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MORTGAGE LENDING AND BANK INVOLVEMENT IN THE INSURANCE BUSINESS: THE EFFECTS OF CROSS-SELLING

by Federico Apicella*, Leandro D'Aurizio**, Raffaele Gallo* and Giovanni Guazzarotti*

Abstract

This paper examines how banks involved in the insurance business adapt their mortgage lending practices. Our findings rely on a unique dataset, including interest rates on residential mortgages offered by a representative sample of Italian banks in the 2018-21 period, as well as data on bank-insurance relationships. We find that a larger involvement of banks in the insurance sector (measured by the ratio of the fees obtained from the selling of insurance policies to the total amount of fees) is only associated with lower rates on mortgage loans in the case of banks with an insurance subsidiary (and not of those that only have a commercial agreement with insurers). This association is stronger for mortgages granted to borrowers who are more likely to buy savings products (i.e. those with low loan-to-value ratios), as well as after the launch of a new life insurance policy by the insurance subsidiary. This evidence is consistent with the adoption of cross-selling strategies by banks, which tend to offer lower rates on low-revenue products (such as residential mortgages offered in a low interest rate environment) in order to attract new customers who will be inclined to buy high-revenue insurance savings products.

JEL Classification: G21, G22, G51, G52.

Keywords: mortgage, insurance business, cross-selling, life policies, mortgage pricing.

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1. Introduction[1]

Banks are largely involved in the insurance sector in Europe and in most other advanced economies. In particular banks frequently distribute insurance products through their branches, offering savings products (e.g. with-profit and unit-linked policies),[2] which represent the main share of the premiums collected, or policies to reduce the risk of their borrowers (e.g. policies connected to mortgages, such as home or mortgage life insurance). Some intermediaries are active in the insurance business by collaborating with insurance companies through commercial agreements; others instead directly acquire shares in the capital of insurance companies. Therefore, the level of involvement of each bank in the insurance sector (so-called *bancassurance*) is heterogeneous and depends on the individual bank's business model.

Bancassurance may have a significant impact on loan pricing through possible cross-subsidization effects. Indeed, banks generally price loans and other services strategically in order to extract value through the scope of their relationship with their customers (Basten and Juelsrud, 2023; Laux and Walz, 2009; Zhao et al., 2013). The greater the business-line diversification, the greater the cross-selling incentive, as banks may achieve economies of scope by offering a larger set of products to the same customer base (Stiroh and Rumble, 2006). According to this strategy, banks may find it profitable to reduce the interest rate on loans to attract customers (a 'loss-leader strategy') and then cross-sell other financial products, compensating the lower interest income in traditional segments with revenues from non-lending business (Carbó Valverde and Rodríguez Fernández, 2007).[3]

In particular, our work focuses on the impact of *bancassurance* on loan pricing for households. Income on bank products is heterogeneous, depending on the type of service or product offered and the level of competition in each market segment. Before interest rates began to rise in the second half of 2022, income levels in the mortgage market generally were low in many euro-area countries, including Italy, given the low interest rate environment and the high competition in a segment characterized by a highly standardized product. By contrast, the selling of life insurance policies, which typically regards savings products (i.e. with-profit and unit-linked policies), is a relatively high-revenue service for banks.[4] Therefore, banks more actively involved in the insurance business, with

[1] We thank Alessio De Vincenzo, Emilia Bonaccorsi di Patti, Silvia Magri, Marco Cosconati, Antonio De Pascalis, the participants to the Bank of Italy's Bank Research Network Workshop and to the Bank of Italy-Bundesbank Research Workshop on Financial Intermediation for their comments. The views expressed in this paper are those of the authors and do not reflect those of the Bank of Italy and IVASS.

[2] With-profit policies offer the policyholders some form of guarantees on their investment. On the contrary, for unitlinked policies the policyholder bears the risks associated with the investment.

[3] Previous works find indeed evidence of a negative relationship between non-interest income – mainly fee component – and net interest income (Abedifar et al., 2018; Lepetit et al., 2008; Maudos and Solís, 2009).

[4] In Europe *bancassurance* represents the main distribution channel of life policies, while its role is limited in the nonlife sector (EIOPA, 2018). Evidence on the Italian market shows that life policies are on average highly profitable

respect to less diversified intermediaries, might decide to offer better prices on low-revenue banking products (e.g. residential mortgages in a low interest rate environment like the period under examination) in order to gain new customers to whom subsequently to sell high-revenue life insurance products (*cross-selling hypothesis*). In sum, our main hypothesis is that greater involvement of banks in the insurance sector is associated with lower rates offered to borrowers.

To this aim, we rely on a unique dataset that includes monthly rates on mortgages offered between 2018 and 2021 by a representative sample of Italian banks, obtained from "Mutui Online", the major online mortgage broker in Italy, and data on bank involvement in the insurance business obtained from supervisory reporting. Importantly, a key feature of our work is that we focus on interest rates that participating banks offer to a set of customer "profiles", which are a combination of borrower and contract characteristics (e.g. income of the potential borrower, loan-to-value, and rate type). By examining offered rates, which are binding and representative of the actual prices observed in the mortgage market (Carella and Michelangeli, 2021), we are able to focus exclusively on the supply of credit and therefore able to assess the effects of cross-selling incentives, avoiding any potential demand-side bias. Moreover, since contract terms are defined through the website tool, we are able to include all profile characteristics used by banks to evaluate their potential borrowers.

We complement information on interest rates with data on banks' involvement in the insurance business both from supervisory reports (i.e. the fees obtained from the selling of insurance policies and the share of insurance companies owned by each bank) and from an *ad-hoc* supervisory dataset containing information on the number and type of life insurance policies offered by each insurance company.

We measure the degree of bank involvement in the insurance sector as the ratio of the fees obtained by each bank from the selling of insurance products to the total amount of fees. Importantly, we control for the degree of revenue diversification of banks (i.e. calculating the share of non-interest income to total operating income) and, therefore, we are able to focus on the specific impact of *bancassurance* by comparing intermediaries with the same level of income diversification.

Our empirical analysis shows that the pricing of residential mortgages is affected significantly by bank involvement in the insurance business. However, we find that the relationship between our measure of *bancassurance* and residential mortgage rates depends on the type of bank-insurer cooperation. Indeed, we find that greater involvement in the insurance sector is associated with lower interest rates only for those banks which have an insurance subsidiary. This effect is statistically and

(D'Aurizio, 2019). Moreover, insurance companies heavily relying on the banking channel to distribute policies are generally specialized in life policies, with unit-linked products representing about 40 per cent of their life portfolio (Apicella et al., 2021).

economically significant: an inter-quartile range in our measure of *bancassurance* is associated with a decrease of about 24 bps in mortgage rates (i.e. about half the standard deviation in the sample period). In contrast, no significant effect emerges for banks that only have commercial agreements with insurance companies. This result suggests that, for a given level of income diversification, the impact of cross-selling across insurance and mortgage markets on interest rates is significant only when a bank is able to 'extract' higher benefits through control of its insurance subsidiary. Given this heterogeneity across intermediaries, in the remaining analyses we only focus on the sample of banks with an insurance subsidiary.

