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ESSAYS IN FINANCIAL INNOVATION

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ÖZ

FİNANSAL İNOVASYON ÜZERİNE MAKALELER

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Geleneksel bankacılık sektörü, internet tabanlı hizmetlerin ve dijitalleşmenin hızla büyümesi nedeniyle önemli bir dönüşüm geçirdi. 2008 mali krizinden sonra, finansal teknoloji (fintek) şirketleri, operasyonel maliyetleri düşürmek, kullanıcı dostu dijital uygulamalar sağlamak ve veri odaklı çözümler sunmak için dijital teknolojileri finansal hizmetlerle birleştirerek yeni finansal yeniliklerle ortaya çıktı. Fintek girişimleri, geleneksel bankaları altüst ederek, iş modellerini değiştirmeye ve teknolojik altyapılarını iyileştirmek ve rekabet avantajı elde etmek için stratejik ittifaklar kurmaya zorladı. Son yıllarda, bankalar ve fintek şirketleri arasındaki iş birliği, bankacılık ve fintek literatüründe giderek artan bir önem kazanmıştır. Bu eğilim, bu tür iş birliklerinin potansiyel faydalarının ve finans sektörü üzerindeki etkisinin giderek daha fazla tanınmasını yansıtmaktadır.

Bu çalışma, fintek firmaları ile geleneksel bankalar arasındaki iş birliğinin farklı boyutlarını araştıran dört bölümden oluşmaktadır. İlk bölüm, küresel finansal teknolojinin tarihsel evrimine, fintek ekosistemine, farklı fintek iş modellerine ve küresel fintech sektörlerinin mevcut durumuna genel bir bakış sunmaktadır. Ayrıca, fintek sektörünün geleceğini şekillendirmesi muhtemel öngörülen eğilimleri tartışarak ileriye dönük bir bakış açısı ortaya koymaktadır. İkinci bölüm, Türkiye' deki mevcut fintek manzarasını ve geleneksel bankalar ile fintek şirketleri arasındaki iş birliklerine ilişkin örnek vakaları incelemektedir. Analiz, Türkiye'nin teknoloji meraklısı genç nüfusu, temel düzenlemelerin uygulanması ve İstanbul Finans Merkezi'nin kurulması gibi faktörler nedeniyle fintek sektörünün gelişimi ve yabancı yatırımcıları çekme konusunda önemli bir potansiyele sahip olduğunu göstermektedir. İkinci bölümün son kısmı, fintek firmalarının geleneksel bankaları nasıl tehdit ettiği ve bu bankaların stratejik olarak nasıl yanıt verdiği konusunda ayrıntılı bir analiz sunmaktadır. Ayrıca, bir inovasyon yönetim stratejisi bağlamında her iki tarafın iş birliği modellerini ve motivasyonlarını açıklamaktadır. Çeşitli küresel bölgelerde ayrıntılı örnek vaka çalışmaları tarandıktan sonra, derinlemesine bir analiz için aynı araştırma yöntemleri Türkiye'deki belirli vakalara uygulanmıştır. Türkiye'deki bankalar ile fintek şirketleri arasındaki iş birlikleri, küresel fintek ortamıyla uyumlu olarak öncelikle ödeme

segmentine odaklanmaktadır. Türkiye'deki geleneksel bankalar finans sektöründe önemli pozisyonlara sahip olmaya devam etmektedir. Ancak son yıllarda fintek şirketleri genişlemekte olup, dijital bankaların ve eşler arası borç verme platformlarının ortaya çıkmasıyla potansiyel rakipler haline gelmeleri beklenilmektedir.

Üçüncü bölümde, Türkiye'deki bankaların fintek firmalarıyla hangi iş birliği türlerini tercih ettiğini ve bu fintek firmaların faaliyet gösterdiği segmentleri araştırmaktadır. Mevcut çalışma 2021'de Türkiye'deki 430 adet banka-fintek ittifakını probit modeli ile analiz etmektedir. Bulgular, Türkiye'deki büyük bankaların, fintek firmalarına doğrudan yatırım yapmak yerine ürünle ilgili girişimler için onlarla iş birliği yapmaya meyilli olduğunu göstermektedir. Bu yaklaşım, bankaların ürün tekliflerini genişletmelerine ve çeşitli dağıtım kanalları aracılığıyla yeni müşterilere ulaşmalarını sağlamaktadır. Türkiye'deki fintek ekosistemi şu anda sınırlı yatırım fırsatlarına sahip olup, fintek şirketlerinin geleneksel finans kuruluşlarıyla rekabet edebilmesi için önemli derecede büyümesi gerekmektedir. Diğer bulgu, ödeme hizmetleri en yaygın ürün segmenti olsa da büyük bankalar ödeme dışı fintek girişimleriyle ortaklık kurmayı tercih etmektedir. Çalışma, İstanbul'da yeni kurulan fintek girişimlerinin ödeme hizmeti segmentinde bankalarla ittifak kurma olasılığının daha yüksek olduğunu göstermektedir.

Dördüncü bölümde, 2013-2021 yılları arasında Türkiye'deki bankalar ve fintek şirketleri arasındaki iş birliklerinin ticari bankaların performansı üzerinde etkisi panel veri metodolojisi kullanılarak araştırılmaktadır. Bulgular, banka fintek iş birliklerinin etkisinin banka büyüklüğüne ve performans göstergelerine göre değiştiğini ortaya koymaktadır. Tüm bankalar için, ortaklığın bankaların varlık getirisi (ROA) üzerinde olumsuz ve anlamlı bir etkisi varken, öz sermaye getirisi (ROE) üzerinde ise anlamlı bir etkisi yoktur. Ancak, büyük bankalar için iş birlikleri yalnızca ROE'yi olumlu yönde etkilemektedir. Buna karşılık, küçük bankalar için iş birliklerinin ROA ve ROE üzerinde olumsuz ve güçlü bir etkisi vardır ve bu da fintek şirketlerinin potansiyel ikame etkisini göstermektedir. Bir diğer önemli bulgu ise fintek gelişiminin (fintek ön ödemeli kredi kartı sayısının toplam ön ödemeli kredi kartı sayısı içindeki payı) tüm panellerde bankaların karlılığını olumsuz etkilemesidir ve bu durum fintek ürünlerinin geleneksel banka ürünlerinin yerini alma potansiyelini göstermektedir. Türkiye'de, küçük yatırımcıların kredilere erişimini kolaylaştıran yeni fintek şirketlerinin ve platformlarının kurulması önem arz etmektedir. Bu şirketler, bankaların sunduğu

benzer ürün ve hizmetleri sunarak geleneksel finans kuruluşlarıyla rekabet etme potansiyeline sahip olacak ve böylece finans sektöründe önemli oyuncular haline gelebileceklerdir.

Fintek sektörünün geleceğini şekillendirecek çeşitli gelişmeler ve faktörler vardır. Yapay zeka ve üretken yapay zekaya olan artan ilginin sektörü önemli ölçüde etkilemesi beklenmektedir. Sürekli değişen regülasyon ortamı, regtek'e yönelik yatırımları yönlendirmeye devam edecektir. Çevresel, Sosyal ve Yönetişim (ESG) ve iklim değişikliği taahhütleri, alternatif enerji kredisi, karbon takibi ve uzun vadeli yeşil yatırım gibi alanlar yeni finteklerin ortaya çıkmasını desteklemeye devam edecektir. KOBİ pazarı, işlerini büyütmek isteyen fintekler ve şirketler için bir hedef olup, bu pazar için sunulacak çözümler yatırımcıların dikkatini çekecektir. Varlık tokenizasyonu ve düzenlenmiş sabit paralar, kripto ve blok zinciri içinde giderek daha popüler yatırım seçenekleri haline gelmektedir. Fintek sağlayıcılarının finansal hizmetlere yönelik artan talebi karşılamak için genişlemeleri gerekebileceğinden, gömülü finans alanındaki ortaklıkların ve ittifakların daha kritik hale gelmesi beklenmektedir. Gelişmekte olan pazarlarda, hükümetler dijital ekonomik kalkınmayı desteklemek için daha fazla yatırım yaptıkça Güneydoğu Asya, Orta Doğu ve Afrika gibi bölgelerde fintek merkezleri ortaya çıkacaktır.

Anahtar Kelimeler: Fintek, Banka, İş birliği, Banka Performansı, Probit Modeli, Panel Veri Modeli

ABSTRACT

ESSAYS IN FINANCIAL INNOVATION

ABDUL BAGHI NABIYEV

The traditional banking industry has undergone significant transformation due to the rapid growth of internet-based services and digitalization. After the 2008 financial crisis, financial technology (fintech) companies emerged with new financial innovations, combining digital technologies with financial services to decrease operational costs, provide user-friendly digital applications, and offer data-driven resolutions. Fintech startups have disrupted traditional banks, forcing them to change their business models and form strategic alliances to improve their technological infrastructure and gain a competitive advantage. In recent years, the collaboration between banks and fintech companies has garnered increasing attention and significance within the banking and fintech literature. This trend reflects a growing recognition of such collaborations' potential benefits and impact on the financial industry.

This study delves into the different dimensions of cooperation between fintech firms and conventional banks, encompassing four comprehensive chapters. The first chapter gives an overview of the evolution of global financial technology, the fintech ecosystem, different fintech business models, and the current state of the global fintech sectors. Furthermore, it offers a forward-looking perspective by discussing anticipated trends likely to shape fintech's future. The second chapter thoroughly examines the current fintech landscape in Türkiye and case studies on collaborations between traditional banks and fintech companies. The analysis shows that Türkiye has significant potential for fintech sector development and attracting foreign investors, attributed to its tech-savvy young population, implementation of key regulations, and establishment of the Istanbul Financial Center. The latter part of the second chapter provides a detailed analysis of how fintech firms threaten traditional banks and how these banks are strategically responding. It also explains both parties' collaboration models and motivations within the context of an innovation management strategy. After conducting detailed exploratory case studies across various global regions, it was applied the same research methods to the specific cases in Türkiye for an in-depth analysis. Collaborations between Turkish banks and fintech companies primarily focus on the payment segment, aligning with the global fintech landscape. Traditional banks

in Türkiye continue to hold significant positions in the financial sector. However, fintech companies are expanding and are expected to become potential competitors with the emergence of digital banks and peer-to-peer lending platforms.

In the third chapter, the study investigates the types of collaboration banks in Türkiye that prefer fintech firms and the specific segments in which these firms operate. A carefully compiled dataset analyzes 430 bank-fintech alliances in Türkiye in 2021 using a probit model. The findings suggest that large banks in Türkiye are inclined to collaborate with fintech startups for product-related initiatives rather than making direct investments in them. This approach allows banks to broaden their product offerings and expand their reach to new clients through various distribution channels. The fintech ecosystem in Türkiye currently has limited investment opportunities and needs to grow to compete with traditional financial institutions. While payment services are the most common segment, large banks favor partnerships with non-payment fintech startups. The study indicates that newly established fintech startups in Istanbul are likelier to form alliances with banks in the payment service segment.

The fourth chapter investigates the impact of partnerships between banks and fintech companies on the performance of commercial banks in Türkiye using panel data methodology from 2013 to 2021. The findings reveal that the effect of bank fintech collaborations varies based on bank size and performance indicators. For all banks, the partnership has a negative and significant effect on banks' return on assets (ROA), with no significant impact on return on equity (ROE). However, for large banks, collaborations only positively influence ROE. In contrast, for small banks, collaborations have a negative and robust effect on ROA and ROE, indicating the potential substitution effect of fintech companies. Another important finding is that fintech development negatively impacts banks' profitability in all panels, suggesting the potential for fintech products to substitute traditional bank products. In Türkiye, It is essential to consider the establishment of new fintech companies and platforms that make it easier for small investors to access loans. These companies have the potential to compete with traditional financial institutions by offering similar products and services, thereby becoming significant players in the financial industry.

Several factors and developments will shape the future of the fintech sector. Rising interest in AI and generative AI, with a growing emphasis on maximizing AI opportunities, is expected to influence the industry significantly. The ever-changing regulatory landscape will continue to drive investments toward regtech.

Environmental, Social, and Governance (ESG) and climate change commitments will continue to support the emergence of new fintech focused on opportunities like alternative energy lending, carbon tracking, and long-term green investment. The SME market is a target for fintechs and corporates looking to grow their business. Solutions for this market will likely gain attention from investors. Asset tokenization and regulated stablecoins are becoming increasingly popular investment options within crypto and blockchain. Partnerships and alliances in embedded finance are expected to become more critical, as fintech providers may need to expand to meet the growing demand for financial services. In developing markets, fintech hubs will emerge in regions like Southeast Asia, the Middle East, and Africa as governments invest more to support digital economic development.

Keywords: Fintech, Banks, Collaboration, Bank Performance, Probit Model, Panel Data Model

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As I present this thesis, I know it represents a collective effort. I hope that the findings and insights shared in this work will contribute to the ongoing discourse in Fintech and inspire future research.

ABDUL BAGHI NABIYEV

İSTANBUL, 2024

TABLE OF CONTENTS

ÖZ ..... **II**

ABSTRACT ..... **V**

ACKNOWLEDGEMENT ..... **VIII**

LIST OF TABLES ..... **XI**

LIST OF FIGURES ..... **XII**

ABBREVIATIONS ..... **XIII**

INTRODUCTION **1**

CHAPTER ONE

FINTECH PHENOMENON

1.1 Introduction 4
1.2 Evolution of Financial Technologies 5
1.3 Fintech Ecosystem 9
1.4 Fintech Business Models 12
1.5 Global Fintech Phenomenon and Trends 19

CHAPTER TWO

THE TURKISH FINTECH ECOSYSTEM AND CASE STUDIES ON BANK-FINTECH COLLABORATIONS

2.1 Introduction 27
2.2 Turkish Fintech Ecosystem 28
2.3 Literature Review and Theoretical Framework 37
2.4 Methodology, Data Collection, and Case Studies 42
2.5 Conclusion 56

CHAPTER THREE

THE SYMBIOTIC RELATIONSHIP AND COLLABORATION BETWEEN COMMERCIAL BANKS AND FINTECHS IN TÜRKİYE

3.1 Introduction 58
3.2 Literature Review and Hypotheses 60
3.3 Data and Methods 64
3.3.1 Data 64
3.3.2 Methods 65
3.4 Empirical Results and Discussion 67
3.4.1 Descriptive Statistics 67
3.4.2 Regression Results 69
3.4.3 Discussion 71
3.5 Conclusion 72

CHAPTER FOUR

FINTECH AND BANK PERFORMANCE: INSIGHTS FROM AN EMERGING ECONOMY

4.1 Introduction 73
4.2 Literature Review and Hypothesis 76
4.3 Data, variables, and methodology 81
4.3.1 Data 81
4.3.2 Variables 82
4.3.3 Methods 83
4.4 Results 84
4.4.1 Descriptive Statistics 84
4.4.2 Regression Results 85
4.5 Conclusion 89

CONCLUSION 91

REFERENCES 96

APPENDICES 103
CV 107

LIST OF TABLES

Table 1.1: Four phases of the historical development of Fintech 8
Table 1.2: Top 10 global fintech deals in 2023 24
Table 2.1: The major fintech regulations in Türkiye 32
Table 2.2: Strategic collaboration motives between banks and fintech 38
Table 2.3: Bank fintech collaboration modes 39
Table 2.4: Data source of the case studies 42
Table 3.1: Strategic response matrix for a bank 59
Table 3.2: Definition of variables involved in the regression model. 66
Table 3.3: Summary statistics of bank fintech alliances in 2021 in Türkiye 67
Table 3.4: Estimation results for investment versus product-related collaboration 69
Table 3.5: Estimation results for payment service versus other fintech segments 70
Table 4.1: Summary of literature review 80
Table 4.2: Definition of variables in the model. 82
Table 4.3: Descriptive Statistics 84
Table 4.4: Fixed effect model results of Panel (A) 87
Table 4.5: Fixed effect model results of Panel (B) 88
Table 4.6: Fixed effect model results of Panel (C) 88
Table A.1: Correlation matrix (*n=198*) 103
Table A.2: Modified Wald test for heteroskedasticity 104
Table A.3: Wooldridge test for serial correlation 104
Table A.4: List of Banks 105

LIST OF FIGURES

Figure 1.1: The five components of the fintech ecosystem 10
Figure 1.2: Fintech tree: A taxonomy of the fintech environment 12
Figure 1.3: Category of fintech activities 13
Figure 1.4: Traditional P2P Lending Model 15
Figure 1.5: How robo-advisors operate 16
Figure 1.6: Payment process through iDeal 17
Figure 1.7: Number of fintech firms as of May 2023 20
Figure 1.8: Global fintech net revenues (billion USD) 21
Figure 1.9: Global fintech net revenue share (%) by Region 22
Figure 1.10: Global fintech net revenue share by level of development 22
Figure 1.11: Total global fintech investment activity 23
Figure 1.12: Top 10 global fintech deals in 2021 24
Figure 1.13: Global fintech adoption index (%) 25
Figure 2.1: Türkiye fintech ecosystem with numbers 29
Figure 2.2: Number of mobile contactless transactions (in thousands) 30
Figure 2.3: Number of QR-code transactions (in thousands) 30
Figure 2.4: Mobile contactless and QR-code transactions / Total contactless transactions of domestic and international cards (%) 30
Figure 2.5: Number of licensed e-money and payment institutions in Türkiye 31
Figure 2.6: Number of newly established fintechs in Türkiye 33
Figure 2.7: Fintech firms by vertical as of 2023 34
Figure 2.8: Fintech deals in Türkiye 35
Figure 2.9: The cooperation process between fintech and banks 38
Figure 2.10: AkÖde's financial performance 44
Figure 2.11: Moka's Financial Performance (Thousand TL) 47
Figure 2.12: Finberg investments with numbers 50
Figure 2.13: Applications made to Albaraka Garaj Center 53
Figure 3.1: Number of Fintech companies by verticals 63
Figure 3.2: Distribution of alliances by fintech segments 68
Figure 3.3: Bank and Fintech collaboration network map 68
Figure 4.1: Research Framework 81
Figure 4.2 Average number of collaborations by bank type 85
Figure A.1: Average number of collaborations by bank type 106

ABBREVIATIONS

AI	:	Artificial Intelligence
API	:	Application Programming Interfaces
AT	:	Algorithmic Trading
ATM	:	Automatic Teller Machine
B2B	:	Business to Business
B2B2C	:	Business to Business to Consumer
BIS	:	Bank for International Settlements
BRSA	:	Banking Regulation and Supervision Agency
CBRT	:	Central Bank of the Republic of Türkiye
CC	:	Cloud Computing
CGFS	:	Committee on the Global Financial System
CMB	:	Capital Markets Board
DLT	:	Distributed Ledger Technology
ECM	:	Error Correction Model
ERP	:	Enterprise Resource Planning
ESG	:	Environmental, Social, and Governance
FSB	:	Financial Stability Board
GDP	:	Gross Domestic Product
GFC	:	Global Financial Crisis
GMM	:	Generalized Method of Moments
HFT	:	High-Frequency Trading
HNWI	:	High-Net-Worth Individual
IMF	:	International Monetary Fund
IoT	:	Internet of Things
ITCA	:	Information Technologies and Communication Authority
M&A	:	Mergers and Acquisitions
ML	:	Machine Learning
MVP	:	Minimum Viable Product
NFC	:	Near-Field Communication
P2P	:	Peer-to-peer
PE	:	Private Equity
POC	:	Proof of Concept
POS	:	Point of Sale
QR	:	Quick Response
R&D	:	Research and Development
ROA	:	Return on Assets
ROE	:	Return on Equity
SaaS	:	Software-as-a-Service
SME	:	Small and Medium-Sized Enterprises
SWIFT	:	Society of Worldwide Interbank Financial Telecommunications
TRA		Turkish Revenue Administration
TURKSAT	:	Turkish Statistical Institute
VC	:	Venture Capital
WWW	:	World Wide Web

INTRODUCTION

Fintech represents more than just a blend of financial services and information technology. It is a powerful and transformative force that has fundamentally altered how financial assets are managed and utilized, leading to a profound shift in the industry's operational dynamics. The term "financial innovation" predates "Fintech," academic papers on financial innovation have significantly increased since 2010, reflecting the growing interest in Fintech. A clear definition of fintech is crucial for understanding its nature and the innovations it brings. Industry and regulatory institutions have proposed several definitions of fintech. The Bank for International Settlements (BIS) defines fintech as technology-enabled innovation in financial services, including the resulting new business models, processes, applications, and products. (BIS, 2019). The International Monetary Fund (IMF) defines fintech as companies that leverage technology to streamline financial systems and improve the accessibility and delivery of financial services.

The fintech industry brings about numerous benefits, transforming the financial sector through the use of advanced technology. Fintech aims to make financial services more accessible to a broader range of people, including those in underserved or remote areas. The introduction of mobile banking and digital wallets has enabled access to financial services without visiting a physical bank. Additionally, fintech solutions often reduce operational costs associated with traditional banking processes by automating procedures, decreasing reliance on physical infrastructure, and eliminating intermediaries. This leads to lower fees for both consumers and businesses. Furthermore, fintech enables faster transaction processing, including immediate fund transfers and swift loan approvals, which is particularly beneficial for businesses needing quick access to capital and individuals requiring immediate financial services. Using data and artificial intelligence, fintech companies can provide personalized financial advice, investment recommendations, and customized products, enhancing customer satisfaction and engagement. Fintech promotes financial inclusion by extending services to unbanked and underbanked populations. Microloans, mobile payments, and peer-to-peer lending platforms cater to individuals who need access to traditional banking services. Additionally, the fintech industry has transformed payment methods by introducing innovative alternatives such as mobile payments,

cryptocurrencies, and contactless transactions, offering users increased convenience and security. To bolster the security of financial transactions, fintech solutions employ state-of-the-art encryption techniques, biometric authentication, and blockchain technology to reduce the risk of fraud and identity theft. Fintech companies prioritize user experience by offering user-friendly interfaces, 24/7 customer support, and seamless cross-device integration, which raises consumer expectations and industry standards. Fintech also provides consumers and businesses with enhanced financial management tools to better manage their financial well-being. Budgeting apps, investment platforms, and financial management tools give users more control over their financial affairs. Many fintech solutions are designed to help businesses navigate regulatory requirements more effectively, promoting transparency in their operations and reducing the risk of penalties while building trust with customers and regulatory bodies.

