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**Banks' attitude to partnership
as an antecedent of Open Banking platforms:
structural determinants and effects on performance in the Italian context**

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Banks' attitude to partnership as an antecedent of Open Banking platforms: structural determinants and effects on performance in the Italian context

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Abstract

The recent developments in regulation, in particular PSD2 and ICT technologies, are fostering the Open Banking phenomenon, a model of forced or voluntary collaboration based on the sharing of data and applications between subjects not necessarily affiliated, in order to develop, produce and distribute innovative and value-added financial products and services for the customer. Open Banking is still in its early stages, and the approach with which banks decide to interpret and adapt to the new PSD2 regulations is crucial to grasp the evolution of the structure and operativity of the financial system in the coming years, as well as the role that banks will play in it. Indeed, a positive banks' attitude to partnership is a crucial factor for developing Open Banking ecosystems and platforms and deserves the attention of researchers.

In this paper, we investigate the attitude to partnership of a sample of 45 Italian banks, which allows us to better understand whether there exist conditions for creating Open Banking ecosystems. Furthermore, we explore the economic determinants of banks' attitudes to partnership and its effect on performance. Results reveal a low current attitude to partnership of Italian banks, a factor that may hinder the formation of Open Banking ecosystems and platforms. The attitude to partnership tends to be low for larger and more capitalised banks, while the opposite occurs for smaller and less capitalised banks, which can be more inclined to participate in Open Banking platforms to compensate for possible constraints in size, resources and human capital. Overall, participation in Open Banking platforms can be justified by the positive effect of attitude to partnership on banks' performance, as shown by our analysis.

1. Introduction

In the current context of the digital economy, the financial services market is constantly evolving. The profound changes occurring in the purchase and consumption habits of customers, whose main drivers of choice are personalization, convenience, accessibility and ease of use (Ernst & Young, 2019), have accelerated, compared to the past, the spread of technological product and process innovations within the financial market (Arner et al., 2016), contributing to the birth of new and increasingly articulated forms of intermediation (Cosma et al., 2020) and the rethinking of the business models of traditional financial intermediaries. FinTech firms play a crucial role in promoting innovation and digital transformation in the financial market, especially with the implementation of the Payment Services Directive 2 (PSD2). Many FinTech firms are entering specific segments of the multi-product financial industry, contributing to the so-called “unbundling” of financial services (Basole and Patel, 2018), a phenomenon that is changing how customers access to financial services and that is slowly nibbling banks’ profitability margins (Navaretti et al. 2017; Euro Banking Association, 2017).

The approach by which banks decide to interpret and adapt to the new PSD2 regulations is crucial to understand the evolution of the structure and operativity of the financial system in the coming years and the role that banks will have within it (Fratini Passi, 2018). Sharing information about customers’ payment transactions with other market participants, under specific conditions, may disrupt a fundamental aspect of banks: maintaining confidential information assets and managing risks from information asymmetries in financial exchanges. This bank asset has been progressively affected by the emergence of new types of information (Big Data) available through innovative channels and able to grasp, in other ways, the elements of riskiness and opportunism that characterise individual customers (Wei et al. 2016, Addo et al. 2018, Onay and Öztürk, 2018; Berg et al., 2020).

The new legislation contributes to increasing competition within the financial services market by obliging banks to share customers’ payment data with authorised Third-Party Providers (TPPs), which in turn can develop their own financial services. At the same time (and paradoxically), it offers the conditions for forming collaborations through digital platforms, also called Open Banking platforms, in which banks, FinTechs and other financial institutions can participate, obtaining numerous potential benefits. What discriminates against the two possible scenarios is the approach with which financial intermediaries, and in particular banks, comply with the new directive.

The regulatory obligation to share some information relating to its customers through APIs can be interpreted in a minimal sense (mandatory) through the literal adaptation to the dictates of the regulation, or it can become the incipit of a different way of competing in the financial system (Cosma et al., 2023). The ability to ensure the interaction of information systems and the exchange of information in a more cooperative approach (voluntary) can contribute to the genesis of new credit and financial ecosystems and Open Banking platforms in which, according to different rules, traditional financial intermediaries, banks and FinTechs cooperate. Therefore, PSD2 gives regulatory concreteness to a phenomenon already underway in the banking system, where some actors, banks and FinTechs, share information and technologies to better serve their customers and, at most, share their customers to offer more innovative services.

In the literature, only a few studies deal with Open Banking, clearly because it is a new and still evolving phenomenon. Researchers' efforts are mainly spent on defining Open Banking and the enabling technologies (APIs) (Brodsky and Oakes, 2017; Zachariadis and Ozcan, 2017), in understanding its impact on banks' intermediation model (Gomber et al., 2018; Colombari and Tedeschi, 2019) and in identifying the roles that banks can assume in Open Banking ecosystems (Euro Banking Association, 2016; Gozman et al., 2018). To the best of our knowledge, there are no studies that approach these issues from an empirical point of view.

Our paper delves into a crucial precursor to Open Banking, which is the banks' approach towards partnerships. The greater the willingness to partner and to open up to external parties, the greater the probability of implementing Open Banking platforms. In particular, we study the current propensity of banks to collaborate with other financial intermediaries, internal or external to banking groups, by shedding light on its structural determinants and its effect on banks' performance through a sample of 45 Italian banks representing 73% of the domestic banking system in terms of total assets.

Our results show that Open Banking ecosystems are still underdeveloped and that, currently, Italian banks are characterised by a low attitude to partnership, mainly oriented to distribution agreements. Such behaviour is more frequent in larger and more capitalized banks than in small and medium-sized ones, since the latter are used to optimise synergies and collaborations with external partners to compensate for possible constraints in size, resources, and human capital. The result can be attributed to the rise of business models that are not as reliant on traditional credit intermediation, which is typical of deposit banks. Additionally, the gradual breakdown of territorial barriers has made customers more open to purchasing digital financial services, making the market more competitive. Furthermore, results show that banks' attitude to

partnership has a positive effect on performance, thus justifying their participation in Open Banking ecosystems.

The remainder of this paper is structured as follows: in Section 2, we review the relevant literature on Open Banking. In Section 3, we describe the dataset and the methodology adopted in the empirical analysis. In Section 4, we present and discuss our results, and finally, Section 5 concludes and provides managerial and policy implications.

2. Literature review

PSD2, although limited to the payment services segment, beyond protecting consumers through an improvement in the security and transparency of services, is promoting a greater level of competition and efficiency within the market, reducing barriers to entry for new payment service providers (called TPPs) in order to increase quality and convenience for the final consumer (Zachariadis and Ozcan, 2017; Romanova et al., 2018). Indeed, there is evidence that PSD2 has positively influenced the establishment of new TPPs in the early years of its introduction (Polasik et al., 2020). Entered into force on the 13th of January 2018 and went into full effect on the 14th of September 2019, PSD2 identifies three types of TPPs: i) Payment Initiation Service Provider (PISP), which lies between the customer and the institution with which he holds his payment account, also called Account Servicing Payment Service Providers (ASPSP), and which initialises payment transactions (art. 4, paragraph 15), ii) Account Information Service Provider (AISP), that offers an information aggregation service to customers who hold payment accounts with different ASPSPs (art. 4, paragraph 15), and iii) Card Issuer Service Provider (CISP) which offers a fund checking service, i.e. it checks the availability of a certain amount of money on payment account before the customer pays by card (art. 65).

