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The role of banks in financing European fintechs: Bridging the gap or guarding the turf?

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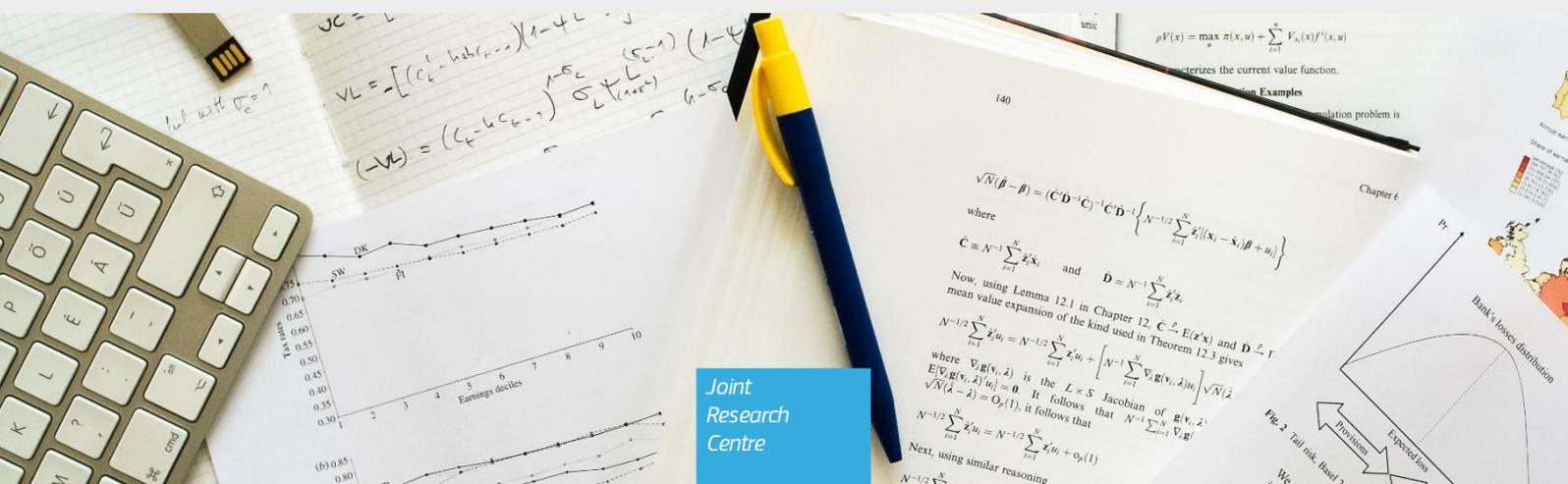


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The role of banks in financing European fintechs: Bridging the gap or guarding the turf?

July 18, 2025

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Abstract

In this paper we investigate the role played by banks in financing European fintech startups. We postulate that this role may be influenced by two conflicting objectives. First, banks could be motivated by value considerations, in that the objective would be to help the fintech scale-up and reach a successful exit, so value can be captured from returns on equity or debt investments. Alternatively, given that fintechs can be viewed as substitutes to banks, investment in fintechs might be motivated by a desire to curb down competition (“buying out competitors”). We examine these conflicting objectives using data on investments made by EU and non-EU banks in fintech startups, and take advantage of an exogenous shock to fintech value provided by the EU’s PSD2 policy. Our results suggest that EU banks are driven by the motive of reducing competition. On the contrary, the behavior of non-EU banks seems to be driven by the value capturing motive, and this may have generated a substitution after PSD2 in non-EU bank financing of EU fintechs towards debt. Our findings suggest that EU fintechs may need to reduce their reliance on bank financing in order to close the financing gap and achieve successful scaling up.

Keywords: EU startup financing gap, bank involvement, value enhancing vs competition.

JEL Classification: G21, G24, M13.

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1. Introduction

The development of the fintech sector over the last fifteen years is probably one of the most striking examples of successful growth. Fintech funding steadily increased throughout the 2010's, reaching a peak of \$143.6 billion in 2021. Even though this financing decreased during 2022-2024, in a context of higher interest rates, to \$33.7 billion in 2024, there were still over 350 fintech unicorns in 2024 valued at over one billion dollars.¹ This is particularly true in the US and UK, where well-developed startup financing ecosystems combine with favorable cultural and structural conditions. As a result, startups in these countries can more easily reach the scale-up and IPO stages than in the EU Member States. In contrast, EU startups encounter greater challenges in their growth trajectory, stemming from expansion barriers caused by fragmentation across key areas and a significantly less mature venture capital (VC) market. Consequently, EU startups have become reliant on bank-based funding (Draghi Report, 2024).

Banks, in turn, have become active investors in both EU and non-EU fintechs, many of which provide services that could be seen as complements to those of banks, or as covering areas not properly served by banks. However, the process of fintech growth also led many fintechs to expand the range of services they offer, to the extent that many fintechs now provide financial services typically associated with traditional banks.² Thus, fintechs have changed the competitive landscape of traditional banks, and this is likely to influence the behavior of banks as investors in fintechs. On the one hand, traditional bank financing of fintechs could be seen as driven by reasons of extracting value from their innovative technologies. This value-driven financing would have an ultimate objective of helping fintechs grow and scale-up (Chen et al., 2019; Hornuf et al., 2021; Lee et al, 2021; Zhao et al. 2022; Li et al, 2023; Turkia and Nahidi, 2024). Given the competitive effect, however, banks may also be motivated by a desire to eliminate or reduce competition by fintechs through “buying them out” (Arner et al., 2016; Demirgüç-Kunt et al., 2017; Goldstein et al., 2019) or through acquiring a controlling interest that may influence the fintech's strategic decisions.

In this paper, we examine empirically the drivers of bank financing for fintechs and try to assess whether banks are driven by a value or a competition objective. To do so, we use a broad database on investments made by EU and non-EU banks in fintech startups, and we take advantage of the implementation of the Payments Services Directive 2 (PSD2) as a shock that affected the value of fintechs located in the EU to design some of our analyses. Our results suggest that the investment behavior of EU banks in fintechs is more consistent with a competition-reduction motive, whereas that of non-EU banks seems to be more motivated by the value capturing objective. Given the high reliance of EU fintechs on bank financing, this finding has implications regarding the potential of EU fintechs for reducing the existing financing gap.

Startups play a critical role in fostering innovation and economic growth within the economy. As a high-risk high-(potential)-reward endeavor, the financing of startups requires significant analysis, and it typically rests on sources of finance, such as business angels and venture capital (VC), which are specialized in providing funds both at the early stages and at the time of scaling-up. The scaling-up stage remains probably the most challenging, given the increased financing requirements, a higher sensitivity to external conditions, and the more complex operational and governance issues of scale-ups. This challenge is particularly pronounced for startups in Europe. EU startups face several disadvantages in successfully reaching the scale-up stage. First, domestic markets in Europe are generally small, making cross-border expansion a necessary part of the growth process. However, this expansion is often hindered by significant obstacles, both cultural—such as the need to offer services in multiple languages—and structural, including

¹ Source: <https://www.cbinsights.com/research/report/fintech-trends-2024/>.

² Sources: dealroom.co and Oliver Wyman report (<https://www.oliverwyman.com/our-expertise/insights/2024/may/bank-fintech-synergy-can-drive-m-a-success.html>).

diverse administrative burdens, compliance requirements, tax regimes, and national laws and regulations. As a consequence of these cultural and structural differences, it is difficult that an EU startup is widely recognized across the EU (European Commission, SWD 2025). Second, later-stage VC financing is much less developed in the EU than in other markets (mainly, the US and the UK): Quas et al. (2022) stress the fact that few EU-based VCs are able to meet the large financing needs of scale-ups. This has the consequence that European scale-ups have a much harder time raising equity financing (a “financing gap”) in the later stages of their growth (Aernoudt, 2017).

The issue of the financing gap encountered by European scale-ups has received significant attention from policymakers. The Draghi report (2024) describes this “financing gap” and points at the reasons for its persistence. One of the key causes of this gap is the fragmentation of European financial markets, which adds to the cross-country differences in the cultural and structural dimensions. The fragmentation of EU financial markets forces EU startups to raise capital locally in the domestic VC and IPO markets. In many of the EU countries, these markets are thin and underdeveloped, have a weaker culture of VC investment, and are limited by a lack of geographical research and technological clusters, which typically act as attractors of VC funding (Grilli et al., 2019; Tykvová, 2018; Pantea and Tkacik, 2024). Another factor stressed by the Draghi report is that the financing of EU startups has traditionally been characterized by an intense reliance on bank funding. Indeed, Europe’s bank-based financial system solves, at least partially, the fragmentation of capital markets, since the largest EU banks are relatively trans-national, thus providing a sort of cross-border financial integration (Demertzis et al., 2018). This bank-induced development of the financial markets has allowed startups to access a broader financing market, but one which may be heavily influenced by the banks’ own objectives.

A specific group of startups who are especially vulnerable to this reliance of bank funding are those specialized in financial technology. The term “fintech”, in general, encompasses the use of technology to innovate or enhance the provision of financial services. Within this umbrella term, we find technologies such as mobile banking, digital payments, or peer-to-peer lending. These technologies have led to more efficient and accessible financial services. The fintech sector has developed quite rapidly, a consequence both of larger financial institutions which have integrated fintech elements in their structures and activities, and of the emergence of a large number of small, flexible fintech startups (“fintechs”, hereafter). This emergence has been particularly intense after trust in the larger, traditional banks eroded by the 2008 financial crisis. The large growth in the number (and relevance) of fintechs raises an interesting question regarding their financing. Fintech startups rely on traditional startup financing sources such as angel financing and VC (Haddad and Hornuf, 2019), or, even, on financing from other fintechs.³ However, especially in the EU and in other bank-dominated markets, banks remain a key player in the financing of fintech startups. Li et al. (2023) report that banks allocate a larger share of their investments than independent venture capitalists (IVCs) to fintech startups, which they can more effectively select and monitor by leveraging their industry expertise. The financing of fintechs by banks poses a significant dilemma: a successful fintech may provide enhanced value to the bank (as investor), but it also becomes a potential competitor in some of the bank’s lines of activity. This value/competition trade-off stems from the dual character of fintechs as potential “complements” or “substitutes” of the activity of banks, and it generates conflicting objectives for the bank as investor in a fintech.

The “fintechs as complements” view would be aligned with a value-capturing objective in a bank’s involvement in financing a fintech: a bank can significantly profit from investing in a successful fintech

³ See, for example, the numerous investments of Stripe, Inc., in other smaller fintechs such as Monzo (a UK “challenger bank”: <https://techcrunch.com/2017/11/06/monzo-moolah/>) or Step (a financial services startup offering bank account services to teenagers: <https://venturebeat.com/business/step-raises-22-5-million-to-help-teens-manage-their-money/>).

venture which complements its activities. This profit may come from the pure financial returns on the bank's equity or debt investment in the fintech or through the use of the technology or products of the successful fintech.⁴ The "fintechs as substitutes" view, on the other hand, would lead to a competition-curbing effect, by which the bank might either not want to finance a potential competitor fintech, or might want to invest in the fintech with the final objective of limiting its growth or acquiring it, in order to preserve the bank's competitive position.

In this paper, we build on this complement/substitute duality to examine the investment behavior by banks in fintechs. In particular, we posit that the dynamics of bank investment will change significantly depending on how the bank views the fintech. If the bank gives more importance to the complementarity, a value-enhancing or value-capturing objective will prevail, and the bank financing will be more oriented towards the growth and scaling-up of the fintech. Alternatively, if the bank weighs more the substitution effect, a competition-curbing objective may prevail, and the bank's involvement might actively impede the growth potential of the fintech or have the ultimate objective of acquiring the fintech.

For our analysis of bank investment dynamics in fintechs, we use a broad database, compiled by Dealroom.com, on startup financing rounds which covers the period 2000 to 2023, and collect information on all pre-exit equity and debt financing rounds.⁵ Apart from fintech descriptives and round size information, the database provides information on the investors who participated in each round. This information allows us to identify the involvement of banks in the different financing rounds. Our analyses attempt to uncover the potential conflict of interest for banks which arises, especially, at the scaling-up and (potential) IPO stages of fintechs. Our identification strategy relies on the expectation of a differential behavior of EU and non-EU based banks, and on how the behavior of both types of banks changed after the announcement of the PSD2 regulation issued by the European Union in 2016. This directive had two main implications for EU fintechs: i) it increased their potential value by expanding the services they could provide and enhancing their access to information; and ii) it introduced more competition in the EU banking and payment services sectors by encouraging fintech innovation and the entry of new types of players that could compete with traditional banking. PSD2 applied only to the European Economic Area ("EU", hereafter), and this geographic scope allows us to construct empirical analyses where we can use the location of banks (EU vs non-EU) to disentangle the relative importance of the competition and value effects. EU banks are likely to be more concerned about the competitive effect, so we expect their investments in fintechs to be more about control (so more likely to be in equity) and less conducive to growth of the fintech (so more likely to be smaller in size and less likely to lead to a successful IPO). On the other hand, non-EU banks are likely to be more influenced by the value effect, so we expect their investments to be more about capturing returns, so they may favor larger investments, investments in debt instruments, and more favorable to a successful IPO.

Given our expectations of different bank investment dynamics, we design a set of empirical analyses intended to provide evidence on (1) the factors that determine bank involvement in the financing (and in the type of financing) of fintech startups, and (2) the effect of bank involvement in the characteristics of the financing process (total and per-round quantity raised, number of financing rounds, and the potential success and type of exit of the startup). Our empirical analyses are carried out in three stages: i) descriptive statistics at the fintech and round levels, ii) cross-sectional analyses using fintech-level data, and iii) granular analyses using the financing round-level data. In order to capture the degree of substitutability/complementarity of the fintechs, we control for the services provided by the fintechs,

⁴ In this regard, Chen et al. (2019) reveal that the majority of fintech innovations generate significant value. Turkia and Nahidi (2024) analyze European fintechs and reveal that those supported by bank-affiliated VC achieve higher profitability and better asset performance than their non-bank-backed peers.

⁵ Hence, we exclude from our dataset rounds corresponding to grants and financing from governments, and the exit and after-exit financing rounds (e.g. IPO/ICOs and post IPO funding, M&A).

distinguishing fintechs specialized in payments services (“paytechs”), fintechs offering only traditional banking services (“banking” fintechs), and fintechs which offer both (“paybanks”). From the perspective of traditional banks, paytechs are likely to be more complementary to banks’ businesses while banking fintechs are probably more of a substitute to traditional banks.

Our analyses at the fintech-level show that fintechs with headquarters in the EU receive significantly less funding (and achieve lower valuations) than non-EU fintechs, but this effect is less noticeable when a bank is involved in the fintech’s funding. Also, we find some evidence that the probability of EU fintechs exiting through an IPO increases significantly if a non-EU bank is involved, as opposed to exiting through an acquisition. Our analyses at the financing round-level show, first, that non-EU banks invest significantly larger amounts in fintechs than EU-banks. Second, we find that, after PSD2, all banks increased significantly their investments in fintechs which provide both banking and payment services. Third, regarding the investment type, we find that involvement of non-EU banks in EU fintechs shifted, after PSD2, towards debt and away from equity, while EU banks increased their equity investments. This hints at a change in the appeal of EU-based fintechs for non-EU banks, a change which may have been motivated by the competition-oriented investment of EU banks.

Our results show evidence of different investment dynamics by EU and non-EU banks in EU fintechs. Even though the probability of bank investment in fintechs has increased after PSD2, EU banks appear to be (relatively) more motivated by the objective of reducing competition by fintechs, through investing in equity but without providing scale-up potential. This investment strategy is likely to have made EU-based banking/payment fintechs less appealing for non-EU banks –for equity investment–, since non-EU banks seem to be more motivated by the traditional value-capturing objective through fintech scale-up and returns on equity and debt. These results are consistent with the difficulties for scaling-up of EU fintechs, and suggest that it is unlikely that this finance gap will be closed unless the non-banking financing markets develop and integrate more significantly across the EU countries. Hence, PSD2 seems to have been effective in attracting outside investors (including non-EU banks), and in generating a potential increase in competition, although it may have been less effective than anticipated in closing the financing gap of EU fintechs.