Fintech companies are revolutionizing the banking industry by leveraging innovative IT-supported service tools to streamline operations, cut costs, and deliver tailored, user-friendly digital experiences. These advancements are powered by data-driven solutions, reshaping the traditional banking landscape and forcing established banks to reevaluate their business models and consider collaboration opportunities with fintech companies. In recent years, there has been a growing emphasis on the collaboration between traditional banks and fintech companies, which has been the subject of increasing attention and significance within the banking and fintech literature. This trend underscores a growing acknowledgment of the potential benefits and profound impact these collaborations can have on the financial industry. This doctoral thesis analyzes the partnerships and collaborative efforts between fintech companies and traditional banks, focusing on fintech's importance. It explores traditional banks' strategies for establishing collaborations with fintech companies and the effects of these collaborations on their performance. This thesis is organized into four chapters, each thoughtfully presented to explore and discuss key aspects of the research.

Chapter 1 comprehensively examines the evolution of financial technologies, the components of the fintech ecosystem, and various business models. It also provides a detailed analysis of the current state of the fintech sector at the global level. It offers a forward-looking perspective by discussing anticipated trends likely to shape fintech's future.

Chapter 2 presents an in-depth exploration of the current landscape of the fintech sector in Türkiye. It further investigates the collaborative relationships between traditional banks and fintech firms, drawing insights from a broad spectrum of relevant literature. Additionally, the chapter includes a detailed analysis of case studies that illustrate the various modes of collaboration utilized by Turkish banks. It concludes by synthesizing the key findings and offering actionable recommendations to guide future research in this field.

Chapter 3 delves into how banks in Türkiye collaborate with fintech firms, examining the preferred forms of collaboration and the specific segments within which these firms operate. The analysis draws on a meticulously gathered dataset, employing a probit model to scrutinize 430 bank-fintech partnerships in Türkiye in 2021. The findings shed light on the prevailing patterns, revealing that larger banks in Türkiye tend to collaborate with fintech startups in a product-related capacity rather than directly investing in these firms. Furthermore, the research highlights that large banks in Türkiye prefer establishing partnerships with non-payment fintech startups over payment service fintechs. Additionally, it is found that young fintech startups in Türkiye predominantly focus on payment services, and those located in Istanbul are more inclined to form strategic partnerships with commercial banks operating in this specific niche.

Chapter 4 explores the effects of collaborations between banks and fintech firms on the performance of commercial banks in Türkiye, using a panel dataset spanning from 2013 to 2021. The results from the fixed effect model reveal that the impact varies based on the size of the banks and various performance indicators. The findings show that collaborations between commercial banks and fintech companies have a negative effect on banks' return on assets (ROA) across all traditional banks. Additionally, these collaborations positively impact the return on equity (ROE) of large banks but have a negative effect on the performance of small banks. Another significant finding suggests that the development of fintech negatively influences the performance of banks across all panels, indicating that specific fintech services and products in the payment segment may serve as substitutes for traditional banks.

CHAPTER ONE
FINTECH PHENOMENON

1.1 Introduction

In the contemporary landscape, fintech is not just a recent amalgamation of financial services and information technology. It is a transformative force that has significantly altered the management and engagement of financial assets, marking a pivotal shift in the industry's operational paradigms. The connection between finance and technology has a deep-rooted history. Financial and technological advancements have always been closely linked and have continually influenced each other. The Global Financial Crisis (GFC) in 2008 was a turning point and has contributed to the transformation of fintech into a new paradigm. This transformation presents significant challenges for regulators and market participants, especially in finding the right balance between the advantages of innovation and the associated risks. However, it also inspires us with the potential of these technologies to reshape the financial landscape, offering an optimistic outlook for the future.

This chapter delves into the historical evolution of financial technologies, providing an in-depth analysis of the fintech ecosystem. It presents a comprehensive overview of its essential components—from payment processing systems to blockchain innovations—and explores a variety of distinct business models that have emerged within the sector. Furthermore, the chapter assesses the current landscape of the global fintech industry, illuminating key statistics that paint a vivid picture of its growth. This includes detailed insights into the number of fintech firms operating worldwide, the scale of investments pouring into the sector, and the varying degrees of fintech adoption across different regions. To conclude, the chapter offers a forward-looking perspective by discussing anticipated trends likely to shape the future of fintech, considering factors such as technological advancements, regulatory changes, and evolving consumer expectations.

1.2 Evolution of Financial Technologies

Financial Technology, also known as Fintech, represents the fusion of financial services and technology, similar to terms like Biotech. Although "FinTech" emerged in the early 1990s, the Global Financial Crisis of 2008 accelerated the integration of digital technologies such as the Internet, smartphones, and artificial intelligence (AI) with financial services.

It is helpful to underline the chronological perspective of fintech history and its critical elements for better understanding. Arner, Barberis, & Buckley (2016) categorized it into three periods: *i) Fintech 1.0 (1866-1967); ii) Fintech 2.0 (1968-2008); iii) Fintech 3.0 (2009- present) and Fintech 3.5 (Last Mover Advantage).* Another classification in the context of the relationship between finance and technology is proposed by Locatelli, Schena, & Tanda (2021). It includes four phases of historical development: *i) Phase 1 (1860 -1960s): Analogue Technology, Much Paper; ii) Phase 2 (1960s-2008): First Technological Changes; iii) Phase 3 (2008- 2020): Fintech Disruption; iv) Phase 4 (Post – 2020): What's next?.* Both classifications follow mostly the same technological changes and their interactions with financial services. The essential characteristics of each period are explained below:

1) *Fintech 1.0*

The Fintech 1.0 era began during the early stages of financial globalization. It was initiated with the installation of the first transatlantic cable between Europe and America in 1866, and it continued until the creation of the first Automatic Teller Machine (ATM) by Barclays in 1967. This period saw the financial sector adopt traditional analog technologies such as the telegraph, railroads, canals, and steamships. These facilitated financial connections across borders and enabled the rapid transmission of financial information, transactions, and payments globally. Moreover, this era marked the introduction of the credit card as a payment instrument, significantly transforming the payment industry landscape in the subsequent decades. The year 1950 marked the debut of the first international credit card, which Diners Club introduced into the market.

2) *Fintech 2.0*

During the second phase of fintech development, digital technology advanced within

the information and communication sector, creating new inventions such as personal computers, mobile phones, the internet, and innovations. These advancements mostly happened in the electronic payment systems that gradually evolved throughout the early 2000s and are relevant today (Locatelli, Schena, & Tanda, 2021). The first Automated Clearing Houses were established in the United Kingdom in 1968 and in the United States in 1970. Additionally, the Society of Worldwide Interbank Financial Telecommunications (SWIFT) was formed in 1973 as a global financial messaging network. The most crucial development in banking services was the introduction of internet banking or home banking. Wells Fargo established the first Internet banking protocols via the World Wide Web (WWW) in 1995. Subsequently, the first branchless banks, ING Direct and HSBC Direct, were introduced in the UK financial market in 2005. The payment system underwent a significant change due to the widespread use of credit cards and the rise of start-ups and large firms specializing in payment services, such as PayPal. In this phase, significant interventions in banking services included the linkage of credit cards to ATMs, the introduction of Point of Sale (POS), and other payment methods, such as electronic payments through Internet banking. The emergence of technology-driven companies specializing in electronic payment, such as Alipay in China and Paypal in the USA, has revolutionized the way people conduct financial transactions. These companies provide secure and user-friendly services, leading to a shift away from traditional banks' dominance in the payment systems. Trading and asset management services, like traditional banking, underwent a revolution with the introduction of electronic trading in 1969. Securities and asset transactions transitioned to a fully digitalized system. Implementing electronic trading offers numerous advantages, including improved market efficiency, reduced transaction costs, and heightened competition among trading venues (Stoll, 2006). Moreover, as Algorithmic Trading (AT) systems and High-Frequency Trading (HFT) systems have come into play, trading systems have become advanced and complex (Brogaard, Hendershott, & Riordan, 2014; Menkveld, 2013). These systems entail using algorithms by human traders for AT and automated systems with very short time frames and holding periods for HFT.

3) Fintech 3.0 and Fintech 3.5

During this phase, the primary force behind the changes was the 2008 Global Financial Crisis, which significantly impacted public perception and human capital. The crisis resulted in a profound loss of trust in traditional financial institutions and a shift in consumer preferences. Moreover, numerous financial professionals displaced during this crisis seized the chance to transition to the burgeoning Fintech 3.0 industry. The emergence of fintech companies has disrupted the financial industry landscape, changing the business models of traditional firms that offer financial services. The industry landscape has evolved, encompassing not only conventional financial institutions but also unregulated entities offering cutting-edge technologies that pose a competitive threat to established players. In this phase, various big tech companies, telecommunication providers, and financial startups launched new products and services, including digital wallets. Notable digital wallets included China's Alipay in 2004, the Philippines' G-Wallet in 2004, and Kenya's M-Pesa in 2005. Additionally, the UK's first peer-to-peer lending platform, ZOPA, was formed in 2005, marking the beginning of peer-to-peer lending disruption in the lending industry. The emergence of various FinTech startups in developing markets like Asia, Africa, and South America has been primarily prompted by pursuing economic goals and the last-mover advantage after the transition. These startups aim to provide essential financial services to a vast population of unfeasible subprime customers considered ineligible by traditional credit scoring criteria. This phenomenon is known as "fintech 3.5" in third-world countries.

Table 1.1 concisely summarizes the key components associated with each stage in the historical evolution of the interaction between finance and technology, as suggested by Locatelli, Schena, & Tanda in 2021.

Key Elements	Phase 1	Phase 2	Phase 3	Phase 4
	Analogue technology (up to the 1960s)	**First Technological Changes (1960s-2008)**	**Fintech Disruption (2008-2020)**	**What's next? (2020 - onwards)**
Technological trends	Analogue technology	Digital technology, PC, Internet	Big data, blockchain,data analytics, cloud computing, IoT, AI, biometrics	All previous+additional applications and increasing computational power; aggregators, ecosystems
Socio-economic trends		Globalization, birth of computerization	Digital economy	Digital green economy
Players providing financial services	Only authorised financial intermediaries	Financial intermediaries New players entering the market as financial intermediaries or through partnerships First specialised payment services	Traditional financial intermedies Fintech companies Bigtech companies	Digitalised financial intermedies Fintech Companies Bigtech Companies
Use of technology		Technology is used to provide distance services /self-services	Technology is used to unbundle and rething banking and financial intermediation business model	Technology is used to improve customer experience and get more data from interactions. Driver for cost saving intiatives
Innovations in banking		Internet banking, home banking	Digital banks, crowdfunding, P2P platforms	Intensive use of technology for channels,integration and interoperability among services. Banking from any device
Innovations in payments	First credit cards,debit cards, and revolving credit card	Electronic payments, P2P payments, prepaid credit cards, e-wallets	All previous+ instant payments, cryptocurrencies and stablecoins	All previous + Central Bank Digital Currencies
Innovations in financial markets		Remote Trading, phone trading	Copy-trading, social trading, robo-advisor	Standardised automated trading services for retail investors. High value added financial advice services for HNWI
Innovations in insurance and related			Insurtech, on demand policies, social insurance	Insurtech: all previous + refinement of AI an IoT Tools

Table 1.1: Four phases of the historical development of Fintech **(Locatelli, Schena, & Tanda, 2021)**

1.3 Fintech Ecosystem

Following a brief overview of fintech's development, it is valuable to delve into the intricate dynamics between the various stakeholders within the fintech ecosystem. According to Moore (1993), an ecosystem is an economic community that thrives on the interactions among various organizations and individuals. The economic community generates valuable goods and services for its customers, who are part of the ecosystem. The community comprises suppliers, industry leaders, rivals, and key stakeholders. Over time, their capabilities and roles coevolve, and they tend to align with the direction set by central companies (Moore, J F, 1996).

Several approaches to defining elements of the fintech ecosystem are in the existing literature. Diemers, Lamaa, Salamat, & Steffens (2015) proposed that the participants of the fintech ecosystem are the government, financial institutions, and entrepreneurs. To extend this approach, Lee & Shin (2018) identified five components of the fintech ecosystem:

1) **Fintech startups:** Payment, lending, capital market, wealth management, asset management, and insurance companies.
2) **Government:** Legislature, financial regulators.
3) **Financial customers:** individuals and organizations:
4) **Technology developers:** AI, big data, machine learning, cloud computing, cryptocurrency, biometrics, and social media developers.
5) **Traditional financial institutions:** Banks, insurance companies, venture capitalists, and brokerage firms.

The components work together to drive innovation, boost the economy, encourage cooperation and rivalry in the financial sector, and ultimately enhance the experience for consumers involved in financial services. Figure 1.1 identifies the components of the fintech system.

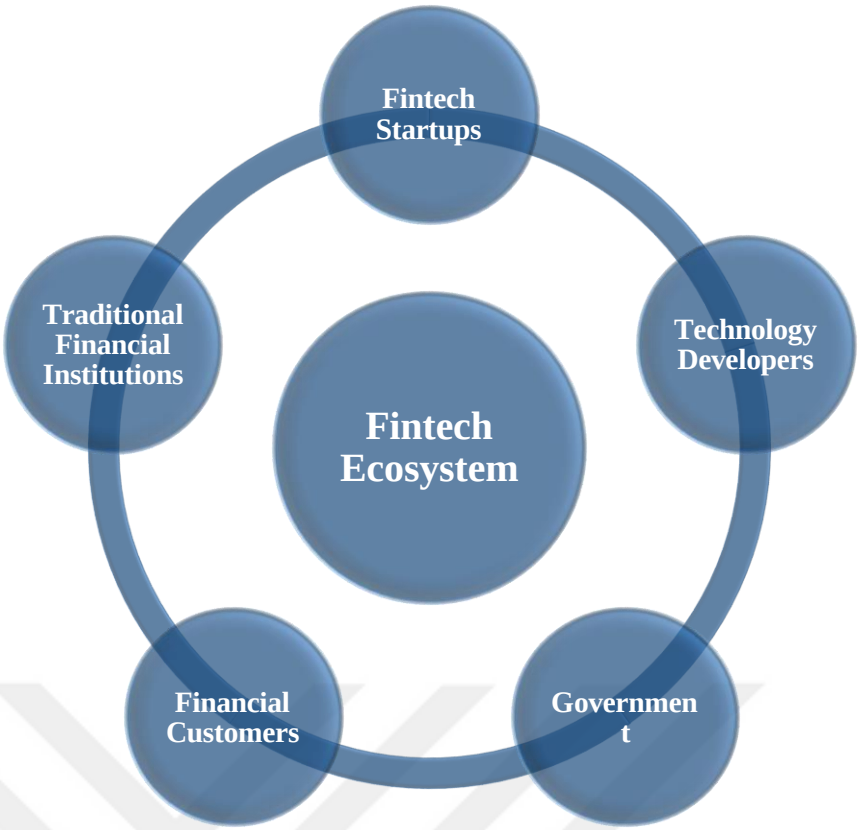


Figure 1.1: The five components of the fintech ecosystem **(Lee & Shin, 2018)**

Fintech startups are the key players in the fintech ecosystem, offering low-cost, personalized services in payment, wealth management, crowdfunding, and lending. These capabilities enable fintech startups to unbundle financial services and exert greater disruptive force on traditional banks. The rise of fintech startups provides customers with additional options, expanding beyond traditional reliance on single financial institutions. Individuals can oversee their loans through SoFi, handle payments with PayPal, take care of their mortgage through Rocket Mortgage, and manage stocks with Robinhood.

The rising demand for financial technology (fintech) services has been facilitated by technology developers who provide digital platforms for social media, big data analytics, cloud computing, artificial intelligence, and mobile services. These platforms enable fintech startups to launch innovative services rapidly and at a fraction of the cost of traditional infrastructure development. Furthermore, mobile network operators also contribute to developing fintech services, such as mobile payment and mobile banking. This symbiotic relationship generates revenue for both the fintech industry and the technology developers

In the aftermath of the 2008 financial crisis, many governments recognized the potential of fintech and began implementing regulatory frameworks to support the growth of fintech companies. These regulatory efforts aimed to strike a balance between fostering innovation and ensuring consumer protection, leading to the establishment of dynamic and responsive regulatory environments that have encouraged investment and development in the fintech sector. For example, Singapore is revising online payment regulations to create a more favorable environment for payment service providers and stimulate the growth of payment technology.

Fintech companies primarily rely on financial customers for revenue. Although large organizations are essential, individual customers and small and medium-sized enterprises (SMEs) are the primary revenue sources for fintech companies. A survey revealed that younger, wealthier customers are the most frequent users of fintech services (Holland FinTech., 2015).

Traditional financial institutions play a significant role in the fintech system. They have been reassessing their business models and creating strategies to adopt fintech innovations as they recognize the significant impact on the market and the limited time available to mitigate its disruptive effects. Traditional financial institutions have economies of scale and more significant financial resources than fintech startups. Fintech startups initially threatened traditional institutions, but now traditional financial institutions focus on collaborating with fintech startups to enhance their competitiveness in the industry.

1.4 Fintech Business Models

In the fintech literature, there are several categories of fintech business models. Lee & Shin (2018) outlined six business models utilized by the rapidly increasing population of fintech startups: wealth management, lending, crowdfunding, payment, insurance, and capital market services. Another conceptual framework for the fintech environment, namely the "fintech tree," was proposed by BIS (2020) and has three categories: fintech activities, policy enablers, and enabling technologies. Fintech business models or fintech activities can manifest in diverse forms and cover a broad financial industry spectrum, integrating with various sectors such as banking, investing, and insurance. Enabling technologies is critical in facilitating the innovation and delivery of financial services within the fintech industry. They form the essential foundation that supports various fintech activities and advancements. Policy enablers encompass a range of public policy measures and initiatives to foster the growth of fintech activities and promote the adoption of enabling technologies. Figure 1.2 outlines the fintech tree and its three components proposed by BIS (2020).

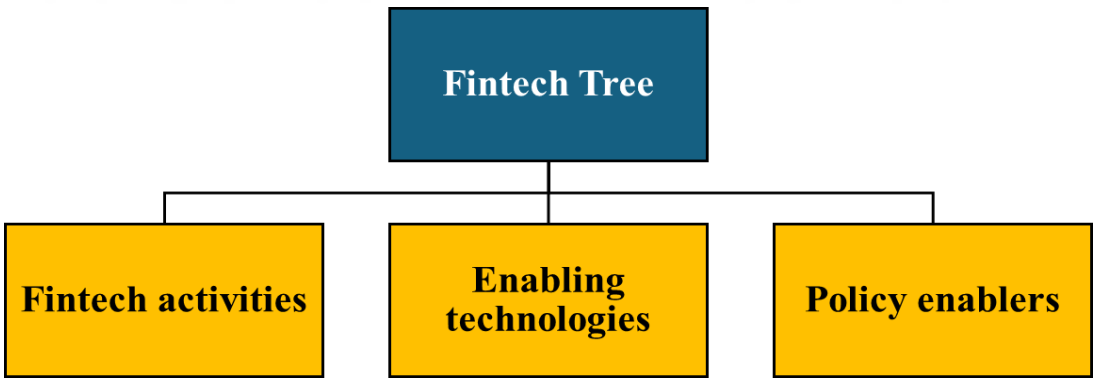


Figure 1.2: Fintech tree: A taxonomy of the fintech environment **(BIS, 2020)**

According to this taxonomy, fintech activities are grouped into six main categories: (i) deposits and lending; (ii) asset management; iii) payments, clearing, and settlement services; (iv) insurance; (v) capital raising; (vi) cryptoassets (BIS, 2020). Figure 1.3 summarizes the classification of fintech business models.