In order to promote the activity of TPPs, including numerous FinTech firms, PSD2 explicitly empowers account holders with the authority to share data, removing the financial institution's role as gatekeeper (Brodsky and Oakes, 2017), i.e. the intellectual property of payment data is shifted from the bank to customers (Omarini, 2018), which have the power to authorise TPPs to access, collect and process such data to develop and offer their own payment service (Brodsky and Oakes, 2017 Romanova et al., 2018). Unless there are valid reasons related to fraud or unauthorized access to a payment account by third-party providers (TPPs) (art. 6-bis) or the customer withdraws their consent, banks cannot deny access to such information.

What is clear from the text of PSD2 is that banks are obliged to open their information assets to authorised third parties, a phenomenon known in the literature as "Open Banking". Academics mainly spent their efforts on the definition of Open Banking, its enabling technologies

(Brodsky and Oakes, 2017; Zachariadis and Ozcan, 2017; Premchand and Choudhry, 2018) and its impact on the banking intermediation model (Gomber et al., 2018; Colombari and Tedeschi, 2019). At a technical level, Open Banking can be defined as a customer-oriented model in which banking data, services and applications are shared through Application Programming Interfaces (APIs) with partners, internal and external developers and customers in a secure and controlled way (Evans and Basole, 2016; Brodsky and Oakes, 2017; Premchand and Choudhry, 2018), enabling banks and TPPs to develop new financial products and services that better meet customer needs. The APIs, therefore, represent a point of contact between the three subjects that participate in the Open Banking ecosystems: i) banks that hold customer payment data, which are provided to authorised TPPs, ii) TPPs, including FinTech and TechFin firms, which ask for permission to access, receive and process customer payment data held at banks, and iii) customers, who hold their payment information at banks and who, at their own discretion, may make it available to TPPs, which can offer them value-added products and services (Open Data Institute, 2016).

However, in practice, the definition of Open Banking can vary depending on whether banks actively or passively comply with the laws (Fratini Passi, 2018). These approaches differ in how data is exchanged, the type of data exchanged and the purposes for which they are exchanged. According to the passive approach, banks comply with the minimum requirements requested by regulation, allowing authorised TPPs to access customer data through a forced collaboration model in which the exchange of data is unidirectional (from bank to TPPs using standard/competitive APIs), limited to the type and quantity of data authorised by the customer. Moreover, the exchange of data is aimed exclusively at providing the customer with the service offered by the TPPs, which can eventually exploit the information within limits imposed by PSD2 and the GDPR to improve its offer of financial products and services. On the contrary, by taking an active approach, banks and TPPs can establish a model of voluntary collaboration where data exchange is bidirectional, i.e., collaborative APIs enable the exchange of information from the bank to TPPs, and vice versa. This collaboration can involve a wider range of customer-authorized data and can improve the development, production, and distribution of financial services, providing benefits to both banks and TPPs by improving their processes and overall offering of financial products and services.

Only through a different interpretation of the concept of competition it is possible to develop and adopt complex and integrated API systems that allow the practical realisation of the Open Banking concept through Open Banking platforms, in which participants interact with each other and gain important benefits (Cosma et al., 2023). Participation in Open Banking ecosystems is profoundly changing the intermediation model of banks', shifting from a universal model to a modular model, mainly due to the unbundling of financial services after the entrance of FinTech

firms in the financial industry, which expose banks to a high risk of disintermediation (Rabitti and Sciarrone Alibrandi, 2019). In fact, FinTech firms carry out numerous activities that range from payments services to financing, investments, and insurance services, but usually, they follow a specialization rather than a diversification strategy. Consequently, their offering has limited scope, and their business model is the opposite of universal banking (Navaretti et al. 2017). Therefore, new entrants create niche products that target very specific groups of customers based on their characteristics, thus competing with incumbents for the few products they have on offer and contributing to the unbundling of financial services (Gomber et al., 2018; Basole and Patel, 2018). Depending on the legal framework of the country in which FinTech firms operate, the disaggregation of incumbents' value chain allows FinTech firms to position themselves in operational segments which escape regulatory and supervision requirements, thus reducing compliance costs (e.g., licenses and capital and liquidity requirements), as well as in market segments where traditional financial institutions cannot effectively meet customers' needs (Tanda and Schena, 2019). The unbundling of banking activities is deeply changing the way in which customers access and use financial services, thanks to a re-bundling process: unbundled services offered by several financial firms are selected and combined according to customers' needs and offered as "new" financial products. These products lead to a shift from a traditional universal banking model to a modular banking model with a strong customer-centric orientation and customer control (Euro Banking Association, 2017).

Practically, this means that instead of choosing a single bank for the totality of financial services based on an average benefit/cost analysis, customers can access to single preferred financial services offered by different financial firms (banks, FinTech firms and TechFin firms), usually through an aggregation and comparison platform (Colombari and Tedeschi, 2019; Borgogno and Colangelo, 2020). The process of platformisation of financial services lays the foundation for creating Open Banking ecosystems in which producers, distributors and users interact and collaborate with each other.

The presence of FinTech firms in Open Banking ecosystems and their contribution to the disaggregation of the value chain and the disintermediation of financial services has some critical implications for the delivery of financial services to the final consumer. Traditionally, banks have not only provided their customers with products but have also been responsible for their distribution, thus characterizing themselves by a low openness degree (Euro Banking Association, 2016). According to these three dimensions (production, distribution, and openness), Open Banking ecosystems may feature different roles of banks in the financial value chain, thanks to the implementation of APIs. More specifically, incumbents' activity can evolve in four scenarios: i)

Bank-as-a-Integrator, ii) Bank-as-a-Producer, iii) Bank-as-a-Distributor, and iv) Bank-as-a-Platform (Euro Banking Association, 2016; Gozman et al., 2018).

Adopting the role of Bank-as-a-Integrator, banks create and distribute the offering under one brand so that they fully control the whole value chain and the customer experience. This model is characterised by a low openness degree, as banks do not open their boundaries to external parties for partnerships beyond compliance issues. In the Bank-as-a-Producer role, the offering to the customer is created by the bank and distributed by external parties: banks decide to set up distribution partnerships with FinTech firms or other financial institutions. On the opposite side, we have banks that adopt the Bank-as-a-Distributor role, which usually leverages on their physical and digital distribution channels, thus allocating financial products that are developed by FinTech firms or other financial institutions and extending their market presence. Both roles have a medium openness degree because even if banks open their boundaries, usually external parties are carefully selected, resulting in a limited number. Finally, banks adopting the Bank-as-a-Platform role serve as intermediaries for other businesses, which is also known as the B2B model. Banks neither produce nor distribute financial products, but offer different capabilities to TPPs, such as matching parties, security, Know Your Customer (KYC), Anti Money Laundering (AML) and APIs technologies, allowing others to set up partnerships. This role has the highest openness degree because banks do not communicate with a limited number of TPPs but may potentially interact with the totality of financial institutions. The abovementioned four roles can be adopted simultaneously (Gozman et al., 2018). Since banks may assume different roles in different lines of business/product, it is common that, for example, a bank can, at the same time, produce and distribute their own financial services, allowing TPPs to distribute them or distribute TPPs' financial services. Banks typically take on various roles, each with their own specific functions.