The rest of the paper proceeds as follows. In Section 2, we present the dual character of fintechs as complements and substitutes of banking, which we use to develop our hypotheses of interest, and we describe the PSD2, which we use as an exogenous source of variation to fintech value. In Section 3, we detail our source data, the variables we collect and construct for our empirical analyses, and we briefly review the empirical methodologies we implement. In Section 4, we describe the results of our analyses. Finally, in Section 5, we conclude with a brief summary and a description of the implications of our results.

2. Bank investment in fintechs and the PSD2

2.1. The dual character of fintechs and bank involvement

The development of the fintech sector and, especially, of fintechs which offer banking or payments services, has direct implications for the activity of banks. Many fintechs offer services and develop technologies that significantly overlap with those of banks. This generates a potential conflict of interest for bank involvement in fintech financing and, especially, in the financing at the scaling-up and (potential) IPO stages. On the one hand, a successful fintech startup may provide enhanced value (financial or operational) to a bank involved in its financing. On the other hand, a successful fintech also becomes a potential competitor in some of the bank’s lines of activity. This dual character of fintechs as potential

“complements” or “substitutes” of the activity of banks is likely to generate significant differences in banks’ investment patterns.

The “fintechs as complements” view understands that a fintech can act as a complement to the bank. Hodula (2022), showed that in banking sectors that are less concentrated, more liquid, and more stable, banks and fintech credit platforms are more likely to coexist as complements, rather than compete for the same clientele.⁶ This complementarity works through two potential channels: (1) fintechs may be able to offer banking and payment services to clients or areas which are not properly served by traditional banks, maybe because of lack of bank branches, or for logistics or technological difficulties (Buchak et al., 2018; Frost, 2020; Erel and Liebersohn, 2022); (2) fintechs may develop technologies or products that can be incorporated into the bank’s value chain through product collaborations or purchases. Lee et al. (2021) find that fintech innovations improve the cost efficiency of banks and enhance their technology. Financing a complementary fintech would, therefore, allow a bank to capture increased value in two ways: (a) the direct financial returns on the equity or debt investment of the financing bank (Turkia and Nahidi, 2024; Chen et al., 2019) (b) the potential embedding of the successful complementary technology in the bank’s value chain (Bellardini et al., 2022; Hornuf et al., 2021; Zhao et al., 2022). Under a “fintechs as complements” view, we would expect bank involvement in fintechs to have a positive effect on fintech financing and, given the enhanced capacity of banks to evaluate and select investment targets (Li et al., 2023), on fintech value growth and on the probability of a successful exit via IPO.

The “fintechs as substitutes” view stems from noticing that fintechs can provide a wide-range of services, many of which compete with those of traditional banks. Thus, a successful fintech has the potential to absorb a significant part of a bank’s clientele and revenue. Hodula (2022), suggests that in highly concentrated and less stable banking sectors, fintechs are likely to serve as a substitute for banks. This would suggest that a bank could view a fintech as a potential competitor and it might either not want to finance the fintech or, if so, it might want to invest in the fintech with the final objective of maintaining the bank’s market power: this would likely lead to lower quantities invested (and lower implied valuations), since the objective for the bank would likely be to absorb or acquire the fintech, rather than to achieve a successful IPO (Arner et al., 2016; Demirgüç-Kunt et al., 2017; Goldstein et al., 2019). Indeed, there is evidence that in economies dominated by large incumbent banks, these banks tend to invest in fintech companies with a motivation related to limiting the development of competition (Arner et al., 2016; Demirgüç-Kunt et al., 2017; Goldstein et al., 2019).

This dual view of the bank/fintech interaction suggests that we expect to find differing patterns of involvement by banks in fintech financing, depending on which of the two objectives is more prevalent. From a “complement” perspective, we would expect banks to be actively involved in fintech financing with a value-capturing objective. This would manifest in: i) larger amounts of financing provided, typically linked to larger implied valuations; ii) involvement both through equity or debt; iii) a higher probability of scaling-up and of reaching a successful exit, typically through an IPO; iv) a higher probability of investing along with other banks which may also be interested in the fintech’s success. From a “substitute” perspective, we would expect banks to be actively involved in fintech financing with a competition-reduction objective. This would imply: i) smaller amounts of financing provided and lower valuations achieved through the growth process; ii) involvement mostly through equity (controlling) instruments; iii) a higher probability of an unsuccessful

⁶ Frost (2020) examines the country-level factors which influence fintech adoption, identifying key drivers such as unmet demand from traditional providers, and a supportive regulatory framework. In the US, for example, the market share of shadow banks in residential mortgage origination almost doubled between 2007 and 2015, with online “fintech” lenders experiencing significant growth during this period (Buchak et al., 2018). Erel and Liebersohn (2022) show that, in the US, fintech usage is higher in ZIP codes characterized by fewer bank branches, as well as in industries with limited banking relationships.

exit or, if successful, of an exit through acquisition; iv) a lower probability of investing along with other banks. We use these broad predictions as a guide for the design of our analyses in Section 3.

2.2. The Payment Services Directives

We discuss now a regulation that significantly changed the dynamics of fintech/banking relations and that, we believe, provides us with potential avenues for identification in our empirical analyses.

In 2007, the EU issued the Payment Services Directive (PSD1), a regulation intended to establish a single EU payments market by setting rules for payment institutions, improving cross-border payments, and increasing competition in the provision of payment services. PSD1 represented a significant step toward the integration of EU financial markets, but it mostly focused on traditional payment services such as credit transfers, direct debits, and card payments. As such, PSD1 quickly became obsolete in the context of intense financial innovation, as it did not regulate mobile banking, fintech companies, or emerging online payment methods that kept evolving at a fast pace. For example, PayPal, which was founded in 1998 and went public in 2002, fell outside the scope of the regulation and operated in a sort of grey area during a significant number of years. As a consequence, in 2015, PSD1 was superseded by the Payment Services Directive 2 (PSD2). PSD2 adoption followed a lengthy process. The European Commission first proposed in 2013 a revision of PSD1, and the proposal was approved in October 2015 by the European Parliament. The final text of the Directive was, then, published in November 2015 in the Official Journal of the EU, and it became law at the EU level in January 2016. The affected member states were given two years (until January 2018) for its implementation (i.e., to transpose the PSD2 into national legislation).

PSD2 placed further emphasis on acknowledging and encouraging innovation in the process of payments, on enhancing consumer protection in the financial industry, and on improving the security of online payments. Key features of PSD2 were: (1) the establishment of Strong Customer Authentication (SCA), normally by requiring multi-factor authentication for online payments;⁷ (2) the promotion of open banking through third-party access: EU banks are now required to provide account information to third-party providers (TPPs) via APIs; (3) the implementation of stronger customer protection, by requiring faster handling of complaints and stronger refund rights in case of unauthorized transactions; (4) the banning of surcharges for credit card payments.

Apart from the positive impact on customer security and experience, PSD2 had the potential to generate a significant increase in competition in the banking sector, since it allowed many fintech companies to access bank account information and, by doing so, enabled them to provide services comparable to those of banks. Hence, PSD2 represented a significant shock to the two dimensions of the bank/fintech relationship mentioned in section 2.1. On the one hand, fintechs became more relevant competitors of banks, an issue that was explicitly recognized as a key objective of both PSD1 and PSD2: Chen et al. (2021) concluded that PSD2 had been instrumental in advancing open banking by enabling third-party providers (TPPs) to offer innovative payment and account services, thereby increasing competition in the financial services sector. On the other hand, the expected value of fintech technology, and of fintech startups related to banking and payments, increased significantly. This increase in value would stem from two effects: (1) the increased access to valuable information that was now possible because of the open banking requirements; and (2) the increase in effective market size that PSD2 generated by enabling fintech startups to operate at a pan-European level, even when headquartered in smaller countries (Polasik et al., 2020).

⁷ Multi-factor authentication requires that a payment be authorized by two of three different types of authentication factors: a password/PIN code, a physical device (mobile phone or card reader) and/or a personal feature (fingerprint or facial recognition).

The introduction of PSD2, therefore, provides with a setting that can help design empirical analyses that may reveal which of the two patterns of investment (value-capture or competition-reduction) may dominate in the involvement of banks in fintech financing. The EU-wide aspect of the regulation, furthermore, generates variation that can help identify the banks' objectives. In particular, how the introduction of PSD2 affects bank involvement in financing EU fintechs is likely to differ in terms of the location of banks, especially given the evidence of a home bias in fintech investments (e.g., Del Gaudio et al., 2024: banks show a preference for investing in fintechs located closer to their own geographic region). We expect non-EU banks to be more affected by the value effects of PSD2, and, consequently, to follow the investment patterns suggested by the view of "fintechs as complements." On the other hand, we expect EU-banks to be more heavily influenced by the competition effect and, therefore, to follow the investment patterns suggested by the view of "fintechs as substitutes."

Our empirical analyses will use the location of the investing banks and the introduction of PSD2 to detect differences in the pattern of bank investment on fintechs and, especially, on EU fintechs. These analyses have the potential to uncover significant differences in the mechanisms and dynamics of startup financing by banks.

3. Methodology

3.1. Data and variable construction

Our analyses use profile and financial information of fintech startups (hereafter, fintechs) obtained from Dealroom.co (DR). DR is an Amsterdam-based data and software platform that provides insights into firms' financing. The database covers over 3 million companies worldwide, with a particular focus on technology and high-growth startup ventures. DR collects, primarily, data on the amounts raised in each of the different financing rounds that the startups go through, and on the list of investors involved in each round.⁸ Furthermore, DR reports the type of financing round classified using criteria related to size of the round, growth stage of the startup, and type of investor:⁹ (1) seed investments are small financing rounds (in the range of 1-4 million euros) made within the first two years of the existence of the startup; (2) rounds undertaken by angel investors; (3) VC rounds; (4) deals that correspond to an acquisition, a merger or an IPO; (5) other non-VC funding rounds such as debt rounds, grants or government financial support; (6) post IPO financing rounds.¹⁰ Besides the typology and characteristics of the financing rounds, including the list of investors present in each round, DR provides a set of descriptive variables related to the startup's profile, such as launch dates, client focus (i.e. business-to-business, B2B, or business-to-consumer, B2C), industry (among which "fintech" is our main subsample of interest) and sub-industries (e.g., banking or payments) in which the startup's activity can be classified, technologies used (e.g.: blockchain), some basic financial KPIs, and other metrics about the startup (number of employees, patents, etc.). Finally, DR provides information on the profiles of the startup founders, detailing aspects like gender, entrepreneurial experience, and educational background.¹¹

⁸ Funding amounts are reported in the original currency, so we standardize them into euros.

⁹ <https://dealroom.co/blog/glossary-definitions>.

¹⁰ In the database, VC financing rounds are labelled using standard terminology: series A (rounds of 4-15 m EUR, which DR still categorizes as early stage); series B (15-40 m EUR) and series C (40-100 m EUR), which are categorized as "breakout stage"; and over 100 m EUR, up to series H, which are categorized as "scale up stage." In our measurement of "early stage" we do not include series A rounds, as we explain below.

¹¹ The characteristics of the founding team are important factors to control for in our study. Bernstein et al. (2017), for example, observe that the average investor places significant emphasis on information about the founding team, while showing little sensitivity to firm traction or to the presence of existing lead investors. Their findings show that the team serves as more than just a signal of quality, supporting the notion that basing investment decisions on team-related information is a rational approach.

We collect from DR the data available until the fourth quarter of 2023 for those firms with headquarters in one of the 30 countries that are either part of the European Economic Area (i.e., the EU-27 countries plus Iceland, Lichtenstein and Norway), the United Kingdom, Switzerland and the US. We consider the UK as a non-EU member state throughout the sample. We limit our download to data for fintech companies (i.e., startups with industry value containing “fintech”) that were launched after January 1998. This date corresponds to the emergence of Paypal, probably the first and most representative company to successfully leverage the internet to provide payment-related financial services. We collect information on the different subindustries in which fintechs are classified, placing special interest on distinguishing those in “banking” and “payments”. These two subindustries are most directly connected to the activity of banks and to the scope of the PSD2. We only use information on pre-exit equity and debt financing rounds. We exclude, therefore, grants, financing from governments, and the exit and after-exit financing rounds (e.g. IPO/ICOs and post IPO funding, M&A).

Our final broad sample consists of 16,402 firms, involved in 36,163 international financing rounds undertaken between 2000 and 2023. Out of these 16,402 firms, 26.5% of them (4,346 firms) are based in an EEA country, and the remaining 73.5% (12,056 firms) are located in the three non-EEA country members in our sample: 59.2% (9,704 firms) are headquartered in the US, 14.3% (2,347 firms) in the United Kingdom, and less than 1% (5 firms) in Switzerland.¹² For most of our analyses, however, we end up using a smaller sample of 5,522 startups involved in 11,332 financing rounds. This final sample corresponds to those startups for which we have non-missing data for all variables of interest for the multivariate analyses (see Tables 1 and 2). The final list of variables we collect/construct appears in Table A1 in Appendix A. Note that our main empirical variables can be categorized into three types:

(1) Variables which refer to time-constant features of the startup (Panel A). This group includes: the information on the profiles of the founding team, the fintech’s subindustry *-banking, payments* or both, which we denote with the term *paybank-*, the location of the headquarters (we define the dummy *EU_hq* as equal to one if the headquarters is located in the European Economic Area), a variable related to the fintech’s customer base *-consumer*, equal to one if the fintech is primarily business to customer- and whether the fintech has the EBA license (see below).

(2) Variables which describe the overall financing process and which are constant for each startup (Panel B). We construct these variables by aggregating the financing round-level information for the complete financing process (e.g., total number of rounds, or total financing raised across all financing rounds), by taking one value of several potential values (e.g., startup valuation), or by constructing dummy indicators that describe the overall process (e.g., indicators of the type of exit, or of the involvement of a bank among the set of investors at any point of the financing process).

(3) Variables specific to the financing round (Panel C). This group includes variables descriptive of the type of round (*earlyvcround* or *debt_round*), variables that describe the past financing process (*roundsofar* or *ln_totalsofar*), variables that describe the current round (*ln_amount*), and variables that describe the presence of banks among the investors in the round (*bank_present*, *EU_bank_present*, and so on).¹³

Aernoudt and De San José (2020) highlight that businesses led by women are less likely to secure venture capital compared to those led exclusively by men, and the amounts they raise tend to be smaller.

¹² In Section 4, we discuss descriptive statistics that reveal significant differences between EU (EEA) and non-EU fintechs, particularly in terms of size. Among the fintechs in our sample offering payments and banking services, the largest in the EEA (EU), based on funding raised during the sample period, are Klarna (€3,593.2 million), the N26 Group (€1,482.9 million), and Mollie (€779 million). The largest non-EU fintechs are Stripe (€8,088.6 million), Chime (€1,759 million), and Checkout.com (€1,591.2 million), which (unsurprisingly) raised significantly larger amounts of capital than the respective three EU fintechs.

¹³ Note the names of the variables that contain the information on bank financing of fintechs. We use the word *involved* for fintech-level variables that capture whether a bank is an investor in that particular fintech at any point during the financing process.