The main identification issue in our framework is that both better pricing conditions and greater involvement in the insurance sector may be originated by common unobservable bank characteristics. To mitigate this issue, we first include bank-level fixed effects in our main models to control for bank-specific time-invariant characteristics that may affect the impact of bank involvement in the insurance sector on loan pricing. Our second strategy to assess more precisely the effect of cross-selling incentives on mortgage pricing is by focusing on quarters when the bank's insurance subsidiary launches a new life product. We test whether immediately after the launch the bank significantly increases the selling of high-revenue newly designed products. This test allows us to better disentangle the effect of cross-selling incentives because our source of variation (i.e. the launch of new life products) depends on the decisions of a different business area, based on the dynamics of a diverse market (i.e. the life insurance sector). Our results indicate that for banks with an insurance subsidiary a greater share of insurance fees is associated with significantly lower mortgage rates, especially when their subsidiary launches a new life product.

We then show that certain characteristics of potential borrowers also affect the relationship between bank involvement in the insurance sector and credit supply. Indeed we find that, for banks with an insurance subsidiary, lower rates are offered mainly to customer profiles with lower loan-to-value for each income level, in line with the hypothesis that banks mainly try to attract customers with more resources available to buy savings products too.[5]

Finally, we find that the cross-selling incentive is lower when the chances of selling additional products to the same customer base are lower, i.e. when the demand for new life insurance policies is low due to exogenous factors (such as during the summer or after the pandemic outbreak); to the contrary, it is higher after a cut in monetary policy rates which reduces the profitability of mortgages

[5] Given the characteristics of the "Mutui Online" tool, where information on borrowers' income is not enough granular, banks posting offers on the platform mainly rely on the LTV to infer the wealth of the borrower.

for banks, thus increasing the incentive for banks to compensate lower interest margins with revenues from non-lending business.

Overall, our work shows that banks' business models significantly affect loan pricing, suggesting that synergies between banks and insurance may lead to a lower cost of credit for households. A back of the envelope calculation also confirms that the strategy related to our cross-selling hypothesis may be profitable for banks. In contrast, the net effect on consumers' welfare is more difficult to assess.

2. Contribution to the literature

The literature has focused extensively on the benefits and drawbacks associated with bank earnings diversification. Generally, banks are interested in diversifying income sources in order to exploit economies of scope, which can lead to increased profitability and reduce the probability of insolvency (Boyd et al., 1993). Earnings diversification, including from the selling of insurance policies, may also lead to a higher and more stable credit supply (Gelman et al., 2021), as it improves banks' ability to absorb negative shocks. On the other hand, business diversification – including in the insurance sector – may lead to organizational complexity, inefficiencies, reputational issues, and risks from interconnectedness (Berger and Ofek, 1995; Laeven and Levine, 2007; Stiroh and Rumble, 2006).

While these works focus on the net benefits for banks of broad diversification, we contribute to this literature by examining the impact on loan pricing of a specific business model diversification (i.e. bank involvement in the insurance business). This allows us to consider the impact on the credit supply of a narrower and more precise measure of bank involvement in non-traditional activities. More generally, we also contribute to the literature on the effects of the bank business model on household credit. As far as we know, we are the first to assess how *bancassurance* affects household mortgage pricing.

Our work also builds on the literature on cross-selling incentives for banks. In our setting, cross-selling is associated with the hypothesis that, holding all else equal, existing bank customers (i.e. borrowers) are more likely to purchase other bank services in the future (e.g. insurance products) than other investors.[6] If this is true, the value of a borrower for banks depends not only on loan rates but *also* on the expected future income associated with cross-selling activities. With this regard, Basten and Juelsrud (2023) show that a bank is more likely to grant a loan to an existing depositor rather than to an otherwise comparable household over a 14-year period, mainly because households tend to request additional services from their existing bank.[7] Other works show that banks generally price

[6] This form of stickiness in households' behaviour may be due to demand complementarities or searching costs.
[7] Bharath et al. (2007) find evidence that previous lending relationships facilitate the provision of other services also for firms.

loans and other services strategically in order to extract value through the scope of their relationship with their customers (Laux and Walz, 2009; Zhao et al., 2013).

The higher the business-line diversification, the greater the cross-selling incentive as banks may make more profits by offering a larger set of products to the same customer base (Stiroh and Rumble, 2006) and banks involved in multiple business areas are also able to reach more potential customers. According to this strategy, banks may find it profitable to reduce the interest rate on loans to attract customers (i.e. a 'loss-leader strategy'), since expanding the customer base can provide greater cross-selling opportunities. Second, through cross-subsidization effects, the cross-selling of other financial products (e.g. insurance policies) should compensate the lower interest income in traditional segments with revenues from non-lending business (Carbó Valverde and Rodríguez Fernández, 2007).

Our paper is specifically related to the literature on the negative relationship between non-interest income (i.e. a measure of bank diversification) and net interest income. Building on the theoretical literature on bank loan spread determinants, Carbó Valverde and Rodríguez Fernández (2007) propose a multi-output model that highlights the importance of "non-traditional" activities, showing that output diversification permits banks to augment their revenues. In particular, through cross-subsidisation effects, income from non-traditional business (i.e. non-interest income) may compensate for the lower interest margins that result from stronger competition in traditional segments (i.e. loans). Using quarterly balance sheet data on US commercial banks, Abedifar et al. (2018) find that higher income in some non-interest activities is negatively associated with bank-level net interest spread. This effect is mainly driven by larger banks, for which they find evidence of the existence of significant profit complementarity and scope economies. Examining annual report data for a sample of European banks, Lepetit et al. (2008) show that higher reliance on fee-based activities is associated with lower lending rates. They also suggest that banks may use loans as 'loss leaders' because these products establish a long-term relationship with customers, raising the probability for banks to extract surplus over a long relationship. Finally, Maudos and Solís (2009) find that more diversified Mexican banks have lower intermediation margins, which may reflect a strategy of cross-subsidization with traditional activities.

These works mainly focus on aggregate balance sheet level data to measure rates and bank diversification. In contrast, we explore the cross-subsidisation effects by employing granular data and focusing on a particular high-revenue business, i.e. insurance products. In particular, we focus on offered rates at the customer profile level, avoiding any potential demand-side bias.

Our work is also related to the literature on the involvement of banks in the insurance sector. Although this phenomenon is significant in many jurisdictions, the literature on the effects of *bancassurance* on banks is indeed quite scarce (Gelman et al., 2021) and it mainly focuses on potential

implications for systemic risks due to the cooperation between the two types of institutions (Baluch et al., 2011; Chen et al., 2013). Our paper tries to shed light on this topic by providing new evidence on the synergies between banks and insurers in the credit market through the cross-selling channel.

