281***	0.276***
	(0.117)	(0.121)	(0.0976)	(0.0966)
Branches	0.0467***	0.0512***	0.0890***	0.0933***
	(0.0134)	(0.0139)	(0.0166)	(0.0169)
Bin FE	Y	N	Y	N
Bank chacacteristics	Y	Y	Y	Y
Borrower chacacteristics	Y	Y	Y	Y
Observations	2,164	2,164	1,554	1,554
R-squared	0.481	0.466	0.296	0.283

Standard errors clustered at the province level in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: Linear probability model. The dependent variable is a dummy equal to one for mortgage contracts originated with the rebranding group and zero otherwise. Old clients are indebted borrowers with a previous lending relationship with the parent brand. Switchers are indebted borrowers that go to the parent brand for the first time since 2000. High, Medium and Low are dummies defined according to the 2018 distribution of newly originated mortgage contracts, and reflect the current lender's ranking in terms of APR within bin. Bins are combinations of mortgage LTV, maturity and rate type. *POST* is a time dummy equal to one starting from the third quarter of 2018 and zero before. *Treated* is a dummy variable equal to one for provinces directly affected by the rebranding and zero for remaining unaffected provinces. *Branches* is the lender's share of physical branches by province. Bank characteristics include size, capital ratio, liquidity ratio and NPL ratio. Borrower characteristics include age, gender, nationality, and a dummy for past default. First-time borrowers are excluded. Category excluded is the lender with Low price ranking. Data are quarterly.

Life-cycle model

Table 8: Parameterization

Description		Parameter value	Source
Coefficient of relative risk aversion	γ	5	Gomes & Michaelides (2005)
Discount factor	β	0.98	Campbell & Cocco (2015)
Bequest factor	θ	0	Cocco et al. (2005)
Retirement age	K	65	Cocco et al. (2005)
Labor income - Age polynomial	Constant	5.0039	SHIW
	Age	-0.13743	SHIW
	$\text{Age}^2/10$	0.03486	SHIW
	$\text{Age}^3/100$	-0.00271	SHIW
Variance permanent labor income shock	σ_e	0.0166	SHIW
Variance transitory labor income shock	σ_u	0.0220	SHIW
Replacement rate (%)		91.8	OCSE
Return on risk free asset	r_f	1.012	Mediobanca
Excess return	μ	0.049	Mediobanca
Std. dev. return on risky assets	σ_r	0.0784	Mediobanca
Tail risk		- 2 σ_r	Mediobanca
Pr(tail risk)		0.05	Mediobanca
Rate on consumer credit	r	1.08	ECB
House value (median, euro)		200,000	SHIW
LTV (median, %)		60	SHIW
Mortgage maturity (median, years)		20	SHIW
Mortgage rate (%)	Low	1.87	CR-MO
Mortgage rate (%)	Medium	2.03	CR-MO
Mortgage rate (%)	High	2.37	CR-MO

Note: The table reports the parameter values assumed in the model and their source.

Table 9: Main statistics for the economy

	Data	Model	Data Source
Initial conditions:			
Share of HHs by type of lender (%)			
Low price	32.4	32.4	CR-MO
Medium price	45.1	45.1	CR-MO
High price	22.4	22.4	CR-MO
Price dispersion (%)	0.24	0.23	CR-MO
Labor income (median, thousands euro)	31.9	30.1	SHIW
Annual consumption (median, thousands euro)	27.6	28.2	SHIW
Share of HHs with risky assets (%)	18.4	18.7	SHIW

Note: The SHIW sample consists of indebted households in their working period (40-65 years old). SHIW data include the 2002-2016 waves.

Table 10: Model results

	Data	Model	Data Source
No rebranding (untreated provinces)			
Transition matrixes			
- HHs that remain with previous lender (%)	49.6	50.9	CR-MO
- HHs that move to cheaper lender (%)	16.0	16.7	CR-MO
Search costs (euro)		1080	
Price dispersion (%)		0.19	
Rebranding (treated provinces)			
Transition matrixes			
- HHs that remain with previous lender (%)	40.4	39.7	CR-MO
- HHs that move to cheaper lender (%)	25.4	27.8	CR-MO
Search costs (euro)		750	
Price dispersion (%)		0.18	
Delta (*Rebranding − No rebranding*)			
Search costs (euro)		330	
Price Dispersion (%)	-0.01	-0.01	CR-MO

Note: The Table reports the model results for transition matrices, price dispersion and search costs. The last two rows (Delta) capture the treatment effect of rebranding, that is the differences in price dispersion and search costs between the "no-rebranding" and "rebranding" scenario.

A French Amortization

We use the French amortization method to estimate the original maturity of the mortgage. This is the most diffused repayment plan among Italian banks, characterized by fixed instalments comprised of interest payments (decreasing) and principal amounts (increasing). For each borrower, we match her total outstanding debt from CR and her loan amount at origination from TAXIA. We compute the principal payment as the difference in the loan outstanding between two consecutive months. The interest payment is the loan outstanding times the interest rate, which is the APR minus loan fees. The APR is directly observable from TAXIA; for loan fees we use the median spread between the APR and the interest rate available from MO. To get original mortgage maturity n, we invert the following equation:

$$R = \frac{K \times i}{1 - \frac{1}{1+i^n}} \tag{A.1}$$

where R is the fixed instalment, K is the initial capital, i is the interest rate on the residual capital, and n is the number of payments. Table A.1 shows that the median, mean and maximum maturity in our dataset is similar to the one resulting from official statistics for residential mortgages in Italy (Regional Business Lending Survey, RBLS). Mortgages with maturity greater or equal than 30 years are 19 per cent in our dataset (according to the RBLS they are almost 21 per cent).

Table A.1: Maturity

	Median	Mean	Maximum
CR - our computation	21	22	42
RBLS	22	22	42

B MutuiOnline

B.1 Data

Table B.1.1: Probability of mortgage offer

	Share of profiles with an offer (%)
All sample	25.24
Contract characteristics	
FRM	25.11
ARM	25.36
10 years maturity	23.75
15 years maturity	24.91
20 years maturity	26.06
30 years maturity	26.22
50% LTV	33.38
60% LTV	33.34
80% LTV	31.61
85% LTV	2.62
Borrower characteristics	
30 years old	25.24
40 years old	25.24
€2000 net monthly income	24.15
€4000 net monthly income	26.32
Fixed-term job	7.91
Permanent job	33.90
Self-employed	33.90
North-West	29.64
North-East	27.20
Center	26.84
South	20.63

Note: The table reports information on the probability of observing an online mortgage offer by one of the 30 banks in our sample over the period from March to December 2018 for selected profiles. Each profile is defined by a combination of the following contract and borrower characteristics: mortgage rate type (fixed or adjustable), original maturity (10, 15, 20 or 30 years), LTV at origination (50, 60, 80 or 85 per cent); borrower age (30 or 40 years), income (2000 or 4000 monthly net income), job type (fixed-term employee, employee with permanent contract or self-employed) and location (North-West, North-East, Center, South). *Source:* MO.

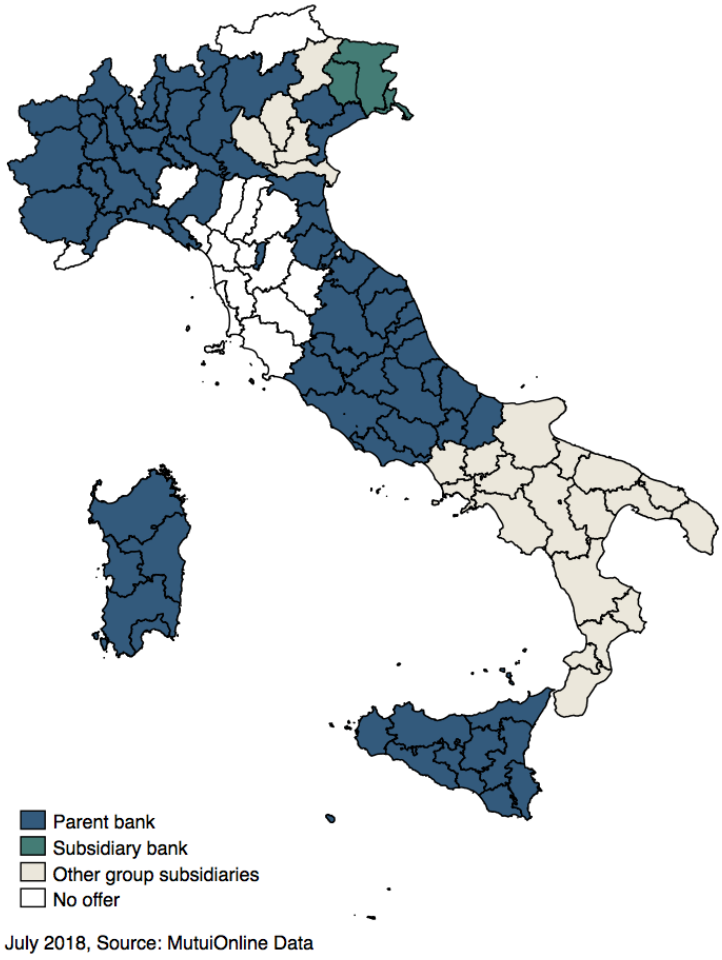
Table B.1.2: Summary Statistics for mortgage offers