We refer to Table A1 for detailed explanations of how all the variables are constructed. We do need to expand, however, on how we construct the most relevant set of variables for our analysis, namely the indicators of bank involvement. Given the objective of our paper of studying the patterns of investment in fintechs by traditional banking entities, from within and outside the EU, we focus on identifying the financing rounds where banks of each origin participate as investors. In order to do so, we follow a two-step process. First, we extract all information on round investors from the DR database, and identify potential banks present in each round by a text search using a lexicon which includes words present in the names of the 200 largest European and US banks, as well as a list of keywords associated to the banking sector (“bank”, “bancorp”, “credit”, “banco”, “banca”, “banque”, etc). This procedure flags, within our financing round database, a set of approximately 3,000 rounds where, potentially, a bank was involved. We then checked manually this first set of matches, and identified all banks involved. This process included a visit to the banks’ websites to check the bank’s headquarter location (when not obvious) and to check that, indeed, the investor flagged could be identified as a banking entity. We also use this step to flag the false positives (for example, investors with last name “Maybanks” or “Goldman”, or VC companies with “credit” in their name), and to make sure that VC companies associated with a bank are also identified. A second lexicon was then built that identifies all banks present in the sample (either directly or through their investment vehicles). We use this lexicon to generate three dummy variables: *bank_present* is a one if any of the investors in a particular financing round is a bank, and a zero otherwise; *EU_bank_present* is a one if any of the investors in a particular financing round is a bank with headquarters located in the European Economic Area, and a zero otherwise; *non_EU_bank_present* is a one if any of the investors in a particular financing round is a bank with headquarters outside of the European Economic Area, and a zero otherwise.¹⁴ Other round-level dummy variables which identify whether a bank is involved in an equity or a debt round (see Panel C of Table A1) are generated by interacting the three bank dummies with a second dummy which identifies equity or debt financing rounds. Finally, Panel B of Table A1 describes some dummy variables (*bank_involved*, *EU_bank_involved*, *non_EU_bank_involved*) which identify whether a bank is involved at any point in time in the financing of a particular startup (i.e., whether the bank is present in any of the financing rounds for the startup).¹⁵

One final variable, which we construct from an alternative data source, is *eba_license*. The European Banking Authority (EBA) is the EU agency responsible for ensuring effective and consistent regulation and supervision of the banking sector across EU member states. As such, the EBA is in charge of keeping a register of information on those firms (typically, fintechs) that have acquired a PSD2 license from the relevant national authorities of the EEA Member States.¹⁶ This license allows banking and payment fintechs to operate in any of the other Member States, serving as a signal of fintech quality that correlates with the value effect of operating under the PSD2. In order to identify the fintechs with the license, we downloaded the EBA Register on December 31, 2023. This list contains 1,335 entities that had already secured a PSD2 license. By manually checking the websites and names of these firms, we identify 836 firms in our database which are compliant with PSD2. For these fintechs the variable *eba_license* takes value one and, hence, we use this variable as a proxy for fintechs for which the PSD2 value effect is likely to be more sizeable.

Alternatively, we use the word *present* for financing round-level variables that capture whether a bank is an investor in that specific financing round.

¹⁴ We take the European Economic Area as the identifier for “EU-banks” given that it is the scope of application of PSD2.

¹⁵ These variables are constant at the startup level, so, in this case, we set the variable to missing if it would be a zero (no bank is present in any of the financing rounds with information on investors) but there is some financing round with missing information on the investors.

¹⁶ The EBA plays a key role in regulating and supervising EU fintechs, especially in areas where fintech intersects with banking and financial services. While the EBA does not directly regulate fintechs, it influences how national regulators approach the incorporation of fintechs into the national financial markets by setting standards, providing guidance, and ensuring regulatory consistency across EU countries.

3.2. Empirical methodology

Our analyses are divided into three blocks. First, we provide some descriptive statistics designed to motivate the subsequent analyses. We then carry out a battery of regression analyses, some of which use the “cross-sectional” fintech-level data and some which use the “granular” financing round-level data.

A first set of fintech-level analyses examine the overall financing process of the fintechs in our sample. Specifically, we run cross-sectional regressions of the form:

$$FPC_i = \beta_0 + \beta_1 eba_license_i + \beta_2 EU_hq_i + \beta_3' activity_i + \beta_4' bank_involvement_i + \beta_5' CFT_i + \varepsilon_i, \quad (1)$$

where FPC is one of three variables which measure characteristics of the overall financing process: $finalrounds$, $ln_totalamount$, and av_amount . The explanatory variables in these regressions are: $activity$, a vector of four variables which describe the startup’s subindustry and type of customers ($banking$, $payment$, $paybank$, $consumer$); $bank_involvement$ is either the single variable $bank_involved$, or a vector containing both $EU_bank_involved$ and $non_EU_bank_involved$; CFT is a five-variable vector that contains the characteristics of the founding team ($prop_female$, $prop_rookie$, $prop_topunis$, $count_founders$, av_exp). In these regressions, our main coefficients of interest lie on the (vectors of) coefficients β_1 - β_4 , which relate EU location of the fintech startup, its type of activity, and the involvement of banks to the characteristics of the overall financing process.

A second set of cross-sectional analyses examine the outcome of the fintech’s financing process. In these regressions, the dependent variables are three proxies of the success of the fintech. First, we use ln_value as dependent variable of linear regressions. Additionally, we estimate two probit models where the dependent variables are $exit_suc$, a dummy that captures whether the startup exited through an IPO or an M&A, and $exit_buy$, a dummy that captures whether the startup exited through an M&A. In the latter model, we restrict the sample to those fintechs which exited either through IPO or M&A, so we can examine the factors that correlated with the two different types of exit. The regressions/probits we estimate in this block have the overall structure in (1), but include additional explanatory variables that capture the impact of the PSD2. These additional variables are $postval$ (in the cross-sectional regressions of ln_value), and $int_post_bank_involved$ and $int_post_nonEUbank_involved$ (in all three models).

Our more comprehensive results derive from the second set of regression-based analyses that take advantage of the granular data at the financing round-level.¹⁷ With these analyses, we can examine the patterns of bank investment in financing fintechs. We take advantage of the heterogeneity in the location of the bank present in the financing round (EU vs non-EU banks), the locations of the fintechs receiving investments, the funding types (equity and debt) used by the banks, and the banks’ preferences in services

¹⁷ We treat the financing-round dataset as a pooled-cross section rather than as a panel. Indeed, many of our fintech startups have more than one financing round, but (1) the panel structure of the dataset is heavily unbalanced (the number of financing rounds per fintech varies significantly, with the majority of fintechs having only one or two financing rounds, so fintech fixed effects would eliminate a significant amount of variation), and (2) the time intervals are irregular (to the extent that, inclusion of time fixed effects would also eliminate a significant amount of observations, unless we aggregated time at a coarse level). Since many of our variables, both controls and variables of explicit interest, are time invariant, we opt for simple regressions without fixed effects and with robust standard errors (tables with fintech-clustered standard errors consistent with pooled-OLS estimation yield the same results, and they are available upon request). Given the inclusion of many time-invariant controls (some of which we do not show in the output tables), we believe that we account for a significant amount of fintech-specific heterogeneity. In any case, Table A2 in the appendix shows the results of estimating model (3) using the methodology of Hausman and Taylor, which allows for estimation of the coefficients of time-invariant models in panels with individual fixed effects. The implications of the results do not differ significantly.

provided by the fintechs (paytech, banking, paybank). We estimate two types of models: i) a set of probit models that examine the probability that EU and non-EU banks participate in a financing round, overall and split by type of funding (equity or debt); and ii) a set of linear models that inspect whether the presence of banks relates to the funding amount provided by EU and non-EU banks before and after the PSD2 was announced.

We first examine the presence of banks as investors in the financing rounds by estimating probit models where the probability that a bank is present in the financing round j of fintech i is related to a broad set of regressors. These models have the form

$$\begin{aligned} \text{Prob}(BP_{ij} = 1) & & (2) \\ & = \Phi(\beta_0 + \beta_1 eba_license_i + \beta_2 EU_hq_i + \beta_3 activity_i + \beta_4 CFT_i \\ & + \beta_5 round_char_{ij} + \beta_6 post_{ij} + \beta_7 Interactions). \end{aligned}$$

where BP_{ij} represents the participation of a bank in a given financing round j of firm i , measured through one of three dummies: *bank_present*, *EU_bank_present*, and *non_EU_bank_present*. In (3), $\Phi(z)$ denotes the cumulative distribution function of the standard normal variable evaluated at z , per definition of the probit model. The explanatory variables in (3) include the time invariant characteristics in (1), namely *eba_license*, *EU_hq*, *activity* and *CFT*. We also include additional variables which are round-specific. In particular, *round_char* is a vector which contains four round-specific characteristics (*roundsofar*, *ln_totalso far*, *earlyvcround*, *debt_round*). We include the variable *post*, which is a one if the financing-round occurs after publication of PSD2 (specifically, $post_{ij} = 1$ if round j of fintech i takes place from January 2016 onwards). Our choice of January 2016 as the moment at which we expect PSD2 to “matter” is based on considering that the fintech financing market is likely to have anticipated the effects of PSD2 implementation and, given the long timelines of fintech development, reacted as soon as the final text and implications were known. This choice aligns with evidence in Polasik et al. (2020), who show that it was the publication of PSD2, in November 2015, which triggered the most noticeable increase in payment-related fintech startups across Europe, rather than the directive’s transposition into national laws (which started in 2018). *Interactions* denotes that, in different regression specifications of model (2), we interact the *post* variable with *EU_hq* and with the *activity* variables, in order to account for heterogeneous effects of PSD2 in bank involvement.

In a related set of analyses, we refine the presence analysis by splitting the financing rounds into equity and debt rounds, in order to examine whether the determinants of bank presence in equity or debt financing differ significantly. In these models the dependent variables are *bank_equity*, *bank_debt*, *EU_bank_equity*, *EU_bank_debt*, *non_EU_bank_equity* and *non_EU_bank_debt*. These are all dummy variables equal to one if a bank (EU-bank or a non-EU-bank) is involved in a particular equity or debt round (with the subsamples restricted to equity or debt rounds).

Finally, we estimate a set of linear regressions where we focus on the size of the financing round (i.e. the amount in euros raised by the fintech at one point in time, *ln_amount*). These models have the following structure:¹⁸

¹⁸ These models also include a time trend, which controls for potential inflationary effects or an overall upward trend in VC financing availability. As mentioned above, we offer in Table A2 results of versions of model (3) where we include fintech fixed effects and use the Hausman-Taylor estimator to obtain parameter estimates for all our regressors, including those that are time-invariant.

$$\ln_amount_{ij} = \beta_0 + \beta_1 eba_license_i + \beta_2 EU_hq_i + \beta_3' activity_i + \beta_4' CFT_i + \beta_5' round_char_{ij} \quad (3) \\ + \beta_6 post_j + \beta_7' BP_{ij} + \beta_8' Interactions + \varepsilon_{ij}.$$

The regressors now include, apart from the controls and explanatory variables in (2) and the interactions of *post* with *EU_hq* and *activity*, the bank-presence variables *BP* and their interactions with the *post* indicator (see table footers for description of these interactions). Estimation of these models should allow us to infer the impact of the presence of banks in the size of the financing round, and to assess whether PSD2 had a significant impact on funding amounts.

4. Results

4.1. Descriptive evidence

Table 1 presents descriptive information of the variables we use for fintech-level analyses. Panel A contains the descriptive statistics for the full sample. We use the largest sample available for each variable (i.e., we do not uniformize the sample, as we do in Table 2 for the financing round-level variables). On average, the fintechs in our sample have raised €18.75 million in equity, with a mean amount of approximately €26 million in total funding. Dispersion in the financing achieved is, however, enormous: the median amount raised is €1.2 million, and the company that has raised the most money across all rounds has accumulated €8.1 billion. The average number of financing rounds per company is 2.2, and its dispersion is also quite substantial, with a maximum of 20 rounds and a median of 1 round. Approximately 26% of our fintechs are located in the EU (broadly considered), and about 3% of the total, which accounts for roughly 11% of EU fintechs, had obtained the EBA license by December 2023. Regarding activity, 4.4% of the fintechs can be classified as “banking”, 11.8% as being involved in “payments” and 1.6% in both; 34.4% of fintechs operate mostly as business-to-consumer. The characteristics of the founding teams, which we use as controls in our regressions, show some interesting features. The average and median number of founders per company is 2, with an average experience of 18.83 years.¹⁹ The founding teams are predominantly male (9.7% proportion of female founders), novices (82% of founders are considered *rookies*), and relatively well educated (17.9% of them graduated from top universities). In terms of bank involvement, our main variables of interest, we can highlight that 13.2% of the fintechs have had a bank involved at some point of their financing process, 4.9% of them have had an EU-bank involved whereas 9.6% of them have had a non-EU bank involved. The exit rate in our sample is 13.5%, 11.8% through an M&A and 1.7% through IPO/ICO.

Panels B and C present these descriptive statistics for sample splits on the basis of headquarter location (Panel B: fintechs outside of the EU; Panel C: fintechs in the EU). A comparison of both panels reveals many similarities but, more importantly, some striking differences. Among the most notable differences, some evidence of the financing gap clearly arises. The total level of funding raised by fintechs located within the EU is significantly lower than that of fintechs located outside the EU (€13.2 million vs €30.39 million mean total funding; €0.76 million vs €1.89 million median funding). This comparison also stands when comparing total equity funding (€9.8 million vs €21.8 million mean funding; €0.64 vs €1.54 million median funding). In terms of industry activity, the proportions of fintechs related to banking or payments are relatively similar, with the EU having a higher proportion of both banking (8% vs 5.2%) and of payments fintechs (17.8% vs 11.8%).²⁰ This statistic is aligned with our expectations of the effect of PSD2, and with the results in Polasik

¹⁹ The variable *av_exp* is calculated by first summing the years of experience of each founder across all startups he/she has founded and then averaging across founders.

²⁰ Note that for these latter proportions we have aggregated the proportions of banking and paybanks and of paytech and paybanks, respectively.

et al. (2020). Interestingly, the proportions of bank involvement are similar (14.2% in EU fintechs vs 12.9% in non-EU fintechs), a finding which suggests that the factor behind the financing gap may not be the higher reliance, in terms of frequency, on bank financing but, rather, that bank financing in the EU tends to be associated with significantly smaller amounts. Regarding exit frequencies, we find no significant differences across fintech location, with 11.5% (14.1%) of EU (non-EU) fintechs reaching successful exits, 10.1% (12.4%) of which are through some type of merger or acquisition. Finally, the founding teams of EU and non-EU fintechs seem to be quite similar in composition, with a slightly higher proportion of female founders in non-EU fintechs (10.3% vs 8.5% in EU fintechs) and a significantly higher proportion of top-university graduates in non-EU fintechs (20.4% vs 11.3% in EU fintechs). These differences in founding team composition, the latter of which is a natural consequence of top-university location, may warrant some future research, but we leave this as an open question.

Table 2 provides descriptive statistics by financing round, now on a common sample. The full-sample descriptives in Panel A show that the average amount per financing round is €20.8 million, with a median of €2.59 million. This, of course, suggests very significant asymmetry in the distribution of financing (the maximum amount obtained in a single round being €6,159 million in one of the growth financing rounds of Stripe).²¹ On average, the time gap between rounds is 18.5 months, and banks are present in 8.1% of the financing rounds (5.2% of the rounds having a non-EU bank present, relative to 3.2% of the rounds having an EU-bank present). Both EU and non-EU banks prefer equity financing over debt, but in the case of EU-banks, the relative preference for equity is significantly more pronounced. Approximately half of the financing rounds in our sample can be considered early VC, a fact consistent with our sampling criteria (we only account for fintechs founded after January 1998), but also with fintech being an actively growing sector and with regulatory changes, such as PSD2, which have fostered this growth.

Panels B and C show the financing round-level descriptives for the samples split on the basis of headquarter location (non-EU fintechs in Panel B, EU fintechs in Panel C). Again, the main difference between the subsamples relates to the amount raised by financing round, which is approximately twice as large for non-EU fintechs relative to their EU counterparts (€23.9 million vs €12.65 million mean amount; €3.31 million vs €1.45 million median amount). The time between rounds is also slightly shorter for non-EU fintechs (17.8 vs 20.2 months on average). Regarding bank presence, EU fintechs show now a slightly higher reliance on banks (10.1% of EU-fintech financing rounds have some bank present as opposed to 7.3% of non-EU fintech rounds). A home bias in bank presence is quite noticeable: EU banks are more frequently present in financing rounds for fintechs located in the EU: 8.4% of EU-fintech financing rounds and 1.2% of non-EU fintech financing rounds have an EU bank present. Conversely, non-EU banks are more frequently present in the financing of fintechs located outside the EU: 6.4% of non-EU fintech financing rounds and 1.9% of EU-fintech financing rounds have a non-EU bank present. In terms of relative presence in equity as opposed to debt, the descriptives do not offer a clear picture, given that most of the financing rounds are actually equity rounds. However, some basic (un-tabulated) statistics show simple, but noticeable, differences in bank presence in debt as opposed to equity financing.²² In particular, for EU fintechs, no bank was involved in debt financing before 2016, and it is only after passage of PSD2 that banks started to participate in debt financing of EU fintechs, most notably non-EU banks. Interestingly, it is never the case that both an EU and a non-EU bank were present in the same debt financing round of an EU fintech, something that did happen in the case of non-EU fintechs. Also, the presence of EU-banks in debt financing of non-EU fintechs was quite residual before 2016 (a finding in line, again, with the home bias), but this

²¹ The relatively large mean of *round_amount* is not inconsistent with the descriptives at the fintech-level but, rather, a consequence of the fact that many of the smaller fintechs drop out of the sample once we eliminate those for which we have data gaps.