In particular, we exploit the fact that the two different types of cooperation (i.e. commercial agreement versus ownership of an insurance subsidiary) may affect the cross-selling incentives for banks. We hypothesize that incentives are greater for banks that have an insurance subsidiary. First, intermediaries with an insurance subsidiary are typically able to extract more benefits from the selling of insurance products than banks which only have commercial agreements with an insurer. Indeed, banks with insurance subsidiaries obtain greater income in the selling of insurance products as the subsidiaries tend to pay back higher fees to their shareholders.[7] Analyses on supervisory data show that the fees paid by insurance subsidiaries for the selling and the management of life policies are about twice those payed by other companies. Second, banks with insurance subsidiaries can push them to design products particularly appropriate for their bank customers. Third, banks should be particularly interested in an increase in the profitability of the controlled insurers, which leads to greater capital gains on their shareholdings.

Taking into account this evidence, we hypothesize that banks with an insurance subsidiary are more prone to employ a 'loss-leader strategy' as they may rely on greater income to cross-subsidize the lower offered rates.

Given data limitations the differences between the two aforementioned types of cooperation has not been particularly explored in the literature. We are the first to show how cross-selling incentives for banks change across different *bancassurance* business models.

3. Data and sample

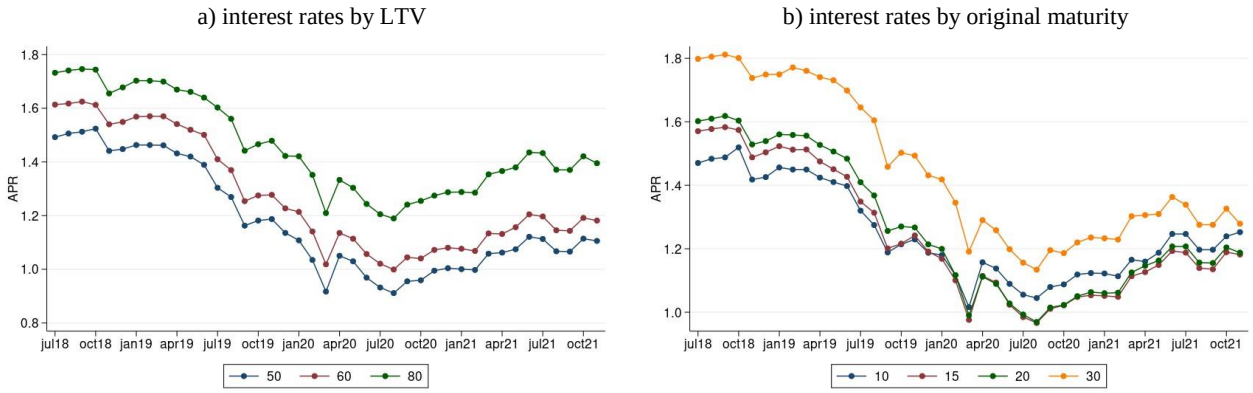
Our analysis relies on "Mutui Online", a dataset that collects information on mortgage rates offered by 30 Italian banks (representative of about 80 per cent of the Italian residential mortgage market). In particular, we use monthly data between June 2018 and December 2021 on annual percentage rates (APR), including fees and commissions, that banks were willing to offer to a set of profiles, representative of potential borrowers. Each profile is defined by a set of borrower and contract characteristics: age (30 or 40 years); monthly net income (€2000 or €4000); job type (fixed-term employee, employee with permanent contract or self-employed); mortgage loan-to-value (LTV) at

[7] Evidence on Italian insurances companies shows that bank-controlled intermediaries have generally lower fixed costs as they can rely on the banking network to distribute policies (i.e. they do not have to maintain their own network of agents). However, a part of these benefits in terms of lower fixed costs is eroded by the higher fees payed back by subsidiaries to their holders (Apicella et al., 2021). Overall, their profitability is still on average greater than that of other insurances.

origination (50, 60, or 80 per cent); original maturity of the loan (10, 15, 20 or 30 years); rate type (fixed or adjustable). We focus on mortgages for first-time home buyers (i.e. no subrogations).[8]

The offers included in this dataset are binding for the bank, and are representative of the actual price of fixed-rate mortgages at an individual bank level (Carella et al., 2020). In Italy, negotiation between the borrower and the lender is quite limited; therefore, all borrowers purchasing the same mortgage product pay close to the posted rate (Guiso et al., 2022).

Figure 1 – Average interest rates on mortgages offered by the sample of banks between June 2018 and December 2021 (*percentage points*)



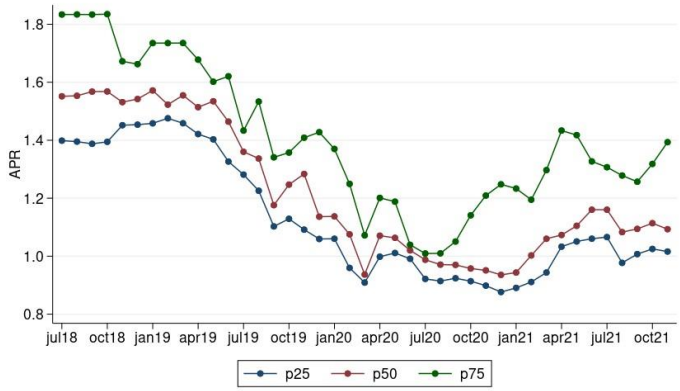
Note: for each period we calculate the average annual percentage rate for profiles with the selected characteristic.

In our dataset, offered rates follow similar trends over time; the main sources of dispersion in each period are LTV and the original maturity of the loan (Figure 1). We also find material dispersion in rates across banks (Figure 2). Moreover, by controlling for bank and time fixed effects, we estimate that the ratio of household mortgages to total assets of bank *i* is negatively correlated with the APR offered by the same bank in the month *t-1*. This result suggests that the amount of mortgages is quite sensitive to the conditions applied by banks and provides evidence of a certain level of price competition in the mortgage market.

Banks' consolidated balance sheet information is obtained from supervisory reports. In particular, for each bank we retrieve the quarterly fees obtained from the selling of insurance products, which we use to estimate our measure of bank involvement in the insurance business together with other key balance sheet items (e.g. total assets, CET1 ratio, and ROE). Figure 3 reports the dispersion of the share of fees obtained from the selling of insurance policies in our sample period. We observe that the interquartile range is quite stable across periods, at about 7-8 percentage points, with an increase in the aftermath of the pandemic outbreak.