As outlined above, in the literature there are very few contributions that deal with Open Banking, clearly because it is a new and still evolving phenomenon and, to the best of our knowledge, there are no studies that approach these issues from an empirical point of view. Our goal is to contribute to the understanding of Open Banking by examining an essential factor that influences it: banks' willingness to partner with external parties. This partnership is crucial in enabling external parties to participate and in facilitating the development of Open Banking ecosystems. If a low attitude to partnership characterises banks, then they hardly go beyond compliance requirements, thus inhibiting the formation of ecosystems and Open Banking in general. By exploiting a sample of 45 Italian banks, representing 73% of the domestic banking system in 2019 in terms of total assets, we answer the following research questions:

RQ1. Have banks a positive attitude to partnership with external parties, thus creating fertile ground for Open Banking ecosystems?

RQ2. What are the structural determinants of the banks' attitude to partnership with external parties?

RQ3. Does their attitude to partnership with external parties affect their performance?

3. Data and methods

In this section, we provide additional details on the dataset, including the variables used in the analysis (Section 3.1), and the regression models employed to address our research questions (Sections 3.2 and 3.3).

3.1 Sample and measures of banks' partnership propensity

The present study exploits a cross-sectional dataset of 45 Italian banks, 35 of which belong to some banking group. These banks represent 73% of the domestic banking system in terms of total assets. To evaluate how banks approach partnerships, we gathered data from the transparency section on their websites. We reviewed and documented 5,262 products and services offered by the banks, representing their offering in December 2019. The structure of this kind of information is highly comparable among banks since they usually follow standard and strict requirements in drafting products' information sheets. These characteristics allowed us to identify the number of products and services offered to customers through collaboration with partners, which can be internal or external to the banking group. Subsequently, for each bank in the sample, we computed two measures of their attitude to partnership: i) share of products with partnership (Q_i) and ii) Shannon-Wiener diversity index (H'_{SW}). The share of products with a partnership is computed as follows:

$$Q_i = \frac{PP_i}{TP_i}$$

where PP_i is the number of products that are created and/or distributed in partnership by the bank i and TP_i is the total number of products that are offered by bank i . The ratio can assume the following values:

- $Q_i = 0$, if there are no partnerships;
- $0 < Q_i < 1$, if $PP_i < TP_i$;
- $Q_i = 1$, if $PP_i = TP_i$.

The Shannon-Wiener diversity index is computed as follows:

$$H'_{SW,i} = - \sum_{s=1}^S \frac{PP_{is}}{TP_i} \ln \frac{PP_{is}}{TP_i}$$

where $s = 1, \dots, S$, is the partner of bank i , TP_i is the total number of products offered by bank i and PP_{is} is the number of products that bank i co-creates and/or co-distributes with its partner s . Diversity measures, such as the Shannon-Wiener index, are usually implemented in the analysis of ecosystems' species heterogeneity and allow us to consider both the richness of species and the number of individuals appearing in each ecosystem. If we consider banks as ecosystems and their partners as species, it is possible to study how heterogeneous the offer of a bank is: the higher the heterogeneity (or diversity) and the higher the willingness to collaborate and the degree of openness to external subjects. The Shannon-Wiener Diversity Index can only take positive values and is applicable to representative samples of an unknown population in its entirety. Because of the last feature, the Shannon-Wiener Diversity Index was preferred over other diversity measures (for more details on diversity measures, see Frerebeau, 2019), since banks' collaborations do not always involve a financial product or service and we are aware that the sample used may not consider the entire population of partners and collaborations with external parties.

Both indices are computed on a two-level basis. The first level considers inter-group collaborations as partnerships, while in the second level they are excluded. The differentiation allows us to discriminate partnerships that are a consequence of the organizational and strategic approach of the group and the business model chosen by the parent company from those that contribute to the actual opening of bank's boundaries to third parties. Therefore, we ended up with four different measures of banks' attitude to partnership: (1) Q_1 , which measures the share of products with partnership by considering also inter-group collaborations, (2) Q_2 , which measures the share of products with partnership by excluding inter-group collaborations, (3) H'_{SW1} , i.e. the Shannon-Wiener diversity index comprehensive of inter-group collaborations, and (4) H'_{SW2} , i.e. the Shannon-Wiener diversity index computed excluding inter-group collaborations.

Regarding the empirical strategy adopted in the paper, the first research question will be investigated in Section 4.1 by exploiting descriptive statistics. On the other hand, to address the second and third research questions, we have implemented two regression models. The variables and equations of these models are described in detail below.

3.2 First regression model: determinants of banks' attitude to partnership

To explore the determinants of banks' attitude to partnership (RQ2), we apply the linear regression model specified by the following equations:

Model 1

$$Z_i = \alpha + \sum_{j=1}^J \beta_j X_{i,j} + \sum_{c=1}^c \beta_c X_{i,c} + \varepsilon_i$$

where Z_i is the index measuring the attitude to partnership of bank i , with $i = 1, \dots, N$, which is alternatively proxied by (1) Q_1 , (2) Q_2 , (3) H'_{SW1} and (4) H'_{SW2} , α is the constant term, X_i 's are explanatory variables grouped into structural determinants features and control variables (j and c respectively) and ε_i is the error term.

Following the literature concerning organisational, economic and strategic motives of inter-firm strategic alliances formation, we consider four possible structural determinants of banks' attitude to partnership: (1) *Avg_Size_{5Y}*, measured as the logarithm of the average total assets over the last five years and used as a proxy for the ownership of complex structures and strategic resources necessary to develop financial products and services internally, which is expected to be negatively associated with the attitude to partnership (Grant and Baden-Fuller, 1995; Madhok and Tallman, 1998; Gulati, 1999; Dyer, & Singh, 2002). At the same time, a larger size could be associated with a well-developed commercial network, so that third parties may be inclined to become partner of the bank to reach a higher market share (Todeva and Knoke, 2005). We also use as explanatory variable (2) *Avg_Leverage_{5Y}*, computed as the logarithm of the average leverage (debt on total assets) of the last five years, to control for the bank's risk capacity, so that the higher its debt, the lower the amount of own funds available to support its business activity. The lack of funds could result in a lower ability to develop products internally and consequently in a higher bank's attitude to partnership aimed at completing the offering. We considered also (3) *Avg_Branch_prod_{5Y}*, i.e. branch productivity, calculated as the logarithm of the average ratio of the sum of direct and indirect funding from customers and net customers lending to the number of branches over the last five years, since banks with a lower productivity could be more inclined to distribute third parties' products, in order to reach scope economies and to improve performance (Mariti and Smiley, 1983; Varadarajan and Cunningham, 1995). Finally, we considered (4) *Avg_Business_model_{5Y}*, measured by the logarithm of the average non-interest income to total assets ratio over the last five years, which represents the extent of off-balance sheet activities. This metric can be considered as a proxy for the width of the range of financial products and services offered by banks, which can be positively associated to the necessity to partner with external parties to dispose of all the strategic resources and competences needed.

Since the documentation of products and services in the transparency section of banks' websites does not allow us to understand when partnerships started precisely, we choose to

consider the average of structural features of banks computed over the last five years (i.e. 2015-2019) in order to better align them to the time in which partnerships were established, thus partially overcoming reverse causality problems. This choice is also justified by the stability that characterised banks' structural features over the 2015-2019 period. In fact, the percentage standard deviations computed for each bank and for each structural feature show a distribution with a mean that ranges between 3% and 18% and a median between 1% and 14%, which are pretty low if we consider the post-crisis economic growth period (Table 1).

[Insert Table 1 here]

When reviewing the banks' offering, for each partnership we identified, we take into account the following characteristics:

1. *Type of product*. Each product or service offered through a collaboration is classified into 5 different types: i) payments, ii) financing, iii) investments, iv) collaterals and v) other products.