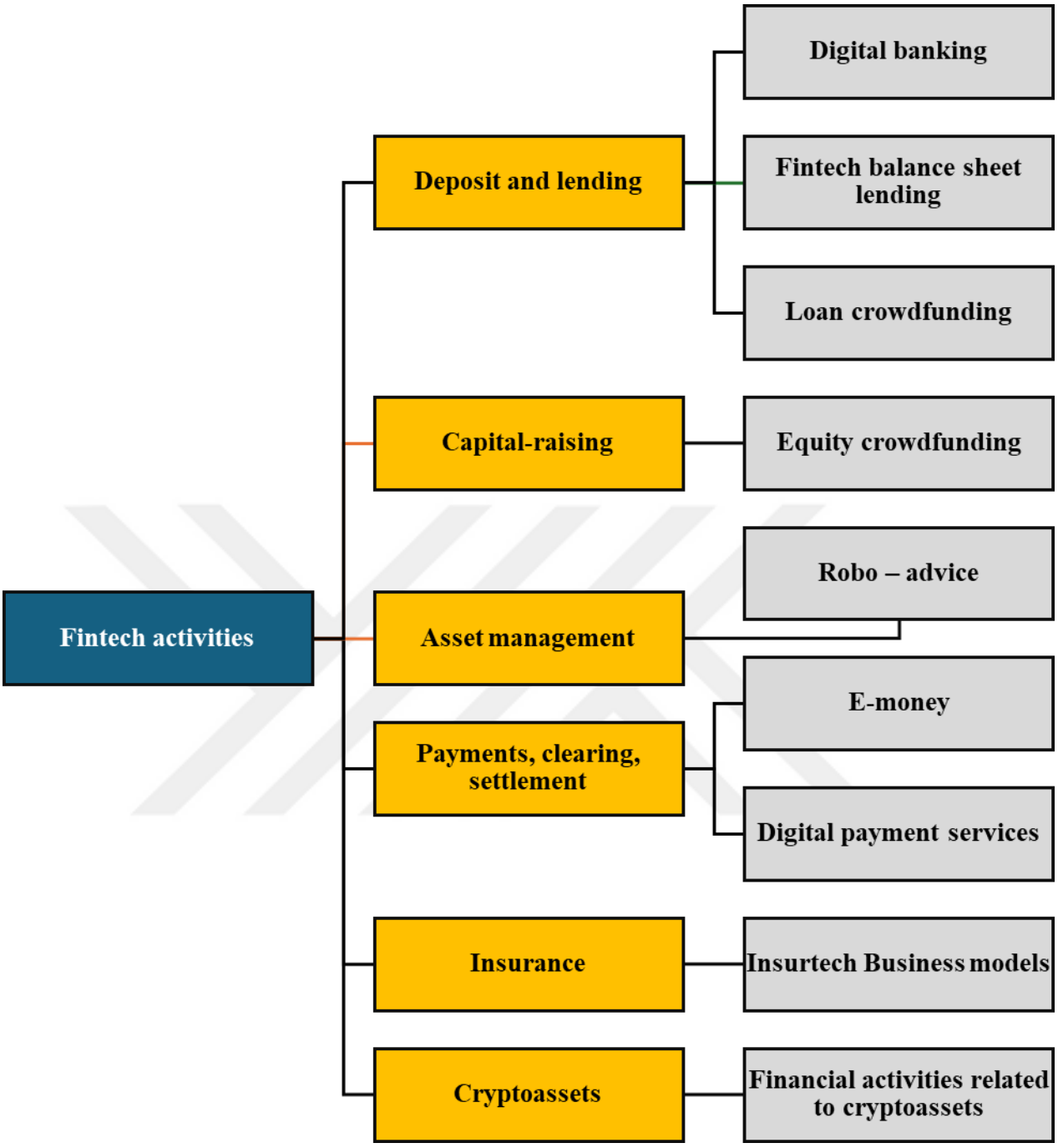


Figure 1.3: Category of fintech activities **(BIS, 2020)**

1) Fintech activities

- **Digital banking.** Regulatory differences mean an entity considered a bank in one jurisdiction may not be in another. Digital banks, including N26 in Europe, Nubank in Brazil, and Monzo in the UK, are characterized as financial institutions that accept deposits and are part of a deposit insurance program. They provide banking services predominantly through electronic platforms rather than traditional brick-and-mortar branches. The foundation of a digital bank's business model is built on advanced technology, and this fundamental aspect sets it apart from a traditional bank.
- **Fintech platform financing.** Numerous financial technology activities rely on electronic platforms offering a conduit for financing over the Internet. There are two types of fintech platform financing:
- **Fintech balance sheet lending** involves credit activity facilitated by internet-based platforms that use their balance sheet to match borrowers and lenders. These platforms, such as WeLend in Hong Kong SAR and Quicken Loans in the United States, do not rely on funding from the "crowd" but use their capital or debt issuance. They enter directly into loan contracts with borrowers, assume credit risk, and keep originated loans on their balance sheet until they are sold to investors.
- **Crowdfunding.** Crowdfunding connects fundraisers with investors without involving traditional financial institutions (BIS, 2020). In other words, it involves three key players: the project initiator or entrepreneur needing funding, the contributors interested in supporting the cause or project, and the moderating organization that facilitates interaction between the contributors and the initiator (Lee & Shin, 2018). In 2018, Lee & Shin's research identified equity-based, donation-based, and reward-based crowdfunding as the most popular forms. Rewards-based crowdfunding is a popular fundraising option for small businesses and creative projects. If interest is charged on the crowdfunding amount, the borrower can set the interest rate and guarantee a refund within a specified period (Mollick, 2014). Donation-based crowdfunding is raising funds for charity projects by requesting individual donations. In this crowdfunding type, the donor receives no financial returns but may receive non-monetary acknowledgments. Equity-based crowdfunding is attractive for small and medium-sized companies (SMEs) due to increased capital ratio requirements on traditional banks, which prioritize lending to SMEs less. This crowdfunding option connects entrepreneurs with investors seeking equity in their startups or privately held

small businesses. Another classification of crowdfunding types proposed by BIS (2020) is equity crowdfunding and loan crowdfunding. The equity crowdfunding model involves private companies receiving funds in the form of equity from investors. In other words, the fintech platform connects investors with companies and startups for early-stage capital raising. The second type of crowdfunding, loan crowdfunding, involves credit activity facilitated by internet-based platforms that connect borrowers with lenders. Individual loan contracts are established between borrowers and lenders without the platform engaging in risk transformation. Loan crowdfunding, sometimes called peer-to-peer lending, is a big trend in fintech. Figure 1.4 shows the traditional Peer-to-Peer (P2P) model mechanism. The most popular P2P lending platforms are Zopa, Lending Club, Prosper, RateSetter, and SoFi.

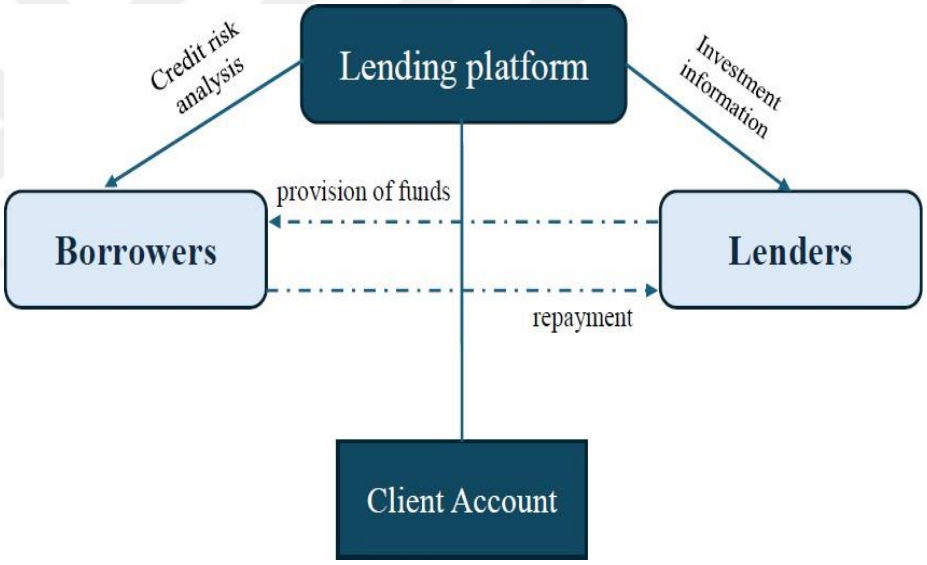


Figure 1.4: Traditional P2P lending model **(Committee on the Global Financial System (CGFS) and the Financial Stability Board, 2017)**

- **Robo advice,** or automated digital advice, is a form of financial guidance for investment products delivered with minimal human involvement. It utilizes technology to automate the client onboarding process and generates advice through algorithm-based tools (BIS, 2020). An increasingly popular model in the wealth management fintech sector involves automated wealth managers, also known as robo-advisors. These digital platforms provide personalized financial advice and investment management services at a significantly lower cost than traditional human

financial advisers (Lee & Shin, 2018). Robo-advisors use algorithms to recommend investment portfolios based on client preferences. Figure 1.5 provides a comprehensive overview that outlines the sequential steps involved in formulating robo-advisor recommendations

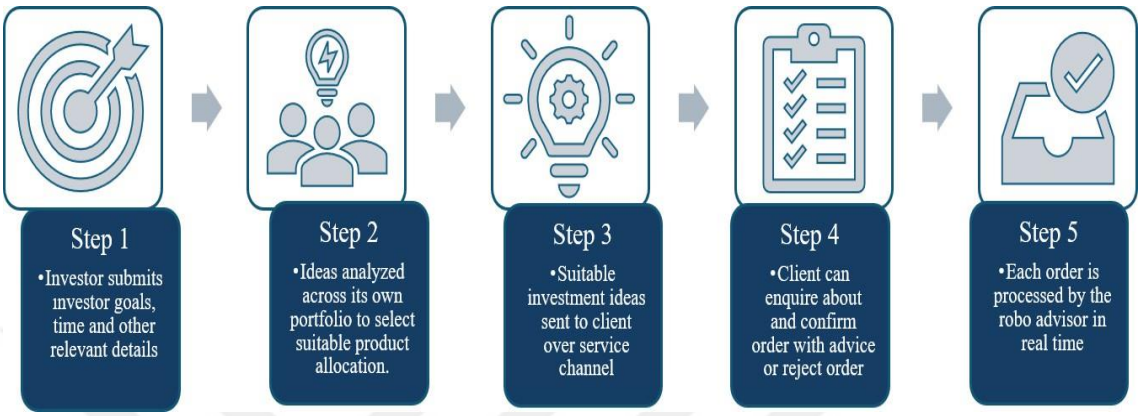


Figure 1.5: How robo-advisors operate **(Inc42 Plus, 2021)**

- **Digital payment service** providers leverage advanced technology to enable seamless payment transactions. By electronically transferring money and digitally clearing or settling balances, these providers eliminate the need for physical currency (BIS, 2020)**.** Payment services are simpler than other financial products. Fintech companies focusing on payments can rapidly acquire customers at lower costs and are leaders in innovation and new payment capabilities. The two main markets of payment fintechs are (1) consumer and retail payment and (2) wholesale and corporate payment (Lee & Shin, 2018). Payments are heavily used in everyday retail financial services and are one of the least regulated financial services. Consumer and retail payment fintechs encompass mobile wallets, P2P mobile payments, foreign exchange, remittances, real-time payments, and digital currency solutions. These services improve the customer experience by providing streamlined and accessible payment options. Mobile payment methods have become increasingly diverse and convenient. Some of the most popular methods include Near-Field Communication (NFC), which allows two devices to exchange data for transactions; charging purchases to a phone bill, which offers a seamless way to pay for digital goods and services; Quick Response (QR) code payments, where a quick scan facilitates the transaction process; credit card payments

on mobile websites, enabling secure and easy online purchases; mobile phone card readers, which are commonly used by small businesses to accept payments through a smartphone or tablet; and direct mobile payments that bypass traditional credit companies, offering users an alternative way to make secure transactions (Li P. , 2016). One of the most prominent examples of payment provider companies is iDeal, a prominent payment provider launched in 2005. It offers a payment guarantee to merchants and enables consumers to pay online through their mobile banking app or bank account. It is the most successful and most used payment method in the Netherlands, with a share of online transactions close to 55%, and several banks, including ABN AMRO, ING, and Rabobank, support it. Figure 1.6 shows how payment transactions via iDeal work.

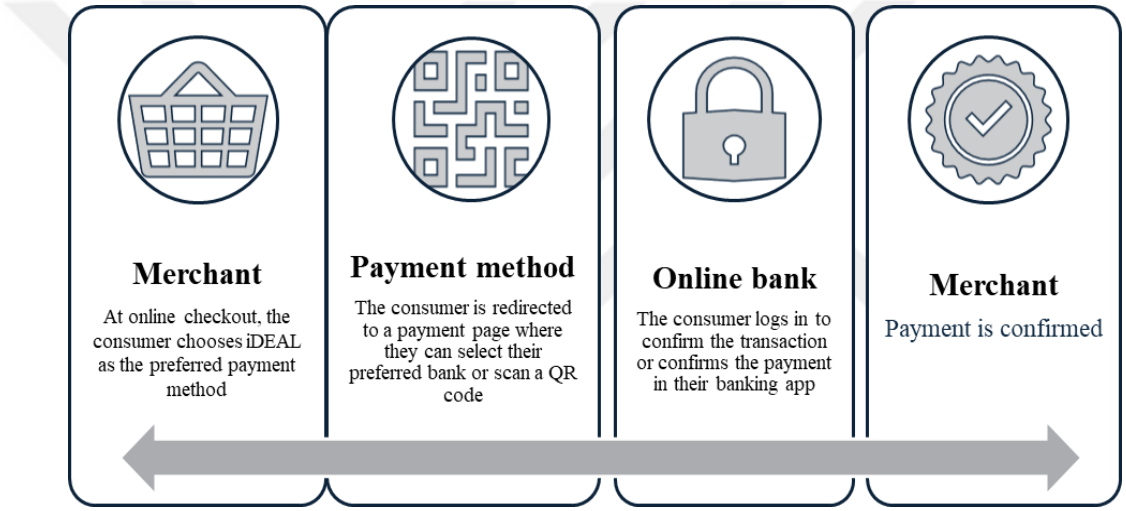


Figure 1.6: Payment process through iDeal **(PPRO, 2024)**

- **E-money services** refer to the creation of electronic money that represents a debt, which is used to help with making payment transactions (BIS, 2020). From a balance sheet perspective, e-money is a digital representation of a fixed value claim issued by an e-money provider, and this claim ensures that the e-money can be redeemed at a predetermined face value in a traditional fiat currency (Adrian & Mancini-Griffoli, 2019). Additionally, for a claim to qualify as e-money, it must (i) function as a versatile medium of exchange, (ii) be recognized as a form of payment by entities other than the issuer, and (iii) be issued only upon receipt of funds (e-money is prepaid).
- **Insurtech business models** encompass the utilization of digital technologies along with innovative business models, both of which hold immense potential to revolutionize the insurance sector (International Association of Insurance Supervisors,

2017). Insurtech business models mainly emerged in the two major fields of insurance: (i) platforms for comparing prices and digital brokers; (ii) the process of underwriting can involve various innovative approaches, such as mobile, on-demand, usage-based, and technology-enabled peer-to-peer and parametric insurance (BIS, 2020). The insurance fintech model is well embraced by traditional providers, allowing insurers to expand data collection to non-traditional sources and improve risk analysis (Lee & Shin, 2018). Censio, CoverFox, The Zebra, Sureify Labs, and Ladder are among the top insurance technology companies transforming the insurance industry with innovative services and solutions.

- **Financial activities related to cryptoassets.** The rapid evolution of technologies and the emergence of new business models within this sector create a significant challenge in establishing a comprehensive classification system for these types of assets. As defined by the Financial Stability Board (FSB), a crypto asset is a type of privately-held digital asset whose value derives from its reliance on cryptographic techniques and distributed ledger or similar technology. Cryptoasset-related financial activities encompass a range of actions, such as generating, dispersing, safeguarding, and trading crypto assets. Additionally, they can be utilized for investment or payment purposes or as a benchmark in financial products.

2) Enabling technologies

The financial sector is experiencing a wave of innovation thanks to the convergence of multiple cutting-edge technologies. These technologies include AI, application programming interfaces (API), machine learning (ML), cloud computing (CC), distributed ledger technology (DLT), and biometric-based identification and authentication (biometrics) (BIS, 2020). Emerging technologies are creating new opportunities in the financial industry with various applications. APIs are streamlining secure access to customer payment and account data. Cloud computing offers efficient and scalable data storage and management. Distributed ledger technology (DLT) enhances efficiency and reduces intermediation, particularly in cryptoassets. Biometric data is increasingly used for secure customer authentication in mobile banking, while artificial intelligence and machine learning are prevalent in credit scoring, high-frequency trading, and robo-advisory services.

3) Policy enablers

Policy enablers play a critical role in maintaining the stability and well-being of the system. For digital financial services to thrive in a market, government entities implement public policies and initiatives to establish the essential digital infrastructure. This involves activities such as building a national broadband network, creating digital identities and authentication systems, promoting interoperability among crucial networks and platforms (e.g., telecoms, banking systems), and developing comprehensive frameworks/strategies for data protection and cybersecurity at either the national level or within the financial industry.

Some regions have taken proactive steps to encourage the integration of new ideas into their financial systems. Various strategies, such as innovation hubs, regulatory sandboxes, and innovation accelerators, are being employed to foster the development of groundbreaking ideas within a secure environment that safeguards consumers' interests. Furthermore, these initiatives offer regulatory bodies valuable insights into the practical application of technology, the underlying principles of emerging business models, and the criteria for determining whether regulatory boundaries need to be reevaluated.

1.5 Global Fintech Phenomenon and Trends

The FinTech industry emerged as a response to the 2008 global financial crisis and has since experienced significant growth and globalization, reaching both developed and developing regions worldwide.

- **Fintech Population**

According to data from Crunchbase, the global fintech landscape was home to approximately 26,393 active firms by May 2023. Figure 1.7 presents a breakdown of these firms across various economies, revealing three major fintech clusters: the Americas (44.1 % of total firms), Europe, Middle East, Africa (EMEA) (36.7% of total firms), and Asia-Pasific (APAC) (19.2% of total firms). In line with the research conducted by Haddad & Hornuf (2018), which delves into the factors contributing to the rise of fintech, it is evident that most startups tend to be founded in advanced economies with easy access to venture capital.

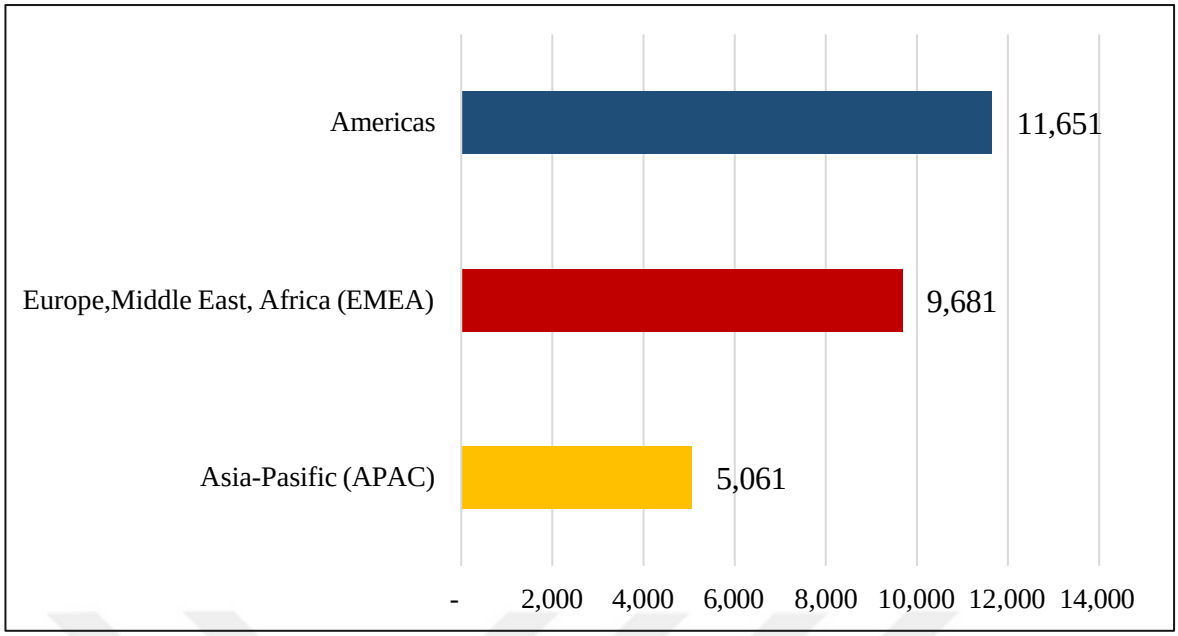


Figure 1.7: Number of fintech firms as of May 2023, **(Crunchbase, 2023)**

The Americas has the largest FinTech population, boasting over 11.000 FinTech firms. The U.S. fintech sector is renowned as the largest in the world, with many of these firms located in prominent cluster areas such as Silicon Valley, San Francisco, and New York. The most prominent fintech firms in terms of valuation and clients are Ripple, Plaid, Square, Robinhood, and Chime.

The second largest fintech population belongs to Europe, the Middle East, and Africa, with 9.681 fintech firms. The United Kingdom's fintech companies comprise a significant part of the European FinTech ecosystem. The "City of London" is an important hub for attracting the establishment of FinTech firms.

While most fintech companies are located in developed countries, the Chinese fintech ecosystem is an essential hub with more than two thousand companies. The driving factors of China’s fintech development are the lack of supply in the traditional financial market, solid governmental support for promoting financial inclusion through digital technology, and a more permissive regulatory environment (Hua & Huang, 2020). The growth dynamics of China's fintech sector differ from those of the

U.S. and European fintech sectors. U.S. and European fintech firms have focused on geographical expansion through specialization, while Chinese firms have primarily targeted the domestic market with high-engagement consumer platforms. In this sense, Chinese companies like Tencent and AntFinancial have become Big Tech companies.

Furthermore, emerging economies such as Brazil and India have significant fintech populations. The underbanked and unbanked populations are perceived as the foremost opportunity for developing the fintech sector in both economies. The unmet demand is a powerful force that propels emerging and developing economies, as well as overlooked market segments (Frost, 2020).

- **Global fintech market**

In 2022, McKinsey (2023) reported that fintech revenue contributed 5% of the global banking sector's net income, amounting to 105 to 205 billion USD. The projected growth suggests the share could surge to over 400 billion USD by 2028. This represents a substantial 15% compound annual growth rate of fintech revenue between 2022 and 2028, three times the overall banking industry's growth rate of approximately 6 %. Figure 1.8 depicts the global fintech revenue projection between 2022 and 2028.

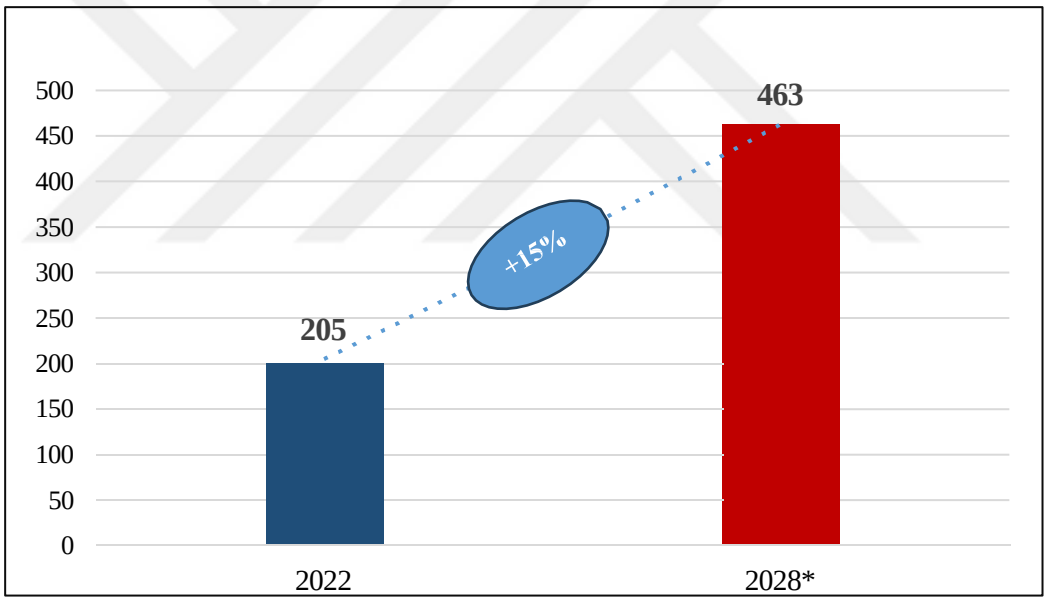


Figure 1.8: Global fintech net revenues (billion USD), **(McKinsey, 2023)**

A noteworthy aspect is that emerging markets will drive a substantial portion of the revenue growth. The specific projection for 2028 can be found in Figure 2.9.