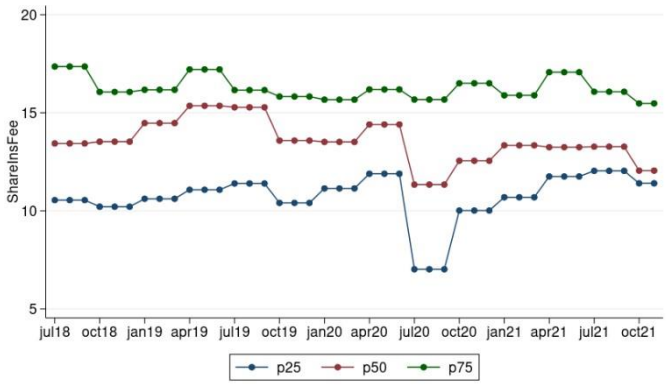
[8] We exclude offers from branches of two foreign banks included in the dataset (5 per cent of offers), since consolidated balance sheet data are not available (therefore, our final sample includes 28 intermediaries).

Figure 2 – Interest rate dispersion across banks between June 2018 and December 2021 (*percentage points*)



Note: for each period and bank we calculate the average annual percentage rate across profiles. The figure presents the first quartile (p25), the median (p50) and the third quartile (p75) of the selling in each month.

Figure 3 – Share of fees obtained from the selling of policies (*percentage points*)



Note: for each period and bank we calculate first quartile (p25), the median (p50) and the third quartile (p75) of the share of fees obtained from the selling of policies.

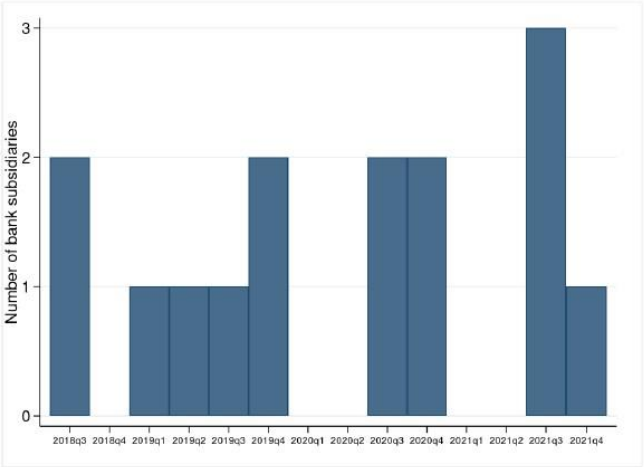
We rely on insurers' supervisory reports to draw information on banks' annual shareholdings of insurance companies' capital. Nine out of 28 banks in our sample owned at least 50 per cent of at least one insurance company and had not changed their participation significantly during the period examined. These 9 banks belong to 5 groups, representing about 40 per cent of total bank assets in Italy. For this restricted sample of banks too, the share of fees obtained from the selling of insurance policies is quite disperse with an interquartile range of 6 percentage points.

From the same source, we also obtain quarterly information regarding the number and type of life insurance products issued by each insurance company since 2014. Therefore, for each company, we are able to identify the number and the characteristics of new and withdrawn products in each quarter. We calculate the net number of new products as new products minus withdrawn ones.[9] By employing

[9] This method allows us to exclude products apparently new, having the same characteristics as those expired, therefore not representing a significant change in the insurance marketing strategy.

this method, we identify 16 "events" (i.e. insurer-quarter observations in which we identify a positive net number of life products; Figure 4). In 15 cases the company launched at least one new product characterized by a new code and a new name in our dataset,[10] while in one case the insurance company reintroduced a product already launched in previous years.

Figure 4 – Number of bank insurance subsidiaries with a positive net number of new life policies by quarter (*units*)



Note: for each period and for insurance company we estimate the net number of new products as new policies minus withdrawn ones.

4. Testable hypotheses and methodology

Our main hypothesis to be tested empirically is that interest rates on mortgages offered by banks more involved in the insurance business may be lower on average than those offered by intermediaries less involved (*cross-selling hypothesis*).

We test this hypothesis by estimating the model described in Eq. (1).

$$APR_{i,j,t} = \beta_0 + \beta_1 ShareInsFee_{i,t-1} + \gamma BankControls_{i,t-1} + X_j + \theta_i + \eta_t + \varepsilon_{i,j,t} \qquad (1)$$

The dependent variable (*APR*) is the annual percentage rate offered by bank *i* to profile *j* at month *t*.[11] Our key variable of interest is the measure of bank involvement in the insurance sector: *ShareInsFee*, which is the ratio of fees obtained from the selling of insurance policies to the total amount of fees of bank *i* at quarter *t-1*. This variable allows us to focus on the 'specialization' of each bank in the insurance business, controlling for income diversification and for other bank characteristics. We expect β_1 to be negative, as greater bank involvement in the insurance business should be associated with lower rates, consistent with our main hypothesis.

[10] For example, an insurance company *k* launched in a specific quarter a new unit-linked product allowing clients to choose across 12 profiles (i.e. 12 portfolios with different riskiness and geographical allocations). Before that date, the previous unit-linked policy included only 6 profiles.

[11] We consider rates including fees and commissions. Our results hold also by considering rates without both components.

We add a vector of controls at the bank level (*BankControls*) to take into account a set of variables that may affect the pricing of mortgages: logarithm of assets (*Size*), the ratio of CET1 to RWA (*CET1ratio*), the ratio of operating costs to total income (*Cost-to-income*), the ratio of net income to total equity (*ROE*), the ratio of deposits to total assets (*Deposit-to-assets*). We also include a dummy to identify intermediaries operating chiefly online (*Onlinebank*), as they typically apply lower rates by relying on a more agile structure. Importantly, we include the share of non-interest income to total operating income (*ShareFee*) to compare banks with the same level of income diversification. Finally, we also take into account the ratio of household loans to total assets (*LoansHH*) in order to consider the incentive of cross-selling for intermediaries with the same relative amount of credit granted to households.

We also control for characteristics of each profile (*X*) by including a set of dummies for each feature: maturity, LTV, and rate type of the contract, as well as age and job type of the borrower. A key feature of our methodology is that we are able to take into account all factors used by banks to evaluate their potential borrowers as we include all profile characteristics available on the "Mutui Online" tool.

Finally, we add bank (θ_i) and month (η_t) fixed effects to control for bank-specific time-invariant characteristics and time-specific shocks common for all banks.

In a second step, we investigate whether the relationship between bank involvement in the insurance sector and the pricing of mortgages is affected by the type of bank-insurer relationship (commercial agreement versus ownership of an insurance subsidiary). As discussed in Section 2, we hypothesize that the interest rates offered by banks with an insurance subsidiary are lower than those offered by other intermediaries which only have commercial agreements with insurers as the former have stronger cross-selling incentives.

We test this hypothesis by introducing in Eq. (1) an interaction between *ShareInsFee* and *InsSubsidiary*, a dummy variable that assumes value 1 if bank *i* holds more than 50 per cent of an insurance company's capital. We also interact *InsSubsidiary* with *BankControls* to consider the potential effect of having an insurance subsidiary on the impact of other bank characteristics on mortgage pricing.