VARIABLES	Obs	Mean	Std. Dev.	Min	Max
Mortgage amount (€)	6,182,580	120,000	0	120,000	120,000
Mortgage instalment (€)	6,182,580	577	197	291	1015
FRM (%)	3,075,676	2.04	0.55	0.94	4.72
ARM (%)	3,106,904	1.19	0.56	0.43	3.80
Mortgage maturity	6,182,580	19	7.40	10	30
Mortgage LTV	6,182,580	63.60	12.70	50	85
Mortgage rate by maturity					
10 years	1,454,824	1.43	0.62	0.43	4.43
15 years	1,525,560	1.55	0.66	0.43	4.41
20 years	1,596,132	1.60	0.70	0.54	4.41
30 years	1,606,064	1.85	0.76	0.54	4.72
Mortgage rate by LTV					
50 per cent	2,044,188	1.48	0.65	0.43	4.52
60 per cent	2,042,020	1.57	0.62	0.57	4.72
80 per cent	1,936,116	1.67	0.64	0.56	4.70
85 per cent	160,256	3.27	0.94	2.00	4.43
Mortgage rate by location					
North-West	1,650,588	1.61	0.68	0.43	4.72
North-East	1,332,576	1.63	0.69	0.44	4.72
Center	1,315,328	1.62	0.74	0.44	4.72
South	1,884,088	1.62	0.71	0.44	4.72
Mortgage rate by borrower age					
30 years old	3,091,290	1.61	0.70	0.43	4.72
40 years old	3,091,290	1.61	0.70	0.43	4.72
Mortgage rate by borrower income					
€2000 (monthly net)	2,957,948	1.62	0.70	0.43	4.72
€4000 (monthly net)	3,224,632	1.60	0.70	0.43	4.72
Mortgage rate by employment status					
Fixed-term contract	645,984	1.54	0.76	0.43	4.43
Permanent contract	2,768,298	1.62	0.69	0.43	4.72
Self-employed	2,768,298	1.62	0.69	0.43	4.72

Note: The table reports summary statistics for online mortgage offers by the 30 banks in our sample over the period from March to December 2018. *Source:* MO.

B.2 Offering Policy

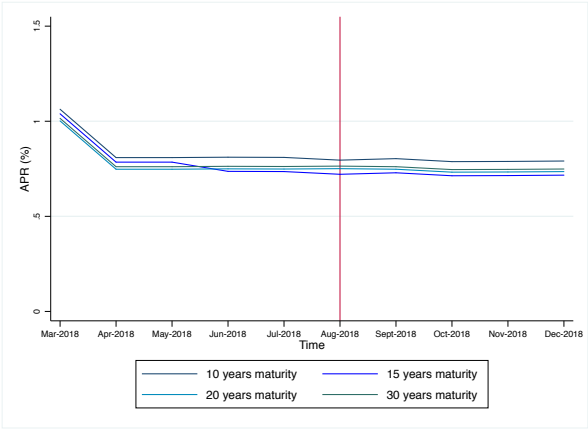
Figure B.2.1: Product offers by banks belonging to the rebranding group



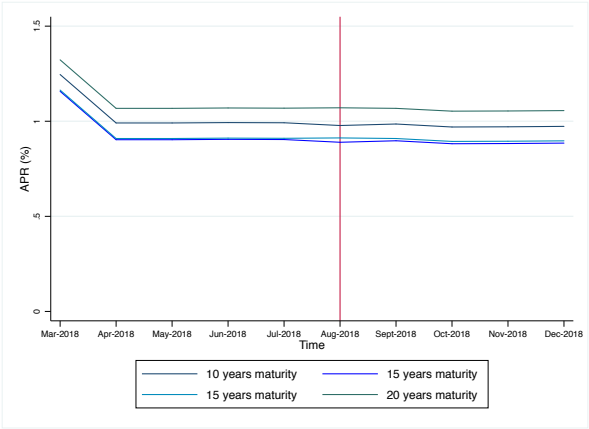
Note: The map shows product offered by individual banks belonging to the rebranding group in each province as of July 2018 (the last month before the rebranding). A product is a combination of mortgage LTV, maturity and rate type, and there are 32 possible combinations in total. Each bank targets specific provinces with the same products and there is no geographical overlapping. Blue provinces are served by the parent bank with 32 out of 32 product offers. Green (treated) provinces are served by the subsidiary bank with 32 out of 32 product offers. Grey provinces are served by other subsidiaries of the group with 32 out of 32 product offers. White provinces are those with no online offer (offers through the branch are still possible). *Source:* MO.

B.3 Pricing Policy

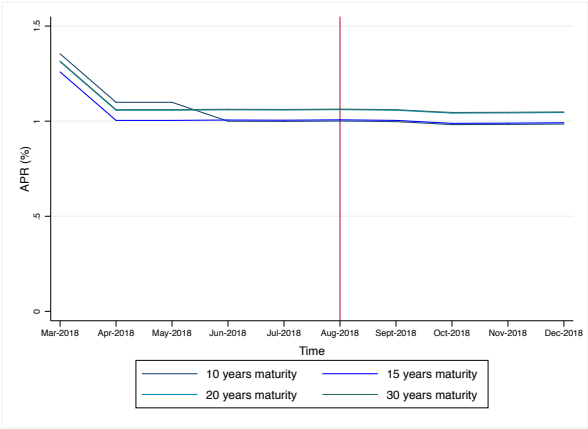
Figure B.3.1: Pricing policy of the rebranding group: treated provinces