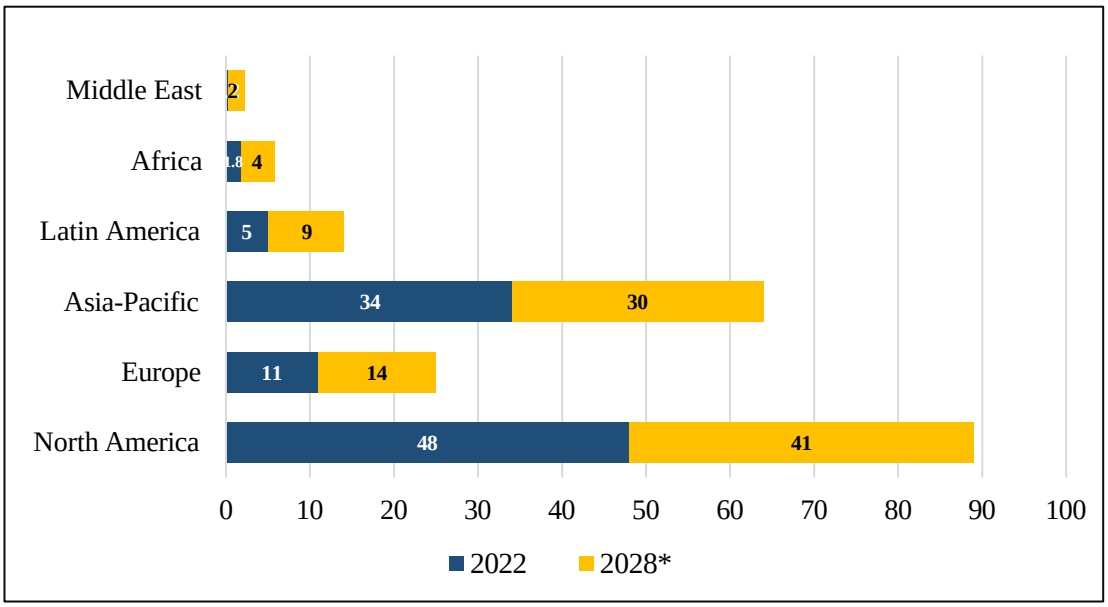


Figure 1.9: Global fintech net revenue share (%) by region **(McKinsey, 2023)**

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According to Figure 1.10, global fintech revenues are expected to increase across Africa, Asia-Pacific (excluding China), Latin America, and the Middle East, rising from 15 % to 29 % by 2028. Meanwhile, North America's share of worldwide fintech revenues is projected to decrease from 48% to 41% by 2028.

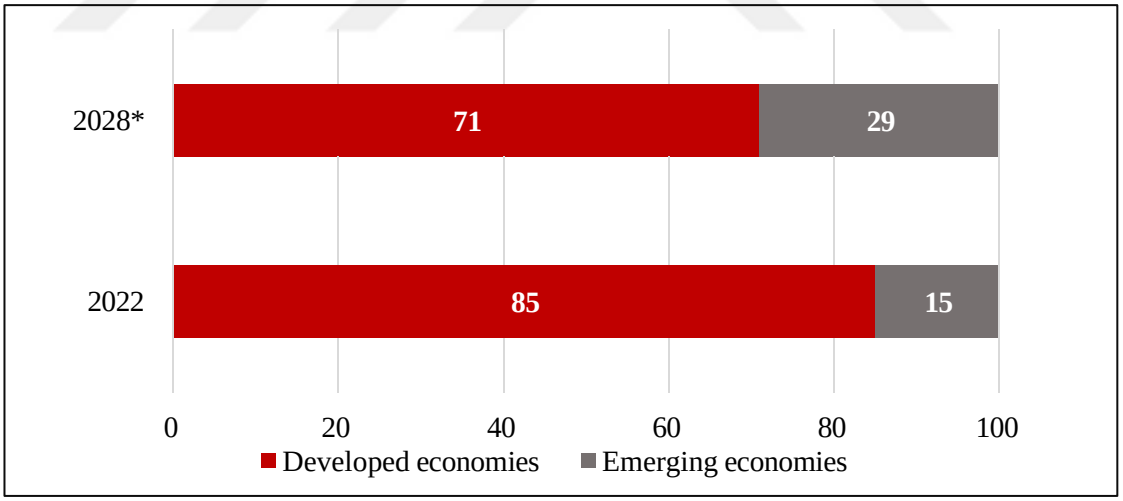


Figure 1.10: Global fintech net revenue share by level of development **(McKinsey, 2023)**

In emerging markets, fintech penetration is currently the highest globally and is poised for further growth due to several factors. These economies often have limited access to traditional banking services, and a significant proportion of the population is underbanked. Fintechs have made inroads in addressing these gaps, as evidenced by

the substantial increase in Nubank users in Brazil, with 46 percent of the adult population utilizing the fintech bank—a figure that has doubled in just two years.

- **Fintech investments**

The fintech sector's potential for growth is evident from the substantial funding it has attracted from investors worldwide. According to KPMG (2023), global investment activity, which includes Venture Capital (VC), Private Equity (PE), and Mergers and Acquisitions (M&A), in the fintech sector experienced a significant downturn in 2023, plunging to $113.7 billion—the lowest level seen in five years as shown in Figure1.11. 4,547 deals marked this decline as investors increasingly hesitated to engage in significant transactions. Concerns surrounding persistently high interest rates, ongoing conflicts in regions like Ukraine and the Middle East, diminishing fintech valuations, and a challenging exit environment contributed to this pullback.

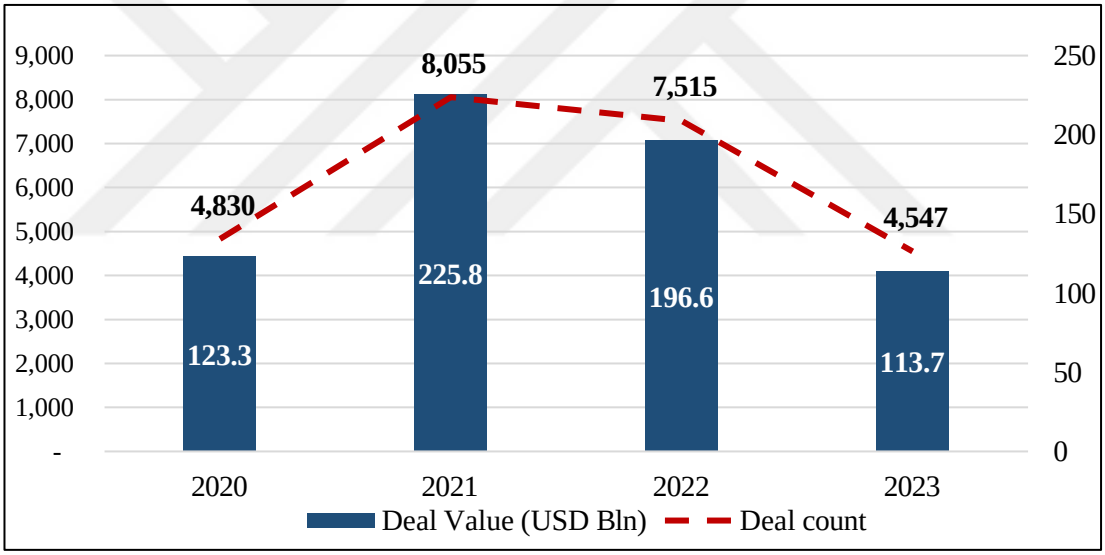


Figure 1.11: Total global fintech investment activity **(KPMG, 2023)**

In 2023, the proptech sector reached a new funding milestone, amassing over $13.4 billion. This surge was largely driven by the significant $11.7 billion acquisition of Black Knight. Investors are increasingly drawn to proptech not only for its property management potential but also for its relevance to ESG initiatives and climate change mitigation.

Interestingly, both proptech and insurtech experienced year-over-year increases in investment, while the payments sector continued to dominate fintech funding, securing

$20.7 billion in 2023. In 2021, Table 1.2 and Figure 1.12 revealed the top ten global fintech deals. It's worth noting that all these deals emerged from developed economies.

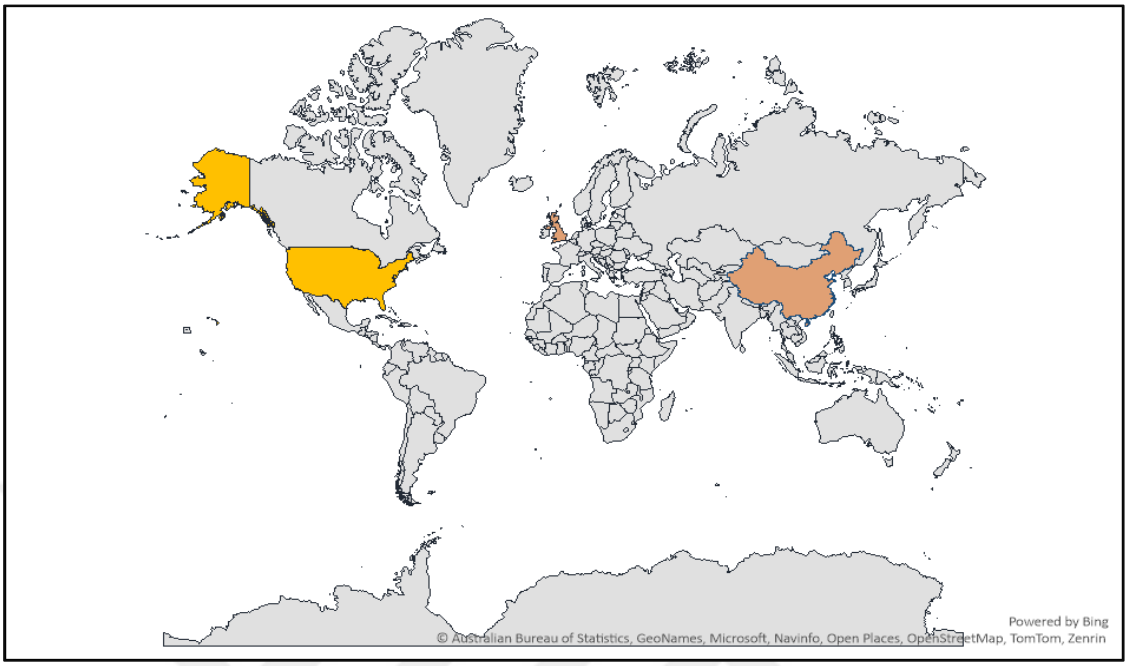


Figure 1.12: Top 10 global fintech deals in 2021 **(KPMG, 2023)**

#	Company Name	Country	City	(Billion)	Segment	Deal Type
1	Black Knight	United States	Jacksonville	$ 11.70	Institutional/B2B	M&A
2	Adenza	United States	New York	$ 10.50	Institutional/back-office	M&A
3	Coupa	United States	San Mateo	$ 8.00	Institutional/B2B	Public-to-private buyout
4	Finastra	United Kingdom	London	$ 6.90	Payments	Recapitalization
5	Stripe	United States	San Francisco	$ 6.90	Payments	Series I
6	EVO Payments	United States	Atlanta	$ 4.00	Payments	M&A
7	Duck Creek Technologies	United States	Boston	$ 2.60	Insurtech	Public-to-private buyout
8	Celsius Network	United States	Hoboken	$ 2.00	Institutional/B2B	Buyout
9	Moneygram	United States	Dallas	$ 1.80	Payments	Public-to-private buyout
10	Chongqing Ant Consumer Finance	China	Chongqing	$ 1.50	Consumer finance	PE growth

Table 1.2: Top 10 global fintech deals in 2023 **(KPMG, 2023)**

- **Fintech Adoption**

Consumers worldwide have been increasingly embracing FinTech services on the demand side. Over the past few years, there has been a steady upward trend in consumers' adoption of FinTech services, indicating a growing interest in and reliance on these financial technologies. Figure 1.13 depicts the fintech adoption index (the percentage of people using fintech services) between 2017 and 2019. According to EY (2019), the fintech adoption index has risen from 33% to an average of 64%. Consumers are classified as fintech adopters only if they have utilized two or more fintech services in the past year. While the adoption indexes have increased in developed and developing countries, the highest rates are observed in emerging countries like China, India, and South Africa. In these nations, over 80% of the population uses fintech apps for various financial activities. Fintech actively contributes to financial inclusion, exemplified by its influential role acknowledged by the International Monetary Fund. High adoption rates for FinTech services are also seen in developed economies such as the Netherlands, United Kingdom, South Korea, and Ireland, where traditional banks are the main financial intermediaries.

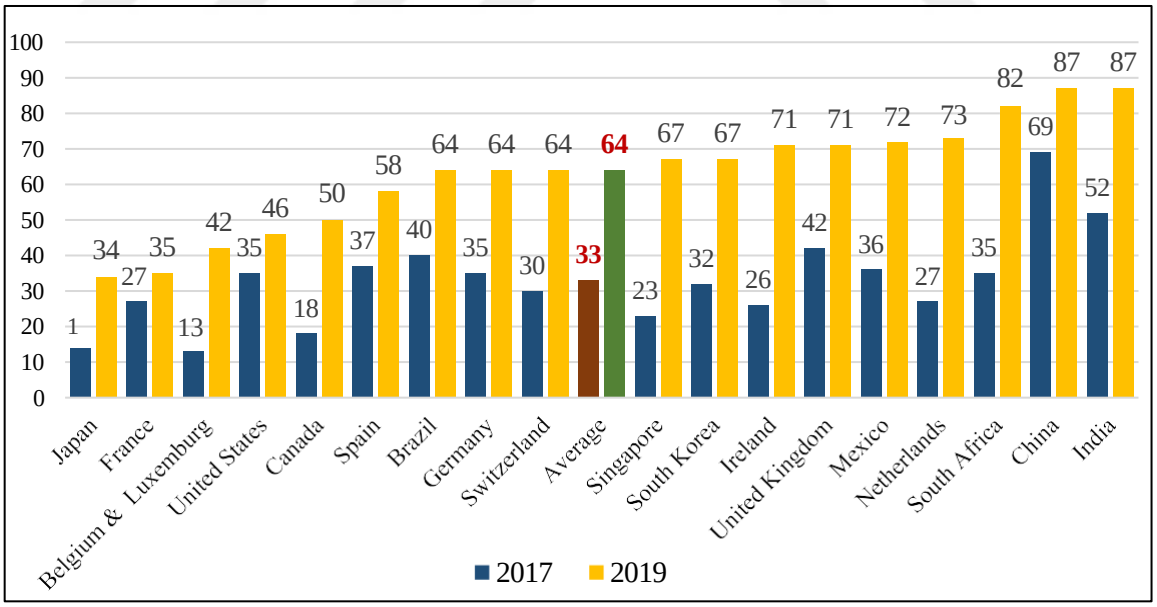


Figure 1.13: Global fintech adoption index (%) **(EY, 2019)** and **(Carbó-Valverde, Cuadros-Solas, & Rodríguez-Fernández, 2021)**

- **Future trends in the Fintech sector**

In 2023, fintech investment decreased due to market uncertainty. The first half of 2024 is expected to begin slowly, but a decrease in interest rates could stimulate deal activity. The lack of exits has made investors hesitant to engage in large deals. According to KPMG (2023), the top fintech trends for subsequent years are as follows:

- Increased M&A activity is anticipated in the payments sector and for distressed assets.
- Rising interest in AI and generative AI across industries is expected to significantly influence the fintech market, with a growing emphasis on maximizing AI opportunities.
- More fintechs will focus on supporting financial institutions rather than targeting end customers directly.
- The ever-changing regulatory landscape will continue to drive investments toward reg tech.
- Environmental, Social, and Governance (ESG) and climate change commitments will continue to support the emergence of new fintech focused on opportunities like alternative energy lending, carbon tracking, and long-term green investment.
- The SME market is a target for fintechs and corporates looking to grow their business. Solutions for this market will likely gain attention from investors.
- Asset tokenization and regulated stablecoins are becoming increasingly popular investment options within crypto and blockchain.
- Partnerships and alliances in embedded finance are expected to become more important, as fintech providers may need to expand to meet the growing demand for financial services.
- In developing markets, fintech hubs will emerge in regions like Southeast Asia, the Middle East, and Africa as governments invest more to support digital economic development.

CHAPTER TWO
THE TURKISH FINTECH ECOSYSTEM AND CASE STUDIES ON BANK-FINTECH COLLABORATIONS

2.1 Introduction

This chapter provides a comprehensive examination of the current landscape of the fintech sector in Türkiye. It begins by outlining the pivotal role fintech plays in reshaping financial services within the country. Following this, the chapter introduces a conceptual framework that categorizes different modes of collaboration between traditional banking institutions and fintech companies.

A thorough review of relevant literature is conducted to deepen our understanding of these collaborative dynamics. This literature spans various aspects of fintech, including technological advancements, regulatory challenges, and evolving consumer preferences that have emerged in recent years.

Given the distinctive characteristics of the fintech ecosystem and the broader financial industry in Türkiye, the chapter presents several exploratory case studies. These case studies employ a variety of research methods, such as qualitative interviews and quantitative analyses, to illustrate the different strategies Turkish banks are implementing in their engagements with fintech firms.

Ultimately, the chapter culminates in a synthesis of key findings, highlighting the effectiveness and challenges of these collaborative efforts. Furthermore, it offers actionable recommendations for future research, suggesting areas where further inquiry could enhance our understanding of fintech's impact on traditional banking and the broader financial landscape in Türkiye.

2.2 Turkish Fintech Ecosystem

Türkiye has a vibrant and tech-savvy young population with high internet and smartphone usage rates. These conditions create an ideal environment for adopting and proliferating digital financial solutions, whether at home or on the go. It is important to remember that Türkiye holds a prominent position in the banking sector with its strong emphasis on technology use and digitalization. The State of Turkish Fintech Ecosystem 2023 report highlights Türkiye's remarkable position as a global leader in banking, ranking 5th worldwide for the sheer volume of credit card transactions. With an impressive 117.8 million credit cards in circulation, a substantial portion of the population is engaged in digital financial activities. This robust infrastructure is further underlined by the presence of 2 million POS devices and 52,900 ATMs, which facilitate seamless transactions across the country. Moreover, Türkiye boasts a significant demographic of 106.6 million active retail digital banking customers, indicative of a strong shift towards digital finance. The fintech landscape has flourished due to progressive regulations that promote innovation, resulting in a vibrant ecosystem featuring 696 active fintech companies. Among these, 81 are licensed payment and electronic money institutions, and there are 21 crowdfunding platforms contributing to the financial diversity. In addition to these impressive figures, the trend of mobile contactless payments has surged, with 50.5 million transactions occurring via this method. QR code transactions have also gained popularity, totaling 35.5 million. Collectively, these statistics paint a picture of a dynamic and rapidly evolving fintech landscape, solidifying Türkiye's status as a key player in the global banking industry. Financial institutions are increasingly channeling their resources into fintech startups, utilizing their established funds to foster innovation in the sector. By doing so, they bolster their investment portfolios and engage in the broader ecosystem by providing support through specialized acceleration programs. These initiatives are designed to nurture and encourage the emergence of new fintech enterprises, creating a dynamic environment ripe for technological advancement and financial solutions. Figure 2.1 shows the snapshot of the Turkish fintech ecosystem.