Eq. (2) describes the main model employed in this test. A negative coefficient of the interaction (β_3) would be consistent with our hypothesis.

$$APR_{i,j,t} = \beta_0 + \beta_1\, ShareInsFee_{i,t-1} + \beta_2\, InsSubsidiary_{i,t-1} + \beta_3\, ShareInsFee_{i,t-1} \cdot InsSubsidiary_{i,t-1} + \gamma\, BankControls_{i,t-1} + \delta\, InsSubsidiary_{i,t-1} \cdot BankControls_{i,t-1} + X_j + \theta_i + \eta_t + \varepsilon_{i,j,t} \quad (2)$$

Table A.1 shows a set of descriptive statistics on the variables adopted in our analyses.[12]

5. Results

5.1. The effects of the involvement in the insurance business

Column (1) of Table 1 shows the results obtained from the estimation of Eq. (1).[13] The negative coefficient of *ShareInsFee* suggests that the rates offered by banks more involved in the insurance business are on average lower than those offered by less involved intermediaries. However, the magnitude of the coefficient is economically negligible since an increase of 1 percentage point (pp) in *ShareInsFee* is associated with a decrease of about 0.3 basis points (bps) in rates.

The results presented in columns (2) and (3) of Table 1 clarify that our hypothesis on the negative relationship between bank involvement in the insurance business and mortgage rates cannot be rejected only for the case of banks with an insurance subsidiary. Figure 5 shows the results of an impact on *APR* of a 1 pp difference in *ShareInsFee* by employing estimates of column (3). By including the interactions with *InsSubsidiary*, we observe that the coefficient of *ShareInsFee* for banks without an insurance subsidiary is basically negligible. Since our model controls for the level of bank income diversification, this result implies that, for banks that do not own an insurance company, greater involvement in the insurance business does not have an effect on mortgage rates significantly different than greater diversification in other business areas (such as the selling of investment fund shares). In contrast, for banks owning over 50 per cent of an insurance company's capital, a difference of 8 pps in *ShareInsFee* (equivalent to the inter-quartile range) is associated with a decrease of about 24 bps in mortgage rates.[14] This effect is economically significant because it is equal to 44 per cent of the standard deviation in the sample period.

Since the cross-selling hypothesis holds only for banks with an insurance subsidiary, we will focus on this group in the following analyses.

[12] Variables are winsorized at the 1st and 99th percentiles to avoid outliers influencing the results.

[13] Tables report robust standard errors; our main findings also hold by clustering at the bank level.

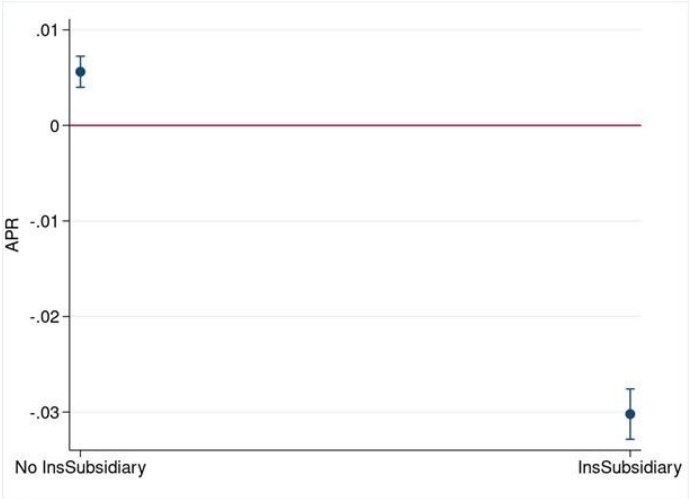
[14] As regards the base effect of *InsSubsidiary*, we observe that the related coefficient is significant only when bank fixed effects are not included (column 2), probably because in our sample this variable has a low variability across times for each bank.

Table 1 – The relationship between banks' involvement in the insurance sector and mortgage pricing

	(1) APR	(2) APR	(3) APR
ShareInsFee	-0.0026***	0.0195***	0.0056***
	(0.0001)	(0.0000)	(0.0000)
InsSubsidiary	-	-0.0985***	-0.0013
		(0.0000)	(0.8616)
ShareInsFee·InsSubsidiary	-	-0.0453***	-0.0358***
		(0.0000)	(0.0000)
ShareFee	0.0001	-0.0056***	0.0002
	(0.7528)	(0.0000)	(0.6639)
Size	-0.0010***	-0.0013***	-0.0009***
	(0.0000)	(0.0000)	(0.0000)
CET1	-0.0353***	0.0608***	-0.0554***
	(0.0000)	(0.0000)	(0.0000)
Cost-to-income	0.0024***	0.0035***	0.0017***
	(0.0000)	(0.0000)	(0.0000)
ROE	-0.0043***	-0.0039***	-0.0074***
	(0.0000)	(0.0000)	(0.0000)
LoanHH	0.0075***	-0.0105***	-0.0171***
	(0.0000)	(0.0000)	(0.0000)
Deposits-to-asset	-0.0206***	0.0004*	-0.0277***
	(0.0000)	(0.0534)	(0.0000)
Onlinebank	-0.0023***	-0.0009***	-0.0030***
	(0.0000)	(0.0000)	(0.0000)
InsSubsidiary·BankControls	No	Yes	Yes
Profile characteristics	Yes	Yes	Yes
Bank FE	Yes	No	Yes
Time FE	Yes	Yes	Yes
Observations	134,752	134,752	134,752
Adj. R-squared	0.633	0.565	0.645

Notes: Column (1) shows the results obtained from the estimation of Eq. (1). Columns (2) and (3) show the results of Eq. (2). The dependent variable in all columns is *APR*, the annual percentage rate offered by a bank *i* to a profile *j* at time *t.* Robust *p*-values in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Figure 5 – The impact on posted mortgage rates of a 1 percentage point difference in *ShareInsFee* (*percentage points*)



Note: the impact for each group of banks is estimated by employing related coefficients in column (3) of Table 1.

Finally, we present a back of the envelope calculation to estimate whether the described strategy may be actually profitable for banks. Indeed, taking into account cross-selling incentives, the value of a new customer for banks is related to the current mortgage rate as well as the expected future profits generated from all possible cross-selling activities. We cannot estimate a borrower-level profitability measure as we do not have contract-level data on all financial products the bank has sold to the individual customer over time. However, we are able to compare the loss incurred by the bank in terms of a lower interest rate margin with the potential future benefits from the selling of insurance products. For example, we calculate that a reduction of 24 basis points (i.e. the impact assessed by employing our regression coefficients) on the rate of a 30-year fixed rate mortgage of 100,000 euros entails a loss for the bank of about 3,000 euros in present value terms. On the other hand, the potential future selling of a unit-linked 20-year contract with a single premium of 12,000 euros,[15] considering a yearly commission of 3.8%,[16] would lead to income for the bank of about 7,700 euros (discounted at present value). Therefore, the net benefit for the bank would be 4,700 euros. This estimate is a lower bound as it does not include management fees (about 2% per year) remunerating the asset management company, often itself a subsidiary of the banking group, as well as the income accruing to the bank holding company in the form of dividends from its subsidiary. Moreover, the profitability of the cross selling strategy should be assessed also taking into account other fee-generating services offered to new customers (e.g. other non-insurance savings products – like mutual funds – and the provision of advisory services). Overall, also taking into account a conservative estimation, our evidence suggests that the mechanism behind the specific cross-selling strategy we are studying is also economically significant for the bank.