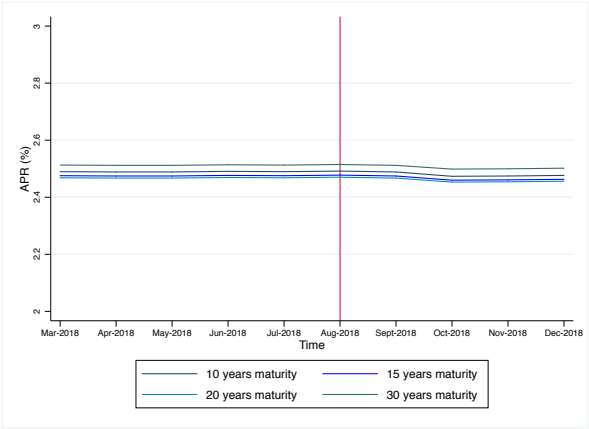
(a) ARM with 50% LTV



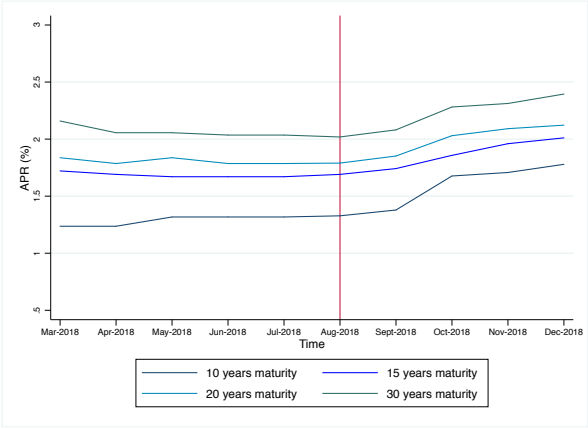
(b) ARM with 60% LTV



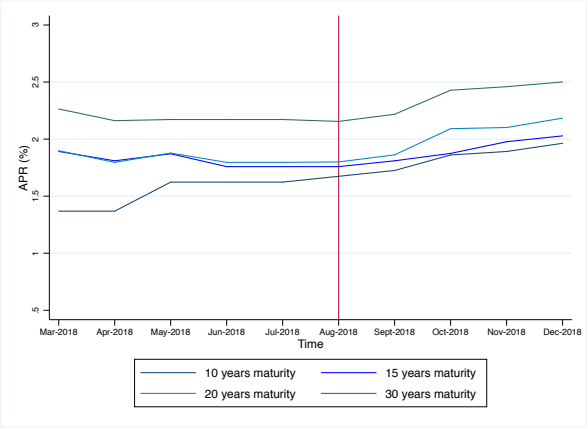
(c) ARM with 80% LTV



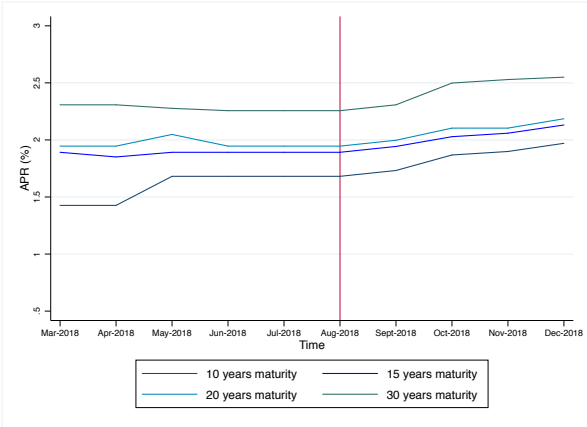
(d) ARM with 85% LTV



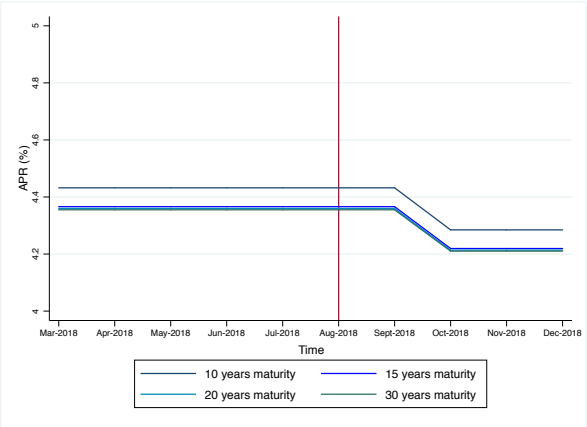
(e) FRM with 50% LTV



(f) FRM with 60% LTV



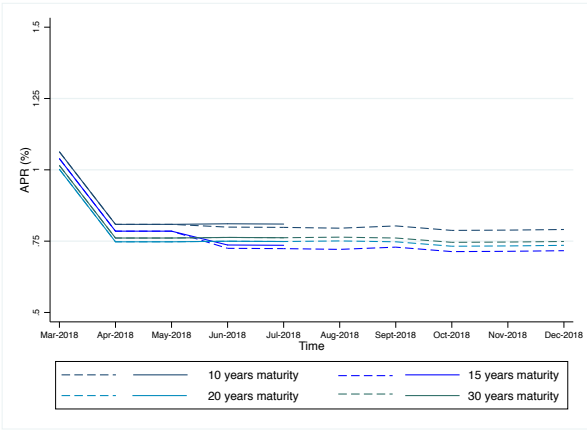
(g) FRM with 80% LTV



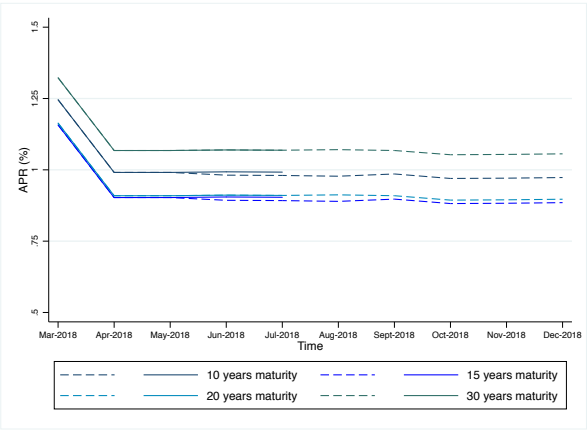
(h) FRM with 85% LTV

Note: The charts plot the APR offered by the rebranding group in treated provinces for different combinations of mortgage maturity, LTV and rate type. Treated provinces are those exposed to the subsidiary brand before the event and to the parent brand after. The red line denotes the month of the rebranding event. To the left is the APR offered by the subsidiary brand. To the right, the APR offered by the parent brand. Data are monthly. *Source:* MO.

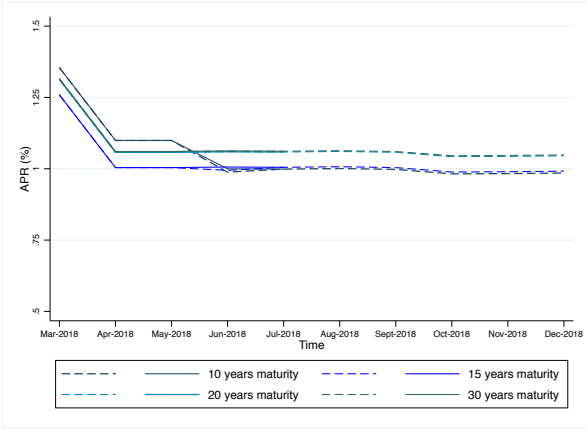
Figure B.3.2: Pricing policy of the rebranding group: average across all provinces



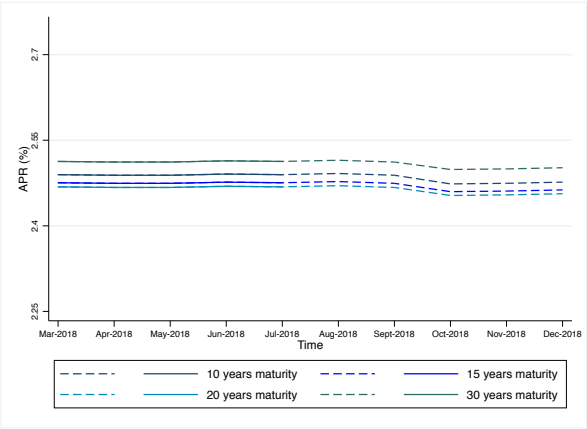
(a) ARM with 50% LTV



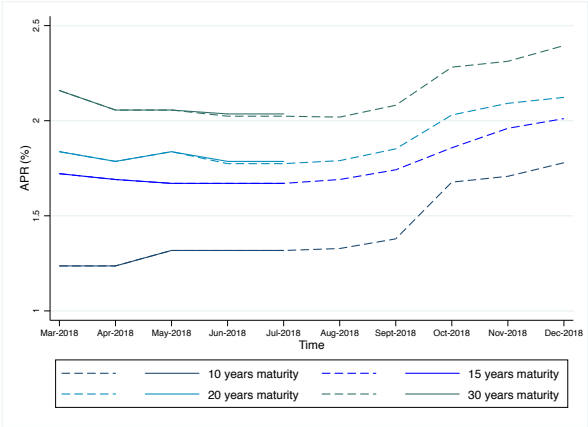
(b) ARM with 60% LTV



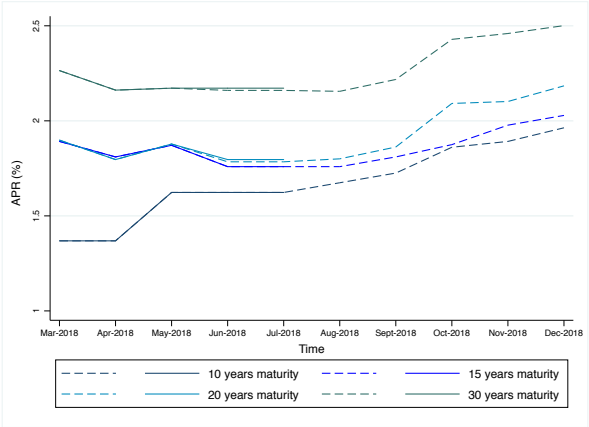
(c) ARM with 80% LTV



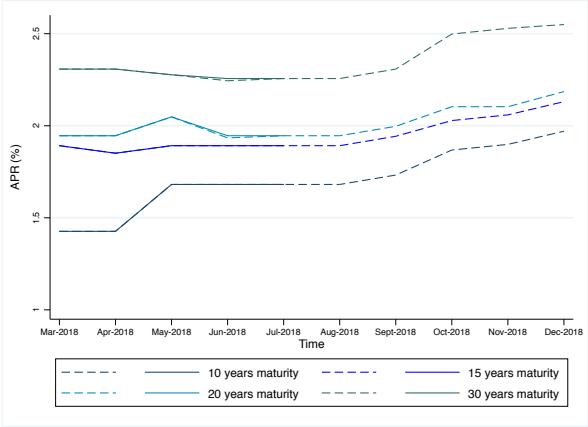
(d) ARM with 85% LTV



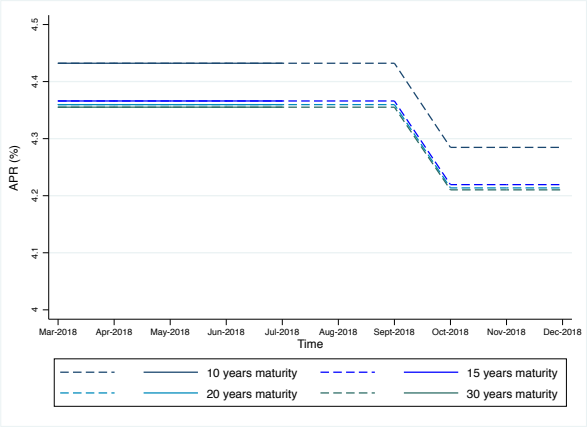
(e) FRM with 50% LTV



(f) FRM with 60% LTV



(g) FRM with 80% LTV



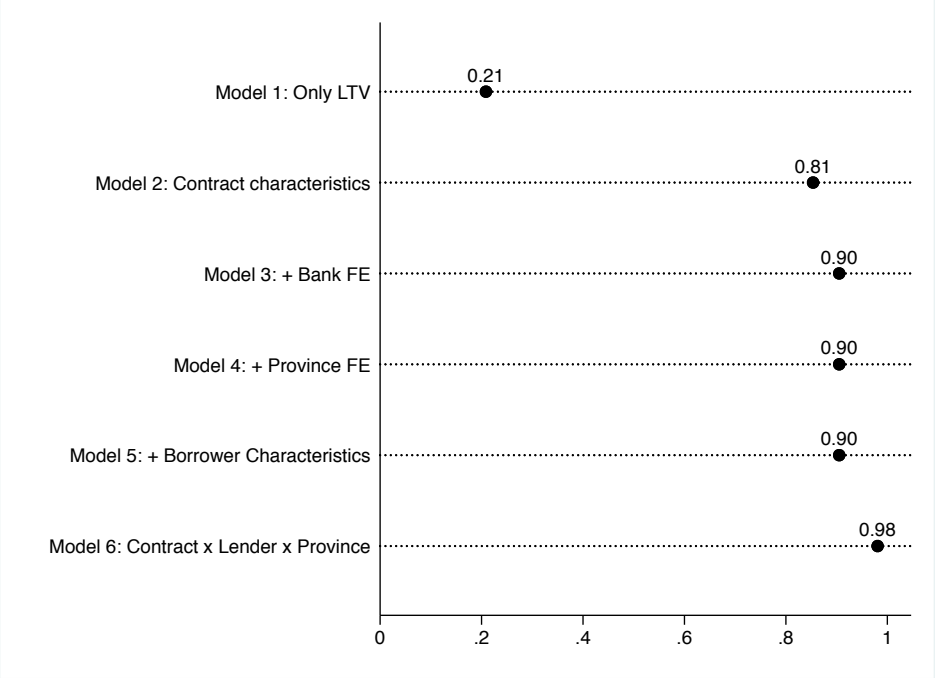
(h) FRM with 85% LTV

Note: The charts plot the average APR offered by the rebranding group across all provinces for different combinations of of mortgage maturity, LTV and rate type. The solid line is the average APR offered by the subsidiary brand, available until incorporation. The dashed line is the average APR offered by the parent brand, available throughout our sample period. Data are monthly. *Source:* MO.