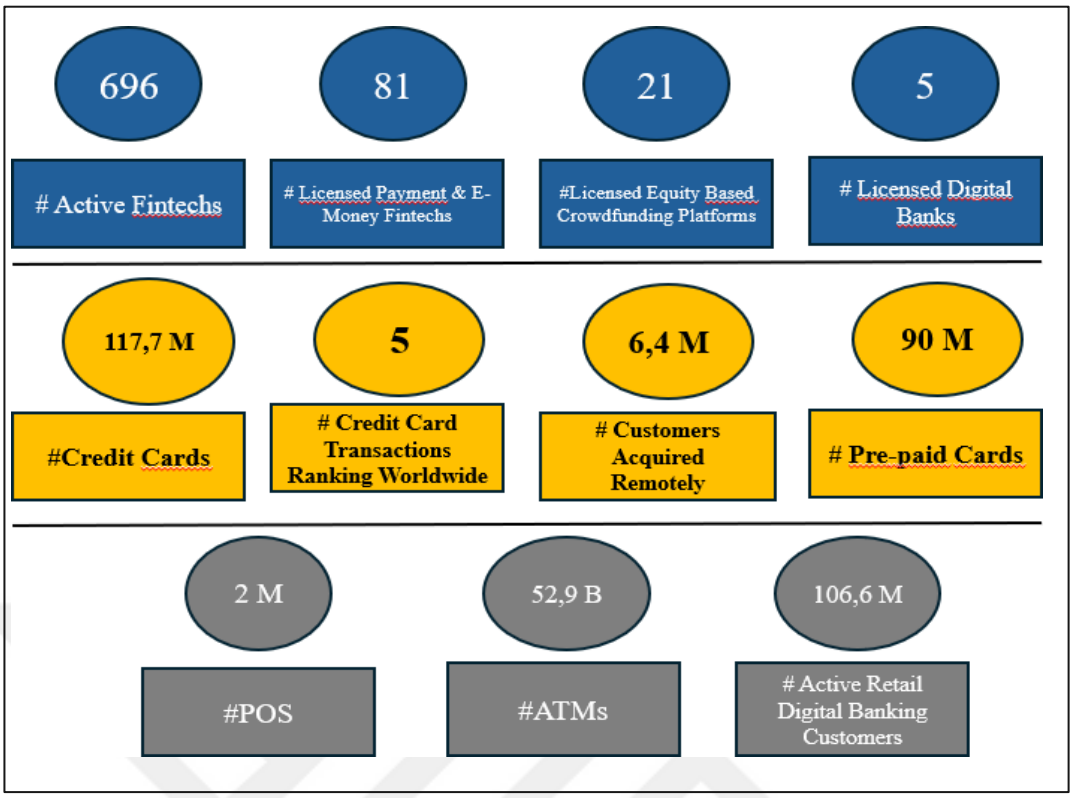


Figure 2.1: Türkiye fintech ecosystem with numbers **(Presidency of the Republic of Türkiye Finance Office, 2023)**

The Interbank Card Center consistently provides detailed updates on the volume and value of transactions via mobile contactless methods and QR codes. As shown in Figure 2.2, the number of mobile contactless transactions in Türkiye increased by more than threefold between 2019 and 2020, primarily due to the impact of COVID-19. This surge indicates a significant upward trend in mobile contactless transactions. Similarly, QR code-based transactions have experienced a rise in popularity in recent years. Figure 2.3 illustrates that the volume of QR code transactions has increased by more than four times in the past two years. In Figure 2.4, the data represents a notable surge in mobile contactless and QR code payment transaction volume. Despite this increase, their representation in the contactless transactions made with domestic and international cards remains comparatively tiny, with 1% as of 2023. This highlights the importance of initiatives to bolster public understanding and adoption of digital payment methods.

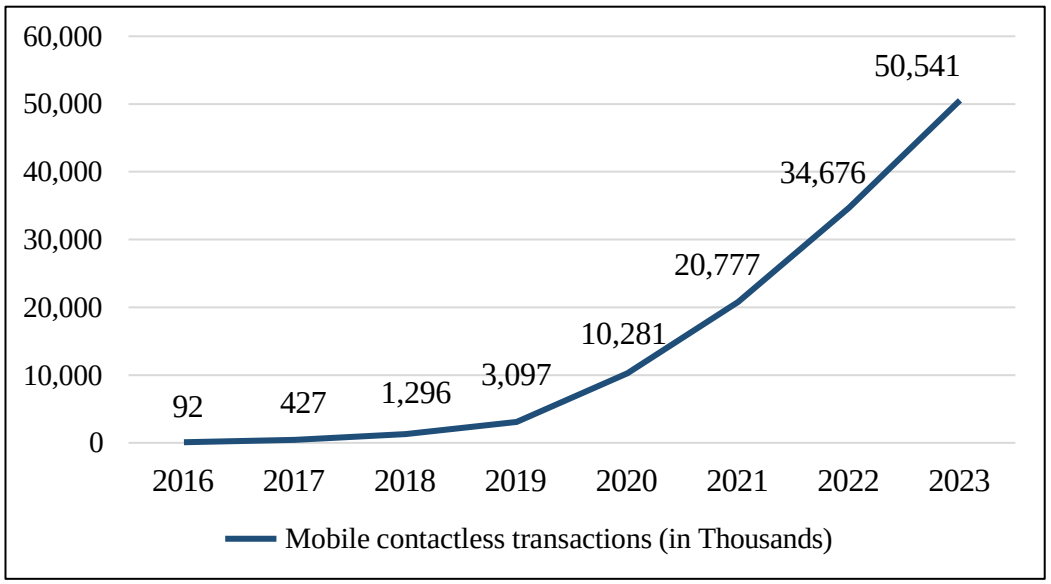


Figure 2.2: Number of mobile contactless transactions (in thousands), **(BKM, 2024)**

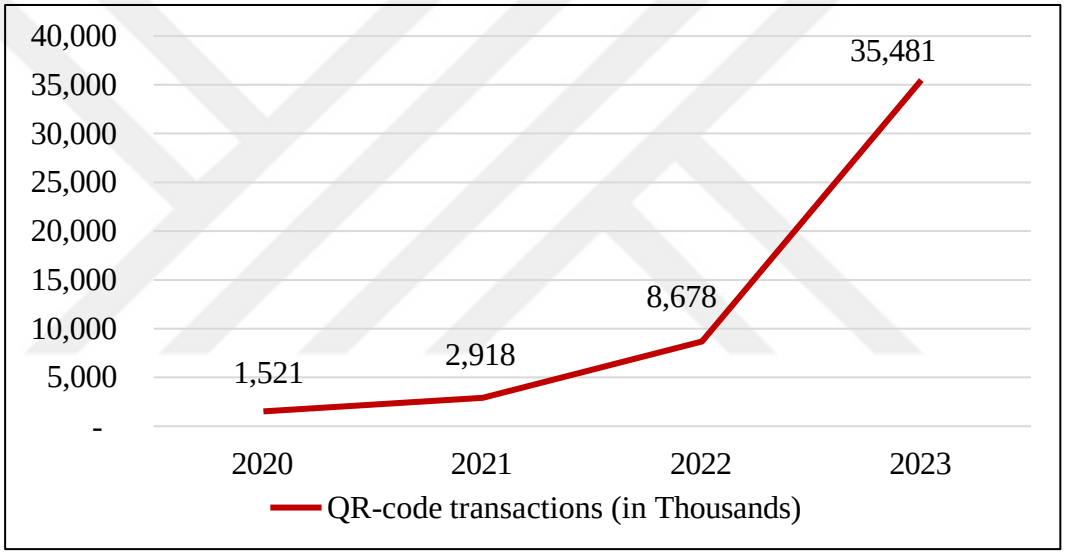


Figure 2.3: Number of QR-code transactions (in thousands), **(BKM, 2024)**

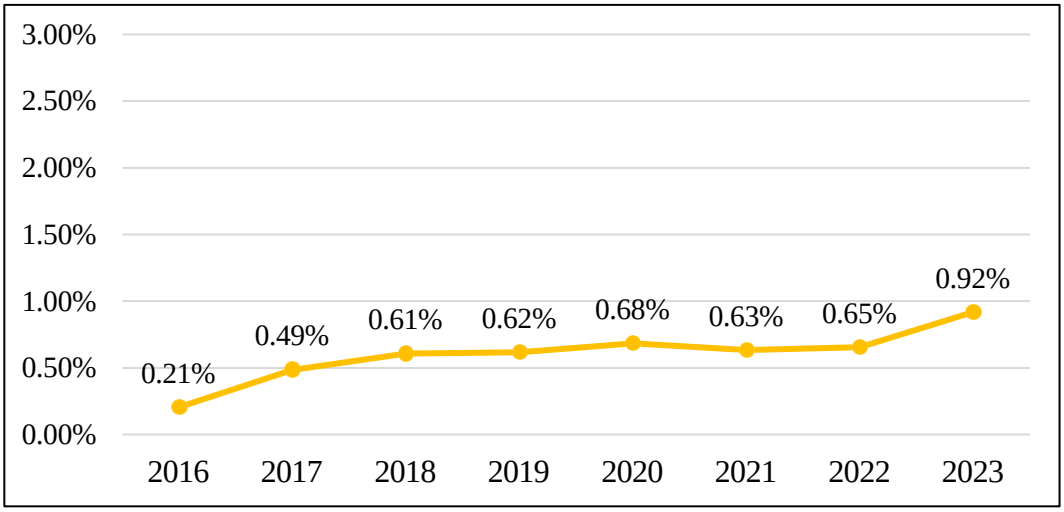


Figure 2.4: Mobile contactless and QR-code transactions / Total contactless transactions of domestic and international cards (%), **(BKM, 2024)**

In the early 2010s, Türkiye established regulations for fintech companies. In 2012, the mandatory adoption of new-generation payment devices sparked a surge of fintech initiatives in the country. These initiatives continued to grow after the issuance of e-money and payment institution licenses in 2015. As of December 2023, a total of 81 companies had obtained licenses to conduct operations within this particular industry, as depicted in Figure 2.5 (Presidency of the Republic of Türkiye Finance Office, 2023).

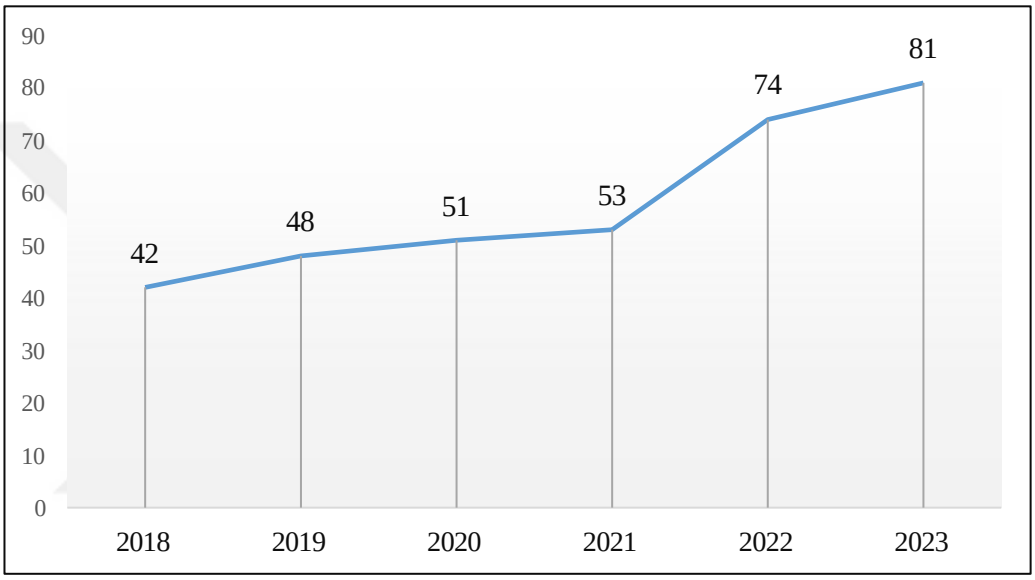


Figure 2.5: Number of licensed e-money and payment institutions in Türkiye **(Presidency of the Republic of Türkiye Finance Office, 2023)**

In the past three years, several regulations have been introduced to support fintech companies, promote bank digital transformation, and lay the groundwork for open banking. The year 2022 marks the beginning of seeing the benefits of these regulations come to fruition. The major fintech-related regulations are summarized in Table 2.1 (Bayram, Talay, & Feridun 2022; Presidency of the Republic of Türkiye Finance Office 2022).

Year	Title	Purpose	Unit
2013	Revenue Administration of Türkiye Communiqué No. 426 on Tax Procedure Law	The mandatory use of POS devices by vendors has led to an increase in fintech start-ups in Türkiye.	TRA
2013	The Law on Payment and Securities Settlement Systems, Payment Services and Electronic Money Institutions (the "Law no. 6493")	The widespread adoption of fintech applications such as electronic payments, money transfers, loyalty cards, digital wallets, and credit card installment plans.	CBRT
2019	Secondary Legislation on Equity-Based Crowdfunding by Capital Markets Board of Türkiye	Technology and production start-ups to raise capital for equity on crowdfunding platforms, leading to more opportunities for renewable energy and agricultural technology start-ups.	CMB
2019	Amendment to Law on Payment and Securities Settlement Systems	Enhancing the ecosystem for start-ups offering open banking applications for online platforms and account information processing	CBRT
2019	Regulatory Change	Supervisory and regulatory authority over payment service providers was transferred from the BRSA to the CBRT.	CBRT
2020	TÖDEB	Payment and Electronic Money Institutions Association of Türkiye was established.	
2020	Amendment to Electronic Communication Law	Financial institutions can now contract digitally, increasing financial inclusion and trade feasibility, especially during crises like the pandemic.	
2020	TR QR Code	The system allows for quick and secure QR code payments, offering customers faster and contactless payment options.	CBRT
2021	Initiation of Centralized Instantaneous Fund Transfer System (FAST) by CBRT	Money transfers are now completed instantly and can be done 24/7 to speed up financial transactions.	CBRT
2021	Secondary Legislation on IBAN (international bank account number) provision by CBRT	Payment institutions and electronic money institutions were enabled to create IBANs.	CBRT
2021	Secondary Legislation on Equity-Based and Debt-Based Crowdfunding by CMB of Türkiye	Expanded the range of crowdfunding applications subject to regulation by incorporating debt-based crowdfunding.	CMB
2021	Secondary Legislation on Banks' Information Systems and Electronic Banking Services by BRSA	The regulations governing electronic payment systems have recently been revised, and the legal framework for open banking has been established, building upon the PSD2 directive.	BRSA
2021	Secondary Legislation on Digital Banking and Banking as a Service (BaaS) by BRSA	Regulation on digital banking and Banking as a Service was published.	BRSA
2021	Digital Money	Digital Turkish Lira Collaboration Platform established.	CBRT
2021	NFC Authentication	NFC technology is now the go-to method for verifying identity documents	ITCA

Table 2.1: The major fintech regulations in Türkiye **(Bayram, Talay, & Feridun, 2022)** and **(Presidency of the Republic of Türkiye Finance Office, 2022)**

According to the Presidency of the Republic of Türkiye Finance Office (2022), the significant developments in fintech regulations in 2022 are as follows:

- Digital banking regulation and Istanbul Financial Center Law entered into force.
- The first digital bank establishment permit was issued.
- New guidelines for payment services and open banking were introduced.
- The first Digital Turkish Lira Network payment transaction was also realized.

The recent advancements suggest that Türkiye will significantly increase its activity shortly. Establishing the İstanbul Financial Center (IFC) will further boost this upward momentum.

In Türkiye, the fintech sector thrives, with 696 active fintech companies in the startup ecosystem, representing 26 newly founded startups in 2023. According to Figure 2.6, the number of new fintech startups in 2023 was lower than usual because many established startups did not immediately announce their launch. However, it is anticipated that approximately 67 new fintech startups will be established each year over the past five years. Regulatory changes in 2021 are expected to increase the average number of new fintech startups in the coming years. Türkiye's focus on areas such as open banking, service banking, digital money, and digital banking is set to boost initiatives in these areas soon significantly.

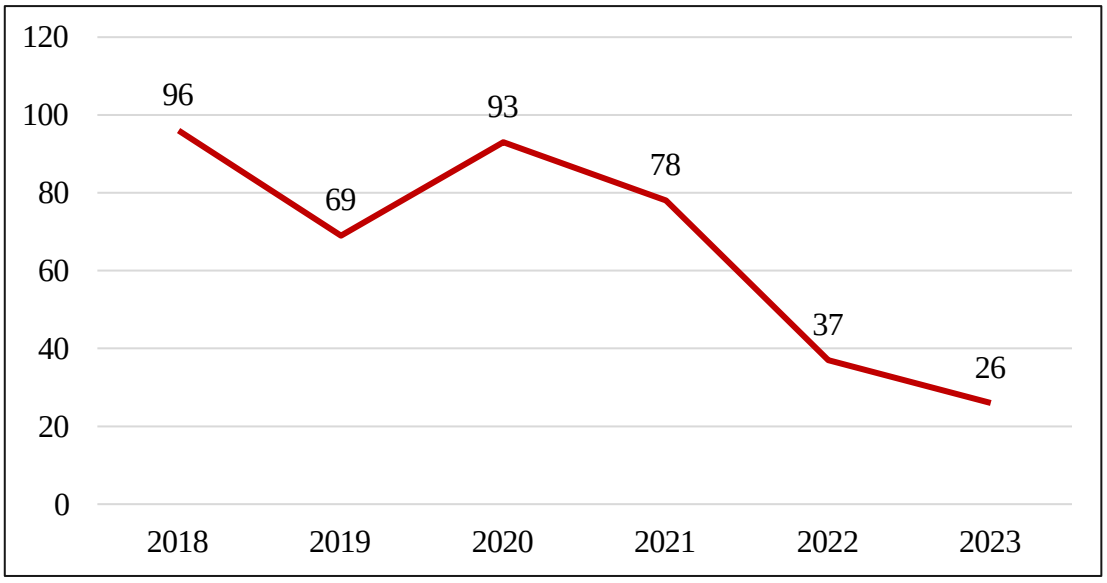


Figure 2.6: Number of newly established fintechs in Türkiye **(Presidency of the Republic of Türkiye Finance Office, 2023)**

Türkiye has a growing presence of innovative startups in the financial technology sector. Figure 2.7 shows the breakdown of fintech companies by vertical as of the end of 2023. This includes 268 payment technology startups, 108 banking technology startups, and 100 blockchain and crypto asset startups. Additionally, emerging initiatives focus on corporate finance solutions, insurance technology, and financing solutions. This trend reflects a dynamic and vibrant ecosystem of financial technology innovation in Türkiye.

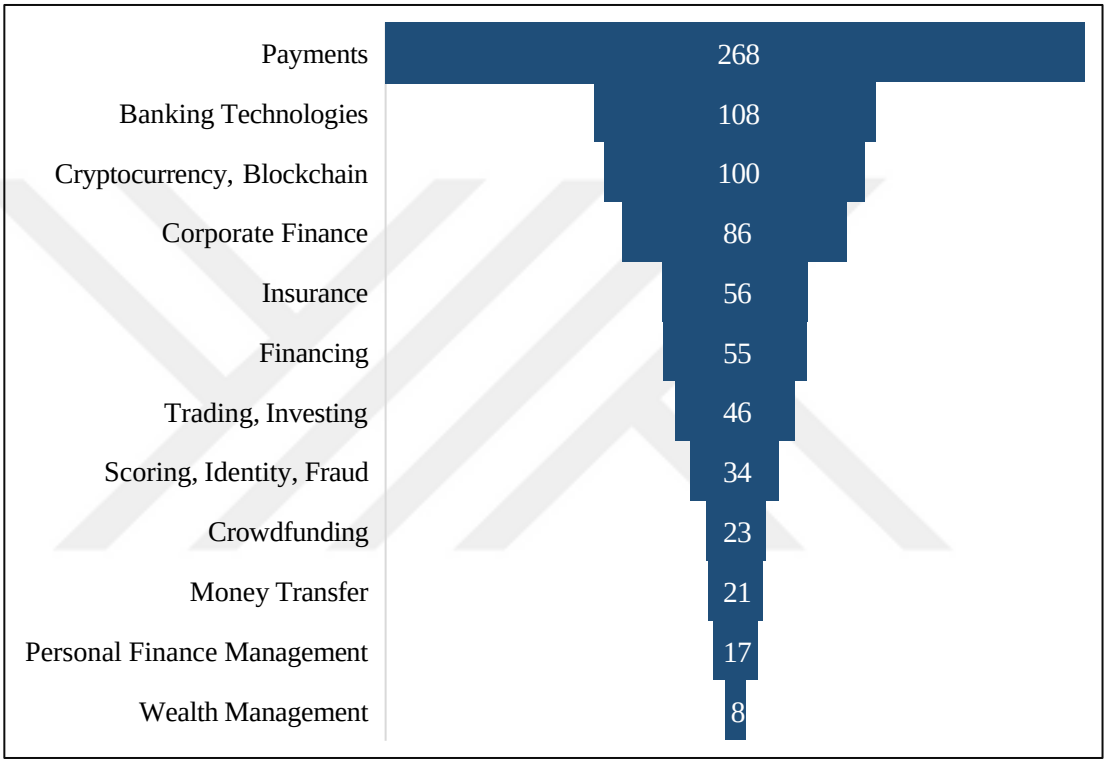


Figure 2.7: Fintech firms by vertical as of 2023 **(Presidency of the Republic of Türkiye Finance Office, 2023)**

The high level of interest from banks and investors has made the fintech sector one of the most popular in Türkiye. However, Turkish fintech startups have faced challenges expanding globally due to the complexities of navigating diverse regulatory processes. Despite this, successful Turkish fintech startups are starting to establish a presence abroad in 2022. Figure 2.8 shows the deal size and count of fintech companies in Türkiye between 2018 and 2023.