2. *Type of collaboration*. When a product is created and/or distributed in collaboration, the collaboration can assume five different forms: i) production-in, if the product is co-created and distributed only by the bank; ii) production-out, if the product is co-created and distributed only by the partner; iii) distribution-in, if the product is created by the partner and distributed only or also by the bank; iv) distribution-out, if the product is created by the bank and distributed only or also by the partner; v) production-distribution, if the product is both co-created and co-distributed.

3. *Type of partner*. When a product is created and/or distributed in partnership, we classify the partner(s) into five possible classes: i) bank, ii) other financial institution, iii) FinTech firm, iv) online bank, v) other type of partner.

Information concerning collaborations at the product level was fundamental in building our control variables. In particular, we aggregated the information concerning the type of product, collaboration and partner, obtaining three qualitative variables at the bank-level, which summarise the diversification of the banks' collaborations according to three perspectives: (1) *Partner_divers*, a metric that assesses the diversity of a bank's partner collaborations on a scale of 0 to 5 (see *Type of partner* classification); (2) *Prod_divers*, which measures product diversification and takes a value between 0 and 5 based on how many types of products are developed or distributed in collaboration (see *Type of product* classification); (3) *Coll_divers*, which measures the diversification of collaborations and takes a value between 0 and 5 based on how many types of collaborations are formed (see *Type of partnership* classification). Similarly to the measures of

attitude to partnership, variety measures are computed on a two-level basis in order to be consistent with the dependent variables.

Finally, we control for the group membership using *Group*, a dummy variable equal to 1 if the bank belongs to a banking group and 0 otherwise. Table 2 provides the descriptive statistics for the variables included in the first regression model (Model 1).

[Insert Table 2 here]

3.3 Second empirical model: the effect of attitude to partnership on banks' performance

To explore the effect of attitude to partnership on banks' performance, we apply a second OLS regression model described by the following equation:

Model 2

$$P_i = \alpha + \beta_z Z_i + \sum_{j=1}^J \beta_j X_{i,j} + \varepsilon_i$$

Where P_i is the performance measure of bank i , with $i = 1, \dots, N$, alternatively proxied by (1) *ROA*, i.e. the operating performance of banks calculated as the ratio of the difference of operating income and operating expenses to total assets, and (2) *ROE*, i.e. the overall performance calculated as net income to equity ratio (Bourke, 1989; Athanasoglou et al., 2008). Both measures are transformed in logarithmic terms and refer to the fiscal year 2019. α is the constant term, Z_i is the index of banks' attitude to partnership of bank i , alternatively proxied by (1) Q_1 , (2) Q_2 , (3) H'_{SW1} and (4) H'_{SW2} , X_i 's are bank-specific control variables, and ε_i is the error term.

We selected several bank-specific explanatory variables as follows. (1) *Size*, measured by the logarithm of total assets and whose effect on performance is still debated in the literature (Antoun et al., 2018); it is supposed to capture the effects of economies of scales through increased operational efficiency, with a consequent positive effect on performance. However, there are also studies suggesting that this relationship is non-linear (Bourke, 1989; Athanasoglou et al., 2008; Lee & Kim, 2013), and others revealing a negative relationship between bank size and performance, i.e. suggesting that only smaller banks benefit from economies of scale (Pasiouras & Kosmidou, 2007; Sufian & Chong, 2008). In our specific case, decreasing economies of scale are already considered by using total assets in logarithmic terms. We also considered (2) *Leverage*, computed as the logarithm of debt on total assets, in order to control for the bank's risk profile, as well as for the availability of funds to support the bank's business and act as a buffer in case of adverse situation. In particular, the higher the debt, the higher the risk of financial distress for the

bank, especially if the debt is mainly composed of deposits, which constitute a fragile funding source inclined to bank runs (Athanasoglou et al., 2008; Diamond and Dybvig, 2000). Other explanatory variables are: (3) *Branch_prod*, i.e., the branch productivity, computed as the logarithm of the ratio of the sum of direct and indirect funding from customers and net customers lending to the number of branches, and used as a proxy for the bank's scope economies, so that a higher productivity should impact positively on bank performance, and vice versa. (4) *Efficiency*, measured by the logarithm of the ratio of operating expenses to operating income and considered as an outcome of bank management, since a better allocation and outflows of resources should lead to higher revenues at equal cost, with a positive impact on performance. (5) *Liquidity_risk*, measured by the logarithm of the ratio of net customer lending to direct customer deposits and used to control for the bank's ability to cover loan losses and withdrawals by its customers and the ability of banks to finance its lending operation through deposits, instead of using debt or equity, thus avoiding higher funding costs. (6) *Credit_risk*, computed as the ratio of loan loss provisions to net customer lending and considered as the economic outcome of the banks' credit risk management activity: the higher the exposure to credit risk and the ineffectiveness in its screening and monitoring activity, the higher the amount of loan loss provisions and the lower the performance. Finally, (7) *Business_model*, computed as the logarithm of the ratio of non-interest income to total assets, in order to capture the effects of off-balance sheet activity on bank performance (Goddard et al., 2004; Petria et al., 2015; Antoun et al., 2018), usually associated with new revenue streams and more stable results.

In the second regression model, bank-specific explanatory variables refer to the fiscal year 2019, the same year for which we computed performance measures used as dependent variables. Table 3 provides descriptive statistics for the variables included in the second regression model.

[Insert Table 3 here]

4. Empirical results and discussion

In this section, we report the results of the empirical analysis based on descriptive statistics in Section 4.1 and the outcome of the first and the second regression model presented in Section 3, in Sections 4.2 and 4.3, respectively.

4.1 Descriptive analysis of banks' attitude to partnership

Firstly, we aim to investigate whether banks have a positive attitude to partnership with external parties, thus creating fertile ground for Open Banking ecosystems (RQ1). Figure 1 shows

the distribution of the measures of banks' attitude to partner with external parties (in box A banks' attitude to partnership is proxied by Q_1 and Q_2 , while in box B is proxied by H'_{SW1} and H'_{SW2}).

[Insert Figure 1 here]

Looking at the Q_1 distribution, it is shown that 76% of the banks in the sample present a share of products created and/or distributed in collaboration between 20 and 50% of the total products in their offering, which is a fairly high value. The percentage is reduced if intra-group collaborations are excluded (Q_2 distribution), although it is still high and equal to 60% of the banks in the sample. However, drawing a conclusion from this data could be misleading, because Q_1 and Q_2 do not consider the number of partners and the related products.

In fact, if we look at the distribution of the Shannon-Wiener diversity index, which considers both the richness of partnership and the diversification of partners, 77% of the sample shows a H'_{SW1} index below 1.2 and the percentage increase at 80% for H'_{SW2} . Furthermore, for the sample, H'_{SW1} and H'_{SW2} do not exceed the unit on average (see Table 2), thus indicating a low attitude to partnership. When looking at the Shannon-Wiener diversity index on a typical scale of 0 to 5, a value below 1 indicates that Italian banks are not very willing to work with outside parties. This factor that could slow down or even hinder the genesis and widespread development of Open Banking ecosystems and platforms in the Italian financial system.

Our conclusion can be further strengthened by analysing the type of collaborations and partners of banks in the sample. As shown in Figure 2, FinTech firms, that should represent the most important contributors to Open Banking ecosystems in terms of innovation, are an under-represented type of partner in the sample. Only 9% of banks in the sample collaborate with at least a FinTech firm (Box A), which reduces to the 7% if we exclude collaborations with FinTech firms that are part of the banking group (Box B).