C Loan-to-Value Inference

To infer the mortgage loan-to-value, we rely on data from the online platform MutuiOnline (MO). Importantly, this represents the only source of information on the LTV currently available in Italy. According to MO, dispersion in mortgage pricing is mostly driven by contract characteristics, and in particular by the lender, the rate type (adjustable versus fixed), the mortgage maturity and the LTV, which all together act as summary statistics for all other relevant characteristics, including borrower income, location and job-type. Our estimation methodology relies on the idea that for each combination of lender, rate type, maturity, province, observable for newly originated mortgage contracts from CR and TAXIA, there is only one corresponding LTV with the same combination in the online offer dataset. Figure C.1 shows the Adjusted R-squared of regressions of the offered APR on a set of dummy variables obtained using data from the digital platform only. This set of regressions allows us to get a decomposition of the explanatory power of borrower and contract characteristics. The $Adjusted - R^2$ reaches 90 per cent when we include dummies for contract characteristics and bank FE. Adding dummies for the location of the house and borrower-level controls does not explain the residual variation in the offered APR. Model 6 includes the interaction of the lender, the rate type, the maturity, the LTV and the province; the R-squared is close to one, meaning that any characteristic other than those included in the above regression should bring almost no additional variation in the offered APR. For new mortgage contracts the LTV is not obervable, but for any observable combination of lender, mortgage rate, maturity, province, and equilibrium APR, Figure C.1 implies that we can uniquely identify the LTV from the corresponding combination in the offer dataset. Table C.1 illustrates this procedure with a very stylized example.

Figure C.1: Explained variation in offered APR: MO data



Note: The chart shows the $Adjusted - R^2$ of regressions of the offered APR on a set of dummy variables. Model 1 includes only dummies for the LTV. Model 2 adds dummies for the mortgage rate and maturity. Model 3 adds fixed effects for the lender. Model 4 adds province fixed effects. Model 5 adds dummies for borrower characteristics (age, income level and job type). For tractability of our dataset, we hereby disregard the time dimension and run all regressions at one single date. The chart presents results for the latest available date (December 2018). The $Adjusted - R^2$ for regressions at previous dates are almost identical. *Source:* MO.

Table C.1: LTV inference: illustrative example

	Lender	LTV	Rate type	Maturity	Province	Month	APR (%)
CR	A	60*	Fixed-rate	20	Rome	March	1
	B	80*	Fixed-rate	20	Rome	March	2
MO	A	60	Fixed-rate	20	Rome	March	1
	A	80	Fixed-rate	20	Rome	March	2
	B	60	Fixed-rate	20	Rome	March	1
	B	80	Fixed-rate	20	Rome	March	2

* Values inferred from MO data

Note: The mortgage LTV is not directly observable for originated mortgage contracts. The table illustrates the methodology used to infer it from online platform data. The idea is the following: for each combination of observable characteristics of the mortgage contract (rate type, maturity, province, time) and equilibrium APR available from the Credit Register, there is only one corresponding combination with the same characteristics and the same offered APR in the MO dataset, to which is associated a unique value of the LTV. We use this value as a proxy for the LTV at origination.

D Supporting evidence

D.1 Physical branches

Table D.1: Distribution of physical branches of the rebranding lender by province

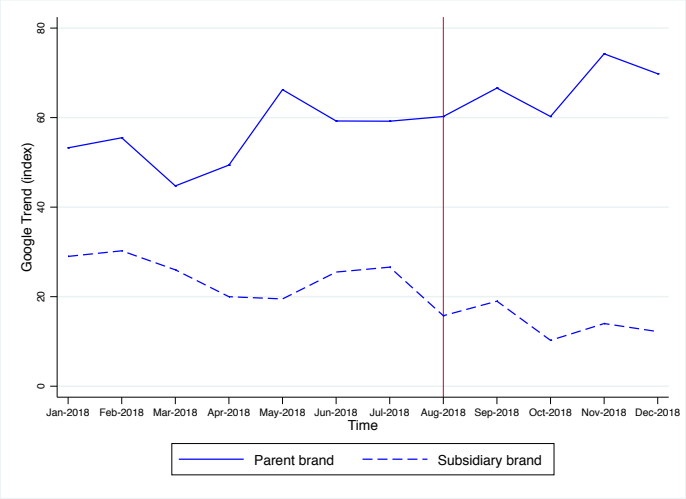
	Provinces	Treated	Number of Physical Branches			% Share of Physical Branches		
			Pre-Rebranding	Post-Rebranding	Delta	Pre-Rebranding	Post-Rebranding	Delta
1	Gorizia	Y	85	85	0	13	13	0
2	Pordenone	Y	32	31	-1	12	12	0
3	Trieste	Y	165	163	-2	19	19	0
4	Udine	Y	15	11	-4	15	12	-4
5	Verona	N	18	18	0	21	21	0
6	Vicena	N	43	43	0	11	11	0
7	Belluno	N	233	232	-1	15	15	0
8	Padova	N	27	27	0	6	6	0
9	Rovigo	N	79	78	-1	20	21	1
10	Torino	N	106	105	-1	20	20	0
11	Aosta	N	65	65	0	19	19	0
12	Genova	N	194	195	1	12	12	0
13	Milano	N	159	159	0	24	25	0
14	Trento	N	12	12	0	9	9	0
15	Venezia	N	11	11	0	12	12	0
16	Bologna	N	66	66	0	16	16	0
17	Ancona	N	14	14	0	9	9	0
18	Firenze	N	13	13	0	15	15	0
19	Perugia	N	42	35	-7	13	11	-2
20	Roma	N	25	25	0	21	21	0
21	Napoli	N	10	10	0	9	9	0
22	L'Aquila	N	42	40	-2	25	24	-1
23	Campobasso	N	25	24	-1	6	5	0
24	Bari	N	17	17	0	12	12	0
25	Potenza	N	27	23	-4	12	11	-2
26	Catanzaro	N	15	15	0	17	17	0
27	Palermo	N	15	15	0	10	11	0
28	Cagliari	N	3	3	0	3	3	0
29	Vercelli	N	61	61	0	17	17	0
30	Novara	N	58	58	0	18	18	0
31	Cuneo	N	6	6	0	5	5	0
32	Asti	N	78	78	0	13	13	0
33	Alessandria	N	61	61	0	8	8	0
34	Imperia	N	53	53	0	19	19	0
35	Savona	N	24	24	0	10	10	0
36	La Spezia	N	25	25	0	9	9	0
37	Varese	N	21	21	0	6	6	0
38	Como	N	74	61	-13	13	11	-2
39	Sondrio	N	136	114	-22	27	24	-3
40	Bergamo	N	36	28	-8	26	21	-4
41	Brescia	N	135	119	-16	29	26	-2
42	Pavia	N	148	122	-26	29	25	-3
43	Cremona	N	47	39	-8	35	31	-4
44	Mantova	N	79	68	-11	20	17	-2
45	Bolzano	N	20	15	-5	24	20	-4
46	Treviso	N	37	28	-9	21	17	-4
47	Piacenza	N	12	12	0	7	7	0
48	Parma	N	54	54	0	19	19	0
49	Reggio Emilia	N	16	16	0	5	5	0
50	Modena	N	31	31	0	8	8	0

	Provinces	Treated	Number of Physical Branches			% Share of Physical Branches		
			Pre-Rebranding	Post-Rebranding	Delta	Pre-Rebranding	Post-Rebranding	Delta
51	Ferrara	N	12	12	0	7	7	0
52	Ravenna	N	21	21	0	8	8	0
53	Forli'	N	43	43	0	16	16	0
54	Pesaro Urbino	N	26	26	0	12	12	0
55	Macerata	N	17	17	0	9	9	0
56	Ascoli Piceno	N	26	26	0	21	21	0
57	Massa Carrara	N	9	9	0	10	10	0
58	Lucca	N	27	27	0	13	13	0
59	Pistoia	N	39	39	0	28	28	0
60	Livorno	N	17	17	0	9	10	1
61	Pisa	N	26	26	0	10	10	0
62	Arezzo	N	39	39	0	19	20	0
63	Siena	N	23	23	0	13	13	0
64	Grosseto	N	23	23	0	16	17	0
65	Terni	N	23	23	0	22	22	0
66	Viterbo	N	33	33	0	19	19	0
67	Rieti	N	27	26	-1	40	39	-1
68	Latina	N	14	14	0	9	9	0
69	Frosinone	N	17	17	0	10	10	0
70	Caserta	N	41	41	0	25	25	0
71	Benevento	N	10	10	0	12	13	0
72	Avellino	N	19	19	0	17	17	0
73	Salerno	N	49	49	0	15	15	0
74	Teramo	N	27	27	0	18	18	0
75	Pescara	N	14	14	0	10	11	0
76	Chieti	N	15	15	0	10	10	0
77	Isernia	N	4	4	0	17	17	0
78	Foggia	N	28	28	0	15	15	0
79	Taranto	N	19	19	0	14	14	0
80	Brindisi	N	21	21	0	20	20	0
81	Lecce	N	33	33	0	14	14	0
82	Matera	N	9	9	0	12	12	0
83	Cosenza	N	22	22	0	13	13	0
84	Reggio Calabria	N	22	22	0	22	22	0
85	Trapani	N	28	26	-2	22	21	-1
86	Messina	N	25	24	-1	15	15	0
87	Agrigento	N	14	13	-1	11	11	-1
88	Caltanissetta	N	11	9	-2	14	12	-2
89	Enna	N	10	9	-1	18	17	-2
90	Catania	N	17	17	0	7	7	0
91	Ragusa	N	10	10	0	11	11	0
92	Siracusa	N	10	10	0	10	10	0
93	Sassari	N	28	28	0	16	16	0
94	Nuoro	N	8	8	0	10	10	0
95	Oristano	N	4	4	0	6	6	0
96	Lodi	N	16	16	0	12	12	0
97	Monza	N	45	45	0	12	12	0
98	Fermo	N	10	10	0	11	12	0
99	BAT	N	17	17	0	16	17	0
100	Barletta Andria Trani	N	32	32	0	33	33	1
101	Crotone	N	2	2	0	6	6	0
102	Biella	N	7	7	0	6	6	0
103	Verbania	N	21	21	0	31	32	1
104	Lecco	N	23	23	0	10	11	0
105	Rimini	N	20	20	0	9	9	0
106	Vibo Valentia	N	6	6	0	20	20	0