5.1.1. Heterogeneity across borrowers

We may hypothesize that the relationship between bank involvement in the insurance sector and the pricing of mortgages could also be affected by borrowers' characteristics. Indeed, the banks' lending policies likely take into account the borrowers' wealth (Abedifar et al., 2018). Intermediaries should be particularly interested in acquiring new customers who have enough available funds to buy savings products after taking out the mortgage.[17] Since our available data do not contain indications of the borrower's wealth, the aforementioned hypothesis should imply that, for each income level,

[15] This is the median premium on unit-linked life products in June 2023.

[16] This is the market average yearly commission earned by banks as a percentage of the premium invested in 2021-22.

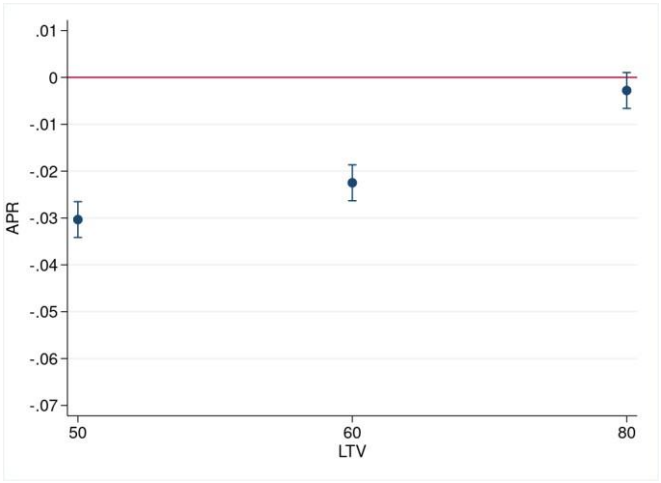
[17] Wealthier customers are significantly more interested in the subscription of life policies. The 2020 Italian Survey on Household Income and Wealth reported that the share of Italian households that underwrote a life policy was significantly higher for those in the top quintile of income than for households in the bottom one (33 versus 2 per cent; Bank of Italy, 2022).

banks more involved in the insurance business apply lower rates especially to profiles with lower LTV. Indeed, in the "Mutui Online" tool this measure is the main indicator adopted by banks to infer both the wealth and the riskiness of the borrower. Indeed, for each level of LTV the dispersion of offered rates across income classes is very limited.[18] We test the hypothesis by introducing a dummy for each LTV considered: LTV_{60} and LTV_{80} are respectively equal to 1 for profiles with an LTV equal to 60 and 80, respectively; profiles with an LTV equal to 50 are our baseline group. We interact these dummies with our bank variables (*ShareInsFee* and *BankControls*), as described in Eq. (3).

$$APR_{i,j,t} = \beta_0 + \beta_1\, ShareInsFee_{i,t-1} + \mu\, LTV_z \cdot ShareInsFee_{i,t-1} + \gamma\, BankControls_{i,t-1} + \delta\, LTV_z \cdot BankControls_{i,t-1} + \xi LTV_z + X_j + \theta_i + \eta_t + \varepsilon_{i,j,t} \quad (3)$$

This model is estimated for the sample of banks with an insurance subsidiary and it allows us to investigate whether there is heterogeneity across different LTV levels (holding equal the level of borrower income). In accordance with our hypothesis, we expect increasing positive coefficients for LTV_{60} and LTV_{80}, suggesting a positive relationship between LTV levels and rates.

Figure 6 – The impact on posted mortgage rates of a 1 percentage point difference in *ShareInsFee* across LTV levels (*percentage points*)



Note: the impact for each LTV level is estimated by employing the related coefficients in column (1) of Table A.2. The sample includes only rates offered by banks with an insurance subsidiary.

Figure 6 shows the results of an impact on *APR* of a 1 pp difference in *ShareInsFee* across LTV levels (the related coefficients are reported in column (1) of Table A.2 in the Appendix). Our estimates show that, for banks with an insurance subsidiary, those with a higher share of insurance fees offer, *ceteris*

[18] Analyses on the Italian Survey on Household Income and Wealth confirm that LTV and borrowers' wealth are negatively correlated.

paribus, significantly lower rates to borrowers with lower LTVs. In particular, the effect of cross-selling incentives is not statistically different from zero for profiles with an LTV equal to 80. These findings suggest that banks more involved in the insurance business more specifically target less risky borrowers more likely to purchase insurance savings products.

5.2. The launch of new products

The launch of a new life insurance product should be a significant commercial event as it should respond to a strategy to increase the insurance company's profitability[19].

Similarly, this type of event may affect the pricing strategy of the loans of the controlling bank. The holding company should be particularly interested in increasing the selling of a new insurance product in order to increase profitability. As a result, we may hypothesize that banks more involved in the insurance business should apply lower rates especially in quarters following the launch of a new product.

We first check whether the launch of new products affects the premium income trend of related companies. Interestingly, we find that the average growth in the premium income in the two quarters immediately after the launch of a new product is significantly higher than that observed in the other quarters (6 vs 3 per cent), suggesting that the launch of new products is linked to an effort to distribute more products and increase revenues.

Second, we verify whether the launch of new insurance products is somewhat anticipated by lower interest rates on mortgages. In principle, we want to rule out the alternative hypothesis that subsidiaries of banks that are applying lower rates in a given quarter are also more prone to launch new products. To this end, we regress $NewProducts_{t,t+1}$, a dummy variable that is equal to 1 if the insurance subsidiary of bank *i* has launched at least one new product in *t* or in *t+1* and 0 otherwise, on APR_{t-1} and we control for bank variables, for characteristics of each profile, as well as for bank and time fixed effects. Estimates reported in Table A.3 in the Appendix show that the coefficient of APR_{t-1} is not statistically significant both in a linear probability model and in a logit specification. These results mitigate our concerns on reverse causality as they suggest that the likelihood of the launch of a new product is not significantly affected by the pre-existing level of interest rates.