[Insert Figure 2 here]

Furthermore, in most cases, banks do not collaborate in the production phase of products and services (Boxes C and D), in which usually resources, knowledge and skills in R&D are shared, resulting in a potential obstacle to access to new competencies and ideas. This hurdle may firstly inhibit innovation and, subsequently, the creation of Open Banking ecosystems in which banks and third parties develop innovative financial products and services that better meet customers' needs. Although legislation and technology have provided market players with the conditions to communicate and collaborate profitably, currently, in the Italian context, banks still need an organisational culture geared towards exchanging ideas and know-how.

4.2 Results and discussion of the first regression model

The following step is to investigate if banks' structural features affect their attitude to partnership (RQ2). To this purpose, Table 4 shows the results of the first OLS regression model described in Section 3.2.

[Insert Table 4 here]

Overall, the adjusted R^2 is fairly high in all model specifications. We also tested the presence of heteroskedasticity, through a Breusch-Pagan test, and collinearity, through the Variance Inflation Factors test (VIF), concluding that they are not an issue for our analysis. Furthermore, errors seem to follow a normal distribution (we run Shapiro-Wilk test).

The coefficient of Avg_Size_{5Y} is negative and highly significant, regardless of the type and level of attitude to partnership measure used as the dependent variable; that is, as the size increases, the propensity to collaborate with third-party intermediaries is reduced. Larger banks are more likely to use their facilities, resources, and expertise in developing financial products and services. This approach is confirmed both towards intra-group and external collaborations. On the contrary, as the size decreases, banks are more likely to form partnerships both inside and outside their group. This allows them to expand and improve their product offerings. This result may also suggest that smaller banks could be more inclined to participate in Open Banking ecosystems in order to increase their ability to satisfy customers' needs.

Although less robust from a statistical point of view, there is also evidence that $Avg_Leverage_{5Y}$ has a positive and statistically significant coefficient in Models 1 and 3, showing that as the level of capitalization decreases (or the incidence of debt capital increases), there is a greater degree of openness to third parties and a greater willingness to form collaborations. Also, a lower availability of own funds (or additional funding/borrowing capacity) can result in a lower ability to independently develop, produce, and distribute new products, resulting in a greater propensity to seek collaborations to complete the offering. It is possible that limited funds could prevent taking on more risks or making new investments. To address this, it may be necessary to lighten the balance sheet by replacing revenues from traditional lending activity with revenues from intermediated services and ensuring, at the same time, quality and innovative services to customers.

An explanatory contribution also comes from the business model variable $Avg_Business_Model_{5Y}$, as shown in Models 1 and 3: the choice of banks to diversify activities towards financial and non-traditional credit services determines a higher willingness to collaborate with external parties. Offering a more comprehensive range of financial products and services,

together with the willingness to offer high quality services, may require outsourcing decisions for certain production and/or distribution activities.

On the other hand, $Avg_Branch_prod_{5Y}$ is never significant in explaining the propensity to collaborate with financial intermediaries inside and outside the banking group. The result is unexpected and may seem surprising in certain aspects. In fact, one would expect a negative coefficient for the variable indicating that banks with lower productivity are more inclined to collaborate with external parties to saturate and fully exploit their production capacity, thus generating scope economies. The result probably reflects both the extreme variety existing in the credit system and the changed commercial value of the branch networks, given the changes that occurred in customers' purchasing and utilisation habits.

As for control variables, results show that banks who form collaborations in several product or service categories ($Prod_divers_1$ and $Prod_divers_2$) are characterised by a higher attitude to partnership. This result reflects the choice of banks in the sample to collaborate with specialized partners presenting profiles of excellence, forming partnership agreements for several products in the same field. Frequent collaborations make partners work more cooperatively and less opportunistically than parties that do not expect to have future dealings with each other (Williamson, 1991). For this reason, if banks have a greater diversification of products with collaboration, co-created and/or co-distributed products increase even if the number of partners is not high, with a positive effect on the degree of openness of banks. The opposite occurs if banks partner with several types of third parties, as shown by the negative and statistically significant coefficient of $Partner_divers_1$ and $Partner_divers_2$. This result is unexpected but may be due to the greater difficulty of interfacing with players offering a narrow range of products, reducing the possibility of forming multiple production or distribution agreements. For instance, this could be applicable to FinTech companies, particularly those that have recently been established, as they usually have a limited range of products. Finally, $Coll_divers_1$ and $Coll_divers_2$, are never statistically significant in our models.

The coefficient of belonging to a banking group is positive and significant only when Q_1 is used as the dependent variable (Model 1). This result reflects the typical strategic orientation of banks to reach scope economies through inter-group collaborations.

4.3 Results and discussion of the second empirical model

As a final step, we aim to investigate whether banks' attitude to partnership affects their performance (RQ3). Table 5 reports the outcome of the second OLS regression model described in Section 3.2. We have conducted the same robustness tests on the current model as we did on

the previous one, and we found no indication of heterogeneous or non-normal errors. The R^2 value in all model specifications is high, indicating a good fit.

[Insert Table 5 here]

Except for Model 4, banks' attitude to partnership is positively and significantly associated with performance, measured by ROA and ROE. The result may be due to several reasons. First, partnerships could be a way to externalize activities that otherwise would be expensive if carried out internally (Williamson, 1975, 1991), as well as helping in circumventing many of the administrative costs of hierarchical forms while maintaining market efficiencies that come from scale and scope economies and operational flexibility (Jarillo, 1988; Child et al. 2019). Second, according to the resource-based view of the firm, cooperation can facilitate learning both in terms of knowledge sharing and transfer of existing knowledge, as well as the creation of new knowledge that neither of the partners previously possessed (Grant and Baden-Fuller, 1995; Gulati, 1999; Dyer, & Singh, 2002; Child et al. 2019) and that firms could not own and/or create independently because of high costs or long development-time. Therefore, partnerships can provide companies with access to valuable knowledge and skills necessary for creating new products and processes, which are vital for innovation and survival in a constantly evolving competitive landscape (Lei et al. 1997; Grant, 2016; Rothaermel, 2016).

Regarding control variables (bank-specific features), in all models the coefficient of *Efficiency* is negative and strongly significant, showing that less efficient banks register lower revenues at equal cost, which in turn lead to worse performance. We also found a negative effect of *Leverage* on ROA, but not on ROE, indicating that less capitalized banks are characterized by a weaker availability of funds to support the banks' operations, with a negative effect on the operating performance. Similarly to other studies, *Credit_risk* has the highest negative and statistically significant coefficient, indicating that overall performance (ROE) is strongly and negatively affected by the amount of loan loss provision per euro of outstanding loans to customers (in all models, the effect of 1% increase of *Credit_risk* on ROE is approximately -13%), thus showing that the ineffectiveness of credit risk management activities can strongly negatively impact performance. Another important result concerns the *Business_model* variable, which has a positive and statistically significant effect on both performance measures, confirming that the strategic choice to offer services beyond traditional credit intermediation services can improve performance due to the access to new revenue streams, contributing to stabilise results.

Differently from other studies in literature, *Size*, *Branch_prod* and *Liquidity* are never statistically significant in our models.

5. Conclusions, implications, and further research

Recent technological and regulatory developments and, in particular, the entry into force of PSD2 have given rise to the Open Banking phenomenon, a model of forced or voluntary collaboration based on the sharing of data and applications between entities not necessarily affiliated, in order to develop, produce and distribute innovative and value-added financial products and services for the customer.