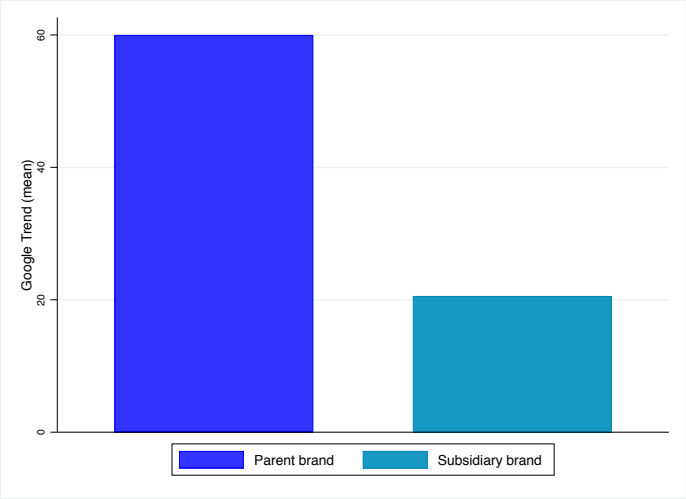
Note: The table lists the average number and share of physical branches by province of the rebranding lender (at the group level) in the two quarters preceding and following the rebranding event, and computes the delta between the two periods. Treated provinces are those exposed to the subsidiary brand before the event and to the parent brand after. *Source:* Bank of Italy Statistical Database and authors' calculation.

D.2 Google Trend Index

Figure D.1: Treated Provinces



(a) Brand popularity over time



(b) 2018 average brand popularity

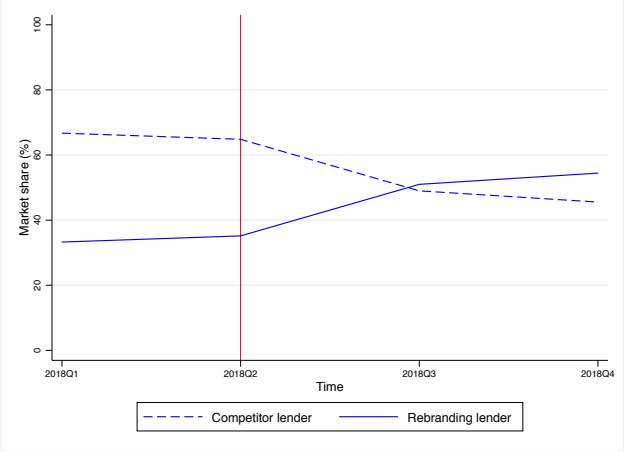
Note: The charts plot the index of individual search behaviour within Google browsers and YouTube (Google Trend index) for the parent and subsidiary brands in treated provinces, excluding repeated search from the same individual over close periods of time. The index measures relative brand popularity compared to the highest point: a value of 100 is the peak popularity of the term, a value of 50 means that the term is half as popular. Treated provinces are those exposed to the subsidiary brand before the event and to the parent brand after. Panel (a) shows the monthly average index from January 2018 to December 2018 in treated provinces. The red line denotes the month of the rebranding event. Panel (b) shows the 2018 average index value in treated provinces. *Source:* Google.

E Ancillary results

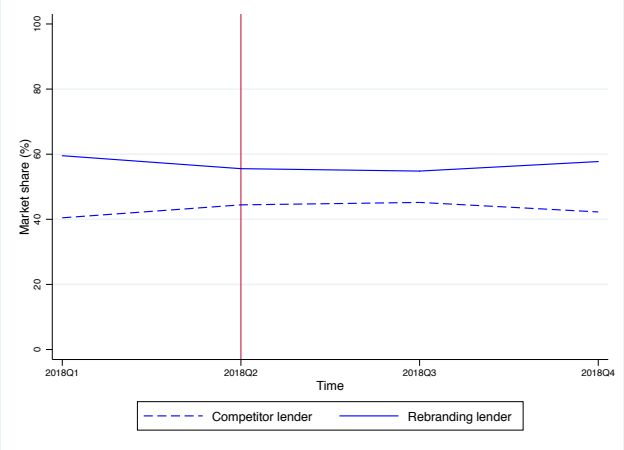
E.1 Market Share

Graphical inspection of the quarterly market share for the rebranding and competitor lender, before and after the event (red line), shows that the former gains almost 20 per cent market share over its competitor in treated provinces (Figure E.1.1). The market share is computed at the group level to account for the incorporation effect.

Figure E.1.1: Market share by lender and province



(a) Treated provinces



(b) Control provinces

Note: The chart plots the quarterly market share of the rebranding and the competitor lender (both at the group level) in 2018. The red line denotes the quarter of the rebranding event. Treated provinces are those exposed to the subsidiary brand before the event and to the parent brand after. Control provinces are remaining unaffected provinces, exposed to the same brand before and after the event. Panel (a) shows the average market share of the two banking groups in treated provinces in each quarter of 2018. Panel (b) shows the groups' average market share in control provinces in each quarter of 2018. Data are quarterly. *Source:* TAXIA.

To study the effect of rebranding on market share we estimate the following equation:

$$MarketShare_{jt} = \beta_0 + \beta_1 POST_t + \beta_2 Treated + \beta_3 (POST_t \times Treated) + \varepsilon_{jt} \tag{E.1.1}$$

where j indexes the lender and t the quarter. The dependent variable is the quarterly market share of the rebranding lender in each province, $Treated$ is a dummy for provinces affected by the rebranding event, $POST_t$ is a time dummy for the event, and the regression coefficient on the interaction between $POST_t$ and $Treated$ is the effect of interest.

Regression results point at a positive and significant treatment effect of brand awareness on market share: the rebranding lender increases market share following the event (Tables E.1.1 and E.1.2), and the effect is statistically significant for provinces where brand popularity increases because of the subsidiary's rebranding under the parent brand (Table E.1.3). This could reflect higher market power as well as greater competitiveness of the parent. If it is market power, we would expect the parent to enforce its dominant position and extract surplus by steering consumers into relatively more expensive products; if it is competitiveness, we would expect the parent to exploit its comparative advantage and attract consumers through more convenient deals. The results presented in the preceding sections suggest that, at least in the short term, the lender exploits the information effect of branding to attract consumers towards cheaper mortgages.

Table E.1.1: Market share: all sample

VARIABLES	Obs	Mean	Std. Dev.	Min	Max
Pre-Rebranding	215	49.30	24.72	3.95	87.37
Post-Rebranding	214	52.60	20.31	1.90	84.37

Table E.1.2: Market share: treated provinces

VARIABLES	Obs	Mean	Std. Dev.	Min	Max
Pre-Rebranding	8	36.62	19.97	8.51	64.93
Post-Rebranding	8	54.31	12.93	34.48	77.59

Note: The table reports the quarterly market share of the rebranding group for new mortgage originations in all provinces and in treated ones. Pre and post periods are the two quarters preceding and following the rebranding event. Data are quarterly. *Source:* TAXIA

Table E.1.3: Brand name on market share

VARIABLES	(1) Market Share	(2) Market Share
POST	1.987	0.209
	(2.272)	(2.342)
Treated	-13.83**	-16.12***
	(5.544)	(5.510)
POST × Treated	15.70**	17.41**
	(7.842)	(7.774)
Branches		0.106**
		(0.0502)
Observations	429	397
R-squared	0.020	0.035

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: Linear regression model. Market share is the quarterly market share of the rebranding group for new mortgage originations in each province. Treated provinces are those exposed to the subsidiary brand before the event and to the parent brand after. Pre and post periods are the two quarters preceding and following the rebranding event. All values are in percentage points. Data are quarterly. *Source:* TAXIA

E.2 Equilibrium Mortgage Quantity

We use our DID model (Equations 1 and 2) to estimate the effect of brand name on the equilibrium amount of mortgage debt. Mortgage credit issued by the rebranding lender in treated provinces increases following the event, consistently with a downward sloping demand (Table E.2.1). The effect survives after conditioning for loan and borrower characteristics (columns 1 and 2). The rebranding strategy does not affect the equilibrium amount of mortgage credit granted by the competitor lender in treated provinces, excluding the possibility that households entirely substitute products of the competitor with those of the rebranding lender (column 3). Also, the difference between the rebranding and the competitor lender is still significant, meaning that the effect is not spuriously driven by the evolution of mortgage demand in treated provinces (column 4). Given the observed reduction in the equilibrium mortgage (Table 3), the effect on quantity is as expected and in line with classic microeconomics theory posing a negative relationship between the quantity demanded of a good and its price.

Table E.2.1: Brand name on equilibrium mortgage debt

	Rebranding Lender		Competitor Lender	All Contracts
	(1)	(2)	(3)	(4)
VARIABLES	log Mortgage debt	log Mortgage debt	log Mortgage debt	log Mortgage debt
POST	0.0242***	0.0178***	0.00496***	0.00511***
	(0.00338)	(0.00243)	(0.00162)	(0.00157)
Treated	-0.0481*	-0.0402*	-0.00247	-0.00325
	(0.0247)	(0.0222)	(0.00730)	(0.00768)
POST × Treated	0.0345**	0.0284**	-0.00203	-0.00200
	(0.0158)	(0.0134)	(0.00471)	(0.00496)
Branches		-0.00223	0.00216	-0.00635
		(0.0416)	(0.0186)	(0.0206)
Rebranding				-0.0124***
				(0.00362)
POST × Rebranding				0.0137***
				(0.00235)
POST × Treated				-0.0338
				(0.0243)
POST × Rebranding × Treated				0.0295*
				(0.0153)
Contract characteristics	N	Y	Y	Y
Borrower characteristics	N	Y	Y	Y
Observations	65,107	63,665	60,068	123,723
R-squared	0.002	0.890	0.918	0.901

Standard errors clustered at the province level in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: Linear regression model. In columns (1) and (2) the dependent variable is the log amount of mortgage debt on contracts originated by the rebranding group. In column (3) the dependent variable is the is the log amount of mortgage debt on contracts originated by the competitor group. In column (4) the dependent variable is the log amount of mortgage debt on mortgage contracts originated by the competitor and the rebranding lender (both at the group level). *Rebranding* is a dummy equal to one for the lender implementing a rebranding strategy and zero for the competitor lender. *POST* is a time dummy equal to one starting from the third quarter of 2018 and zero before. *Treated* is a dummy variable equal to one for provinces provinces directly affected by the rebranding and zero for remaining unaffected provinces. *Branches* is the lender's share of physical branches by province. Contract characteristics include mortgage amount, rate type and maturity. Borrower characteristics include age, gender, nationality, a dummy for past default and one for first-time borrowers. Data are quarterly.