²² These statistics, available upon request, are simple cross-tabulations of the *EU_bank_debt* and *non_EU_bank_debt* variables by double-splitting the sample into pre- and post-PSD2 and EU vs non-EU fintechs.

presence increased significantly after 2016. Finally, the participation of EU-banks also increased significantly in non-EU fintech financing via equity after PSD2, a finding consistent with our expectations, and which suggests that EU banks may operate with a value objective regarding the financing of non-EU startups.

We next show a series of figures (Figures 1-3) which plot the evolution of some of our variables of interest. Figure 1 shows data on the number of financing rounds per year (overall and for EU fintechs) in the broader sample, as well as the average amount, in millions of euros, of the financing round (overall and for EU fintechs). The upward trend in all the variables is evident, as well as the slight slowdown experienced after 2021. Still, there are two noteworthy findings: (1) the number of EU fintech deals is a relatively small fraction of the overall market; and (2) the average size of the financing round of EU fintechs has consistently been 50% smaller than the full sample average, and this difference does not seem to be closing over time, even after passage of PSD2. In Figure 2, we show how the proportion that banks are involved in the different financing rounds has increased steadily over time (note that the sample period starts in 2007, to avoid distortions in the early years due to a significantly smaller number of financing rounds in the dataset), and this is especially noticeable for EU-banks, whose involvement in equity deals was significantly low until 2015, and which were basically not present in debt deals before 2013 (see Panel B). An interesting result, to which we come back in the regression analyses, is the increased interest for debt financing by non-EU banks: the proportion of debt deals which involve a non-EU bank has gone from around 15% in the early part of the sample to almost 30% in the latter years (this figure corresponds to the difference between the thin solid and dashed lines in Panel B of the figure). The presence of banks in equity deals, on the other hand, is still relatively low in comparison (staying at a level of around 8%). Finally, Figure 3 shows the time evolution of the average size of the financing round. Panel A very forcefully shows how the average round size has increased significantly over time (something also seen in Figure 1), but that this is especially the case if a bank is present as investor in the round. Indeed, the presence of a bank seems to increase the size of the financing round by an average factor of 3 to 5. This effect is significantly smaller if an EU-bank is present: the data in Panel B show very clearly that EU banks tend to be involved in financing rounds that are smaller in size than those which involve non-EU banks, this gap being quite stable over time, with the exception of 2020 and 2021 (which were, in any case, relatively peculiar years where the COVID outbreak significantly distorted the functioning of financing markets).

4.2. Fintech-level analyses

The descriptive evidence shown aligns, broadly speaking, with significantly lower financing (a financing gap?) of EU fintechs, as well as with their higher reliance on bank financing, but it also points at differences in bank investment patterns. We now begin a series of multivariate analyses where we show that these general results still hold while controlling for fintech characteristics.

Table 3 presents the results of the analysis of the characteristics of the financing process coming from different versions of model (1). We look, in particular, at how the final number of rounds, the total amount raised and the average amount per round, are related to fintech characteristics and to the presence of banks in the overall financing process. Columns (1)-(4) of the table focus on the number of financing rounds. The results show that the number of rounds is significantly lower for EU-fintechs (by approximately half a round less than non-EU fintechs), although if these fintechs have the EBA license, this effect is compensated by receiving almost one additional round on average.²³ Bank involvement comes associated with more financing rounds, especially if the fintech is not headquartered in the EU, which increases the expected number of rounds by 1.85 to 2.5. Interestingly, note that the results in columns (3) and (4) -where we restrict

²³ Untabulated Wald tests do not reject the null that the sum of these two coefficients, in columns (1) and (2), is equal to zero.

the sample to EU fintechs- suggest that having the EBA license leads to a higher number of rounds within the EU fintech sample, but that this effect comes mostly from non-EU bank involvement (coefficient of 1.87 for non-EU banks compared to a coefficient of 0.96 for EU banks). Also, note that the coefficient of *eba_license* becomes non-significant in column (4), once we account for the differential impact of the two types of banks. The results for total amount raised through the financing process appear in columns (5)-(8). As suggested by the descriptives in Tables 1 and 2, EU fintechs tend to raise a significantly lower amount of funding (the coefficient of *EU_hq* implies approximately half the total amount, a proportion similar to that implied by the descriptives), although this gap is compensated when the EU-fintech has an EBA license.²⁴ Firms offering banking services only or both banking and payments services receive approximately twice the amount compared to the rest of fintechs. For fintechs offering payment services only, the amounts received are around 50% larger, but this effect becomes non-significant if we focus only on the subsample of EU fintechs (columns 7-8). The involvement of a bank leads to significantly larger amounts raised through the financing process (around threefold compared to when a bank is not involved), especially if the bank is a non-EU bank (see the coefficients in column (6)). Again, when we focus only on EU fintechs, the larger amount raised from bank involvement shown in column (7) seems to be related only to non-EU banks (column (8), where the coefficient suggests a threefold increase). However, the results in column (8) suggest that involvement of EU banks does not seem to increase significantly the amount raised by EU fintechs, whereas the coefficient in column (6) does suggest a significantly larger amount for the complete sample. This is a first result consistent with our expectation that non-EU banks seem to be generally driven by value considerations (so they provide larger amounts of total financing) whereas EU-banks may do so when investing in non-EU fintechs, but not when investing in EU fintechs, where the competition objective may dominate. Results in columns (9)-(12) on the average amount raised per round are, generally, parallel to the results of columns (5)-(8) (indeed, they should be similar by construction of the dependent variable and the median value of one round per fintech) so we do not dwell further on this part of Table 3.

Table 4 contains the results of estimating the models where the dependent variables are proxies of the outcome of the financing process. Specifically, Panel A looks at the drivers of startup valuation by focusing on the maximum valuation attached to the startup at a financing round (in most cases, the last round prior to exit). The results in this panel give us the intuition on how involvement of banks has correlated with fintech valuation. The results of the basic controls exhibit coefficients which are very similar, both in significance and signs, to the coefficients related to total amount raised in Table 3. In particular, EU fintechs tend to achieve significantly lower valuations, a general result that we can attribute to the fact that Europe's fragmented financial market creates barriers for startups attempting to scale up, as it offers less access to venture capital (VC) and other funding mechanisms. As with quantity raised, this undervaluation effect is eliminated for fintechs which hold an EBA license, a result in line with the value effect expected to result from PSD2.²⁵ Banking fintechs (in both the complete and the EU sample) and payment fintechs (in the complete sample) also achieve larger valuations. The result on *postval* (an indicator for whether the largest valuation -typically pre-exit- is after announcement of PSD2) is likely to stem from a mechanical effect (the pre-exit valuations tend to come later in the life of the fintechs). However, the interactions of *postval* with other variables do offer results of interest. Note that the involvement of a bank is associated with a larger valuation, and there is some (significant at the 10% level) evidence that in the post-2016 period this effect was even larger (coefficient of the *int_post_bank_involved* interaction in column (3)). This result does not hold in the sample restricted to EU fintechs (column (4)). Interestingly, when we split the banks into EU and non-EU (columns (5)-(8)), a pattern consistent with our expectations appears: non-EU banks are associated

²⁴ Again, Wald tests do not reject the null that the sum of these two coefficients, in columns (5) and (6), is equal to zero.

²⁵ Note that this result is attributable, at least partly, to the effect of PSD2 in helping fintechs -that obtained the licence- to achieve larger valuations and scale up. Our subsequent results suggest that this effect may not have come from- EU bank involvement, however, so that the effect of PSD2 may have come from alternative sources of financing.

with larger valuations, a result which does not hold for EU banks. Further, when we focus only on the EU fintech sample (columns (7) and (8)), we see that the positive effect of non-EU banks is mostly seen for the post-PSD2 valuations (note the significant coefficient of *int_post_nonEUbankinvolved*). There is some mild evidence that EU banks are positively related to EU fintech valuation overall (with a less significant and much smaller coefficient than non-EU banks) but this effect does not increase in the post-PSD2 sample (rather, we obtain a negative coefficient on the *int_post_EUbankinvolved* interaction, though not significant). All in all, the results are consistent with the expectation that non-EU banks invest much more clearly with value capture motives (which become more relevant after PSD2) whereas EU bank involvement does not seem to be as clearly linked to value effects. In view of the evidence in Li et al. (2023) that banks leverage their expertise for the effective selection of fintech startups, this result suggests alternative motivations for the investment of EU banks in EU fintechs, an implication which is in line with our expectation of a competition-based motivation of EU banks.

Li et al. (2023) also suggest that banks, compared to independent venture capitalists (IVCs), allocate a larger share of their investments to fintech startups and achieve a higher rate of IPO exits. The claim is that the superior exit performance cannot be attributed to a preference by banks for later-stage or larger investments or to their tendency to follow successful peer IVCs but, rather, to the aforementioned banks' industry expertise. With this in mind, Panel B of Table 4 examines the factors that determine the likelihood of a successful financing process (during the sample period), where we define success as exiting the VC market through an acquisition or through an IPO. Most of the results in this panel, as it tends to be the case of such analyses in the literature, show non-significant impacts. Indeed, the only significant (and robust) result is the much lower probability of success for fintechs located in the EU, reflected by the negative and very significant coefficient of *EU_hq*. Interestingly, bank involvement does not seem to have a significant effect on the probability of success, regardless of the location of the bank (or of the fintech). Panel C, finally, analyzes the probability that the process results in an M&A, conditional on the process being successful. The results in this table are not very conclusive (the sample size is quite reduced by the conditioning on success). Indeed, we only find some evidence that, overall, the involvement of a non-EU bank in the financing of a fintech reduces the likelihood of the company being acquired (so it increases the relative probability that the fintech reaches the IPO stage), and that the involvement of a bank in financing EU-fintechs increases the probability of an acquisition exit. Both these results are (marginally, so we do not press them further) in line with our arguments about the differential motivations of EU vs non-EU bank involvement in fintech financing.

Overall, the results in the three Panels of Table 4 are (broadly) aligned with evidence indicating that the participation of non-EU banks in funding rounds is associated with a higher company valuation and a lower probability of acquisition. At this stage of start-up level analysis, these results are suggestive of non-EU bank financing correlating with the startup becoming a scale-up through subsequent financing rounds. Investment of EU banks, however, seems to be less related to value. As a consequence, EU-based fintechs tend to reach lower valuations (unless they obtain the EBA license), thus facing greater challenges in financing their growth, and they have a significantly lower probability of success and a (marginally) lower probability that, if successful, they will do so by reaching the IPO stage.

4.3. Round-level analyses

Our regression results so far have been quite descriptive, and may be seen more as suggestive of the implications of our discussion of fintech financing by banks, in that they related general characteristics of the financing process to overall bank involvement. We now turn to the analysis of the more granular data on financing rounds, which will give us improved identification of the different bank investment strategies.

Our first results examine the probability that a bank will be present as one of the investors in a specific financing round. This evidence comes from estimation of probit models with the structure of model (2). Table 5 focuses on the presence of a bank in the financing round (dependent variable is *bank_present*, a dummy equal to one if a bank is present as investor in a specific round), and it contains the results of several specifications that differ in the variables that we interact with the *post* (PSD2) indicator. The first four regressors shown in the table capture the effects of characteristics of the financing round: the likelihood of a bank being present in the round increases with the amount previously raised by the fintech, as well as with the number of prior rounds. Furthermore, a bank's presence is more likely if the round is a debt round, and less likely if it is an early equity round (i.e., banks tend to enter later in the financing process). Regarding fintech-specific characteristics, it is significantly more likely that a bank will be present in financing rounds of fintechs that hold an EBA license, and if the fintech's headquarters are located in the EU. These latter two results are in line with the increased attractiveness of fintechs for banks after PSD2, and with the higher reliance of EU fintechs on bank financing. Finally, banks are more likely to be involved in banking and payment fintechs, and less involved in fintechs that operate mostly with consumers. All the above results, which we take from column (1), are generally stable across the rest of specifications.

In columns (2)-(4) we add additional variables to the model, and in column (5) we limit our sample to EU fintechs. Column (2) shows the results of augmenting the model with the variable *post*, which identifies financing rounds realized after the passage of PSD2. The estimated coefficient suggests that the introduction of PSD2 has had a positive impact on the probability of banks being interested in financing fintechs in general. However, this effect is accounted for by fintechs that are categorized in the banking industry and in payments (and banking): note the results in column (4), where we interact *post* with the three dummies that identify the subindustry of activity of the fintech. This result also holds (for fintechs carrying out *both* banking and payments activities) if we only focus on EU-fintechs, a result that qualifies the lack of significance of the interaction between *post* and *EU_hq* in column (3): the implementation of PSD2 has led to an increased investment appetite from banks toward startups that offer banking or both banking and payment services, and this result holds for fintechs that offer both types of services within the EU.

Table 6 delves into the results in Table 5 by looking at the probability of a bank being present in a financing round, depending on whether the bank is headquartered within or outside the EU.²⁶ Panel A displays the results corresponding to the analysis of the presence of EU banks: the dependent variable, *EU_bank_present* is a dummy equal to one if an EU-bank is present as investor in a specific financing round of a fintech. The effect of the first five regressors (round characteristics and *eba_license*) is robust, and similar to the results of general bank presence, with the exceptions that we do not find a significantly lower probability of participating in early rounds, and that the probability of involvement in EU fintechs is significantly higher: note that the coefficient increases from 0.288, in the baseline specification (1) of Table 5, to 0.949 in specification (1) in Table 6-Panel A. This result underscores, again, the preference of EU banks for geographical location. Regarding the effect of the introduction of PSD2, the overall result that EU banks are more likely to be present in financing rounds of fintechs after PSD2 does not hold (note the non-significant coefficient of *post* in columns (2) and (3)). However, an interesting effect appears (columns (4) and (5)) in that EU banks become much more likely to invest in paybank fintechs, that is, in fintechs that operate both in banking and payment activities after announcement of PSD2. In particular, a higher preference for fintechs that offer only payment services in the "pre-" period appears to be substituted by a preference for paybanks in the "post-" period.

²⁶ Note that the *EU_bank_present* and *non_EU_bank_present* are not mutually exclusive and, hence, the two panels of the table provide results of standalone interest.

The results of non-EU bank presence are shown in Panel B: in this panel, the dependent variable, *non_EU_bank_present*, is a dummy equal to one if a non-EU-bank is present as investor in a specific financing round of a fintech. For non-EU banks, the results regarding the four round-characteristic regressors are, again, comparable to those of Table 5, so we do not comment on them. The home bias of non-EU banks is also noticeable in that the probability of financing a fintech is negatively related to location of the fintech in the EU, although this result could also be attributable to a desire not to compete with EU-banks. Following the implementation of PSD2, non-EU banks show more interest in investing in paybanks in general (column (4)), a result suggestive of the value effect of PSD2 and of a value motivation of non-EU banks. When we restrict the sample to EU-fintechs (column (5)), it seems that PSD2 made non-EU banks more interested in EU-fintechs in general (note the major change in the coefficient on *post*), and shifted from payments to banking fintechs (note the interplay of signs of the baseline effects and of the interactions of *banking* and *paytech* with *post*). We take this result to suggest that non-EU banks did show a higher propensity to invest in EU banking fintechs after PSD2, but without competing with EU-banks, which increasingly focused on paybanks (as per the results in Panel A).