The regulatory thrust coming from PSD2 made the phenomenon and "voluntary" sharing of data, information, services and technological and financial innovation more concrete, contributing to the creation of ecosystems and relational networks, also in the form of Open Banking platforms (Cosma et al., 2023). This paper sheds light on one fundamental factor for the development of Open Banking platforms, namely the banks' attitude to collaborate and open up to external parties through partnership agreements, by providing also empirical evidence on its structural determinants and its effect on performance.

The possibility of seizing opportunities from sharing information, customers and innovation and, therefore, of opening up to collaboration with other financial intermediaries - traditional but also of the new generation such as FinTechs and TechFins - depends on the ability to overcome traditional competitive models. Our analysis shows that Italian banks do not currently have a positive attitude to intra- or extra-group collaboration and that, often, a self-referential approach to customer satisfaction prevails. Also, the scarcity of partnerships in the development phase of financial products and services is proof of the limited openness of banks' boundaries to external ideas that could inhibit innovation and formation of Open Banking ecosystems. In general, even from a cultural point of view, banks do not seem to be keen on partnering with other intermediaries and FinTech firms; indeed, our analysis reveals that collaborations mainly involve individual products.

This behaviour is commonly seen in bigger and more capitalized banks but tends to be less prevalent in smaller and medium-sized banks. These banks are more accustomed to optimizing synergies and collaborations with external partners to make up for any limitations in size, resources, and human capital. This phenomenon is also the consequence of the spread of business models less linked to traditional credit intermediation typical of deposit banks and the progressive fading of territorial barriers that have made customers more contestable and willing to purchase digital financial services.

Our study provides important managerial implications for banks. Since small and medium-sized banks have greater expertise in collaborating with external financial partners, participation in Open Banking platforms can be of prospective strategic importance in order to continue to

compete in a market whose complexity is progressively intensifying, to reduce operational, technological and innovation gaps and, not least, to reduce the risks of takeover by larger banks. Through partnerships, small and medium-sized banks can improve their innovation capacity, production and distribution phases and, consequently, their ability to better meet customers' needs and create value for their stakeholders and shareholders, by renewing and strengthening their role for customers and reference territories. Their participation in Open Banking ecosystems could be justified by the positive effect of banks' attitude to partnership on their performance, as shown by our analysis. In general (and regardless of banks' dimension), banks' managers should consider that participation in Open Banking platforms can speed up the acquisition of new customers and reduce market fragmentation by becoming a one-stop shop (Mensah and Muroura, 2017) in which the customer has the opportunity to choose the individual financial services she/he needs from a plurality of subjects thanks to the aggregation and comparison of the solutions offered by banks and TPPs participating in the platform (Euro Banking Association, 2016). The participation of traditional financial intermediaries, banks, FinTech, TechFin and other providers of innovative services allows not only to develop and expand the offer of services, but also plays a crucial role in enabling greater financial innovation available to the end customer (Coetzee, 2019). If the set of financial services offered by banks and TPPs is perceived as valuable by customers, then Open Banking platforms can also improve customer retention (Zachariadis and Ozcan, 2017).

On the other side, a critical issue for banks is the risk of partial disintermediation, mainly due to the difficulty of maintaining a direct relationship with customers if they prefer to purchase financial products provided by other TPPs and intermediaries participating in the Open Banking platform. Certainly, banks should maximize the quality of their offering to reduce such risk, which, however, could be partly mitigated by the existence of intra-platform agreements and bilateral agreements between partners, which regulate the bidirectional exchange of data and define the roles, conditions and limits for the parties in the production and distribution phases of the financial product.

Finally, banks' managers should consider security challenges arising from participation in Open Banking platforms, which are primarily related to API adoption and involve, for example, fraudulent TPPs activity, digital intrusion, identity theft, data misuse and privacy issues, since customer data is aggregated into API infrastructures posing significant cybersecurity risks (Cosma et al., 2023; Mensah and Muroura, 2017). These risks can have negative impacts on the reputation of the platform participants and on the credibility of the services they offer (Romanova et al., 2018), requiring an adequately standardised approach in terms of security in order to protect the image and brands of banks, but also of other participants of the Open Banking platform (Euro

Banking Association, 2016; Open Data Institute, 2016; Gozman et al., 2018). However, trust in banks' role as custodians of customers' data is sometimes insufficient (van Zeeland and Pierson, 2021). From the perspective of banks, it is important to strongly comply with privacy and data protection regulations (GDPR in the European Union context). At the same time, it is important for regulators to create reliable mechanisms for oversight and enforcement in order to ensure that individuals feel secure when participating in a rapidly evolving financial market.

Our study has two main limitations, which provide new research paths. First, the difficulty of finding complete information on all banks' collaborations leads us to analyse their attitude to partnership by only considering products and services offered to customers. This problem is partially overcome through the implementation of the Shannon-Wiener diversity index, which is applicable to representative samples of an unknown population in its entirety. Nevertheless, it is important to further verify our results by including all types and forms of partnerships. Second, the unavailability of information concerning the year in which banks formed collaborations with external parties can introduce reverse causality problems when studying the determinants of banks' attitudes to partnership. We tried to circumvent this problem by considering the average structural features of banks in the sample over the last five years. To improve the alignment of dependent and explanatory variables, future research should consider including the specific year of partnership formation.

Furthermore, it would be interesting to compare the Italian context to other countries' one, in order to understand if the limited openness of banks' boundaries, and our results in general, can be generalized on an international level. Finally, future research could narrow down the analysis to financial institutions that are part of the same Open Banking platform. This would help to gain a better understanding of why they chose to join the ecosystem, what benefits and drawbacks come with that decision, and how they interact with each other.

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Table 1. Descriptive statistics of the percentage standard deviations from the mean of structural features of banks in the sample over the 2015-2019 period.

	Mean	Median	Standard Deviation	Minimum	Maximum
%SD_Size _{5Y}	9.96	7.79	8.09	1.58	49.72
%SD_Leverage _{5Y}	2.92	0.78	0.0593	0.15	51.99
%SD_Branch_prod _{5Y}	17.78	13.81	18.43	2.46	114.59
%SD_Business_model _{5Y}	14.49	6.69	28.37	2.07	186.6

Table 2. Descriptive statistics of variables employed in the first OLS regression model. All values refer to the original distribution of variables, before applying logarithmic transformation.

Variable	Mean	Median	Standard Deviation	Minimum	Maximum
Dependent variables					
Q ₁	0.2653	0.2727	0.1278	0	0.487
Q ₂	0.2311	0.2469	0.1427	0	0.487
H' _{SW1}	0.9338	1.0009	0.419	0	1.7533
H' _{SW2}	0.8058	0.8053	0.419	0	1.678
Independent variables					
Avg_Size _{5Y} (mln €)	55,980.6	4,157.9	167,861.2	407.2	848,915
Avg_Leverage _{5Y}	0.9088	0.93	0.0593	0.6013	0.9116
Avg_Branch_prod _{5Y} (mln €)	143.79	295.49	424.287	59.34	2,511.52
Avg_Business_model _{5Y}	0.0151	0.1124	0.0174	0.0011	0.1065
Control variables					
Partner_divers ₁	2.311	2	0.925	0	5
Partner_divers ₂	2.067	2	0.8893	0	4
Prod_divers ₁	3.044	3	1.1862	0	5
Prod_divers ₂	2.778	3	1.2227	0	5
Coll_divers ₁	1.311	1	0.6682	0	4
Coll_divers ₂	1.2	1	0.5477	0	3
Group	0.7778	1	0.4204	0	1

Table 3. Descriptive statistics of variables employed in the second OLS regression model. All values refer to the original distribution of variables before applying logarithmic transformation.