E.3 Households' choice

Table E.3.1 presents results from the following multivariate regression:

$$\begin{cases} High_{jit} = \beta_0 + \beta_1 POST_t + \beta_2 Treated + \beta_3 (POST_t \times Treated) + \varepsilon_{jit} \\ Medium_{jit} = \beta_0 + \beta_1 POST_t + \beta_2 Treated + \beta_3 (POST_t \times Treated) + \varepsilon_{jit} \\ Low_{jit} = \beta_0 + \beta_1 POST_t + \beta_2 Treated + \beta_3 (POST_t \times Treated) + \varepsilon_{jit} \end{cases} \tag{E.3.1}$$

where j indexes the lender, i the borrower, and t the quarter. $High$, $Medium$ and Low are dummies reflecting the lender's ranking in terms of APR within bins. $POST$ and $Treated$ are defined as before. The three equations are estimated simultaneously and the regression coefficient β_3 captures the impact of brand name on the probability of choosing a lender with a given price ranking.

Table E.3.1: Multivariate regression: Household's choice of lender

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	High	Medium	Low	High	Medium	Low
POST	-0.0769***	0.186***	-0.109***	-0.0815***	0.187***	-0.105***
	(0.0116)	(0.0169)	(0.0168)	(0.0116)	(0.0170)	(0.0169)
Treated	0.157***	-0.0185	-0.139**	0.155***	-0.0122	-0.143**
	(0.0391)	(0.0570)	(0.0566)	(0.0390)	(0.0572)	(0.0567)
POST × Treated	-0.117**	-0.154**	0.271***	-0.128**	-0.151**	0.279***
	(0.0523)	(0.0762)	(0.0758)	(0.0522)	(0.0766)	(0.0760)
Bin FE	Y	Y	Y	N	N	N
Observations	3,718	3,718	3,718	3,718	3,718	3,718
R-squared	0.041	0.066	0.041	0.021	0.034	0.012

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: High, Medium and Low are dummies defined according to the 2018 distribution of newly originated mortgage contracts, and reflect the current lender's ranking in terms of APR within bin. Bins are combinations of mortgage LTV, maturity and rate type. *POST* is a time dummy equal to one starting from the third quarter of 2018 and zero before. *Treated* is a dummy variable equal to one for provinces provinces directly affected by the rebranding and zero for remaining unaffected provinces. Data are quarterly.

Table E.3.2: Share of low-priced offers by the rebranding lender in treated provinces by bin

Bins	10 years maturity	15 years maturity	20 years maturity	30 years maturity
ARM with 50% LTV	100%	100%	80%	100%
FRM with 50% LTV	0%	0%	0%	20%
ARM with 60% LTV	100%	100%	80%	0%
FRM with 60% LTV	0%	0%	0%	0%
ARM with 80% LTV	100%	100%	80%	100%
FRM with 80% LTV	0%	0%	0%	20%
ARM with 85% LTV	100%	100%	100%	100%
FRM with 85% LTV	100%	100%	100%	100%

Note: Green cells are bins where the lender's price ranking is not constant across offers. Blue cells are bins where the lender always makes low-price offers. Grey cells are bins where the lender is the only one making an offer. These are loans with LTV above 80 % are fairly uncommon because they are penalized by regulation, as banks that offer those kind of loans need to hold extra capital. *Source:* MO.

Table E.3.3: Household's transition towards the rebranding lender

	Switchers			
	(1)	(2)	(3)	(4)
VARIABLES	Rebranding	Rebranding	Rebranding	Rebranding
Previous High	0.186***	0.0368**	0.194***	0.0351**
	(0.0551)	(0.0146)	(0.0553)	(0.0158)
Previous Medium	0.000647	0.00511	-0.00706	0.00552
	(0.0461)	(0.0198)	(0.0445)	(0.0194)
Treated	-0.0613	0.0764	-0.0474	0.0807
	(0.228)	(0.141)	(0.241)	(0.144)
POST	0.183***	0.0418***	0.177***	0.0456***
	(0.0423)	(0.0131)	(0.0420)	(0.0146)
POST × Treated	0.166	-0.0920	0.144	-0.0870
	(0.261)	(0.140)	(0.286)	(0.143)
Previous High × POST	-0.242***	-0.0256	-0.238***	-0.0223
	(0.0539)	(0.0188)	(0.0548)	(0.0189)
Previous High × Treated	-0.610***	-0.161	-0.622**	-0.165
	(0.227)	(0.149)	(0.245)	(0.152)
Previous High × POST × Treated	0.453	0.202	0.462	0.196
	(0.299)	(0.157)	(0.302)	(0.158)
Previous Medium × POST	-0.499***	0.0313	-0.497***	0.0318
	(0.0626)	(0.0235)	(0.0608)	(0.0226)
Previous Medium × Treated	-0.409*	-0.126	-0.422*	-0.123
	(0.228)	(0.166)	(0.242)	(0.160)
Previous Medium × POST × Treated	0.169	0.144	0.176	0.138
	(0.251)	(0.160)	(0.289)	(0.151)
Branches		0.193		0.225
		(0.127)		(0.138)
Bin FE	Y	Y	N	N
Bank chacacteristics	N	Y	N	Y
Borrower chacacteristics	N	Y	N	Y
Observations	1,554	1,554	1,554	1,554
R-squared	0.176	0.927	0.135	0.922

Standard errors clustered at the province level in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: Linear probability model. The dependent variable is a dummy equal to one for mortgage contracts originated with the rebranding group implementing. Switchers are indebted borrowers that go to the rebranding lender for the first time since 2000. Previous High, Medium and Low are dummies defined according to the 2018 distribution of newly originated mortgage contracts, and reflect the previous lender's ranking in terms of APR within bin. Bins are combinations of mortgage LTV, maturity and rate type. *POST* is a time dummy equal to one starting from the third quarter of 2018 and zero before. *Treated* is a dummy variable equal to one for provinces directly affected by the rebranding and zero for remaining unaffected provinces. *Branches* is the lender's share of physical branches by province. Bank characteristics include size, capital ratio, liquidity ratio and NPL ratio. Borrower characteristics include age, gender, nationality, and a dummy for past default. First-time borrowers and old clients are excluded. Category excluded is the previous lender with Low price ranking. Data are quarterly.

E.4 Price Dispersion

Across bins

Table E.4.1: All sample

VARIABLES	Obs	Mean	Std. Dev.	Min	Max
Pre-Rebranding	169	.336	.019	0	1.04
Post-Rebranding	183	.324	.018	0	1.13

Table E.4.2: Treated Provinces

VARIABLES	Obs	Mean	Std. Dev.	Min	Max
Pre-Rebranding	8	.470	.017	0.20	0.71
Post-Rebranding	8	.342	.206	0	0.661

Note: The tables summarize the quarterly standard deviation in the mortgage rate by province across all bins. Bins are combinations of mortgage LTV, maturity and rate type. Pre and post periods are the two quarters preceding and following the rebranding event. Treated provinces are those exposed to the subsidiary brand before the event and to the parent brand after. Data are quarterly. *Source*: TAXIA, CR and MO.

Within bin

Table E.4.3: All sample

VARIABLES	Obs	Mean	Std. Dev.	Min	Max
Pre-Rebranding	135	.096	.139	0	.562
Post-Rebranding	153	.076	.079	0	.415

Table E.4.4: Treated Provinces

VARIABLES	Obs	Mean	Std. Dev.	Min	Max
Pre-Rebranding	8	.086	.141	0	.357
Post-Rebranding	8	.056	.083	0	.293

Note: The tables summarize the quarterly standard deviation in the mortgage rate by province holding bins constant. Bins are combinations of mortgage LTV, maturity and rate type. Pre and post periods are the two quarters preceding and following the rebranding event. Treated provinces are those exposed to the subsidiary brand before the event and to the parent brand after. Data are quarterly. *Source*: TAXIA, CR and MO.

We compute the quarterly standard deviation by province in the APR across all bins (between standard deviation) and within the same bin (within standard deviation), and run the following regression for the treatment effect of brand name on price dispersion:

$$PriceDispersion_{jit} = \beta_0 + \beta_1 POST_t + \beta_2 Treated + \beta_3 (POST_t \times Treated) + \varepsilon_{jit} \tag{E.4.1}$$

where $PriceDispersion$ is the average standard deviation in the mortgage rate by province across all bins and within the same bin.

Table E.4.5: Price Dispersion

VARIABLES	Obs	Mean	Std. Dev.	Min	Max
Between St. Dev.	352	.33	.18	0	1.13
Within St. Dev.	288	.09	.11	0	.56

Note: The table summarizes the quarterly dispersion in the mortgage rate by province across all bins (between standard deviation) and within the same bin (within standard deviation). Bins are combinations of mortgage LTV, maturity and rate type. Data refer to contracts originated in the period from 2018Q1 to 2018Q4. Data are quarterly. *Source*: TAXIA, CR and MO.