In order to verify the impact of the launch of new products on the cross-selling incentives, we interact our bank variables (*ShareInsFee* and *BankControls*) with $NewProducts_{t-1}$, a dummy variable

[19] We focus on the life sector as the large majority of insurance premiums collected by banks are related to life products which are generally much more profitable for banks, in terms of fees, than other insurance products.

that is equal to 1 if the insurance subsidiary of bank *i* has launched at least one new product in the quarter before *t* and 0 otherwise, as presented in Eq. (4).

$$APR_{i,j,t} = \beta_0 + \beta_1 ShareInsFee_{i,t-1} + \beta_2 NewProducts_{i,t-1} + \beta_3 ShareInsFee_{i,t-1} * NewProducts_{i,t-1} + \gamma BankControls_{i,t-1} + \xi BankControls_{i,t-1} * NewProducts_{i,t-1} + X_j + \theta_i + \eta_t + \varepsilon_{i,j,t} \quad (4)$$

This test allows us to better disentangle the effect of cross-selling incentives, as our source of variation (i.e. the launch of new life products) depends on the decisions of a different entity (i.e. the commercial department of the insurance subsidiary) and on the dynamics of a different market (i.e. insurance products). More specifically, we expect β_3 to be significantly negative.

Figure 7 – The impact on posted mortgage rates of a 1 percentage point difference in *ShareInsFee* after the launch of a new product (*percentage points*)

Note: the impact after the launch of a new product and that in the other quarters are estimated by employing the related coefficients in column (2) of Table A.2. The sample includes only rates offered by banks with an insurance subsidiary.

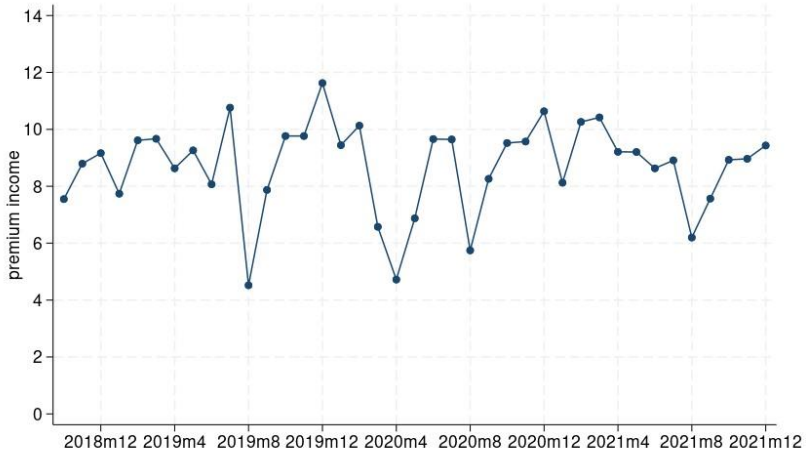
Figure 7 shows the results of an impact on *APR* of a 1 pp difference in *ShareInsFee* after the launch of a new life policy (i.e. *NewProducts* equal to 1) and in the other quarters (i.e. *NewProducts* equal to 0) for the sample of banks with an insurance subsidiary; (the related coefficients are reported in column (2) of Table A.2 in the Appendix). Our estimates show that, for banks with an insurance subsidiary, those with a higher share of insurance fees apply significantly lower rates immediately after their subsidiary launches a new insurance product. In particular, an economically significant difference emerges in the degree of the cross-selling incentive between the quarters immediately after the launch of a new life product and the other quarters. A difference of 8 pps in *ShareInsFee* leads to a reduction of around 55 bps when *NewProducts* is equal to 1, while the same difference in *ShareInsFee* is associated with a decrease of about 21 bps in mortgage rates in the other quarters. This result supports the hypothesis of a direct link between cross-selling strategies and mortgage pricing.

5.3. Robustness checks

This Section presents two tests to check the validity of our main findings. The first robustness check focuses on the relationship between the cross-selling incentive and the volume of life premium income across time.

Our hypothesis about the impact of cross-selling strategies on mortgage pricing relies on the chance for banks to sell insurance products to the same base of customers. This channel should be particularly active when the likelihood of selling multiple products is sufficiently high, i.e. the bank will apply lower rates only if it reasonably believes this will help increase the sale of insurance policies. However, in some months included in our sample periods, banks had fewer chances of cross-selling. For example, during summer months the volume of life premium income is generally lower than average (Figure 8), owing to consumer habits and the closure of some branches. Similarly, the volume of new life policies significantly dropped after the COVID-19 outbreak (i.e. March and April 2020).

Figure 8 – Monthly volume of life premium income of the Italian insurance sector (*billion of euro*)



Source: supervisory reports.

Therefore, we can test whether the incentive to reduce rates declines when banks more involved in the insurance business have fewer chances to implement cross-selling strategies. To employ this test, we estimate Eq. (1) by including only rates offered by banks with an insurance subsidiary and by interacting our bank variables (*ShareInsFee* and *BankControls*) with *Lowpremia*, a dummy equal to 1 if the level of premium income in *t* is lower than the median in the period examined.[20]

The estimates are reported in column (1) of Table 2. For banks with an insurance subsidiary, those with a higher share of insurance fees do not apply economically significant lower rates in the selected

[20] We do not include the base effect of *Lowpremia* as it is absorbed by time fixed effects. We observe a reduction in the number of observations due to a missing.

periods of low premium income, while the difference remains statistically and economically significant in months with a greater chance to sell life policies.[21] As a result, this additional test supports our main hypothesis of commercial linkages across these market segments.

Table 2 – The relationship between banks' involvement in the insurance sector and mortgage pricing during periods of low life premium income and after monetary policy decisions

	(1) APR	(2) APR
ShareInsFee	-0.0260***	-0.0241***
	(0.0000)	(0.0000)
ShareInsFee·Lowpremia	0.0226***	-
	(0.0000)	
ShareInsFee·2019Q4	-	-0.0168***
		(0.0000)
Lowpremia·BankControls	Yes	No
2019Q4·BankControls	No	Yes
Profile characteristics	Yes	Yes
Bank FE	Yes	Yes
Time FE	Yes	Yes
Observations	43,452	47,852
Adj. R-squared	0.660	0.602

Notes: In both columns the sample includes only rates offered by banks with an insurance subsidiary. Column (1) shows the results obtained from the estimation of Eq. (1) by interacting our bank variables (*ShareInsFee* and *BankControls*) with *Lowpremia*, a dummy equal to 1 if the level of premium income in *t* is lower than the median in the period examined. In column (2) we replace *Lowpremia* with *2021Q4*, a dummy equal to 1 in the quarter after the reduction in interest rates occurred in September 2019 and 0 otherwise. The dependent variable in both columns is *APR*, the annual percentage rate offered by a bank *i* to a profile *j* at time *t*. Robust *p*-values in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

In the second robustness check we explore the interplay between the cross-selling incentive and monetary policy. A decrease in official interest rates generally reduces the profitability of mortgages by lowering the net interest margin. In particular, during our sample period the ECB adopted a negative interest rate policy. Several papers provide evidence on the impact of negative rates on credit supply (Balloch et al., 2022; Bottero et al., 2022), suggesting that net interest margins are negatively impacted when central banks lower the remuneration on excess reserves below zero and intermediaries cannot pass this on to depositors.[22] In this context, according to our hypothesis, we should observe a greater incentive to adopt cross-selling strategies as banks should be more interested in offsetting the lower interest margins with revenues from non-lending business.