Variable	Mean	Median	Standard Deviation	Minimum	Maximum
Dependent variables					
ROA	0.0087	0.0078	0.007	-0.0181	0.0327
ROE	0.0303	0.0439	0.1466	-0.5481	0.2966
Independent variables					
Q ₁	0.2653	0.2727	0.1278	0	0.487
Q ₂	0.2311	0.2469	0.1427	0	0.487
H' _{sw1}	0.9338	1.0009	0.419	0	1.7533
H' _{sw2}	0.8058	0.8053	0.419	0	1.678
Control variables					
Size (mln €)	58,269.9	4,261.5	174,003.4	433.6	85,5647
Leverage	0.9209	0.9296	0.0299	0.7853	0.9525
Branch_prod (mln €)	365.42	172.02	0.5113	67.97	3,071.51
Efficiency	0.7267	0.6894	0.2609	0.4376	2.2213
Liquidity_risk	1.0313	0.991	0.2799	0.6711	2.136
Credit_risk	0.0063	0.0059	0.0059	-0.0012	0.033
Business_model	0.014	0.011	0.0134	0.0014	0.0677

Table 4. Results of the first OLS regression model for studying the structural determinants of banks' attitude to partnership.

	Q₁	Q₂	H'_{SW1}	H'_{SW2}
	(1)	(2)	(3)	(4)
Intercept	0.4064 ** (0.1923)	0.3805 * (0.2108)	0.7502 * (0.4233)	0.6491 (0.4439)
Avg_Sizes_y	-0.035 *** (0.0082)	-0.0392 *** (0.0089)	-0.0523 *** (0.0181)	-0.6653 *** (0.0187)
Avg_Leverages_y	0.5133 ** (0.2382)	0.3336 (0.2485)	0.894 * (0.5245)	0.6449 (0.5233)
Avg_Branch_prods_y	0.0095 (0.0906)	0.0131 (0.0197)	0.0039 (0.0422)	0.0204 (0.0416)
Avg_Business_models_y	0.0424 ** (0.0195)	0.0323 (0.0207)	0.078 * (0.0429)	0.0465 (0.0436)
Partner_divers₁	-0.0301 *** (0.0108)	-	-0.0559 ** (0.0238)	-
Partner_divers₂	-	-0.0237 ** (0.0111)	-	-0.0462 * (0.0233)
Prod_divers₁	0.0333 *** (0.0228)	-	0.0825 *** (0.0208)	-
Prod_divers₂	-	0.0343 *** (0.0089)	-	0.0847 *** (0.0187)
Coll_divers₁	0.0062 (0.0097)	-	0.0271 (0.0214)	-
Coll_divers₂	-	-0.0044 (0.0119)	-	0.0171 (0.025)
Group	0.0309 * (0.0164)	0.0276 (0.0179)	0.0528 (0.0361)	0.049 (0.0377)
R²	0.4824	0.5343	0.5209	0.5834
Adj. R²	0.3674	0.4308	0.4145	0.4908
N° observations	45	45	45	45
F-stat	4.195 ***	5.163 ***	4.893 ***	6.302 ***

Note: the table reports the outcome of OLS regressions for four different dependent variables, i.e. Q_1 , which measures the share of products with partnership by also considering inter-group collaborations (Model 1), Q_2 , which measures the share of products with partnership by excluding inter-group collaborations (Model 2), H'_{SW1} , i.e. the Shannon-Wiener diversity index comprehensive of inter-group collaborations (Model 3), and H'_{SW2} , i.e. the Shannon-Wiener diversity index calculated excluding inter-group collaborations (Model 4). Control variables concerning diversification of collaboration are implemented according to the inclusion/exclusion of inter-group collaborations in the dependent variables. Robust standard errors are in parenthesis. Significance levels: *, **, *** for 10%, 5% and 1% respectively.

Table 5. Results of the first OLS regression model for studying the effect of banks' attitude to partnership on their performance.

	ROA				ROE			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Intercept	0.0039 (0.004)	0.0042 (0.0043)	0.0039 (0.0043)	0.005 (0.0044)	0.0233 (0.0934)	0.0456 (0.1029)	0.0131 (0.1003)	0.0469 (0.1039)
Q1	0.0094 ** (0.0037)	-	-	-	0.2739 *** (0.0864)	-	-	-
Q2	-	0.0069 * (0.0036)	-	-	-	0.1735 * (0.0867)	-	-
H²_{sw1}	-	-	0.0033 * (0.0017)	-	-	-	0.105 ** (0.0394)	-
H²_{sw2}	-	-	-	0.0021 (0.0016)	-	-	-	0.0715 * (0.0374)
Size	0.0000 (0.0002)	0.0001 (0.0002)	-0.0001 (0.0002)	-0.0001 (0.0002)	0.0039 (0.0044)	0.0037 (0.0052)	0.0003 (0.0042)	0.0018 (0.0048)
Leverage	-0.0599 *** (0.0115)	-0.0554 *** 0.0116	-0.0612 *** (0.0126)	-0.0545 *** (0.0119)	-0.0121 (0.2664)	0.1373 (0.2775)	-0.0814 (0.2907)	0.1279 (0.2806)
Branch_prod	-0.0001 (0.0004)	-0.0001 (0.0004)	0.0000 (0.0004)	0.0000 (0.0004)	-0.0046 (0.0086)	-0.0045 (0.0093)	-0.0004 (0.0092)	-0.0025 (0.0095)
Efficiency	-0.023 *** (0.0015)	-0.0228 *** (0.0015)	-0.0229 *** (0.0015)	-0.0229 *** (0.0016)	-0.3444 *** (0.034)	-0.3402 *** (0.0367)	-0.341 *** (0.0352)	-0.3418 *** (0.0368)
Liquidity_risk	-0.0012 (0.0019)	-0.0015 (0.0019)	-0.0019 (0.0019)	-0.0019 (0.002)	-0.0045 (0.0434)	-0.018 (0.0464)	-0.0242 (0.0437)	-0.0218 (0.0462)
Credit_risk	0.0079 (0.0651)	0.0013 (0.0683)	-0.0061 (0.0677)	0.0092 (0.0699)	-12.8936 *** (1.5053)	-12.979 *** (1.6401)	-13.0171 *** (1.5676)	-12.9428 *** (1.6467)
Business_model	0.0033 *** (0.0006)	0.0033 *** (0.0006)	0.0032 *** (0.0006)	0.0033 *** (0.0006)	0.0304 ** (0.014)	0.0318 ** (0.015)	0.0265 * (0.0145)	0.0328 ** (0.0152)
R²	0.928	0.923	0.9232	0.9193	0.9026	0.8879	0.896	0.8869
Adj. R²	0.912	0.9059	0.9061	0.9014	0.881	0.8629	0.8729	0.8617
N° observations	45	45	45	45	45	45	45	45
F-stat	57.99 ***	53.92 ***	54.08 ***	51.29 ***	41.7 ***	35.63 ***	38.76 ***	35.27 ***

Note: OLS regressions for two different dependent variables, i.e. *ROA* (Models 1-4) and *ROE* (Models 5-8). The four explanatory variables for the banks' attitude to partnership are considered one at a time in order to avoid multicollinearity problems. Robust standard errors are in parenthesis. Significance levels: *, **, *** for 10%, 5% and 1%, respectively.