Table E.4.6: Quarterly price dispersion by province

	(1)	(2)
VARIABLES	Between St. Dev.	Within St. Dev.
POST	-0.00259	-0.0187
	(0.0173)	(0.0193)
Treated	0.144**	-0.0102
	(0.0303)	(0.00826)
POST × Treated	-0.125**	-0.0110*
	(0.0278)	(0.00431)
Observations	352	288
R-squared	0.023	0.010

Standard errors clustered at the province level in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: Linear regression model. The dependent variable is the average standard deviation in the mortgage rate by province across all bins (column 1) and within the same bin (column 2). Bins are combinations of mortgage LTV, maturity and rate type. $POST$ is a time dummy equal to one starting from the third quarter of 2018 and zero before. $Treated$ is a dummy variable equal to one for provinces directly affected by the rebranding and zero for remaining unaffected provinces. $Branches$ is the lender's share of physical branches by province. Data are quarterly.

RECENTLY PUBLISHED "TEMI" (*)

N. 1314 – *Working horizon and labour supply: the effect of raising the full retirement age on middle-aged individuals*, by Francesca Carta and Marta De Philippis (February 2021).

N. 1315 – *Bank credit and market-based finance for corporations: the effects of minibond issuances*, by Steven Ongena, Sara Pinoli, Paola Rossi and Alessandro Scopelliti (February 2021).

N. 1316 – *Is inflation targeting a strategy past its sell-by date?*, by Alberto Locarno and Alessandra Locarno (February 2021).

N. 1317 – *Declining natural interest rate in the US: the pension system matters*, by Jacopo Bonchi and Giacomo Caracciolo (February 2021).

N. 1318 – *Can we measure inflation expectations using Twitter?*, by Cristina Angelico, Juri Marcucci, Marcello Miccoli and Filippo Quarta (February 2021).

N. 1319 – *Identifying deposits' outflows in real-time*, by Edoardo Rainone (February 2021).

N. 1320 – *Whatever it takes to save the planet? Central banks and unconventional green policy*, by Alessandro Ferrari and Valerio Nispi Landi (February 2021).

N. 1321 – *The power of text-based indicators in forecasting the Italian economic activity*, by Valentina Aprigliano, Simone Emiliozzi, Gabriele Guaitoli, Andrea Luciani, Juri Marcucci and Libero Monteforte (March 2021).

N. 1322 – *Judicial efficiency and bank credit to firms*, by Giacomo Rodano (March 2021).

N. 1323 – *Unconventional monetary policies and expectations on economic variables*, by Alessio Anzuini and Luca Rossi (March 2021).

N. 1324 – *Modeling and forecasting macroeconomic dowside risk*, by Davide Delle Monache, Andrea De Polis and Ivan Petrella (March 2021).

N. 1325 – *Foreclosures and house prices*, by Michele Loberto (March 2021).

N. 1326 – *inancial structure and bank relationships of Italian multinational firms*, by Raffaello Bronzini, Alessio D'Ignazio and Davide Revelli (March 2021).

N. 1327 – *Foreign investors and target firms' financial structure: cavalry or lucusts?*, by Lorenzo Bencivelli and Beniamino Pisicoli (April 2021).

N. 1328 – *Board composition and performance of state-owned enterprises: quasi experimental evidence*, by Audinga Baltrunaite, Mario Cannella, Sauro Mocetti and Giacomo Roma (April 2021).

N. 1329 – *Can internet banking affect households' participation in financial markets and financial awareness?*, by Valentina Michelangeli and Eliana Viviano (April 2021).

N. 1330 – *(In)Efficient separations, firing costs and temporary contracts*, by Andrea Gerali, Elisa Guglielminetti and Danilo Liberati (April 2021).

N. 1331 – *The catalytic role of IMF programs*, by Claudia Maurini and Alessandro Schiavone (April 2021).

N. 1332 – *Dating the euro area business cycle: an evaluation*, by Claudia Pacella (April 2021).

N. 1333 – *Population aging, relative prices and capital flows across the globe*, by Andrea Papetti (April 2021).

N. 1334 – *What drives investors to chase returns?*, by Jonathan Huntley, Valentina Michelangeli and Felix Reichling (April 2021).

N. 1335 – *Managerial talent and managerial practices: are they complements?*, by Audinga Baltrunaite, Giulia Bovini and Sauro Mocetti (April 2021).

(*) Requests for copies should be sent to:
Banca d'Italia – Servizio Studi di struttura economica e finanziaria – Divisione Biblioteca e Archivio storico – Via Nazionale, 91 – 00184 Rome – (fax 0039 06 47922059). They are available on the Internet www.bancaditalia.it.

2019

ALBANESE G., M. CIOFFI and P. TOMMASINO, *Legislators' behaviour and electoral rules: evidence from an Italian reform,* European Journal of Political Economy, v. 59, pp. 423-444, **WP 1135 (September 2017).**

APRIGLIANO V., G. ARDIZZI and L. MONTEFORTE, *Using the payment system data to forecast the economic activity,* International Journal of Central Banking, v. 15, 4, pp. 55-80, **WP 1098 (February 2017).**

ARNAUDO D., G. MICUCCI, M. RIGON and P. ROSSI, *Should I stay or should I go? Firms' mobility across banks in the aftermath of the financial crisis,* Italian Economic Journal / Rivista italiana degli economisti, v. 5, 1, pp. 17-37, **WP 1086 (October 2016).**

BASSO G., F. D'AMURI and G. PERI, *Immigrants, labor market dynamics and adjustment to shocks in the euro area,* IMF Economic Review, v. 67, 3, pp. 528-572, **WP 1195 (November 2018).**

BATINI N., G. MELINA and S. VILLA, *Fiscal buffers, private debt, and recession: the good, the bad and the ugly,* Journal of Macroeconomics, v. 62, **WP 1186 (July 2018).**

BURLON L., A. NOTARPIETRO and M. PISANI, *Macroeconomic effects of an open-ended asset purchase programme,* Journal of Policy Modeling, v. 41, 6, pp. 1144-1159, **WP 1185 (July 2018).**

BUSETTI F. and M. CAIVANO, *Low frequency drivers of the real interest rate: empirical evidence for advanced economies,* International Finance, v. 22, 2, pp. 171-185, **WP 1132 (September 2017).**

CAPPELLETTI G., G. GUAZZAROTTI and P. TOMMASINO, *Tax deferral and mutual fund inflows: evidence from a quasi-natural experiment,* Fiscal Studies, v. 40, 2, pp. 211-237, **WP 938 (November 2013).**

CARDANI R., A. PACCAGNINI and S. VILLA, *Forecasting with instabilities: an application to DSGE models with financial frictions,* Journal of Macroeconomics, v. 61, **WP 1234 (September 2019).**

CHIADES P., L. GRECO, V. MENGOTTO, L. MORETTI and P. VALBONESI, *Fiscal consolidation by intergovernmental transfers cuts? The unpleasant effect on expenditure arrears,* Economic Modelling, v. 77, pp. 266-275, **WP 1076 (July 2016).**

CIANI E., F. DAVID and G. DE BLASIO, *Local responses to labor demand shocks: a re-assessment of the case of Italy,* Regional Science and Urban Economics, v. 75, pp. 1-21, **WP 1112 (April 2017).**

CIANI E. and P. FISHER, *Dif-in-dif estimators of multiplicative treatment effects,* Journal of Econometric Methods, v. 8. 1, pp. 1-10, **WP 985 (November 2014).**

CIAPANNA E. and M. TABOGA, *Bayesian analysis of coefficient instability in dynamic regressions,* Econometrics, MDPI, Open Access Journal, v. 7, 3, pp.1-32, **WP 836 (November 2011).**

COLETTA M., R. DE BONIS and S. PIERMATTEI, *Household debt in OECD countries: the role of supply-side and demand-side factors,* Social Indicators Research, v. 143, 3, pp. 1185–1217, **WP 989 (November 2014).**

COVA P., P. PAGANO and M. PISANI, *Domestic and international effects of the Eurosystem Expanded Asset Purchase Programme,* IMF Economic Review, v. 67, 2, pp. 315-348, **WP 1036 (October 2015).**

ERCOLANI V. and J. VALLE E AZEVEDO, *How can the government spending multiplier be small at the zero lower bound?,* Macroeconomic Dynamics, v. 23, 8. pp. 3457-2482, **WP 1174 (April 2018).**

FERRERO G., M. GROSS and S. NERI, *On secular stagnation and low interest rates: demography matters,* International Finance, v. 22, 3, pp. 262-278, **WP 1137 (September 2017).**

FOA G., L. GAMBACORTA, L. GUISO and P. E. MISTRULLI, *The supply side of household finance,* Review of Financial Studies, v.32, 10, pp. 3762-3798, **WP 1044 (November 2015).**

GERALI A. and S. NERI, *Natural rates across the Atlantic,* Journal of Macroeconomics, v. 62, article 103019, **WP 1140 (September 2017).**

GIORDANO C., M. MARINUCCI and A. SILVESTRINI, *The macro determinants of firms' and households' investment: evidence from Italy,* Economic Modelling, v. 78, pp. 118-133, **WP 1167 (March 2018).**

GOMELLINI M., D. PELLEGRINO and F. GIFFONI, *Human capital and urban growth in Italy,1981-2001,* Review of Urban & Regional Development Studies, v. 31, 2, pp. 77-101, **WP 1127 (July 2017).**

LIBERATI D. and M. LOBERTO, *Taxation and housing markets with search frictions,* Journal of Housing Economics, v. 46, article 101632, **WP 1105 (March 2017).**

MAGRI S., *Are lenders using risk-based pricing in the Italian consumer loan market? The effect of the 2008 crisis,* Journal of Credit Risk, v. 15, 1, pp. 27-65, **WP 1164 (January 2018).**

MERCATANTI A., T. MAKINEN and A. SILVESTRINI, *The role of financial factors for european corporate investment,* Journal of International Money and Finance, v. 96, pp. 246-258, **WP 1148 (October 2017).**