Table 7 qualifies the previous results by looking at the probability of the presence of banks (columns (1) and (2)), of EU banks (columns (3)-(5)) and of non-EU banks (columns (6)-(8)) conditional on the type of financing provided. The empirical models in this table have the structure of model (2), but the samples are restricted to equity financing rounds (columns (1), (3), (4), (6) and (7)) or to debt financing rounds (columns (2), (5) and (8)). In general, having an EBA license generates increased interest from banks; however, EU banks prefer to enter as shareholders in fintechs with the EBA license (note the significant coefficients of 0.37 and 0.18 in columns (3) and (4)), whereas the EBA license seems to increase the preference of non-EU banks to participate as creditors (note the significant coefficient of 0.63 in column (8)). Given that the EBA license is expected (and we showed in Table 4 results consistent with this expectation) to have a positive impact on the value of fintechs with the license, this result is, indirectly, in line with our predictions, since participation as creditor, which is the case only for non-EU banks, is likely to be more motivated by pure value considerations (a more valuable fintech is less likely to default) than by competition effects: entering as creditor does not provide control over the fintech. This result contrasts with the baseline effect of *EU_hq*, where we observe the general negative coefficient for non-EU banks (in both equity and debt participation), and a positive effect for EU-banks (again, in both equity and debt). As was the case with Table 6, the probability of bank participation in financing banking and paybank fintechs (i.e., platforms offering both banking and payment services) increases significantly after PSD2 passage. This is the case for both equity and debt participation from EU banks (in EU paybank fintechs), and for debt participation of non-EU banks (again, in EU paybank fintechs). This result is not so clear with respect to purely payment fintechs, which have a lower probability of obtaining equity from both EU banks and non-EU banks after PSD2 (negative and significant coefficients -0.44 and -3.17 in columns (3) and (7) respectively). Similarly to the EBA license effect, this result is consistent with the value effect of PSD2 on banking and paybank fintechs, and with a value motivation for non-EU banks. For EU banks, the result is consistent with both a value and a competitive motivation: we believe the results in Table 8 allow us to comment on which of the two effects may dominate.

The final step in our analysis involves estimating different specifications of model (3), where we look at the (log)amount raised in each financing round. The regressors in (3) attempt to capture the influence of the presence of banks, as well as the differential effects induced by PSD2. The estimation results of different specifications of model (3) are shown in Table 8.²⁷ We observe that financing rounds of fintechs

²⁷ Due to space limitations, we have omitted from the output table the coefficient estimates corresponding to the time trend and to the four variables which account for round characteristics. These results (available upon request) are consistent across specifications, and suggest an overall increasing trend in quantities (footnote 18), a positive and significant effect of the number

with the EBA license are significantly larger, by around 37%, relative to fintechs without an EBA license (columns (1) and (2)). The basic impact of the PSD2 is measured by the coefficient of *int_post_EU*, which is significant across all specifications (when the variable is included), suggesting that, indeed, the announcement of PSD2 in 2016 made EU fintechs more attractive (in the sense of being able to raise around 80% more funding per financing round) among their peers. This suggests that the introduction of PSD2 may have contributed to narrowing the overall financing gap for EU fintechs. Delving into fintech activities (payments, banking or both), we find that, in general, banking fintechs tend to raise more money, except when we restrict our sample to EU fintechs. When we do so, in columns (5) and (8), we do not find evidence that there are heterogeneous effects in funding across fintech types, i.e. banking, payments or both, whether before or after PSD2 introduction. In short, PSD2 does not seem to have had a differential effect amongst the sub-sectors of banking and payments within the fintech industry.

Regarding the financing effect of bank presence, the presence of banks leads to larger financing rounds (positive and significant coefficients of *bank_present* in columns (3) and (4)), although this larger amount does not seem to have changed in the *post* period (non-significant coefficient of the interaction *int_post_bank*). However, when we split into EU and non-EU banks, we find that, indeed, non-EU banks do tend to invest larger quantities when involved in a financing round (note the very significant coefficients of *non_EU_bank_present* in columns (6) to (8)). This effect, seems to have decreased after announcement of PSD2 (coefficient of the interaction between *post* and *non_EU_bank_present* in column (8)). In other words, involvement of non-EU banks in EU fintechs, especially paybanks, has increased (results from Tables 5-6), but more through debt (Table 7) and with a reduction in quantities invested (results from column (8) of Table 8). This hints at the fact that EU fintechs involved in payments and banking have not particularly benefitted from PSD2 in terms of raised financing from banks (only, maybe, through easier availability of debt), despite the fact that EU banks have been more significantly involved in financing the types of fintechs (paybanks) affected by PSD2 (large and significant coefficients for *int_post_paybank* in columns (3) and (4) of Table 7). Given the result (stemming from the coefficients of *EU_hq* and its interaction with *post*) that fintechs in general seem to have reduced the financing gap, the implication is that EU bank involvement has limited the general positive effect of PSD2 on the amount of financing to EU banking and payment fintechs. This, we believe, is suggestive of a competition-curbing motivation behind EU bank investment in EU fintechs.

To sum up, our results suggest that EU banks tend to invest in fintechs motivated by a stronger competition-driven objective, acting as shareholders but without providing scale-up potential and generating a sort of displacement of non-EU banks into creditor roles. These results are in line with findings that, while reform regulations such as PSD2 grant fintechs access to customer data that was previously exclusively controlled by banks and, hence, are potentially value enhancing, EU banks de facto retain market power over the standards that enable fintechs to access customer information (European Banking Authority, 2017; Haddad and Hornuf, 2019) and they reinforce this control through equity investments in EU fintechs. In contrast, the investment behavior of non-EU banks appears to be more motivated by the traditional objective of value capture, focusing on fintech scale-up and returns on equity (of non-EU fintechs) and debt (of EU fintechs). Finally, some evidence of a reduction in the financing gap appears in our results, but this reduction seems to come from non-bank types of financing and, hence, it may have applied mainly to the fintechs operating in subindustries of lower interest to EU banks.

of previous rounds and of the amount raised in the previous rounds, and a negative and significant effect if the round is an early round or a debt round.

5. Conclusions and policy implications

Startups play a crucial role in driving innovation and economic growth. However, securing adequate financing remains a major challenge, particularly in Europe, as highlighted by the European Commission (2024) in the Draghi report. Europe's fragmented financial market creates significant barriers for startups aiming to scale up, as it offers more limited access to venture capital (VC) and other funding mechanisms, at least in comparison to the United States. The reliance of EU startups on bank financing would seem to alleviate the difficulties created by fragmentation of the market, since EU banks are more international in scope.

In this paper, we examine the role of banks in the financing of European fintech startups. In particular, we focus on how the role of banks may be influenced by two competing motivations. On the one hand, banks may invest in fintechs with a value-enhancing approach - supporting their growth and scale-up to generate returns on equity or debt or technological complementarities-. On the other hand, since fintechs often emerge as competitors to traditional banks, investment in these firms may also serve as a strategic tool to limit competition - essentially, acquiring stakes in fintechs to curb their disruptive potential rather than fostering their expansion -.

Our empirical findings show evidence that banks, whether EU-based or non-EU-based, are more likely to invest in fintechs operating in the banking and payments sectors, particularly after the announcement of PSD2, a regulation which provided a value shock to the fintech sector (and a potential competitive shock to the banking sector). However, after PSD2, while both types of banks increased their investments in fintechs that were active in both banking and payments -i.e., the fintechs most affected by PSD2-, non-EU banks appeared to reduce their equity participation in EU-based fintechs, and switched to debt financing, whereas EU banks significantly increased their equity involvement. Regarding the characteristics of the financing process, we find that non-EU banks typically invest significantly larger amounts than EU banks. Finally, our findings suggest that fintechs receiving investments from non-EU banks have a higher probability of reaching the IPO stage rather than exiting through an acquisition. These results suggest a shift in the attractiveness of EU-based banking and payment fintechs for non-EU banks which may be aligned with the competition-curbing motivation of investments by EU banks.

We believe that our results support the view that EU banks are relatively more motivated by a competition-controlling strategy when investing in fintechs. They do so by acquiring equity stakes without providing the necessary scale-up potential, effectively limiting the fintechs' growth prospects. This investment approach likely contributed to the declining interest of non-EU banks in equity investment on EU-based fintechs after PSD2, as non-EU banks appear to prioritize value capture through fintech expansion and financial returns on both equity and debt.

Our results have implications regarding the financing gap of EU fintechs. In particular, the investment behavior of EU banks seems to pose a challenge for the scaling-up of EU fintechs, unless non-banking startup financing markets develop and integrate more effectively across EU countries both in size and in scope (i.e., cross-border integration). Some evidence of a positive impact of non-banking financing appears in our results, but the high reliance of EU fintechs on bank financing may limit this positive effect. The fact remains that, without a more unified and dynamic funding environment, European fintechs may keep struggling to reach their full potential, reinforcing the structural disadvantages of the region's fragmented financial landscape.

We believe our findings raise important issues regarding the impact of regulations aimed at promoting competition and startup growth. In particular, the upcoming adoption of the Payment Services Directive (PSD3) provides with further opportunities for research on whether a level playing field is being created

between traditional banks and fintechs in Europe. In June 2024, the European Commission released a draft proposal revising PSD2. This draft offered insights into potential new features of the next PSD3 that could enhance fintech access to financial institutions.²⁸ PSD3 is expected to: (1) improve the data sharing between banks and third-party providers, incentivizing banks to enhance their data sharing interfaces (APIs) and offering them compensation for doing so; (2) protect consumers' data privacy while enlarging data sharing under the current PSD2 to all EU payments systems; (3) permit data sharing with retailers for cash transactions in shops or independent ATM; (4) introduce more services—such as personal finance management, advisory services, and mortgage applications—accessible to both consumers and businesses through non-bank providers. If indeed the European Commission objective of reaching a more competitive financial sector in Europe is to be achieved, we believe our results suggest that the design and implementation of PSD3 should explicitly account for the incentives generated in bank behavior towards fintechs.

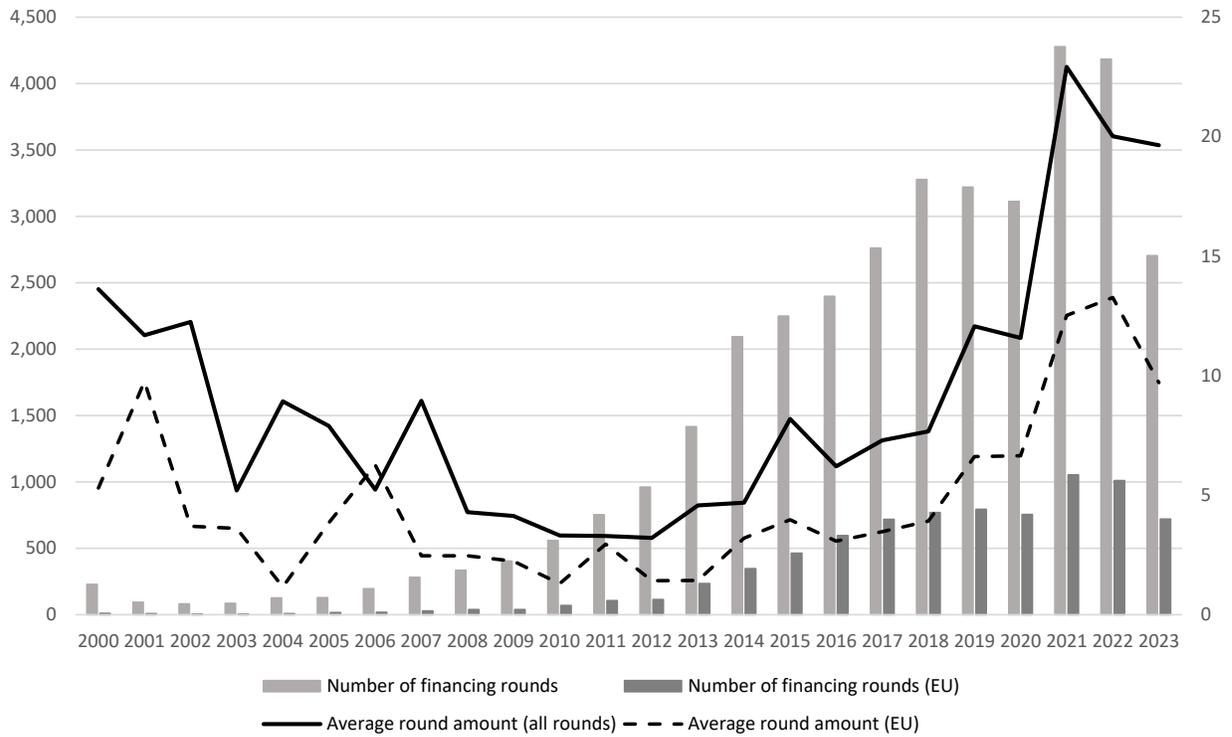
²⁸ https://ec.europa.eu/commission/presscorner/api/files/document/print/en/ip_23_3543/IP_23_3543_EN.pdf

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Figure 1. Evolution of the number of financing rounds and round size

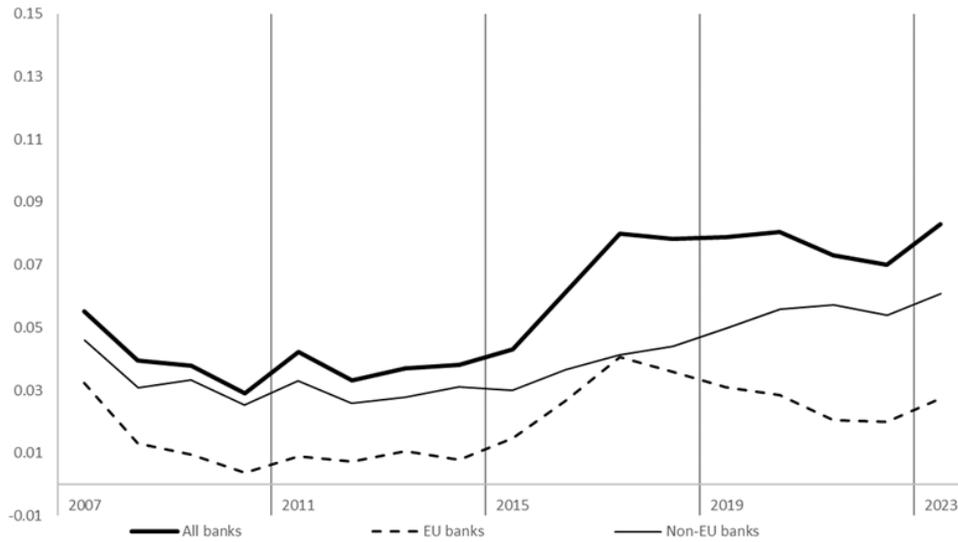


Source: Dealroom, authors' own elaboration.

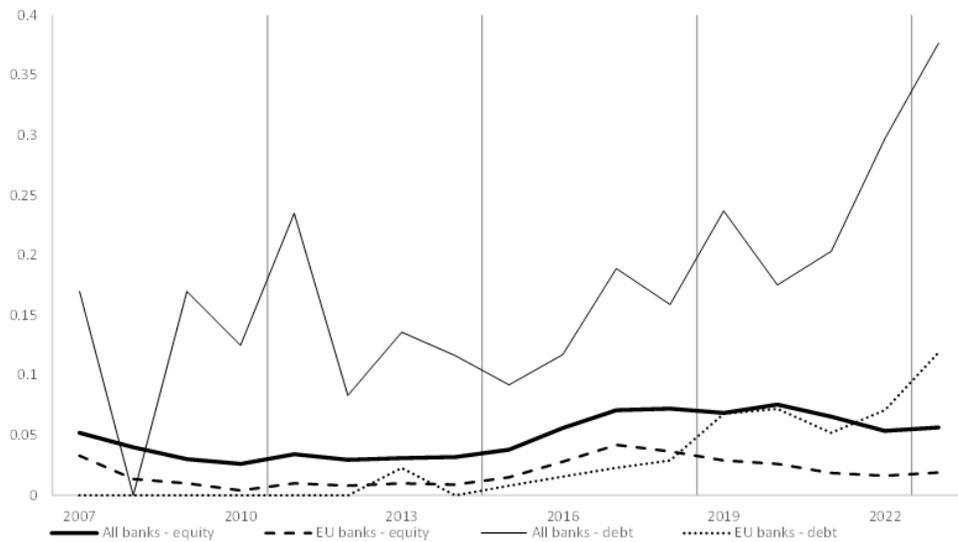
Notes: The figure shows the evolution over the complete sample period, and for all fintechs in the dataset of: (1) the total number of financing rounds per year (light-grey bars); (2) the number of financing rounds corresponding to EU-headquartered fintechs (dark-grey bars); (3) the average amount raised per round (solid black line); (4) the average amount raised per round by EU-headquartered fintechs (dashed black line).