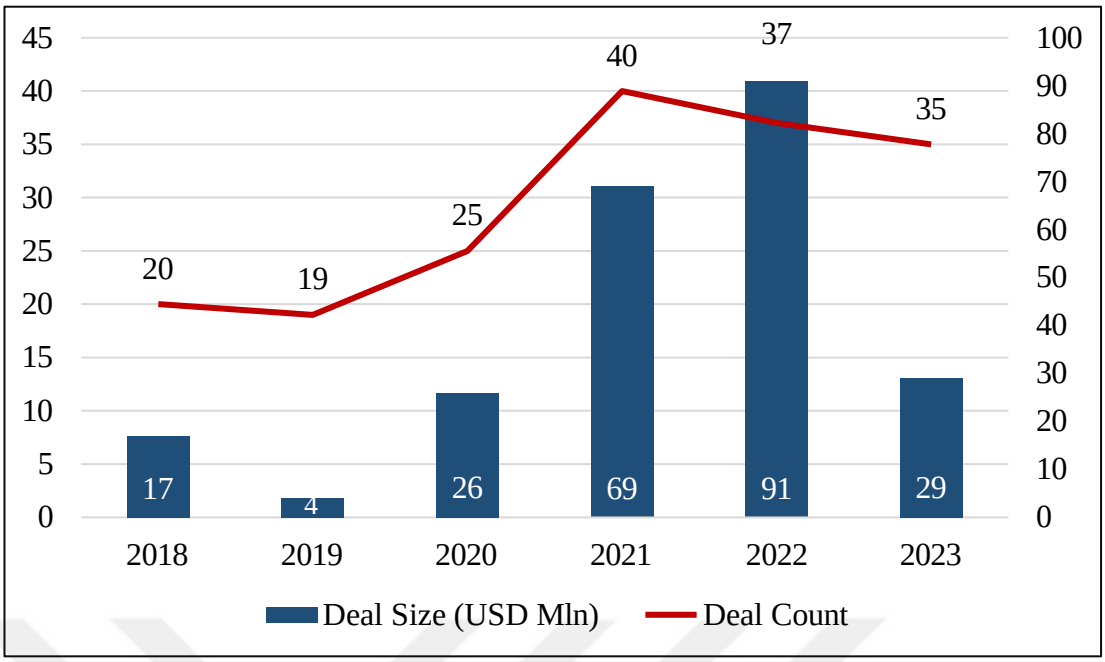


Figure 2.8: Fintech deals in Türkiye **(Presidency of the Republic of Türkiye Finance Office, 2023)**

In 2022, several Turkish initiatives, including "Arf," "Param," "Figopara," "Midas," and "Fimple," received significant fintech investments for expanding abroad, resulting in a record level of fintech investment (Presidency of the Republic of Türkiye Finance Office, 2023). "Arf" initiative has successfully expanded internationally with its blockchain-based solution and has secured the largest fintech investment since the "Param" initiative. Moreover, 2022 saw the highest number of fintech investments in the Turkish startup ecosystem, with $90 million in fintech investment. In 2021, startups such as "Colendi" broke the record, which showcased globalization in the fintech sector. Another popular initiative, “Hadi,” is the banking application of TOM Bank, Türkiye’s most prominent digital bank, launched in 2023. With the Hadi application, you can enjoy shopping at A101, the biggest retail chain (more than 13000 stores), with buy now, pay two months later options, savings in shopping, access term deposit accounts, and make secure payments with Hadi cards globally. Hadi makes all financial transfers quick and easy. You can quickly deposit money into your Hadi account and access the funds from an ATM or secure A101 safes. You can also instantly send money to anyone in your contact list using their mobile phone number or IBAN. Keep track of your bills and set up automatic payments for added convenience. As part of the collaboration with A101, customers using the Hadi app in

2023 saved an average of 500 TL, while some saved over 11,000 TL. In early 2022, a slowdown in digitalization and regional conflicts led to global money shortages in startup ecosystems, causing investors to focus on protecting their existing portfolios rather than making new investments. This resulted in a decline in fintech investments worldwide. In Türkiye, investments also dropped, with only $29 million invested across 35 rounds in 2023. While Türkiye ranked 15th globally in the number of fintech investments, it was 49th in total investment amount. Contributing factors include global money scarcity and slower fintech globalization in Türkiye. Notable 2023 acquisitions included Param's purchase of PayCore and TeamSystem's acquisition of Mikro Yazılım.

In response to the evolving financial landscape and the growing interest of public institutions in financial innovations, the Finance Office of the Presidency of the Republic of Türkiye has developed a comprehensive "National Fintech Strategy Document." This strategy seeks to integrate all relevant factors and stakeholders in the fintech ecosystem to ensure its sustainable growth. The document, currently in its preparatory stages, is expected to be officially released in 2023 and is anticipated to play a pivotal role in shaping the future of the fintech sector. In parallel with this strategy, Istanbul Finance and Technology Base was established in 2022 to unlock the potential in the fintech field and respond to the development and needs of fintech entrepreneurship.

The incubation center will support entrepreneurs in the target group, contributing to a sustainable structure and investing in entrepreneurs with growth potential. Efforts will be made to develop this perception throughout Türkiye with virtual acceleration and incubation services on the Fintech Hub Türkiye platform, bringing fintech entrepreneurs together and facilitating entrepreneur-investor matching.

2.3 Literature Review and Theoretical Framework

The rapid rise of the fintech sector, thanks to advancements in digitalization and IT-enabled technologies, imposes significant threats on traditional financial institutions. Divya & Murali (2019) classified the nature of these threats to the incumbent bank's business model as technology-based and market-based. Fintech companies' solutions to specific financial service needs are considered business model innovations from the perspective of incumbent banks. Traditional financial institutions have developed various strategies to respond based on these threats' perceived levels they face. Divya & Murali (2019) defined five simple categories of responses for a bank: 1) Hold; 2) Make (Build); 3) Ally; 4) Buy; 5) Exit. Suppose both technological and market-based risks are perceived as low. In that case, the bank adopts the "hold" strategy, which involves conducting business as usual but implementing revitalization efforts to mitigate the detrimental effects of fintech threats. In the event of higher market-based and lower technology-based risks, the bank will choose the "Make" strategy, wherein the incumbent will establish a new R&D center or laboratory, a new entity or project, and a novel process or system. When market-centered risks are higher than technology-based risks, the incumbent prefers the "Ally" strategy, which engages strategic alliances with fintech companies to avoid losing its target customers. Lastly, when the perceived level of both threats is higher, incumbents can buy the entrant fintech if the bank is large enough or exit from the sector.

The current study investigates the modes of collaboration between fintech companies and traditional financial institutions and their case studies in Türkiye. Before explaining these modes, it is essential to emphasize the critical motives behind strategic partnerships between incumbents and fintech startups. Klus, Lohwasser, Holotiuk, and Moormann (2019) conducted semi-structured interviews with banks and fintech companies to find the strategic motivations of both parties. The results imply that banks' motives are outsourcing, innovation, business model evolution, and competitive advantage, while fintechs' motives are resources, trust and credibility, and customer acquisition. A recent study by Bömer and Maxin (2018) investigated 14 case studies and found that fintech companies collaborate with banks for several reasons. i) Banks provide fintech companies with an entryway into the market; ii) Collaboration with banks can help fintech companies generate more profits; iii) Banks can facilitate the development of new fintech products and services. Furthermore, fintech companies

use various labeling approaches when collaborating with banks to market their products. Figure 2.9 shows the cooperation process between fintech companies and banks.

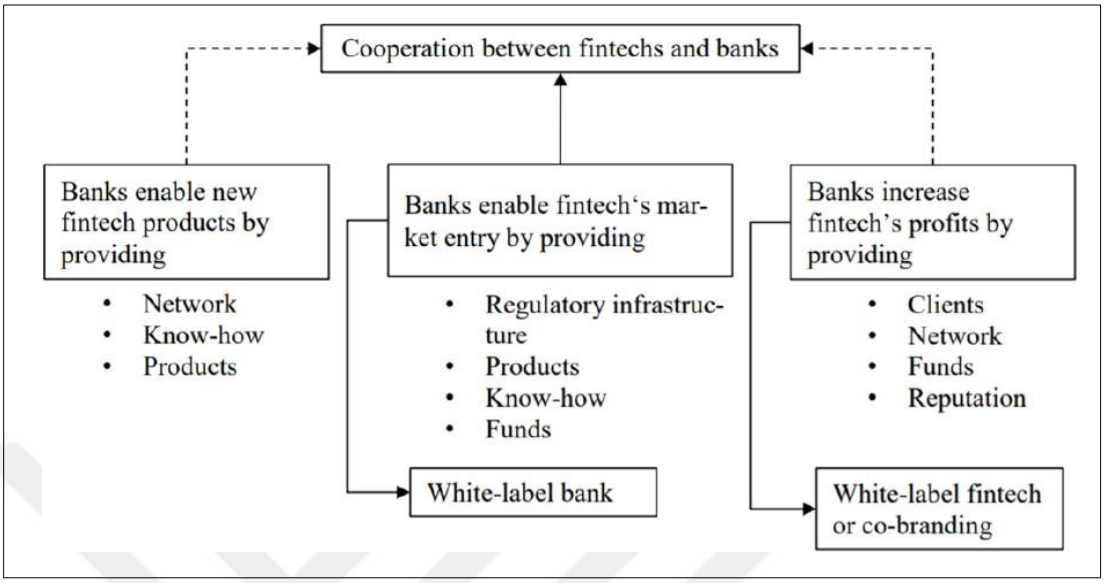


Figure 2.9: The cooperation process between fintech and banks **(Bömer & Maxin, 2018)**

Another study by Bartolacci, Cardoni, Lasak, and Sadkowski (2022) found several motives for establishing strategic alliances between banks and fintech. Banks outsource, innovate, develop business models, gain competitive benefits, improve efficiency and service quality, and learn. On the other hand, fintech startups aim to reach customers and obtain credits, banking licenses, economies of scale, and trust. Table 2.2 summarizes the fundamental motivations of collaborations between banks and fintech companies in the existing literature.

Motives of Banks	Motives of Fintech	Common Motives
External Innovation Access	Reputation & Credibility	Customer Satisfaction
Business Model Innovation	Regulatory & Synergies	Financial Return
Strategic Advantage	Product Development	Knowledge Transfer
Access to Top Talent	Market Entry Support	Competition

Table 2.2: Strategic collaboration motives between banks and fintech **(Ruhland & Wiese, 2023)**

The literature outlines different collaboration modes between traditional banks and fintech companies. According to a study by Birgl, Gorss-Selbeck, Dehnert, Florian, and Simon (2019), corporations utilize five types of innovation vehicles when collaborating with startups: innovation or digital labs, accelerators, corporate venture capital, partnership units, and incubators. Drasch, Schweizer, and Urbach (2018) studied 136 bank fintech collaboration cases and developed a taxonomy of 13 factors to categorize these collaborations. They identified four primary modes of cooperation: acquisition, alliance, incubation, and joint venture. Following Drasch, Schweizer, & Urbach (2018) and Gold & Ali (2019), Table 2.3 shows four principal collaboration modes applied in this study.

Collaboration Type	Definition
Acquisition / M&A	A corporate action in which the acquiring company purchases a majority of the target company and merges it into its existing operations
Alliance / Partner	A contract between companies to share resources and knowledge to achieve common goals.
Incubation / Build	Supporting early-stage companies through financial, managerial, or other forms of assistance, setting up internal labs for creating and testing product prototypes, and building a new entity or division.
Joint venture / Invest	The resources are pooled in an independent but shared entity, and the participating organizations bear the risks and responsibilities.

Table 2.3: Bank fintech collaboration modes **(Drasch, Schweizer, & Urbach, 2018)** and **(Gold & Ali, 2019)**

Several case studies examine the nature and dynamics of partnerships between traditional financial institutions and fintech companies. Gold & Ali (2019) investigate three collaboration modes using exploratory case studies to demonstrate how Australian financial institutions integrate and leverage fintech innovations. The first case study examines the "build" strategy mode, which involves General Insurance Group launching Insurtech Lab to develop new customer solutions and introduce product innovations into the organization. The Lab can manage insurance coverage for digital platforms using a Business to Business to Consumer (B2B2C) model. The Lab enabled the Group to

quickly pilot and scale its on-demand insurance within 6 months, giving it a first-mover advantage as the only Australian general insurer offering this cover. The second case study explores the collaboration between one of Australia's major full-service banks and a foreign accounting software-as-a-service (SaaS) utilized by 2 million accountants and their SME customers. In order to be 'Australia's Best Business Bank', The bank has formed a strategic alliance with a leading accountant platform SaaS to provide direct feeds and access to a range of the bank's products and payment functionality through the Bank's APIs. Within 6 months of partnering with SaaS, the bank's SME customers increased by approximately 40%, providing seamless transaction payment capabilities to over 100,000 customers. The last case study explores the "invest" strategy mode between full-service banks and Fintech Venture Capital Fund. In 2015, the Bank announced its investment in the equity of a P2P platform. This investment closely examined novel innovations in the P2P sector, such as loan assessment/scoring algorithms and loan platform management. Furthermore, The bank provides FinTech investees access to capital resources and industry expertise, helping entrepreneurs rapidly scale their product innovations.

Hung & Luo (2016) studied the strategic considerations of the bank when investing in fintech companies in Taiwan. While T Bank, one of the top 5 banks in Taiwan, excels in SME loans, its personal finance business is weak. The bank invested in a fintech company that offers intelligent POS systems to foster personal loans after completing the necessary selection criteria in 2016. Expanding the market share in SME loans and supporting personal finance through credit card issuance, the Fintech company complements T Bank. Furthermore, the study has several outcomes: 1) Regulations and policies influence the development of FinTech; 2) Banks, technology companies, and customers are not yet ready for FinTech; 3) The relationship between banks and FinTech companies is complex; 4) Taiwan may struggle to create FinTech disruptors soon; 5) Compare Top-down with bottom-up strategies;

Riikkinen & Pihlajamaa (2022) investigated how Nordea Bank achieved strategic alignment in its collaboration with a fintech startup by establishing an accelerator and incubator program. Three startup programs between 2015 and 2018 were investigated during a major fintech boom to analyze how the programs implemented corporate sponsorship and enabled corporate innovation. In the first Nordea Startup Accelerator in 2015, there was a mismatch between Nordea's strategic targets and the startup's knowledge source. However, in the second program in 2016, the strategic fit was

enhanced due to the more focused selection of startups and increased unit participation. The 2018 Nordea Runway program achieved a high strategic fit by incubating internal teams. This accomplishment was primarily due to iterative adjustments to the accelerator/incubator design over time. By 2018, Nordea had increased its technological and market knowledge, enabling it to generate new ideas internally.

Santander and Kabbage collaborated to provide better financing options for small and medium-sized enterprises, leveraging their strengths in banking infrastructure and innovative technology to make quick lending decisions (Santander, 2016). The collaboration with Kabbage enabled Santander to integrate cutting-edge fintech solutions into its traditional banking services, aligning with its digital transformation goals and allowing Kabbage to reach a broader customer base through Santander's extensive network.

Commerzbank AG and Deutsche Börse AG have established a strategic investment and partnership with the NFT marketplace startup 360X (Deutsche Börse Group, 2021). This start-up is creating a digital blockchain-based trading platform for art and real estate assets to facilitate secure and efficient transactions in these sectors.

Based on the collaboration examples above, the current study aims to investigate partnerships between traditional banks and fintech startups in Türkiye. This research makes several contributions to existing literature. To our knowledge, this is the first paper to conduct such case studies in Türkiye. Secondly, the findings of these case studies provide insights that can help entrepreneurs, traditional banks, and policymakers in emerging markets make informed decisions regarding future partnerships with fintech startups.

2.4 Methodology, Data Collection, and Case Studies

The qualitative methodology analyzes and understands the collaborative relationships between traditional banks and fintech companies. This approach allows for exploring key questions surrounding the intricacies of fintech advancements and partnerships, including identifying key stakeholders, the nature of the collaboration, and the specific impact areas. The retrospective case studies focused on capturing specific characteristics of incumbents engaged in fintech collaboration. This allowed for the effective utilization of commercial benefits and technologies to enhance their business models and products within a rapidly evolving industry.

The primary data for this research is primarily obtained from secondary sources, including public documents, investor presentations, annual reports, and media releases. Table 2.4 outlines the key data sources used for the exploratory case studies. As illustrated in the table, most of the data is derived from internal documents, particularly the annual reports of related banks.

Organization	Details	Year
Internal Documents		
Akbank	Annual Reports	2018 -2023
Albaraka Türk	Annual Reports	2017 -2023
Fibabanka	Annual Reports	2018 -2023
İş Bankası	Annual Reports	2021-2023
Web Site		
Garanti BBVA and Logo Yazılım	Logo Yazılım Web Site	2024

Table 2.4: Data source of the case studies

Case 1: Akbank – AKÖde

Collaboration Mode	Build
Incumbent	Akbank
Fintech Firm	AKÖde
Product vertical	Payment Services

Akbank, one of the top six banks in terms of total assets in the Turkish banking sector as of 2023, was founded in January 1948 in Adana to provide financing to cotton producers in the region. The bank's primary shareholder is Sabancı Holding, the second-largest multi-business enterprise in Türkiye, with multinational business partners. In 2023, the bank increased its credit support to the economy to 757 billion TL, with 616 billion TL in cash. Additionally, with 12860 employees, the bank significantly contributed to employment, reaching a total customer base of 13.1 million and 5850 ATMs.

Akbank stated that its corporate strategy is to be “Türkiye's best and most valuable bank in terms of customer experience and satisfaction” in 2016. As part of the ongoing transformation efforts since 2016 with the New Generation Akbank vision, the number of customers will be increased through digital channels; the sales and service model in branches and digital channels will be enhanced with more innovative, simple, mobile, and paperless experience designs. In parallel with this strategy, the bank started making strategic collaborations with fintech startups that offer digital solutions that will meet the needs of SMEs and increase their productivity.

In 2018, the Bank established “AkÖde”, Türkiye’s first bank subsidiary fintech company, within the scope of Law No. 6493 on Payment and Securities Settlement Systems, Payment Services, and Electronic Money Institutions to reach new customers in the young generation segment. With its AkÖde mobile application and prepaid card infrastructure, the Bank aims to produce accessible, fast, and creative solutions for the financial needs of non-customers and young users.

In 2019, AkÖde launched its first product, “Tosla,” “a fun and playful, simple and fast, and social’’ mobile platform that targets young users providing core financial services. In Tosla, created with the slogan "The social state of money," users can share all the transactions they carry out with their friends. Thanks to strategic alliances with

e-commerce companies and music and entertainment platforms, Tosla increased its financial transaction users tenfold and reached more than one million customers by opening approximately one hundred thousand monthly accounts in 2020. In 2021, strategic alliances were formed with Belbim in the transportation sector to enable the loading of the Istanbulkart balance. A partnership was established with Starbucks Tosla, allowing users to make payments easily. In 2022, AkÖde started to provide customers with Virtual POS and link payment services under the name "AkÖde POS." Furthermore, AkÖde introduced a new Digital-Only innovative card that supports mobile contactless (NFC), QR payments, and QR withdrawal projects to expand our digital payment capabilities. Within collaboration with Helpsteps, Tosla supports customers' health as part of its social responsibility. Customers can also convert their steps into TL balances in Tosla. As part of "AkÖde POS," AkÖde introduced its first physical product, the Cash Register POS, and the "Payment Gateway with Tosla Credit" product, allowing businesses to offer customer loans with a single integration on their payment pages starting in 2023.

AkÖde's focus on customer growth led to a 4.5-fold increase in active customers and a 3.3-fold increase in customers performing monetary transactions compared to the previous year as of 2022. Moreover, AKÖde reached over 3,500 member businesses and a turnover volume of 2 billion TL in the first year of business with POS product.

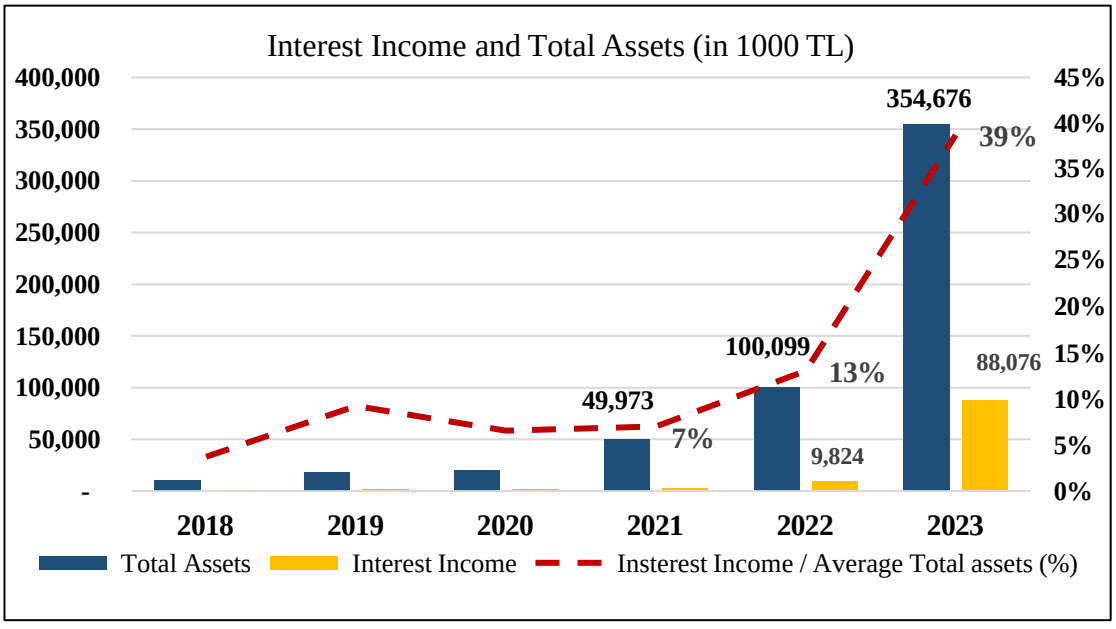


Figure 2.10: AkÖde's financial performance

In Figure 2.10, AkÖde's financial performance from its establishment to 2023 shows a negligible increase in total assets and interest income/average total assets in the first three years, followed by a significant increase in the last two years, with both almost tripling. Thanks to this partnership, Akbank has gained a first-mover advantage, allowing it to reach its target customers in the market. According to a study by Bömer & Maxin (2018), Aköde (a combination of *"Ak"* and *"Öde"*) exemplifies successful co-branding, leveraging both the established reputation of Akbank and the innovative brand of the fintech company. Customers are aware that they are utilizing a product from a well-known bank combined with new technology.

Case 2: İş Bankası – Moka

Collaboration Mode	Acquisition / M&A
Incumbent	İş Bankası
Fintech Firm	Moka
Product vertical	Payment Services

İş Bankası, established in 1924, maintains its position as "Türkiye's largest private bank," with total assets reaching 2.5 trillion TL by the end of 2023. The bank's funds to the economy reached 1.6 trillion TL in 2023, with 1.2 trillion TL in cash loans and 427.3 billion TL in non-cash loans. İş Bankası remains the top private bank with the largest branch and ATM network, consisting of 1066 branches and 6312 ATMs covering all cities in Türkiye.

İş Bankası launched the "Digital Transformation Program" in 2015 to be the closest bank to customers in digital environments and to define the digital transformation journey in business models. The Bank's goal of becoming "Türkiye's Best Multi-Channel Bank" has been expanded to "Being Türkiye's Best Digital Bank." In line with this objective, innovation has consistently been at the core of business strategies. Current trends in innovation include supporting common platforms, enhancing collaborations with fintech, and reaching underserved groups. In İş Bankası's 2021 annual report, attention was drawn to the rise of fintech companies as competitors to traditional banks. This change is attributed to changing customer and employee expectations, digitalization, and the increasing ease of operating in the banking and

finance sector, which leads to increased demand for purpose-oriented institutions. Traditional banks can enhance their competitive position by embracing common platforms, fostering strong partnerships with fintech companies, and extending their services to underserved population segments.