MIGLIETTA A., C. PICILLO and M. PIETRUNTI, *The impact of margin policies on the Italian repo market,* The North American Journal of Economics and Finance, v. 50, **WP 1028 (October 2015).**

MONTEFORTE L. and V. RAPONI, *Short-term forecasts of economic activity: are fortnightly factors useful?,* Journal of Forecasting, v. 38, 3, pp. 207-221, **WP 1177 (June 2018).**

NERI S. and A. NOTARPIETRO, *Collateral constraints, the zero lower bound, and the debt–deflation mechanism,* Economics Letters, v. 174, pp. 144-148, **WP 1040 (November 2015).**

PANCRAZI R. and M. PIETRUNTI, *Natural expectations and home equity extraction,* Journal of Housing Economics, v. 46, 4, **WP 984 (November 2014).**

PEREDA FERNANDEZ S., *Teachers and cheaters. Just an anagram?*, Journal of Human Capital, v. 13, 4, pp. 635-669, **WP 1047 (January 2016).**

RIGGI M., *Capital destruction, jobless recoveries, and the discipline device role of unemployment,* Macroeconomic Dynamics, v. 23, 2, pp. 590-624, **WP 871 (July 2012).**

2020

ALESSANDRI P. and M. BOTTERO, *Bank lending in uncertain times,* R European Economic Review, V. 128, **WP 1109 (April 2017).**

ANTUNES A. and V. ERCOLANI, *Public debt expansions and the dynamics of the household borrowing constraint,* Review of Economic Dynamics, v. 37, pp. 1-32, **WP 1268 (March 2020).**

ARDUINI T., E. PATACCHINI and E. RAINONE, *Treatment effects with heterogeneous externalities,* Journal of Business & Economic Statistics, , v. 38, 4, pp. 826-838, **WP 974 (October 2014).**

BOLOGNA P., A. MIGLIETTA and A. SEGURA, *Contagion in the CoCos market? A case study of two stress events,* International Journal of Central Banking, v. 16, 6, pp. 137-184, **WP 1201 (November 2018).**

BOTTERO M., F. MEZZANOTTI and S. LENZU, *Sovereign debt exposure and the Bank Lending Channel: impact on credit supply and the real economy,* Journal of International Economics, v. 126, article 103328, **WP 1032 (October 2015).**

BRIPI F., D. LOSCHIAVO and D. REVELLI, *Services trade and credit frictions: evidence with matched bank – firm data,* The World Economy, v. 43, 5, pp. 1216-1252, **WP 1110 (April 2017).**

BRONZINI R., G. CARAMELLINO and S. MAGRI, *Venture capitalists at work: a Diff-in-Diff approach at late-stages of the screening process,* Journal of Business Venturing, v. 35, 3, **WP 1131 (September 2017).**

BRONZINI R., S. MOCETTI and M. MONGARDINI, *The economic effects of big events: evidence from the Great Jubilee 2000 in Rome,* Journal of Regional Science, v. 60, 4, pp. 801-822, **WP 1208 (February 2019).**

COIBION O., Y. GORODNICHENKO and T. ROPELE, *Inflation expectations and firms' decisions: new causal evidence,* Quarterly Journal of Economics, v. 135, 1, pp. 165-219, **WP 1219 (April 2019).**

CORSELLO F. and V. NISPI LANDI, *Labor market and financial shocks: a time-varying analysis,* Journal of Money, Credit and Banking, v. 52, 4, pp. 777-801, **WP 1179 (June 2018).**

COVA P. and F. NATOLI, *The risk-taking channel of international financial flows,* Journal of International Money and Finance, v. 102, **WP 1152 (December 2017).**

D'ALESSIO G., *Measurement errors in survey data and the estimation of poverty and inequality indices,* Statistica Applicata - Italian Journal of Applied Statistics, v. 32, 3, **WP 1116 (June 2017).**

DEL PRETE S. and S. FEDERICO, *Do links between banks matter for bilateral trade? Evidence from financial crises,* Review of World Economic, v. 156, 4, pp. 859 - 885, **WP 1217 (April 2019).**

D'IGNAZIO A. and C. MENON, *The causal effect of credit Guarantees for SMEs: evidence from Italy,* The Scandinavian Journal of Economics, v. 122, 1, pp. 191-218, **WP 900 (February 2013).**

ERCOLANI V. and F. NATOLI, *Forecasting US recessions: the role of economic uncertainty,* Economics Letters, v. 193, **WP 1299 (October 2020).**

MAKINEN T., L. SARNO and G. ZINNA, *Risky bank guarantees,* Journal of Financial Economics, v. 136, 2, pp. 490-522, **WP 1232 (July 2019).**

MODENA F., E. RETTORE and G. M. TANZI, *The effect of grants on university dropout rates: evidence from the Italian case,* Journal of Human Capital, v. 14, 3, pp. 343-370, **WP 1193 (September 2018).**

NISPI LANDI V., *Capital controls spillovers,* Journal of International Money and Finance, v. 109, **WP 1184 (July 2018).**

PERICOLI M., *On risk factors of the stock–bond correlation,* International Finance, v. 23, 3, pp. 392-416, **WP 1198 (November 2018).**

RAINONE E., *The network nature of OTC interest rates,* Journal of Financial Markets, v.47, article 100525, **WP 1022 (July 2015).**

RAINONE E. and F. VACIRCA, *Estimating the money market microstructure with negative and zero interest rates,* Quantitative Finance, v. 20, 2, pp. 207-234, **WP 1059 (March 2016).**

RIZZICA L., *Raising aspirations and higher education. Evidence from the UK's widening participation policy,* Journal of Labor Economics, v. 38, 1, pp. 183-214, **WP 1188 (September 2018).**

SANTIONI, R., F. SCHIANTARELLI and P. STRAHAN, *Internal capital markets in times of crisis: the benefit of group affiliation*, Review of Finance, v. 24, 4, pp. 773-811, **WP 1146 (October 2017).**

SCHIANTARELLI F., M. STACCHINI and P. STRAHAN, *Bank Quality, judicial efficiency and loan repayment delays in Italy,* Journal of Finance , v. 75, 4, pp. 2139-2178, **WP 1072 (July 2016).**

2021

ALBANESE G., E. CIANI and G. DE BLASIO, *Anything new in town? The local effects of urban regeneration policies in Italy,* Regional Science and Urban Economics, v. 86, **WP 1214 (April 2019).**

FIDORA M., C. GIORDANO and M. SCHMITZ, *Real exchange rate misalignments in the Euro Area,* Open Economies Review, v. 32, 1, pp. 71-107, **WP 1162 (January 2018).**

LI F., A. MERCATANTI, T. MAKINEN and A. SILVESTRINI, *A regression discontinuity design for ordinal running variables: evaluating central bank purchases of corporate bonds,* The Annals of Applied Statistics, v. 15, 1, pp. 304-322, **WP 1213 (March 2019).**

LOSCHIAVO D., *Household debt and income inequality: evidence from Italian survey data,* Review of Income and Wealth. v. 67, 1, pp. 61-103, **WP 1095 (January 2017).**

NISPI LANDI V. and A. SCHIAVONE, *The effectiveness of capital controls,* Open Economies Review, v. 32, 1, pp. 183-211, **WP 1200 (November 2018).**

PEREDA FERNANDEZ S., *Copula-based random effects models for clustered data,* Journal of Business & Economic Statistics, v. 39, 2, pp. 575-588, **WP 1092 (January 2017).**

FORTHCOMING

ACCETTURO A., A. LAMORGESE, S. MOCETTI and D. PELLEGRINO, *Housing Price elasticity and growth: evidence from Italian cities,* Journal of Economic Geography, **WP 1267 (March 2020).**

ALBANESE G., G. DE BLASIO and A. LOCATELLI, *Does EU regional policy promote local TFP growth? Evidence from the Italian Mezzogiorno,* Papers in Regional Science, **WP 1253 (December 2019).**

ANZUINI A. and L. ROSSI, *Fiscal policy in the US: a new measure of uncertainty and its effects on the American economy*, Empirical Economics, **WP 1197 (November 2018).**

APRIGLIANO V. and D. LIBERATI, *Using credit variables to date business cycle and to estimate the probabilities of recession in real time*, The Manchester School, **WP 1229 (July 2019).**

BALTRUNAITE A., C. GIORGIANTONIO, S. MOCETTI and T. ORLANDO, Discretion and supplier selection in public procurement, Journal of Law, Economics, and Organization, **WP 1178 (June 2018)**

COVA P., P. PAGANO, A. NOTARPIETRO and M. PISANI, *Secular stagnation, R&D, public investment and monetary policy: a global-model perspective,* Macroeconomic Dynamics, **WP 1156 (December 2017).**

DE PHILIPPIS M., *Multitask agents and incentives: the case of teaching and research for university professors,* Economic Journal, **WP 1042 (December 2015).**

DEL PRETE S. and M. L. STEFANI, *Women as "Gold Dust": gender diversity in top boards and the performance of Italian banks,* Economic Notes, Monte dei Paschi di Siena, **WP 1014 (June 2015).**

HERTWECK M., V. LEWIS and S. VILLA, *Going the extra mile: effort by workers and job-seekers,* Journal of Money, Credit and Banking, **WP 1277 (June 2020).**

METELLI L. and F. NATOLI, *The international transmission of US tax shocks: a proxy-SVAR approach,* IMF Economic Review, **WP 1223 (June 2019).**

MOCETTI S., G. ROMA and E. RUBOLINO, *Knocking on parents' doors: regulation and intergenerational mobility,* Journal of Human Resources, **WP 1182 (July 2018).**

PERICOLI M. and M. TABOGA, *Nearly exact Bayesian estimation of non-linear no-arbitrage term-structure models,* Journal of Financial Econometrics, **WP 1189 (September 2018).**