Figure 2. The presence of banks in financing rounds

Panel A: Frequency of the presence of a bank in a financing round



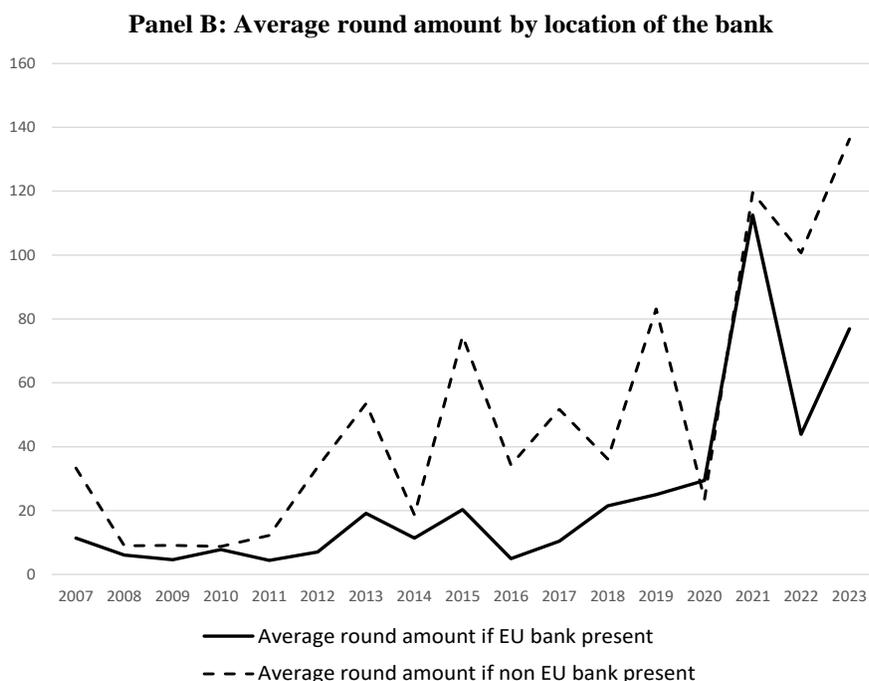
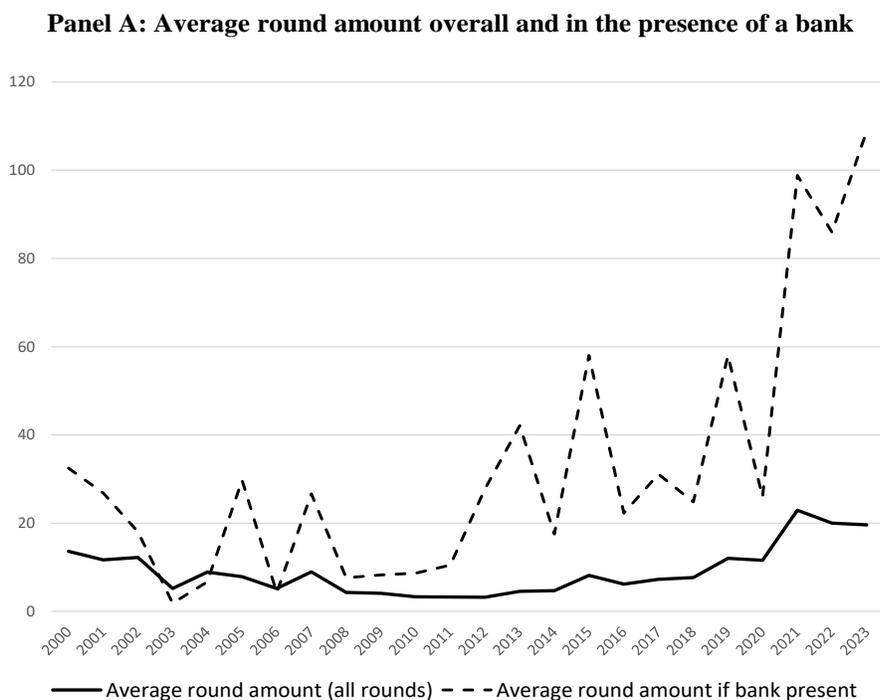
Panel B: Frequency of the presence of banks in equity vs debt rounds



Source: Dealroom, authors' own elaboration.

Notes: Panel A shows, for all fintechs in the dataset, of: (1) the proportion of financing rounds in which a bank is involved (solid thick line); (2) the proportion of financing rounds in which an EU-bank is involved (dashed line); (3) the proportion of financing rounds in which a non-EU bank is involved (solid thin line). Panel B shows, for all fintechs in the dataset: (1) the proportion of equity rounds in which a bank is involved (solid thick line); (2) the proportion of debt rounds in which a bank is involved (solid thin line); (3) the proportion of equity rounds in which an EU bank is involved (dashed line); (4) the proportion of debt rounds in which an EU bank is involved (dotted line). The period is restricted to 2007-2023 to avoid distortions in the early years due to the small number of financing rounds.

Figure 3. Evolution of the size of the financing rounds as a function of bank presence



Source: Dealroom, authors' own elaboration.

Notes: Panel A shows the evolution over the complete sample period, and for all financing rounds available of: (1) the average round amount in millions of euros (solid line); (2) the average round amount in millions of euros when a bank is present (dashed line). Panel B shows the evolution over the period 2007-2023 of: (1) the average round amount in millions of euros when an EU-bank is present (solid line); (2) the average round amount in millions of euros when a non-EU bank is present (dashed line).

Table 1. Summary statistics by company

Panel A. Sample-wide descriptive statistics						
	N	Mean	SD	Median	Min	Max
tot_equity	16,402	18.745	112.643	1.200	0	8,088.602
tot_funding	16,402	25.994	145.887	1.482	0	8,088.602
finalrounds	16,402	2.205	1.816	1	1	20
av_amount	16,159	8.208	53.312	0.858	0	4,813.806
eba_license	16,402	0.029	0.167	0	0	1
EU_hq	16,402	0.256	0.436	0	0	1
banking	16,402	0.044	0.204	0	0	1
paytech	16,402	0.118	0.322	0	0	1
paybank	16,402	0.016	0.124	0	0	1
consumer	14,730	0.344	0.475	0	0	1
bank_involved	8,167	0.132	0.339	0	0	1
EU_bank_involved	7,869	0.049	0.217	0	0	1
non_EU_bank_involved	8,058	0.096	0.295	0	0	1
exit_buy	16,402	0.118	0.323	0	0	1
exit_suc	16,402	0.135	0.341	0	0	1
prop_female	5,948	0.097	0.242	0	0	1
prop_topunis	11,071	0.179	0.329	0	0	1
prop_rookie	11,065	0.820	0.331	1	0	1
count_founders	11,071	1.973	1.173	2	1	12
av_exp	11,071	18.834	16.876	15	-6	360

Source: Dealroom, European Banking Authority, authors' analysis.

Notes: See Table A1-Panels A and B in appendix A for variable definitions. The sample comprises all fintech startups with founding date January-1998 or later. Panel A contains basic univariate descriptive statistics of the startup level variables. Panels B and C show the same descriptive statistics for a sample split based on whether the startup headquarters are located in a non-EU country (Panel B: see our definition of "EU country" in the main text) or in an EU country (Panel C). The descriptive statistics are calculated on the basis of the largest sample available for each variable.

Table 1 (continued)

Panel B. Startups with headquarters located in a non-EU country						
	N	Mean	SD	Median	Min	Max
tot_equity	12,202	21.818	123.195	1.539	0	8,088.602
tot_funding	12,202	30.388	160.706	1.885	0	8,088.602
finalrounds	12,202	2.298	1.899	2	1	20
av_amount	12,202	9,645	60.627	1.032	0	4,813.806
eba_license	12,202	0.008	0.091	0	0	1
banking	12,202	0.040	0.196	0	0	1
paytech	12,202	0.106	0.307	0	0	1
paybank	12,202	0.012	0.110	0	0	1
consumer	10,914	0.329	0.470	0	0	1
bank_involved	5,903	0.129	0.335	0	0	1
EU_bank_involved	5,623	0.020	0.140	0	0	1
non_EU_bank_involved	5,885	0.120	0.326	0	0	1
exit_buy	12,202	0.124	0.330	0	0	1
exit_suc	12,202	0.141	0.348	0	0	1
prop_female	4,048	0.103	0.247	0	0	1
prop_topunis	8,042	0.204	0.347	0	0	1
prop_rookie	8,038	0.819	0.333	1	0	1
count_founders	8,042	1.922	1.135	2	1	10
av_exp	8,042	19.088	17.557	15	-6	360
Panel C. Startups with headquarters located in an EU country						
	N	Mean	SD	Median	Min	Max
tot_equity	4,200	9.818	73.171	0.642	0	3,564.492
tot_funding	4,200	13.229	88.694	0.762	0	3,593.220
finalrounds	4,200	1.933	1.519	1	1	17
av_amount	4,200	4,296	19.992	0.492	0	650.289
eba_license	4,200	0.088	0.283	0	0	1
banking	4,200	0.055	0.228	0	0	1
paytech	4,200	0.153	0.360	0	0	1
paybank	4,200	0.025	0.157	0	0	1
consumer	3,816	0.385	0.487	0	0	1
bank_involved	2,264	0.142	0.349	0	0	1
EU_bank_involved	2,246	0.123	0.328	0	0	1
non_EU_bank_involved	2,173	0.031	0.174	0	0	1
exit_buy	4,200	0.101	0.302	0	0	1
exit_suc	4,200	0.115	0.320	0	0	1
prop_female	1,900	0.085	0.228	0	0	1
prop_topunis	3,029	0.113	0.264	0	0	1
prop_rookie	3,027	0.823	0.325	1	0	1
count_founders	3,029	2.108	1.259	2	1	12
av_exp	3,029	18.159	14.903	14	0	205

Source: Dealroom, European Banking Authority, authors' analysis.

Table 2. Summary statistics by financing round

Panel A. Sample-wide descriptive statistics by financing round						
	N	Mean	SD	Median	Min	Max
round_amount	11,332	20.826	102.564	2.588	0	6,158.802
months_from_prev	11,332	18.498	23.665	12.167	0	284.633
ln_amount	11,332	-0.133	3.763	0.951	-9.267	8.726
bank_present	11,332	0.081	0.272	0	0	1
EU_bank_present	11,332	0.032	0.176	0	0	1
non_EU_bank_present	11,332	0.052	0.221	0	0	1
bank_equity	11,332	0.066	0.248	0	0	1
bank_debt	11,332	0.015	0.121	0	0	1
EU_bank_equity	11,332	0.029	0.168	0	0	1
EU_bank_debt	11,332	0.003	0.055	0	0	1
non_EU_bank_equity	11,332	0.040	0.195	0	0	1
non_EU_bank_debt	11,332	0.012	0.109	0	0	1
earlyvcround	11,332	0.537	0.499	1	0	1
Panel B. Financing rounds of startups with headquarters located in a non-EU country						
	N	Mean	SD	Median	Min	Max
round_amount	8,205	23.943	116.347	3.310	.001	6,158.802
months_from_prev	8,205	17.837	23.224	12.167	0	284.633
ln_amount	8,205	0.054	3.804	1.197	-7.365	8.726
bank_present	8,205	0.073	0.260	0	0	1
EU_bank_present	8,205	0.012	0.110	0	0	1
non_EU_bank_present	8,205	0.064	0.245	0	0	1
bank_equity	8,205	0.058	0.233	0	0	1
bank_debt	8,205	0.015	0.122	0	0	1
EU_bank_equity	8,205	0.011	0.104	0	0	1
EU_bank_debt	8,205	0.001	0.037	0	0	1
non_EU_bank_equity	8,205	0.050	0.217	0	0	1
non_EU_bank_debt	8,205	0.014	0.119	0	0	1
earlyvcround	8,205	0.493	0.500	0	0	1
Panel C. Financing rounds of startups with headquarters located in an EU country						
	N	Mean	SD	Median	Min	Max
round_amount	3,127	12.648	50.117	1.452	0	918.611
months_from_prev	3,127	20.231	24.703	13.200	0	273.467
ln_amount	3,127	-0.625	3.608	0.373	-9.267	6.823
bank_present	3,127	0.101	0.301	0	0	1
EU_bank_present	3,127	0.084	0.278	0	0	1
non_EU_bank_present	3,127	0.019	0.136	0	0	1
bank_equity	3,127	0.087	0.282	0	0	1
bank_debt	3,127	0.013	0.115	0	0	1
EU_bank_equity	3,127	0.077	0.266	0	0	1
EU_bank_debt	3,127	0.008	0.087	0	0	1
non_EU_bank_equity	3,127	0.013	0.114	0	0	1
non_EU_bank_debt	3,127	0.006	0.076	0	0	1
earlyvcround	3,127	0.651	0.477	1	0	1

Source: Dealroom, European Banking Authority, authors' analysis.

Notes: See Table A1-Panel C in appendix A for variable definitions. The sample comprises all equity and debt financing rounds of startups with founding date January-1998 or later, conditional on having data on all other round-level variables, including the startup level fixed variables.

Table 3. Global characteristics of the financing process

Dep. variable	finalrounds				ln_totamount				ln_av_amount			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
eba_license	0.956*** (0.269)	0.856*** (0.263)	0.608** (0.291)	0.316 (0.259)	0.772** (0.347)	0.822** (0.390)	0.694 (0.473)	0.475 (0.538)	0.575* (0.310)	0.630* (0.353)	0.548 (0.427)	0.385 (0.492)
EU_hq	-0.624*** (0.066)	-0.478*** (0.063)			-1.104*** (0.133)	-0.857*** (0.142)			-0.906*** (0.123)	-0.692*** (0.132)		
banking	0.643*** (0.181)	0.674*** (0.189)	0.525* (0.273)	0.480* (0.279)	0.927*** (0.239)	1.014*** (0.258)	1.158*** (0.346)	1.193*** (0.373)	0.733*** (0.216)	0.810*** (0.234)	0.998*** (0.318)	1.046*** (0.346)
paytech	0.313*** (0.101)	0.260*** (0.094)	0.165 (0.142)	0.174 (0.129)	0.448** (0.178)	0.435** (0.187)	0.232 (0.303)	0.257 (0.310)	0.353** (0.163)	0.341** (0.173)	0.152 (0.281)	0.164 (0.288)
paybank	0.285 (0.230)	0.227 (0.222)	0.226 (0.367)	0.252 (0.369)	0.953*** (0.282)	0.919*** (0.304)	0.661 (0.521)	0.616 (0.562)	0.830*** (0.253)	0.806*** (0.274)	0.599 (0.470)	0.548 (0.510)
consumer	0.192*** (0.069)	0.171*** (0.066)	0.262** (0.107)	0.154 (0.097)	0.019 (0.129)	-0.033 (0.137)	-0.013 (0.218)	-0.092 (0.227)	-0.021 (0.119)	-0.069 (0.126)	-0.069 (0.202)	-0.130 (0.211)
bank_involved	2.500*** (0.118)		1.854*** (0.179)		2.633*** (0.141)		1.601*** (0.273)		1.878*** (0.127)		0.981*** (0.245)	
EU_bank_involved		1.327*** (0.211)		0.955*** (0.207)		0.622** (0.279)		0.411 (0.376)		0.250 (0.250)		0.088 (0.338)
non_EU_bank_involved		2.086*** (0.179)		1.869*** (0.404)		3.022*** (0.198)		2.963*** (0.519)		2.415*** (0.177)		2.391*** (0.471)
Fintech team controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
EU-headquarters only	No	No	Yes	Yes	No	No	Yes	Yes	No	No	Yes	Yes
Observations	3,136	2,892	1,087	1,015	3,136	2,892	1,087	1,015	3,136	2,892	1,087	1,015
R-squared	0.322	0.256	0.254	0.196	0.162	0.133	0.104	0.098	0.116	0.102	0.074	0.076

Source: Dealroom, European Banking Authority, authors' analysis.