To expand its inclusiveness in the world of payment services, which are at the center of e-commerce and platform economy, İş Bankası completed the acquisition of shares of “Moka Ödeme Kuruluşu A.Ş.” for 3.8 million USD in 2021. With this investment, the aim is to increase İş Bankası's competitiveness in digital payment systems by leveraging the agile contribution of fintechs to the corporate way of doing business. “Moka Ödeme Kuruluşu A.Ş.” joined the industry in 2014 to offer quick, convenient, and efficient payment solutions, including mobile payments and virtual POS. It has operated as a licensed payment institution since obtaining permission from the Banking Regulation and Supervision Authority (BRSA) in 2016. In 2021, the company received permission from the CBRT to issue electronic money and changed its title to "Moka Ödeme ve Elektronik Para Kuruluşu A.Ş." The Moka Super Virtual POS Campaign enables small and medium-sized companies to process installments to different bank cards using a single virtual POS as of 2022. This service is now available to customers through İşCep and the Commercial Internet Branch. In 2023, İş Bankası collaborated with its payment institution subsidiary MOKA to offer the prepaid card infrastructure of S-Wallet, a mobile wallet application developed for Samsung users in Türkiye. Thanks to integrating İş Bankası prepaid card APIs into Moka, Samsung digital wallet users can now make contactless payments using their smartwatches and smartphones and quickly load money into their mobile wallets for secure purchases online and in stores, both domestically and abroad. Moka started negotiations regarding its merger with “Birleşik Ödeme Hizmetleri,” one of the subsidiaries of Oyak Group, to evaluate the synergy and growth opportunities at home and abroad at the end of 2023. Moka has increased its monthly business volume through new business partnerships this year and now ranks 3rd in the payment institutions market based on POS volume. Figure 2.11 illustrates Moka's financial performance. Following its acquisition by İş Bankası, total assets increased from 119 million TL to 1.385 million TL. Additionally, its equity more than doubled, and the return on average equity dramatically rose from 5% to 68% over the last two years. To summarize, this acquisition offers significant benefits for both parties to target customers and enhance their position in the market.

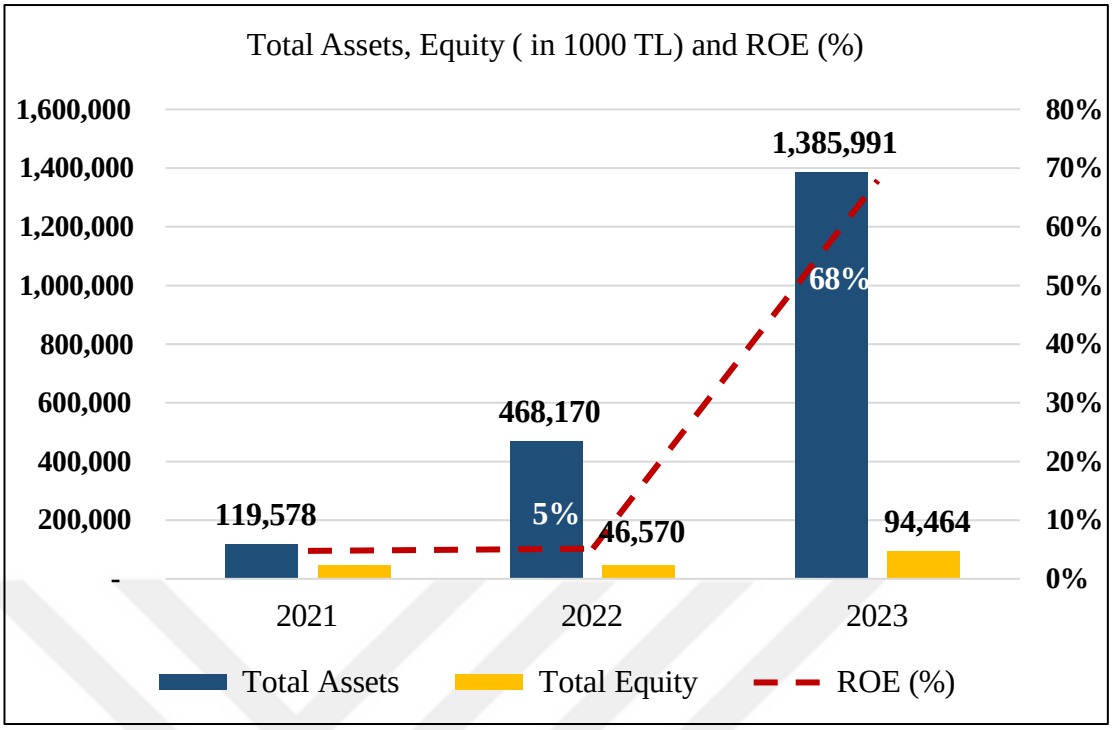


Figure 2.11: Moka's Financial Performance (Thousand TL)

Case 3: Fibabank – Finberg

Collaboration Mode	Invest/Joint Venture
Incumbent	Fibabank
Fintech Firm	Finberg
Product vertical	Financial management; Investment

Established as a subsidiary of Fiba Group on December 27, 2010, Fibabanka, a medium-sized dynamic bank, has made significant strides in the Turkish finance industry. The bank is dedicated to providing agile solutions, focusing on personalized customer service, adhering to the motto "Agile thinking, agile solutions." Fibabanka aims to become a technology company with a banking license and transform its financial services into an end-to-end digital experience. In parallel to this strategy, Fibabank launched the first "Investment and Financial Technology Initiative" "Finberg" to revolutionize entrepreneurship in the Turkish banking sector in 2018.

The primary purpose of Finberg's establishment is to provide classic banking products and offer new products that combine financial services and technology. These technological products will help Finberg reach new customers, better understand existing bank customers, and provide them with the most suitable products. It aims to eliminate difficulties in accessing customer information and incorrect information in traditional banking products while minimizing high costs and time losses in providing products and services.

In 2018, Finberg supported “Bizim Hesap A.Ş.,” which offers an online pre-accounting reporting program, and Garaj Sepeti, which connects auto dealerships and expertise companies on a digital platform. Furthermore, it invested both in “Birleşik Ödeme Hizmetleri A.Ş.” which has a license for payment services and e-money, and in the venture capital fund Revo Capital Fund I BV, which invests in startup companies operating in the field of financial technology, especially in the fields of information services, communication, and payment systems.

In 2019, Finberg funded two strategic initiatives: ComPay Ödeme Çözümleri A.Ş. (“Compay”), a payment system platform Finberg has invested in, has expanded the Bank's on-site loan application service to small-scale business partners and implemented a similar model at many key locations. Bizim Hesap A.Ş., one of Finberg's first investments, attracted the attention of different investors in 2019 thanks to its stable growth and received investment from n11.com. Birleşik Ödeme Hizmetleri A.Ş. collaborated with Fibabanka in 2018 to introduce innovative practices such as "loan collection from stores." In the last quarter of 2019, the company was added to Finberg's investment portfolio.

In 2020, the fund size was increased from 15 million TL to 15 million USD. The most significant investment agreement made by Finberg is with “Getir Perakende Lojistik A.Ş.” for Getir Application. Finberg joined Garaj Sepeti's new 1.5 million USD investment round, which grew 12 times in one year, reaching a volume of 100 million TL. This helped expand access to financial products for Garaj Sepeti and its dealers while indirectly benefiting the automotive industry, especially the second-hand car market. Finberg invested in ComPay, a payment platform that facilitated the distribution of 20 products from 12 banks to 2,200 sales points. ComPay's turnover increased ninefold in 2020, expanding its network further. Finberg invested in Figopara to provide services to SMEs by combining Figopara's invoice financing experience with Fibabanka's products. Finally, In 2020, Finberg made its first

investment exit with the sale of " Birleşik Ödeme Hizmetleri A.Ş." to Oyak Holding A.Ş. after attracting significant attention due to its rapid growth.

Finberg invested USD 34 million in 14 startups and increased its fund size to USD 130 million in 2021. In 2021, Finberg made 9 investments and expanded internationally. It led to transferring information from abroad to Türkiye through successful investments in companies such as Invstr, Plum, and Bits of Stock. Additionally, it reinforced its fund-of-funds approach by investing in the Revo II fund after the Revo I fund. Getir, developed by “Getir Perakende Lojistik A.Ş.,” is on track to become Türkiye's second decacorn, hitting a valuation of USD 7.56 billion in the latest investment round, marking Finberg's most prominent investment deal. The second exit happened when Mexico-based Kavak Intermediate Holding acquired Garaj Sepeti and its dealers, an investment initially funded by Fibabanka and made by Finberg. Finberg, which closely follows blockchain and crypto technology, made its first investment in this field with BiAltın, which is s Türkiye's first cryptocurrency platform that offers crypto money equal to 1 gram of gold and is implemented with 100 percent Turkish partners. Moreover, Finberg invested in Easycep, Figopara, Mobilet, and Colendi.

In 2022, Finberg invested in 23 new ventures across fintech, retail tech, cyber security, e-commerce, and investment funds, totaling 41 investments and USD 51 million. Finberg aims to exceed a fund size of USD 150 million by the end of 2022, with 31 active venture investments and 7 fund investments.

Since its inception, Finberg has invested around USD 67 million. As of the end of 2023, its total investment reached USD 110 million, with 55 investments, including the ventures it exited. Currently, Finberg manages over USD 71 million in assets. It has successfully exited 6 venture investments and has a portfolio of 39 active ventures and 10 venture capital fund investments. Finberg has achieved a significant milestone in its transformation journey by effectively concluding its investments in all startups between 2018 and 2019. This marks a noteworthy accomplishment for the organization.

Figure 2.12 illustrates that the total amount and number of investments almost doubled and tripled between 2021 and 2023.

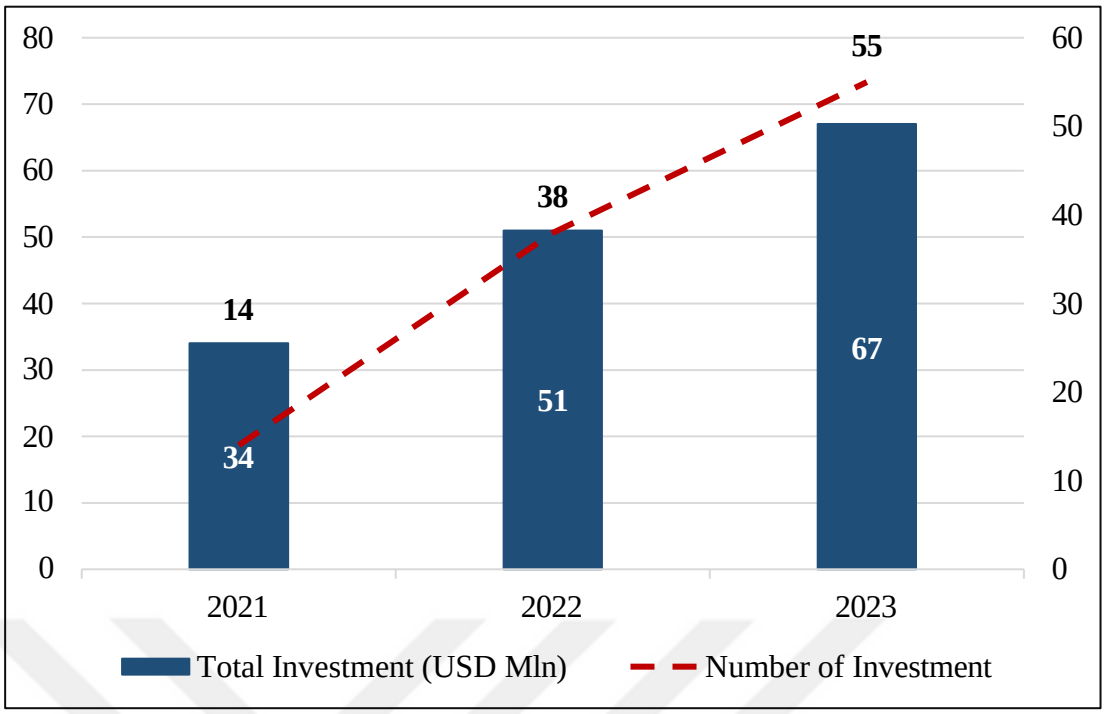


Figure 2.12: Finberg investments with numbers

Case 4: Albaraka – Garaj

Collaboration Type	Incubation
Incumbent	Albaraka Türk
Fintech Firm	Albaraka Garaj
Product vertical	AI; SaaS; Payment; Blockchain; IoT

Albaraka Türk, established in 1984, was the first participation bank in Türkiye and the only one traded on the Borsa Istanbul. It operates under Banking Law No. 5411, pioneering interest-free banking in the country through a collaboration between Al Baraka Group, the Islamic Development Bank, and a domestic industrial group. Albaraka Türk is a global participation bank offering practical, fast, and seamless banking services to 2.5 million customers through 223 domestic branches, two international branches, and alternative distribution channels, with a team of 2,723 employees. Albaraka Türk had an outstanding year in 2023, achieving a total profit of TL 3.4 billion. The company also saw an impressive 58.7% increase in total assets and achieved significant growth, with a 44.6% increase in total funded credits and a 43.6%

growth in funds collected. According to the 2017 annual report prepared by Albaraka Türk, banks are integrating innovation into business processes and focusing on digitization. There will be differentiation among branches and changes in business models in response to developments such as mobility and the Internet of Things (IoT). Albaraka Türk will prioritize digitization and personalization by customer segment in the coming years, aiming to bolster its leadership position through digital transformation. As part of our strategic initiative, we took a significant step forward by establishing Albaraka Garaj in 2017. This pioneering move marked the launch of the world's first start-up accelerator by a participation bank. Albaraka Türk aims to become a leader in innovation and entrepreneurship within the financial industry.

During 2017, 455 applications from across the country were carefully assessed, and Albaraka Garaj's first entrepreneurs were selected. The center provides a wide range of services to entrepreneurs with finance-based business ideas and innovative projects under a single roof. Albaraka Garaj offers entrepreneurs an acceleration program, seed capital assistance, mentoring, office space, and opportunities to develop projects within the ank to test their products. The Bank utilized Albaraka Garaj to leverage the energy and talent of the start-up community. This initiative led to discussions among employees on emerging technologies such as chatbots, artificial intelligence, machine learning, and Blockchain. As a result, various Bank departments and enterprises collaborated on joint projects with the help of Albaraka Garaj.

In 2018, Proof of Concept (POC) studies were performed with seven first-round applicants at Albaraka Garage, and the Bank acquired the products of four others. The Bank has rapidly extended the culture of collaboration with entrepreneurs. 500 entrepreneurs from 50 cities applied to the start-up acceleration center Albaraka Garaj and 11 more start-ups were accepted in 2018. Several start-ups within the Garage have been incorporated into the Albaraka Venture Capital Fund, established under the auspices of Albaraka to provide them with financing. Furthermore, through a partnership with one of the supported start-ups, it is now feasible to conduct transactions at bank counters by capturing a customer's biometric signature on a tablet PC, eliminating the need for printed bank receipts.

In 2019, POC studies were conducted with five second-round entrepreneurs at Albaraka Garage. Albaraka Türk acquired two products to enhance collaboration with entrepreneurs. The Albaraka Garaj program underwent some changes based on the experiences from the first two rounds. A two-month pre-acceleration phase was

introduced before the actual acceleration program. The program received nearly 800 applications for the third round, marking the highest application rate. After including 22 startups in the pre-acceleration program, the bank accepted 14 startups into its acceleration program following the final elimination. After a surge in start-up activity prompted by Albaraka Garaj, the Bank established the Fintech Venture Capital Investment Fund to create partnerships with talented entrepreneurs interested in learning more about the Bank. Investment decisions were made for four initiatives within the Fund, totaling TL 3 million. These initiatives include Inooster (a gamification platform), Pedudi (an educational technologies initiative), Tam Entegre (a SaaS solution for e-commerce sites), and Kronnika (a robotic process automation solution).

Albaraka Garage Startup Acceleration Center completed its 2021 program entirely online. In 2021, the center added a preliminary program to examine initiatives and closely maximize their growth. Albaraka Türk aims to contribute to the Turkish economy and entrepreneurship ecosystem. As one of the few implementing organizations in Türkiye under the TÜBİTAK 1512 Individual Young Initiative Program (BİGG), they conduct projects and Garaj programs. In the scope of TÜBİTAK BİGG Program, applications were evaluated based on specific criteria, and business plans were prepared after entrepreneurship training and mentorships. Start-ups approved by TÜBİTAK for a grant of TL 200,000 are offered participation in a preliminary acceleration program by Albaraka Türk, providing end-to-end support from idea to investment and support for initiatives in the Minimum Viable Product (MVP) or commercialization stage.

In 2023, many applications were received in the fields of SaaS, Social Enterprise, AI, Edutech, and FinTech. After a rigorous selection process, 24 startups were accepted into the pre-accelerator program based on their alignment with Albaraka's strategic goals, the team's experience, market viability, and the maturity level of the startup. “Gokido,” a startup incubated at Albaraka Garaj, is dedicated to developing smart canes for visually impaired children. In collaboration with Albaraka Türk, the team organized events in Adana, Gaziantep, and Hatay, providing 75 smart canes to visually impaired earthquake survivors in these affected cities. Since its establishment, Albaraka Garaj has supported over 120 startups with financial aid and will continue contributing to the intellectual capital of Albaraka Türk and the entrepreneurial world.

Figure 2.13 shows the application distribution and success rate at Albaraka Garaj from 2017 to 2023.

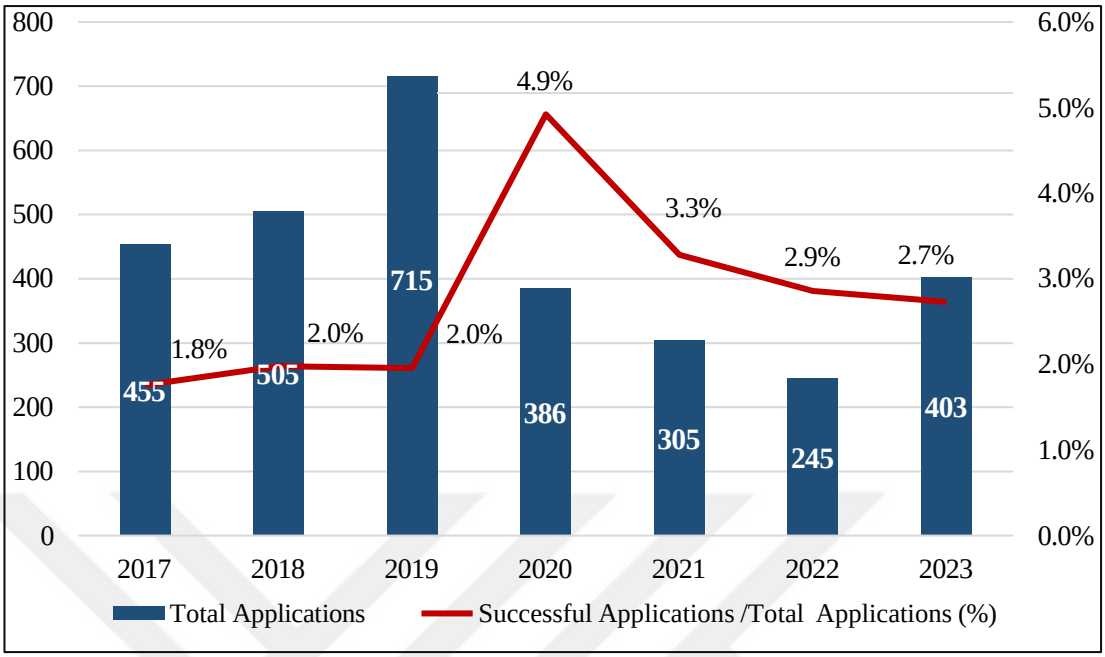


Figure 2.13: Applications made to Albaraka Garaj Center

During the initial three years, the number of applications rose; however, the success rates remained consistent at 2%. After 2019, the success rate increased by introducing a two-month pre-acceleration phase before the official acceleration program and targeting experienced individuals from related industries. This strategic move not only improved the success rate but also enhanced the alignment between startups and the bank, demonstrating the program's adaptability and forward-thinking approach.

Case 5: Garanti Bankası – Logo

Collaboration Type	Alliance
Incumbent	Garanti BBVA
Fintech Firm	Logo Yazılım
Product vertical	Enterprise Resource Planning (ERP) Software

Established in 1946 in the capital city of Ankara, Garanti BBVA is Türkiye's second-largest privately owned bank. As of December 31, 2023, the bank's consolidated assets totaled 2,2 trillion TL. Garanti BBVA is a comprehensive financial institution covering all banking industry aspects, catering to corporate, commercial, SME, individual, private, and investment banking. Additionally, they offer a wide range of services, including payment systems, private pension and life insurance, financial leasing, factoring, and investment and banking services. Beyond that, they have international subsidiaries in the Netherlands and Romania. Garanti BBVA is an integrated financial services group with specialized subsidiaries in portfolio management, making them a complete solution for all financial needs.

Garanti BBVA subsidiaries recognized a need for a comprehensive system to streamline their business processes. This is why they collaborated with "Logo Yazılım" to address their needs. Established in 1984 to create software applications for personal computers, Logo Yazılım has become one of Türkiye's most prominent and influential software companies. Through its diverse range of solutions, services, and innovative offerings, Logo has solidified its position as the leading innovator in Türkiye's thriving software industry.

Garanti BBVA sought a web-based ERP solution to manage its resources centrally, drive operational improvements, and facilitate faster access to data from any location. Additionally, it aimed to efficiently onboard new subsidiaries and transition to a flexible system that could adapt to its evolving business needs.

Throughout the project, the Logo digital transformation services team thoroughly assessed the structure of the current parts and identified the specific needs, particularly in sales, purchasing, and finance, for the transition to the new structure (Logo, 2024). Following the analysis phase, the components were automated, and swift installations were carried out, resulting in a more precise organization and presentation of data.