[21] The reduction in posted mortgage rates associated with a 1 percentage point difference in *ShareInsFee* during periods of low premium income is equal to the sum of -0.026 and 0.0226, i.e. -0.3 expressed in bps. In contrast, the effect is equal to -2.6 bps during periods of high premium income.

[22] The overall impact on banks' profitability is not obvious as intermediaries could compensate for shrinking intermediation margins by increasing lending volumes and applying higher fees on banking services (Bottero et al., 2022).

[24] On the same date, the ECB decided also to introduce a two-tier system for the remuneration of reserves and restart its Asset Purchase Programme (APP). During our sample period there were no other changes in monetary policy rates.

To perform this test, we exploit the ECB Governing Council's decision to lower the deposit facility rate from -40 to -50 basis points in September 2019.[24] Therefore, we estimate Eq. (1) by including only rates offered by banks with an insurance subsidiary and by interacting our bank variables (*ShareInsFee* and *BankControls*) with *2019Q4,* a dummy equal to 1 in the quarter after the reduction in interest rates in September 2019 and 0 otherwise. Column (2) of Table 2 shows that, for banks with an insurance subsidiary, those with a higher share of insurance fees applied significantly lower rates than the others in the last quarter of 2019. This result further supports the link between the relative profitability of banking products and the cross-selling incentive.

6. Conclusions

This paper investigates how banks' involvement in the insurance business affects residential mortgage lending practices. We find evidence that greater involvement in the insurance sector is associated with lower mortgage rates in the case of banks that have an insurance subsidiary and for borrowers who are more likely subsequently to buy insurance savings products too (i.e. those with lower loan-to-value for each income level). This evidence is consistent with the adoption of cross-selling strategies by banks. This strategy implies that banks may lower rates in low-revenue business areas (i.e. residential mortgages during the examined period) in order to attract new customers for high-revenue products (i.e. life insurance policies). Moreover, we find that greater involvement of banks in the insurance business is associated with significantly lower rates especially when their insurance subsidiaries launch a new life product, supporting the direct link between insurance business and mortgage pricing. Finally, we check the dynamics of the cross-selling incentive over time. We find that this incentive is lower in periods of low volume of new life policies, and it is higher after a cut in monetary policy rates that reduces the profitability of mortgages.

Our evidence suggests that the business model adopted by each bank may have a significant impact on the supply of credit, underlining the potential benefits associated with the synergies between banks and insurances.

Finally, although our sample period is characterized by low interest rates, our results may provide some insights on the interlinkages between cross-selling strategies and rising interest rates. Indeed, our estimates show that banks' incentive to adopt these strategies is directly connected with the chance to sell insurance products to the same base of customers. Since an increase in rates could reduce the palatability of life insurance policies (as observed in 2022 and in the first months of 2023),[23] it may

[23] Since the second half of 2022, after the rise in interest rates in the euro area, the net premium income of life policies for Italian insurers remarkably decreased due to the search for more profitable alternatives to insurance-based investment products (Bank of Italy, 2023).

also decrease the chances for banks to sell insurance products. Moreover, rising interest rates lead to greater profitability on mortgages for banks, reducing the difference with respect to high-revenue businesses, such as life insurance policies. As a result, in a context of rising interest rates both effects should also reduce the incentive for credit intermediaries to adopt cross-selling strategies.

Future research could use more granular information at the bank-contract-customer level to quantify how the cross-selling strategy affects the selling of insurance products to the same customer base.

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Appendix

Table A.1 - Summary statistics

	Mean	P25	Median	P75	Std. Dev.
APR (%)	1.32	0.95	1.17	1.59	0.55
ShareInsFee (%)	13.65	8.91	13.91	16.86	5.33
InsSubsidiary	0.33	0.00	0.00	1.00	0.47
ShareFee (%)	41.28	37.30	42.11	45.32	8.50
Size (ln)	25.19	24.98	25.55	25.85	1.71
CET1ratio (%)	13.18	12.08	13.36	14.33	1.61
Cost-to-income (%)	76.46	65.45	72.16	80.32	19.63
ROE (%)	0.37	0.60	1.18	1.87	3.43
LoansHH (%)	25.36	20.83	25.27	28.90	5.75
Deposits-to-assets (%)	76.44	71.32	76.98	82.31	8.85
Onlinebank (dummy)	0.19	0.00	0.00	0.00	0.40

Table A.2 – The relationship between banks' involvement in the insurance sector and mortgage pricing across borrower characteristics and after the launch of new life products

	(1) APR	(2) APR
ShareInsFee	-0.0303***	-0.0264***
	(0.0000)	(0.0000)
ShareInsFee·LTV_{60}	0.0079***	-
	(0.0006)	
ShareInsFee·LTV_{80}	0.0275***	-
	(0.0000)	
LTV_{60}	0.0220***	-
	(0.0000)	
LTV_{80}	0.0738***	-
	(0.0000)	
NewProducts	-	-0.0187**
		(0.0155)
ShareInsFee·NewProducts	-	-0.0418***
		(0.0000)
60LTV/80LTV·BankControls	Yes	No
NewProducts·BankControls	No	Yes
Profile characteristics	Yes	Yes
Bank FE	Yes	Yes
Time FE	Yes	Yes
Observations	47,852	47,852
Adj. R-squared	0.609	0.622

Notes: In both columns the sample includes only rates offered by banks with an insurance subsidiary. Column (1) and (2) show the results obtained from the estimation of Eqs. (3) and (4), respectively. The dependent variable in all columns is *APR*, the annual percentage rate offered by a bank *i* to a profile *j* at time *t.* Robust *p*-values in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Table A.3 – The impact of mortgage pricing on the launch of new life products

	(1) $NewProducts_{t,t+1}$	(1) $NewProducts_{t,t+1}$
APR_{t-1}	-0.2420	1.6584
	(0.5939)	(0.8150)
Bank control variables	Yes	Yes
Profile characteristics	Yes	Yes
Bank FE	Yes	No
Time FE	Yes	No
Observations	44,516	44,516
Adj./Pseudo R-squared	0.668	0.191

Notes: Column (1) shows the results of a linear probability model obtained by regressing $NewProducts_{t,t+1}$, a dummy variable that is equal to 1 if the insurance subsidiary of bank *i* has launched at least one new product in *t* or in *t+1* and 0 otherwise, on APR_{t-1}; it controls for bank variables, profile characteristics, and bank and time fixed effects. In column (2) the model is estimated by adopting a logit specification, clustering standard errors at the bank and time level; the column reports the average marginal effects. Robust *p*-values in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

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