Notes: Fintech-level cross-sectional regressions of characteristics of the complete financing process (number of financing rounds, *finalrounds*, (log)amount raised, *ln_totamount*, and average amount per round, *ln_av_amount*) on startup characteristics. Robust standard errors in parentheses. *, ** and *** denote significance at the 10%, 5% and 1% level based on a two-sided test. The intercepts have been omitted from the output table.

Table 4. Outcome of the financing process

Dep. variable	Panel A. Startup valuation							
	ln_value							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
eba_license	1.142*** (0.169)	0.995*** (0.198)	1.000*** (0.197)	0.861*** (0.222)	1.109*** (0.213)	0.974*** (0.221)	0.906*** (0.246)	0.862*** (0.248)
EU_hq	-0.608*** (0.050)	-0.639*** (0.065)	-0.633*** (0.065)		-0.519*** (0.067)			
banking	0.511*** (0.108)	0.321** (0.133)	0.320** (0.133)	0.411** (0.195)	0.369*** (0.141)	0.349** (0.142)	0.454** (0.209)	0.460** (0.211)
paytech	0.378*** (0.069)	0.285*** (0.087)	0.283*** (0.087)	0.188 (0.136)	0.250*** (0.091)	0.248*** (0.093)	0.175 (0.139)	0.180 (0.137)
paybank	0.201 (0.139)	0.038 (0.156)	0.039 (0.155)	-0.104 (0.223)	-0.091 (0.147)	-0.114 (0.156)	-0.169 (0.239)	-0.114 (0.233)
consumer	0.000 (0.049)	0.064 (0.064)	0.063 (0.064)	0.134 (0.097)	0.045 (0.067)	0.047 (0.067)	0.110 (0.099)	0.118 (0.098)
postval	1.584*** (0.049)	1.617*** (0.064)	1.570*** (0.071)	1.531*** (0.102)	1.567*** (0.067)	1.635*** (0.071)	1.514*** (0.096)	1.521*** (0.102)
bank_involved		0.969*** (0.079)	0.773*** (0.132)	0.432*** (0.162)				
int_post_bank_involved			0.267* (0.162)	0.244 (0.235)				
EU_bank_involved					0.113 (0.123)	0.095 (0.179)	0.209 (0.150)	0.380* (0.208)
non_EU_bank_involved					1.251*** (0.126)	1.297*** (0.279)	1.098*** (0.279)	-0.287 (0.616)
int_post_EUbankinvolved						-0.278 (0.241)		-0.327 (0.292)
int_post_nonEUbankinvolved						0.136 (0.311)		1.682** (0.687)
Fintech team controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
EU-headquarters only	No	No	No	Yes	No	No	Yes	Yes
Observations	4127	2413	2413	840	2186	2186	774	774
R-squared	0.319	0.389	0.390	0.365	0.380	0.365	0.364	0.369

Source: Dealroom, European Banking Authority, authors' analysis.

Notes: Startup level cross-sectional analyses of the valuation the start-up received during the financing process (Panel A), the probability of successful exit (*exit_suc*, equal to one if exit through M&A or IPO, 0 otherwise) of the financing process (Panel B) and of the probability of exit by M&A (*exit_buy*, equal to one if exit through M&A, 0 otherwise), conditional on *exit_suc*=1 (Panel C). *int_post_bankinvolved* / *int_post_EUbankinvolved* / *int_post_nonEUbankinvolved* are the interactions between *postval* and *bank_involved*, *EU_bank_involved* and *non_EU_bank_involved*, respectively. Robust standard errors in parentheses. *, ** and *** denote significance at the 10%, 5% and 1% level based on a two-sided test. The intercepts have been omitted from the output table.

Table 4 (continued):

Panel B. Probability of successful exit (M&A or IPO)					
Dep. variable	exit_suc				
	(1)	(2)	(3)	(4)	(5)
eba_license	0.045 (0.117)	0.096 (0.140)	0.132 (0.152)	0.067 (0.178)	0.149 (0.196)
EU_hq	-0.170*** (0.044)	-0.211*** (0.058)	-0.224*** (0.063)		
banking	0.073 (0.088)	-0.076 (0.118)	-0.029 (0.123)	0.097 (0.183)	0.109 (0.195)
paytech	0.118** (0.057)	0.089 (0.074)	0.082 (0.077)	0.090 (0.127)	0.053 (0.133)
paybank	0.043 (0.135)	0.037 (0.171)	0.007 (0.186)	0.059 (0.262)	-0.112 (0.298)
consumer	0.013 (0.042)	0.062 (0.055)	0.045 (0.057)	0.166* (0.097)	0.104 (0.101)
bank_involved		0.092 (0.066)		0.111 (0.115)	
EU_bank_involved			0.013 (0.122)		0.069 (0.149)
non_EU_bank_involved			0.010 (0.101)		-0.302 (0.298)
Startup team controls	Yes	Yes	Yes	Yes	Yes
EU-headquarters only	No	No	No	Yes	Yes
Observations	5,522	3,136	2,892	1,087	1,015
Pseudo R ²	0.030	0.033	0.034	0.039	0.034
Panel C. Probability of exit by M&A conditional on successful exit					
Dep. variable	exit_buy				
	(1)	(2)	(3)	(4)	(5)
eba_license	-0.279 (0.270)	-0.325 (0.322)	-0.325 (0.357)	-0.433 (0.537)	-0.501 (0.563)
EU_hq	-0.127 (0.116)	-0.189 (0.150)	-0.373** (0.162)		
banking	0.001 (0.225)				
paytech	-0.082 (0.136)	-0.084 (0.168)	-0.052 (0.183)	0.210 (0.355)	0.219 (0.351)
paybank	0.403 (0.386)	0.680 (0.557)			
consumer	-0.073 (0.105)	-0.174 (0.137)	-0.239 (0.146)	-0.222 (0.251)	-0.242 (0.255)
bank_involved		-0.172 (0.154)		0.618* (0.372)	
EU_bank_involved			0.157 (0.326)		0.171 (0.436)
non_EU_bank_involved			-0.512** (0.222)		
Startup team controls	Yes	Yes	Yes	Yes	Yes
EU-headquarters only	No	No	No	Yes	Yes
Observations	970	546	478	145	129
Pseudo R ²	0.024	0.040	0.052	0.058	0.039

Source: Dealroom, European Banking Authority, authors' analysis.

Table 5. Probability of bank presence in financing round

Dep. variable	bank_present				
	(1)	(2)	(3)	(4)	(5)
ln_totalsofar	0.061*** (0.011)	0.058*** (0.011)	0.058*** (0.011)	0.058*** (0.011)	0.029* (0.015)
roundsofar	0.054*** (0.010)	0.049*** (0.010)	0.049*** (0.010)	0.049*** (0.010)	0.044** (0.017)
earlyvcround	-0.173*** (0.045)	-0.189*** (0.045)	-0.189*** (0.045)	-0.188*** (0.045)	-0.149* (0.077)
debt_round	0.611*** (0.060)	0.606*** (0.060)	0.607*** (0.060)	0.613*** (0.060)	0.438*** (0.116)
eba_license	0.228*** (0.078)	0.222*** (0.078)	0.224*** (0.078)	0.222*** (0.078)	0.226** (0.103)
EU_hq	0.288*** (0.041)	0.266*** (0.042)	0.382*** (0.109)	0.401*** (0.110)	
banking	0.283*** (0.061)	0.277*** (0.061)	0.276*** (0.061)	-0.139 (0.222)	-0.194 (0.389)
paytech	0.113** (0.050)	0.129*** (0.050)	0.127** (0.050)	0.226** (0.104)	0.118 (0.203)
paybank	0.171* (0.102)	0.159 (0.102)	0.159 (0.102)	-3.953*** (0.103)	-3.691*** (0.155)
consumer	-0.097** (0.038)	-0.094** (0.038)	-0.095** (0.038)	-0.094** (0.038)	-0.076 (0.065)
post		0.214*** (0.051)	0.246*** (0.058)	0.239*** (0.065)	0.053 (0.131)
int_post_EU			-0.134 (0.116)	-0.153 (0.117)	
int_post_banking				0.457** (0.231)	0.620 (0.400)
int_post_paytech				-0.127 (0.116)	0.079 (0.221)
int_post_paybank				4.170*** (0.146)	4.039*** (0.216)
Fintech team controls	Yes	Yes	Yes	Yes	Yes
EU-headquarters only	No	No	No	No	Yes
Observations	11,302	11,302	11,302	11,302	3,101
Pseudo R ²	0.092	0.095	0.096	0.098	0.062

Source: Dealroom, European Banking Authority, authors' analysis.

Notes: Round-level probit models of the probability of a bank being one of the investors of the financing round (*bank_present* equal to one if at least one of the round investors is a bank or an investment company directly linked to a bank, 0 otherwise). *int_post_EU* is the interaction between *post* (a dummy equal to 1 if the financing round happens after January 2016) and *EU_hq* (a dummy equal to 1 if the startup's headquarters are located in an EU country). *int_post_banking* / *int_post_paytech* / *int_post_paybank* are the interactions between *post* and *banking*, *paytech* and *paybank*, respectively. Robust standard errors in parentheses. *, ** and *** denote significance at the 10%, 5% and 1% level based on a two-sided test. The intercepts have been omitted from the output table.

Table 6. Probability of bank presence in financing round by bank location

Panel A. Probability of involvement in financing round by an EU bank					
Dep. variable	EU_bank_present				
	(1)	(2)	(3)	(4)	(5)
ln_totalsofar	0.031** (0.013)	0.030** (0.013)	0.030** (0.013)	0.030** (0.013)	0.017 (0.015)
roundsofar	0.057*** (0.013)	0.055*** (0.013)	0.055*** (0.013)	0.055*** (0.013)	0.030* (0.018)
earlyvcround	-0.023 (0.065)	-0.028 (0.065)	-0.028 (0.065)	-0.022 (0.065)	-0.102 (0.080)
debt_round	0.179* (0.096)	0.174* (0.095)	0.175* (0.095)	0.187* (0.096)	0.174 (0.132)
eba_license	0.353*** (0.094)	0.349*** (0.094)	0.350*** (0.094)	0.362*** (0.094)	0.179* (0.107)
EU_hq	0.949*** (0.056)	0.940*** (0.057)	1.016*** (0.135)	1.054*** (0.136)	
banking	0.466*** (0.077)	0.466*** (0.077)	0.464*** (0.077)	0.100 (0.296)	-0.136 (0.373)
paytech	0.143** (0.070)	0.150** (0.070)	0.150** (0.070)	0.494*** (0.142)	0.096 (0.205)
paybank	0.210* (0.124)	0.208* (0.123)	0.208* (0.123)	-3.906*** (0.164)	-3.779*** (0.151)
consumer	-0.088* (0.053)	-0.086 (0.053)	-0.087 (0.053)	-0.085 (0.053)	-0.050 (0.067)
post		0.083 (0.074)	0.131 (0.105)	0.236** (0.110)	0.003 (0.131)
int_post_EU			-0.090 (0.146)	-0.128 (0.146)	
int_post_banking				0.394 (0.306)	0.615 (0.386)
int_post_paytech				-0.442*** (0.159)	0.081 (0.225)
int_post_paybank				4.145*** (0.201)	4.180*** (0.213)
Fintech team controls	Yes	Yes	Yes	Yes	Yes
EU-headquarters only	No	No	No	No	Yes
Observations	11,302	11,302	11,302	11,302	11,302
Pseudo R ²	0.155	0.155	0.155	0.157	0.157

Source: Dealroom, European Banking Authority, authors' analysis.

Notes: Panel A: Round-level probit models of the probability of an EU bank being one of the investors of the financing round (*EU_bank_present* equal to one if at least one of the round investors is an EU bank or an investment company directly linked to an EU bank, 0 otherwise). Panel B: Round-level probit models of the probability of a non-EU bank being one of the investors of the financing round (*non_EU_bank_present* equal to one if at least one of the round investors is a non-EU bank or an investment company directly linked to a non-EU bank, 0 otherwise). All interaction variables are defined in Table 5. Robust standard errors in parentheses. *, ** and *** denote significance at the 10%, 5% and 1% level based on a two-sided test. The intercepts have been omitted from the output table.

Table 6 (continued)

Panel B. Probability of involvement in financing round by a non-EU bank					
Dep. variable	non_EU_bank_present				
	(1)	(2)	(3)	(4)	(5)
ln_totalsofar	0.075*** (0.015)	0.071*** (0.015)	0.071*** (0.015)	0.071*** (0.015)	0.047 (0.038)
roundsofar	0.043*** (0.012)	0.038*** (0.012)	0.038*** (0.012)	0.038*** (0.012)	0.057* (0.029)
earlyvcround	-0.271*** (0.055)	-0.294*** (0.056)	-0.294*** (0.056)	-0.293*** (0.056)	-0.420*** (0.147)
debt_round	0.684*** (0.064)	0.680*** (0.064)	0.678*** (0.064)	0.681*** (0.064)	0.657*** (0.162)
eba_license	-0.081 (0.111)	-0.091 (0.111)	-0.091 (0.112)	-0.095 (0.112)	0.166 (0.185)
EU_hq	-0.510*** (0.064)	-0.541*** (0.065)	-0.915*** (0.352)	-0.908*** (0.345)	
banking	0.123 (0.079)	0.112 (0.079)	0.114 (0.079)	-0.260 (0.303)	-0.437* (0.254)
paytech	0.104* (0.057)	0.121** (0.057)	0.124** (0.057)	0.177 (0.123)	3.540*** (0.380)
paybank	0.080 (0.135)	0.060 (0.134)	0.060 (0.134)	-3.840*** (0.150)	0.084 (0.193)
consumer	-0.112** (0.045)	-0.111** (0.045)	-0.110** (0.045)	-0.111** (0.045)	-0.154 (0.125)
post		0.265*** (0.060)	0.246*** (0.062)	0.234*** (0.071)	3.703*** (0.136)
int_post_EU			0.396 (0.361)	0.388 (0.355)	
int_post_banking				0.406 (0.314)	0.591** (0.295)
int_post_paytech				-0.066 (0.137)	-3.436*** (0.420)
int_post_paybank				3.953*** (0.205)	-0.166 (0.392)
Fintech team controls	Yes	Yes	Yes	Yes	Yes
EU-headquarters only	No	No	No	No	Yes
Observations	11,302	11,302	11,302	11,302	3,101
Pseudo R ²	0.136	0.140	0.141	0.142	0.171

Source: Dealroom, European Banking Authority, authors' analysis.