Figure 1. Distribution of banks' attitude to partner with external parties for the sample. Our elaboration.

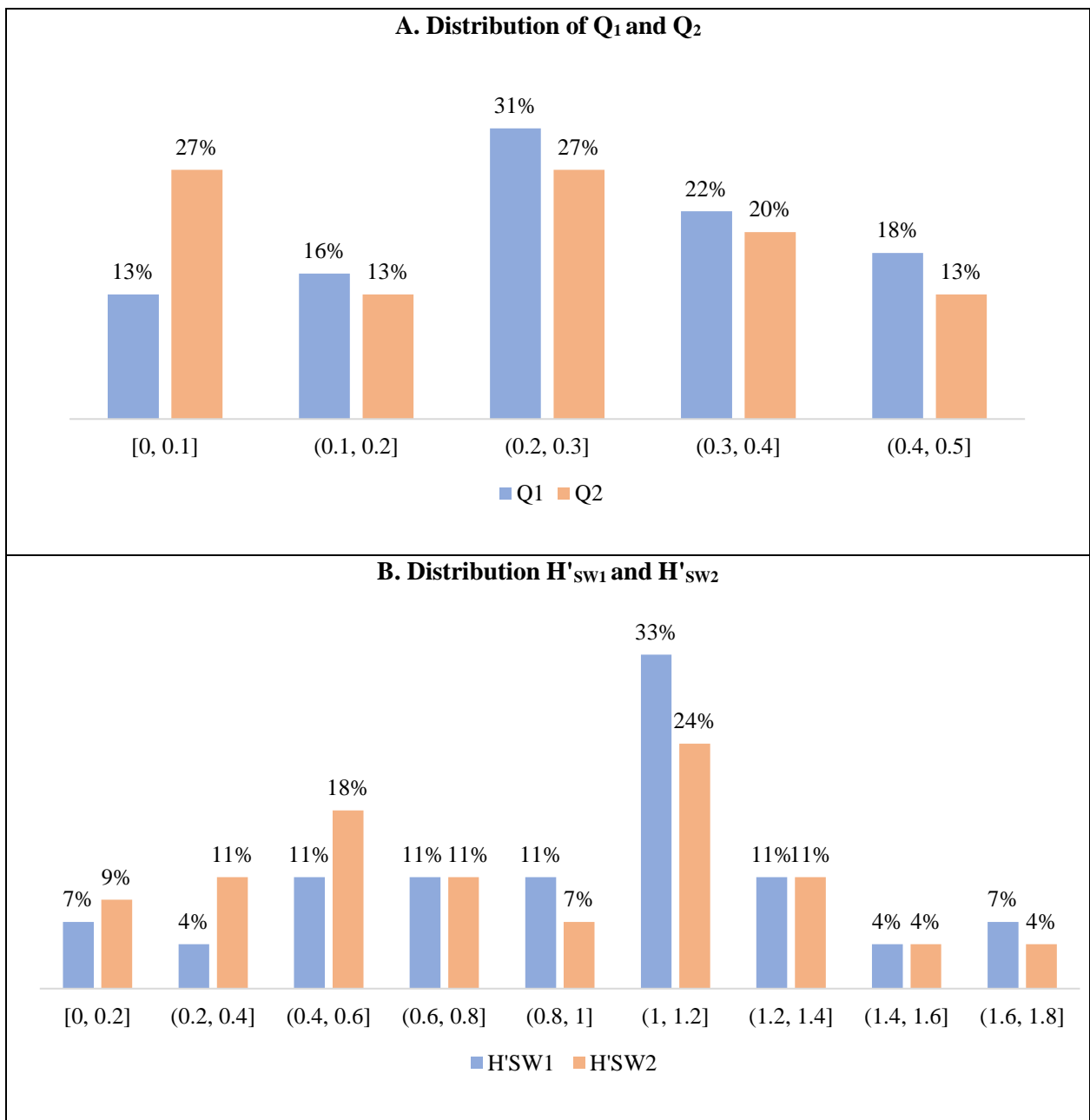
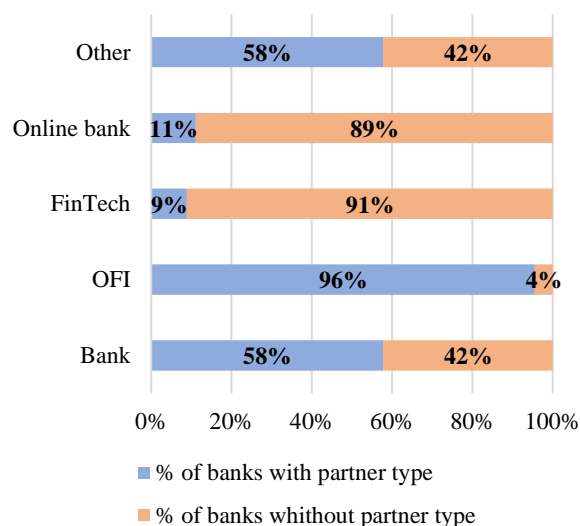
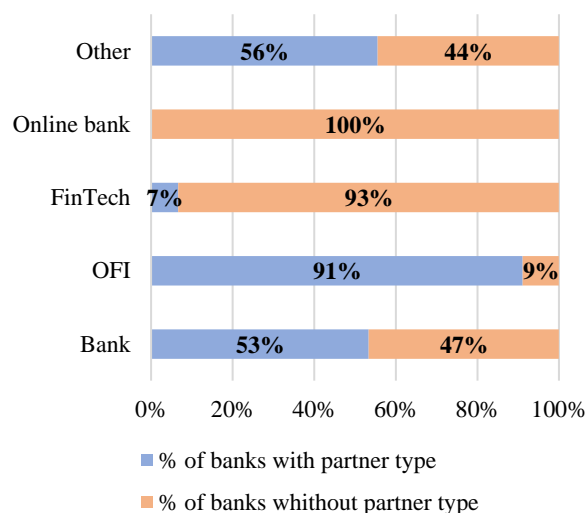


Figure 2. Type of partner and collaborations identified in the offering of banks in the sample. Source: our elaboration.

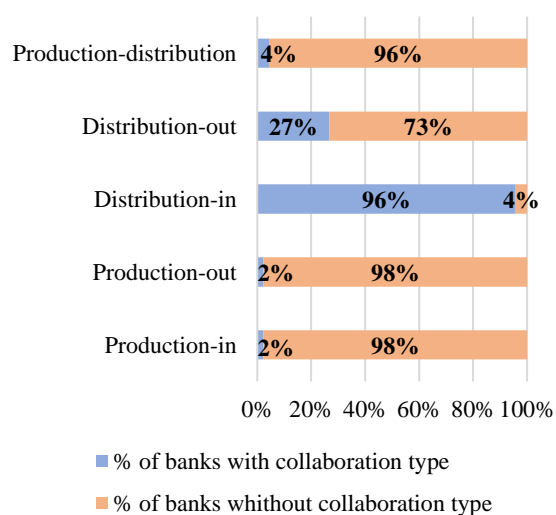
A. Type of partners (considering inter-group partners)



B. Type of partners (excluding inter-group partners)



C. Type of collaborations (considering inter-group collaborations)



D. Type of collaborations (excluding inter-group collaborations)