Table 7. Bank presence by type of financing

Dep. variable	bank_equity	bank_debt	EU_bank_equity		EU_bank_debt	non_EU_bank_equity		non_EU_bank_debt
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ln_totalsofar	0.040*** (0.010)	0.199*** (0.042)	0.024* (0.013)	0.008 (0.015)	0.082** (0.035)	0.048*** (0.014)	0.017 (0.036)	0.199*** (0.048)
roundsofar	0.053*** (0.010)	-0.018 (0.031)	0.046*** (0.014)	0.021 (0.019)	0.079** (0.039)	0.049*** (0.013)	0.074** (0.030)	-0.040 (0.034)
earlyvcround	-0.236*** (0.046)		-0.049 (0.066)	-0.138* (0.080)		-0.336*** (0.057)	-0.489*** (0.144)	
eba_license	0.189** (0.082)	0.654** (0.313)	0.368*** (0.097)	0.183* (0.109)	0.152 (0.463)	-0.189 (0.129)	0.103 (0.201)	0.629** (0.318)
EU_hq	0.458*** (0.111)	-4.283*** (0.212)	1.033*** (0.135)		1.133*** (0.221)	-0.834** (0.334)		-4.343*** (0.211)
banking	-0.019 (0.215)	-4.315*** (0.262)	0.148 (0.292)	-0.055 (0.374)	0.368 (0.321)	-0.159 (0.297)	-0.084 (0.157)	-4.309*** (0.250)
paytech	0.255** (0.107)	-0.163 (0.433)	0.496*** (0.142)	0.103 (0.205)	0.139 (0.251)	0.204 (0.128)	3.223*** (0.366)	-0.128 (0.430)
paybank	-3.847*** (0.124)	-4.469*** (0.219)	-3.679*** (0.168)	-3.810*** (0.153)		-3.149*** (0.103)	-0.096 (0.145)	-4.499*** (0.218)
consumer	-0.117*** (0.040)	0.067 (0.117)	-0.084 (0.055)	-0.044 (0.070)	-0.078 (0.193)	-0.149*** (0.049)	-0.156 (0.140)	0.085 (0.122)
post	0.264*** (0.071)	-0.052 (0.183)	0.208* (0.112)	-0.010 (0.132)		0.265*** (0.079)	3.382*** (0.116)	-0.103 (0.183)
int_post_EU	-0.191 (0.119)	4.390*** (0.243)	-0.122 (0.147)			0.313 (0.346)		3.855*** (0.251)
int_post_banking	0.378* (0.225)	4.246*** (0.351)	0.376 (0.302)	0.541 (0.387)		0.346 (0.310)	0.271 (0.232)	4.181*** (0.349)
int_post_payment	-0.164 (0.121)	0.503 (0.458)	-0.442*** (0.162)	0.070 (0.227)		-0.114 (0.145)	-3.165*** (0.420)	0.531 (0.455)
int_post_paybank	4.094*** (0.161)	4.464*** (0.415)	3.982*** (0.204)	4.291*** (0.216)		3.242*** (0.183)	-0.063 (0.476)	4.810*** (0.422)
Fintech team controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
EU-headquarters only	No	No	No	Yes	No	No	Yes	No
Observations	10618	684	10618	2916	538	10618	2916	684
Pseudo R ²	0.069	0.159	0.157	0.036	0.182	0.102	0.117	0.165

Source: Dealroom, European Banking Authority, authors' analysis.

Notes: Round-level regressions of the involvement of banks in the financing rounds depending on the type of financing. *bank_equity* / *EU_bank_equity* / *non_EU_bank_equity* are dummy variables equal to 1 if a bank / EU-bank / non-EU-bank is involved in an equity round. *bank_debt* / *EU_bank_debt* / *non_EU_bank_debt* are dummy variables equal to 1 if a bank / EU-bank / non-EU-bank is involved in a debt round. *int_post_EU* and *int_post_banking* are defined in Table 5. Robust standard errors in parentheses. *, ** and *** denote significance at the 10%, 5% and 1% level based on a two-sided test.

Table 8. The size of the financing round

Dep. variable	ln_amount							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
eba_license	0.370*** (0.135)	0.367*** (0.135)	0.187 (0.149)	0.190 (0.149)	0.373* (0.214)	0.228 (0.149)	0.232 (0.149)	0.361* (0.215)
EU_hq	-0.205*** (0.060)	-0.879*** (0.130)	-0.879*** (0.176)	-0.887*** (0.176)		-0.823*** (0.176)	-0.852*** (0.180)	
banking	0.483*** (0.100)	0.778*** (0.215)	0.789*** (0.261)	0.792*** (0.261)	0.677 (0.578)	0.797*** (0.262)	0.796*** (0.261)	0.684 (0.580)
paytech	0.283*** (0.073)	0.248** (0.125)	0.241 (0.154)	0.231 (0.154)	0.211 (0.367)	0.247 (0.154)	0.231 (0.155)	0.182 (0.368)
paybank	0.002 (0.172)	0.070 (0.411)	0.196 (0.524)	0.209 (0.524)	-1.269 (1.033)	0.191 (0.525)	0.202 (0.525)	-1.270 (1.031)
consumer	0.095* (0.054)	0.099* (0.054)	0.140** (0.063)	0.140** (0.063)	0.126 (0.118)	0.142** (0.063)	0.141** (0.063)	0.130 (0.118)
post	-0.212** (0.099)	-0.412*** (0.112)	-0.227* (0.137)	-0.214 (0.138)	0.358 (0.275)	-0.214 (0.137)	-0.210 (0.138)	0.384 (0.276)
int_post_EU		0.830*** (0.144)	0.787*** (0.190)	0.796*** (0.190)		0.797*** (0.190)	0.830*** (0.194)	
int_post_banking		-0.354 (0.242)	-0.364 (0.289)	-0.364 (0.288)	-0.409 (0.614)	-0.348 (0.289)	-0.343 (0.289)	-0.400 (0.615)
int_post_payment		0.066 (0.150)	0.073 (0.180)	0.084 (0.181)	-0.142 (0.406)	0.064 (0.181)	0.080 (0.181)	-0.111 (0.406)
int_post_paybank		-0.075 (0.452)	-0.100 (0.563)	-0.111 (0.563)	1.349 (1.082)	-0.080 (0.564)	-0.088 (0.563)	1.379 (1.080)
bank_present			0.692*** (0.116)	0.981*** (0.277)	0.235 (0.569)			
int_post_bank				-0.336 (0.301)	-0.051 (0.607)			
EU_bank_present						-0.008 (0.179)	0.503 (0.441)	0.110 (0.571)
non_EU_bank_present						1.070*** (0.140)	1.139*** (0.336)	4.132*** (0.451)
int_post_EU_bank							-0.587 (0.481)	-0.160 (0.614)
int_post_nonEU_bank							-0.083 (0.364)	-2.957*** (0.645)
Fintech team controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Round characteristics controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
EU-headquarters only	No	No	No	No	Yes	No	No	Yes
Observations	15,584	15,584	11,302	11,302	3,101	11,302	11,302	3,101
R-squared	0.225	0.226	0.245	0.245	0.214	0.246	0.246	0.216

Source: Dealroom, European Banking Authority, authors' analysis.

Notes: Round-level regressions of the amount raised in the financing round (*ln_amount*) on startup and round-level characteristics. *int_post_bank* / *int_post_EU_bank* / *int_post_nonEU_bank* are interactions between *post* and *bank_present* / *EU_bank_present* / *non_EU_bank_present*, respectively. *int_post_EU* and *int_post_banking* are defined in Table 5. Robust standard errors in parentheses. *, ** and *** denote significance at the 10%, 5% and 1% level based on a two-sided test.

APPENDIX A

Table A1: Variable definitions and measurement

Unless explicitly stated otherwise, the data come from the DealRoom.co database: some of the definitions below are taken verbatim from the Dearroom.co website. Interactions constructed from the main variables in Panels A-C and other proxies constructed for the purpose of a specific analysis are explained in the main text and in table captions.

Panel A: Startup level variables directly collected from Dealroom (unless explicitly stated)	
Name	Definition and measurement
<i>eba_license</i>	A dummy equal to 1 if the startup obtained the EBA license at some point through the sample, a 0 if not. These data come from the European Banking Authority.
<i>EU_hq</i>	A dummy equal to 1 if the startup is headquartered in the EU (excluding UK during pre-Brexit years), a 0 if not.
<i>prop_female</i>	Proportion of startup founders who are female
<i>prop_rookie</i>	Proportion of <i>rookie</i> startup founders. Rookie founders are those for whom this is the first startup founded
<i>prop_topunis</i>	Proportion of startup founders who graduated from a Top-25 university as defined by Dealroom
<i>count_founders</i>	Number of startup founders
<i>av_exp</i>	Average experience of the startup founders: experience for each individual founder is calculated by summing the years of experience of the founder in all the startups that he/she has founded
<i>banking</i>	A 1 if the startup has “banking” as one of its subindustries of activity but not “payments”. Banking startups are those “developing solutions, and/or digitising the activities, services and products of traditional banks”
<i>paytech</i>	A 1 if the startup has “payments” as one of its subindustries of activity but not “banking”. Payment startups are those “developing solutions to improve the way financial transactions are settled, and how money is transferred between two parties”
<i>paybank</i>	A 1 if the startup has both “banking” and “payments” in its subindustries of activity
<i>consumer</i>	A 1 if the startup is considered to be “business-to-consumer,” so that its customers are primarily, or exclusively, individual consumers
Panel B: Startup level variables constructed from financing round information	
Name	Definition and measurement
<i>tot_funding</i>	Total amount of funding in current (million) euros raised by the startup from founding till the end of the sample
<i>tot_equity</i>	Total amount of equity funding in current (million) euros raised by the startup from founding till the end of the sample
<i>final_rounds</i>	Total number of financing rounds (including equity and debt) for the startup from founding till the end of the sample
<i>ln_totamount</i>	Natural logarithm of the total amount (in current million euros) <i>tot_funding</i> received in the equity or debt financing rounds from founding till the end of the sample

<i>av_amount</i>	Average amount per round received (<i>tot_funding / final_rounds</i>) in the equity or debt financing rounds from founding till the end of the sample
<i>ln_av_amount</i>	Natural logarithm of <i>av_amount</i>
<i>ln_value</i>	Natural logarithm of one plus the maximum valuation (in million euros) that the start-up received during the financing process
<i>exit_buy</i>	A dummy equal to 1 if the startup exited through a M&A, a 0 if not.
<i>exit_suc</i>	A dummy equal to 1 if the startup exited through an M&A or IPO, a 0 if not
<i>bank_involved</i>	A dummy equal to 1 if a bank is involved in any of the equity or debt financing rounds from founding till the end of the sample, a 0 if not, blank if investor information of some round is missing
<i>EU_bank_involved</i>	A dummy equal to 1 if a bank headquartered in the EU (excluding UK during pre-Brexit years) is involved in any of the equity or debt financing rounds from founding till the end of the sample, a 0 if not, blank if investor information of some round is missing and no EU bank is involved in any of the rounds with investor information
<i>non_EU_bank_involved</i>	A dummy equal to 1 if a bank not headquartered in the EU is involved in any of the equity or debt financing rounds from founding till the end of the sample, a 0 if not, blank if investor information of some round is missing and no non-EU bank is involved in any of the rounds with investor information
<i>postval</i>	A dummy equal to 1 if the valuation (<i>ln_value</i>) corresponds to a round which happens on or after January 2016, a 0 if not
Panel C: Round level variables	
Name	Definition and measurement
<i>round_amount</i>	Total amount of funding in current (million) euros received in the financing round
<i>ln_amount</i>	Natural logarithm of the total amount, <i>round_amount</i> (in current million euros), received in the financing round
<i>months_from_prev</i>	Number of months from the previous equity or debt financing round
<i>bank_present</i>	A dummy equal to 1 if a bank is one of the investors of the financing round, a 0 if not, blank if investor information is missing
<i>EU_bank_present</i>	A dummy equal to 1 if a bank headquartered in the EU (excluding UK during pre-Brexit years) is one of the investors of the financing round, a 0 if not, blank if investor information is missing
<i>non_EU_bank_present</i>	A dummy equal to 1 if a bank not headquartered in the EU is one of the investors of the financing round, a 0 if not, blank if investor information is missing
<i>bank_equity</i>	A dummy equal to 1 if a bank is one of the investors of an equity round, a 0 if not, blank if investor information is missing
<i>bank_debt</i>	A dummy equal to 1 if a bank is one of the investors of a debt round, a 0 if not, blank if investor information is missing
<i>EU_bank_equity</i>	A dummy equal to 1 if a bank headquartered in the EU (excluding UK during pre-Brexit years) is one of the investors of an equity round
<i>EU_bank_debt</i>	A dummy equal to 1 if a bank headquartered in the EU (excluding UK during pre-Brexit years) is one of the investors of a debt round
<i>non_EU_bank_equity</i>	A dummy equal to 1 if a bank not headquartered in the EU is one of the investors of an equity round
<i>non_EU_bank_debt</i>	A dummy equal to 1 if a bank headquartered in the EU is one of the investors of a debt round

<i>earlyvcround</i> ²⁹	A dummy equal to 1 if the financing round is categorized as “Angel”, “Early VC” or “Seed”
<i>debt_round</i>	A dummy equal to 1 if the financing round is categorized as “Debt”, “Convertible” or “Lending Capital”
<i>ln_totalsofar</i>	Natural logarithm of the total amount (in current euros) received in the financing rounds prior to the current one
<i>roundsofar</i>	Number of financing rounds prior to the current one
<i>post</i>	A dummy equal to 1 if the financing round happens on or after January 2016
<i>timeround</i>	A time trend indicator constructed from the numerical value assigned to the date of the financing round

Source: Authors' own elaboration.

²⁹ Note that our definition of early VC round differs slightly from that used by other authors, for example, Li et al. (2023) who consider as “early-stage” the seed, series A, and series B rounds, and from the categorization of DR, which considers series A as “early-stage.”

Table A2. The size of the financing round – Fixed effects specifications

Dep. variable	ln_amount							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
eba_license	1.297 (3.538)	1.171 (3.313)	1.503 (3.590)	1.559 (3.591)	13.489*** (2.930)	1.632 (3.574)	1.606 (3.585)	13.404*** (2.926)
EU_hq	-9.705*** (0.817)	-10.011*** (0.827)	-9.241*** (1.012)	-9.226*** (1.012)		-9.194*** (1.010)	-9.278*** (1.012)	
banking	1.205*** (0.347)	1.646*** (0.456)	1.644*** (0.508)	1.639*** (0.508)	-0.364 (0.904)	1.644*** (0.506)	1.628*** (0.507)	-0.357 (0.903)
paytech	0.956** (0.395)	0.792* (0.404)	0.619 (0.466)	0.619 (0.466)	-1.722*** (0.642)	0.626 (0.464)	0.614 (0.465)	-1.765*** (0.642)
paybank	1.142 (0.741)	1.959** (0.837)	1.460 (0.927)	1.445 (0.928)	-3.391** (1.542)	1.426 (0.924)	1.439 (0.926)	-3.410** (1.539)
consumer	0.312** (0.136)	0.314** (0.135)	0.291** (0.141)	0.290** (0.141)	-0.250 (0.249)	0.290** (0.140)	0.288** (0.140)	-0.246 (0.249)
post	-0.378*** (0.131)	-0.476*** (0.152)	-0.400** (0.195)	-0.409** (0.196)	0.210 (0.313)	-0.392** (0.195)	-0.432** (0.196)	0.227 (0.313)
int_post_EU		0.459* (0.249)	0.522 (0.323)	0.513 (0.323)		0.579* (0.323)	0.690** (0.328)	
bank_present			0.970*** (0.164)	0.794** (0.402)	0.678 (0.689)			
int_post_bank				0.207 (0.431)	-0.182 (0.721)			
EU_bank_present						0.307 (0.269)	1.215* (0.679)	0.430 (0.701)
non_EU_bank_present						1.240*** (0.192)	0.487 (0.478)	5.483* (3.208)
int_post_EU_bank							-1.038 (0.718)	-0.168 (0.738)
int_post_nonEU_bank							0.887* (0.517)	-4.357 (3.253)
Fintech team controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fintech fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Round characteristics controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
EU-headquarters only	No	No	No	No	Yes	No	No	Yes
Observations	15,584	15,584	11,302	11,302	3,101	11,302	11,302	3,101

Source: Dealroom, European Banking Authority, authors' analysis.

Notes: Hausman-Taylor estimation of the different specifications of model (3). All variables are described in the captions to Tables 5 and 8. The variables considered to be potentially endogenous are: *eba_license*, *EU_hq*, *bank_present*, *EU_bank_present*, *non_EU_bank_present* and all their interactions with *post*. Hausman-Taylor standard errors in parentheses. *, ** and *** denote significance at the 10%, 5% and 1% level based on a two-sided test. For simplicity, *int_post_banking*, *int_post_payment* and *int_post_paybank* are omitted from the table output.

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