Moreover, integrating e-invoice, e-archive, and e-ledger applications, integral to Logo's e-transformation solutions for the digital transformation process, was successful.

The tangible outcomes and the advantages obtained from the project (Logo, 2024):

- Following the implementation of the Logo j-Platform project, Garanti BBVA successfully streamlined the centralized management of its subsidiaries' basic requirements, resulting in improved operational efficiency. This initiative also led to enhancements in sales, purchasing, and finance processes, alongside the digitization of various business operations.
- Garanti BBVA's projects, considered the first in their field, were achieved by providing solutions appropriate to the needs.
- The automatic transfer of banking transactions of Garanti BBVA subsidiaries to the Logo j-Platform solution was carried out with standard file format compatibility.
- Thanks to the successful integration of e-transformation solutions, gains in digitalization, efficiency, optimization, rapid adaptation to regulatory changes, process management, and cost savings in business processes were achieved.

Upon the successful conclusion of this project, the key manager at Garanti BBVA provided the following assessments relating to the collaboration: *"As Garanti BBVA, we have been using j-Platform, one of Logo ERP solutions, for a long time in nearly 10 of our subsidiaries. In addition to ERP solutions, we prefer Logo products in e-Transformation solutions. In the software industry, the quality of the solutions offered and the strength, reliability, and speed of support of the companies offering these solutions come to the fore. We also feel the power of Logo Yazılım, which understands the needs of our subsidiaries correctly and provides quality solutions in the required time in the maintenance and support processes."* (Logo, 2024)

2.5 Conclusion

Since the financial crisis of 2008, the financial services sector has been gradually changing. Technological innovations have brought new business models, applications, processes, products, and financial services. As traditional financial institutions strive to adapt to the digital landscape, it is evident that a new wave of disruptive players, fintech firms, has quickly integrated technological innovations and challenged incumbent banks. These Fintech firms are reshaping the financial landscape by offering micro-segmented products and prioritizing enhanced customer experiences. Due to its implications, examining the FinTech phenomenon, including its evolution, critical business models, and components of the fintech ecosystem, has become relevant. Fintech has facilitated the digitalization of both developed and emerging economies. In doing so, Fintech firms have contributed to expanding financial inclusion by providing services to underbanked populations. Additionally, the evolution of the FinTech industry indicates that it has become a global issue deserving of attention.

The study examines the current state of the Turkish fintech sector, highlighting its fundamental dynamics and the essential regulations that contribute to its growth. With a dynamic and tech-savvy young population demonstrating high internet and smartphone usage rates and the establishment of the Istanbul Fintech Center aimed at accelerating the growth of fintech solutions in sustainable finance, Türkiye has significant potential for developing the fintech sector and attracting foreign investors. In the latter part, a thorough examination of the threats posed by fintech firms to traditional banks and the strategic reactions of incumbents is provided. The collaboration models between fintech firms and traditional banks, along with the motivations of both parties, are described based on the innovation management strategy. After conducting exploratory, collaborative case studies at the global level, similar research methods were applied to the Turkish cases for in-depth analysis. Each case study has unique internal dynamics; however, the common goal of these collaborations is to obtain strategic advantages and benefits for all involved parties. When examining collaborative efforts between Turkish banks and fintech companies, it becomes evident that most partnerships are centered around the payment segment. Like in the global fintech landscape, the payment segment is prominent in Türkiye's fintech sector. As a result, traditional banks form strategic partnerships with these

companies to leverage their innovations and align with their business models. In Türkiye, traditional banks hold significant positions in the financial sector, while fintech companies are still expanding to challenge the incumbents. With the recent authorization of digital banks in 2022 and the imminent emergence of peer-to-peer lending platforms, these fintech firms will be poised to become formidable competitors to traditional banks by offering a wide range of banking products and services.

The findings of this study have significant implications for investors, bankers, and policymakers. The case studies serve as excellent models for small and medium-sized banks seeking to form successful strategic partnerships with fintech companies to stay competitive. Large banks need careful analysis to make strategic investment decisions regarding the choice of fintech segment to establish their fintech firms successfully. These case studies are crucial for fintech investors looking to develop an effective exit strategy. They are also essential for business owners strategically planning to sell ownership in a company to investors, banks, or another company. These studies outline a process for reducing or liquidating ownership in a business and making a substantial profit if the business is booming. It is essential for policymakers and government agencies to maintain continuous oversight of the fintech industry and to enact timely and proportionate regulatory and supervisory measures to address financial risks linked to data privacy and cybersecurity in fintech transactions. Furthermore, cultivating a collaborative environment within the fintech ecosystem is critical for fostering ongoing innovation and entrepreneurship.

Finally, the article's limitations and future directions can guide researchers in exploring further research opportunities. This study uses secondary data sources, such as internal documents and website materials, for case studies. In contrast, employing structured or semi-structured interview methods would be more suitable for exploratory case studies. For future research, exploring collaborations between fintech firms and non-banking financial institutions, such as insurance companies and venture capital firms, would be beneficial. Additionally, while this study examines case studies from the traditional banks' perspectives, an alternative approach focusing on the fintech perspective could also be investigated.

CHAPTER THREE
THE SYMBIOTIC RELATIONSHIP AND COLLABORATION BETWEEN COMMERCIAL BANKS AND FINTECHS IN TÜRKİYE

3.1 Introduction

In the last two decades, the traditional financial sector, especially the banking industry, has been significantly transformed by the rapid growth of internet-based services and digitalization. After the 2008 financial crisis, new financial innovations emerged by fintech companies that combine digital technologies like cellular smartphones, internet, social networking services, machine learning, artificial intelligence, and big data tools with financial services (Lee & Shin, 2018; Takeda & Ito, 2021). The Financial Stability Board introduces fintech as "technologically enabled financial innovation that could result in new business models, applications, processes or products with an associated material effect on financial markets and institutions and the provision of financial services" (Navaretti, Calzolari, Mansilla-Fernandez, & Pozzolo, 2017). By developing and using practical new IT-supported service tools, fintech companies decrease operational costs and provide customer-centric services, user-friendly digital applications, and data-driven resolutions in the banking industry. Some of the abovementioned new financial innovations can force out several traditional business models of banks (Navaretti, Calzolari, Mansilla-Fernandez, & Pozzolo, 2017). Therefore, with disruptive technology-driven advances, fintech companies are considered a threat to traditional financial institutions, and these institutions are forced to review their corporate frontiers (Kohtamäki, Parida, Oghazi, Gebauer, & Baines, 2019). A simple organizational structure and a lack of legacy infrastructure make fintech startups more flexible, agile, and adaptive to innovation quickly (Brandl & Hornuf, 2020). Conversely, traditional banks cannot quickly adapt to novel technology developments due to the high level of organizational complexity and complying with extensive regulatory obligations. Furthermore, recent innovations in the digital service industry force banks to alter their current distribution channels, thus decreasing their inducements in new distribution channels. Although fintech companies are a significant threat to banks, they offer several opportunities to traditional financial institutions, such as making strategic alliances to benefit from competitors. For instance, the key players of the Turkish bank sector İş Bankası and

Yapı Kredi Bank, have mentioned in their 2021 annual report that fintech startups are becoming a threat to traditional banks. The prominent trends of İşbank in innovation are supporting common platforms, strengthening cooperation with fintechs, and reaching groups not served before. Yapı Kredi has adopted the strategy of gaining a competitive advantage by establishing new business platforms with fintechs.

Strategy and marketing literature studies have shown some general choices for incumbents' (traditional banks') strategic responses to entrants (fintech startups), such as competition, collaboration, or acquisitions. The applicable strategic response of the traditional banks depends on the nature and level of threat composed by the entrants. Divya & Murali (2019) conducted a study based on Borah and Tellis' research from 2014. They categorized the nature of threats posed by fintech as technology-centered and market-centered, respectively. Based on the levels of these threats, Table 3.1 figures out the bank's four strategic responses to the threats posed by fintech: *Hold, Make, Ally, Hold, or Exit.*

		Perceived level of Fintech entrant's technology-centered business model innovation (BMI) threat	
		Low	**High**
Perceived level of Fintech entrant's market-centered business model innovation (BMI) threat	**Low**	**1: Hold**	**3:Ally**
	High	**2:Make**	**4: Buy or Exit**

Table 3.1: Strategic response matrix for a bank **(Divya & Murali, 2019)**

The current study examines the collaborations between traditional banks and fintech startups in light of the high level of technology-centered and low level of market-centered threat. The strategic collaboration forms, such as investment-related or product-related ones established in Türkiye, are analyzed in terms of bank and fintech-specific determinants. Furthermore, the relationship between fintech segments and the determinants of strategic alliances are investigated.

This study makes some contributions to the empirical literature. To the best of my knowledge, this study is the first paper to examine the type of collaboration between banks and fintechs in Türkiye. Secondly, this study contributes to the financial innovation literature regarding how fintech startups forced traditional banks to adopt new financial innovations or make strategic alliances with fintech companies. Finally, this analysis contributes to the "make, buy, or ally" literature (Borah & Tellis, 2014), which shows a wide scale of collaborations regarding innovation management between companies and others in the market.

This paper comprises the following sections: In the "Literature Review and Hypotheses" section, the related articles about the bank fintech collaboration are briefly examined, and the study's hypotheses are constructed. The "Data and Methods" section describes the data and applied methodology. The "Empirical Results and Discussion" part captures the estimation results and analytical discussion. Lastly, the "Conclusion" section provides practical implications, limitations, and remarks for future research.

3.2 Literature Review and Hypotheses

While there is a rapid increase in papers on fintech, a scant empirical study quantitatively captures the strategic alliances between traditional commercial banks and fintech.

Borah and Tellis (2014) studied innovation strategies for firms, including make, buy, or ally options. They constructed such hypotheses: (i) "High payoff from make or buy or ally in the prior year encourages firms to make or buy or ally, respectively"; (ii) " A high number of commercialization in the prior year encourages firms to make"; A low number of commercialization in the prior year encourages firms to make or ally." To address this issue, the researchers analyzed 3522 make, buy, and ally announcements for 192 firms across 108 industries from 2002 to 2007. Announcements that involve making or allying tend to result in positive and more lucrative outcomes than announcements that involve buying, which can lead to negative consequences. In a related article to this study, Lars, Milan, Todor, & Armin (2021) investigated the form of collaborations between banks and fintech, which banks make strategic alliances, and how significantly they do it. Employing hand-collected data from 2007 to 2017 that includes developed economies such as France, Germany,

Canada, and the United Kingdom, panel probit and cross-sectional regression methodology are applied. According to the panel probit model results, when banks hire a chief digital executive, they are keen on establishing more strategic alliances with fintech startups. Furthermore, in parallel with incomplete contract theory, banks establish product-related collaborations with larger banks. On the other hand, they are eager to invest in small fintech startups. Brandl & Hornuf (2020) investigated a bank-fintech network approach for Germany and showed that the form of relations between banks and fintechs is often product-related. Another study by Bartolacci, Cardoni, Lasak, & Sadkowski (2022) examined the features, success factors, and critical motives for forming collaborations between a cooperative small-scale bank and a fintech startup in Italy. According to the qualitative research method, several motives exist to establish strategic alliances between banks and fintech. From the point of banks' view, these motives are as follows: outsourcing, innovation, developing a business model, gaining competitive benefit, cost efficiency, advancing service quality and learning. On the other hand, fintech startups' motives include reaching customers, credits, banking licenses, economies of scale, trust, etc. Furthermore, experience, ability, professionalism, regional closeness, and hybridization determine a strategic alliance's success. Ntwiga (2020) examined the impact of bank fintech collaboration on the efficiency of the banking sector, comparing the Pre-Fintech and Post-Fintech period in Kenya with 15 banks. This study employs a data envelopment analysis approach with input based on four intermediation dimension models. Empirical results show that banks collaborating with fintech companies manage better and have higher efficiency scores. Furthermore, the collaboration decreased the cost of intermediation and improved the scale of operations. Bömer & Maxin (2018) studied why fintech startups collaborate with banks in Germany. After examining 14 case studies, three main reasons were detected: First, banks provide to fintech entering the market; second, banks increase a fintech's profits; and lastly, banks support new fintech services. Another important finding shows that when making strategic alliances with banks, fintech use different labels to trade their products.

Based on the above literature review, the motivations of bank and fintech alliances are briefly explained. The benefits of forming an alliance with a fintech startup instead of acquiring one vary depending on the bank. Moreover, due to the scarcity of professional knowledge or lack of appropriate decision mechanisms, strategic collaborations may fail to produce notable financial performance. Investing in the

wrong fintech startup can be very risky to small banks when compared with large banks, as large banks can quickly minimize such risks. The main motivations for investing in fintech startups through obtaining a minority or majority shares are adopting fintech technology quickly and taking sole control of knowledge. Thus, in parallel with Lars, Milan, Todor, & Armin (2021), such a hypothesis can be constructed:

Hypothesis 1: While large banks mainly invest in fintech startups, small banks are expected to establish product-related alliances.

This statement is consistent with an incomplete contracting theory, which has robust arguments about selecting between collaboration governed by contracts and acquiring a technology-based firm (Grossman & Hart, 1986). In the innovation context, the final outputs of contracts are difficult to determine ex-ante and hence can not be confirmed ex-post (Aghion & Bolton, 1992). When contracting, terms between banks and fintech startups about possible innovations are unclear; ex-post implementation is impossible. Therefore, investing in a fintech startup is preferable to making product-related collaborations since it allows banks to take control of decision-making processes in the fintech company.

When analyzing Türkiye's fintech ecosystem and banking sector, it is evident that the regulatory environment is innovation-friendly. The progress of the fintech and banking ecosystem in Türkiye began in 2012 with cutting-edge payment devices that facilitated automated processing and storage of credit card and invoice data (Presidency of the Republic of Türkiye Finance Office, 2021). In 2013, enacting "6493 Payment and Securities Reconciliation Systems, Payment Services, and Electronic Money Institutions" led to the issuance of e-money and payments licenses, increasing startups' focus on e-money and payments. An equity-based crowdfunding platform was introduced, and open banking products were defined as payment services in 2019. The first platform launched in May 2021; five approved platforms are now as of December 2021. In 2019, the supervision and regulation authority over payment service providers was transferred from the Banking Regulation and Supervision Agency (BRSA) to the Central Bank of the Republic of Türkiye. The pandemic highlighted the need for banking digitalization in 2020. Regulations were implemented for digital onboarding, contract signing, and TR QR code standardization. In 2021, the Digital Turkish Lira Cooperation Platform was established. New regulations now allow for video call

authentication and electronic contract notarization and mandate Near Field Communication (NFC) technology, a type of wireless technology that allows devices to exchange data over short distances for ID authentication. During that year, several developments took place in the financial industry. The principles for debt-based crowdfunding were published, a definition for banking-as-a-service/digital banking was established, and the "Association of Payment and Electronic Money Institutions of Türkiye" was formed. Additionally, the secondary regulation for payment services was renewed, and Payment Services Directive 2 made open banking arrangements. The abovementioned regulations have been issued to strengthen fintech companies, encourage bank digitalization, and pave the way for open banking.

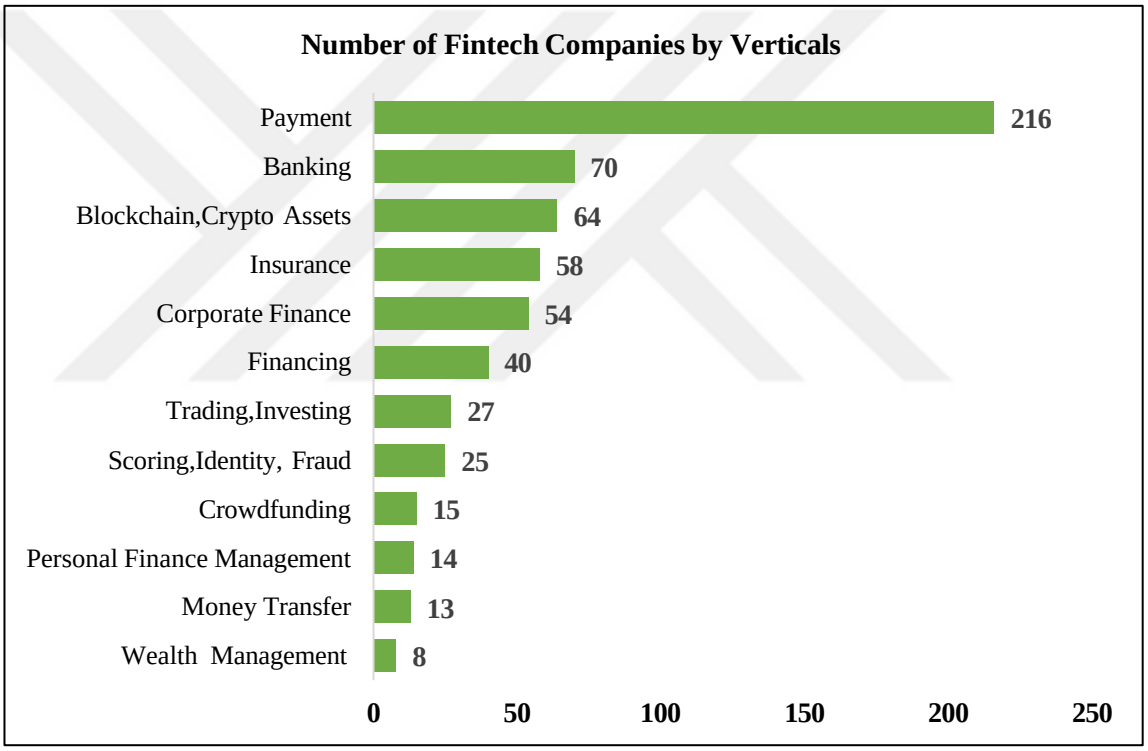


Figure 3.1: Number of Fintech companies by verticals **(Presidency of the Republic of Türkiye Finance Office, 2021)**

Figure 3.1 shows that fintech startups operating in the payment service area constitute %35 of fintech companies by verticals as of 2021.* These startups operating in the payment service segment are expected to be big rivals to the banking sector. Thus, it is considered that large banks establish more strategic alliances than non-payment fintech startups. Based on this statement, the next hypothesis can be built as follows:

* The updated version of the Figure 3.1 data is shown in Figure 2.7 on page 34.

Hypothesis 2: Large banks establish more alliances with fintechs in the payment service segment, and small banks are likely to collaborate with other field segment startups.

3.3 Data and Methods

To test hypotheses, the quantitative methodology is applied using hand-collected data covering the details of bank-fintech alliances in Türkiye, a developing economy.

3.3.1 Data

The sample of this study consists of 24 (twenty-four) active commercial banks as of 2021, and detailed information related to the banks is collected from The Banks Association of Türkiye. A wide range of Internet search and network data from (FinTech İstanbul, 2022) is employed when collecting hand-collected data. In the first step, all banks' official websites and press announcements about collaborations with fintech are checked. Second, to determine which company is a fintech startup, the list from (Startups.watch, 2021), a Turkish startup ecosystem platform, is used. Third, fintech side information is gathered from the Google, LinkedIn, and Crunchbase databases. In this study, a collaboration is considered an investment if the bank made a minority or majority acquisition and a product collaboration if it made a contract-based corporation. Some investment-related and product-related collaboration examples reveal this assumption more solid. For example, Moka Payment and Electronic Money Institution, which offers virtual POS, mobile payment, and bill payment systems, was acquired by Türkiye İş Bankası for $3.8 million in 2021 (Kamuyu Aydınlatma Platformu, 2021). Furthermore, Akbank has established a new company, "AkÖde", with a capital of 12 million TL, which it will fully own (Kamuyu Aydınlatma Platformu, 2018). Odeabank added virtual POS agreements with Papara and Öde Al companies licensed by the BRSA within the scope of the E-commerce Law no. 6493, which covers the work of fintechs. Moreover, Şekerbank partnered with Fongogo, a crowdfunding platform, to bring entrepreneurs and their target audiences together virtually. Businesses reaching 50% of their target fund could access up to 50,000 TL in cash support from Şekerbank, repayable over 36 months with a 3-month grace period. To test Hypothesis 1, the dummy variable Investment takes one value if

this collaboration is in the form of investment and 0 if the collaboration is product-related. The main explanatory variables are *ln (Bank Total Assets)* and the *Fintech Employees*, respectively, proxies for bank and fintech size. Furthermore, other control variables for fintech-specific characteristics are used: *Fintech age* shows the age of fintech since its establishment. *Fintech headquarters* is a dummy variable that equals one if this fintech is located in Istanbul. For bank-specific characteristics, *ln (Bank Age)* natural logarithm of the bank's age in years, *Bank Type* dummy variable takes one value if the bank is domestic. Table 3.2 summarizes definitions of variables used in the regression model.

3.3.2 Methods

To estimate the models, parallel with Lars, Milan, Todor, & Armin's (2021) study, a standard cross-sectional probit model is applied by constructing the following equations:

Model 1: Type of Alliance Forms

$$Pr\,(Investment = 1) = F\,(\ln(\text{Bank Total assets})_i + \text{Fintech Employees}_i + \text{Bank Type}_i + \ln(\text{Bank Age})_i + \text{Fintech Age}_i + \text{Fintech Headquarters}_i)$$

According to Lars, Milan, Todor, & Armin (20,21), which is similar to the present study, there is a negative and statistically significant association between Fintech Employees and Investment. This result matches Hypothesis 1 and confirms that large banks are more likely to invest in small fintech startups. Another significant result indicates that *Bank Total Asset* affects *Investment* positively and statistically significantly, and large banks invest more in fintech startups. In the existing study, the sign of bank total asset coefficients and fintech employees are expected to be positive and negative, respectively.

Model 2: Type of Fintech Segment

$$Pr\,(\text{Payment Service}_i = 1) = F\,(\ln(\text{Bank Total assets})_i + \text{Fintech Employees}_i + \text{Bank Type}_i + \ln(\text{Bank Age})_i + \text{Fintech Age}_i + \text{Fintech Headquarter}_i)$$

The sign of bank total assets is expected to be positive, and large banks collaborate more with fintech startups operating in the payment service sector.

Variable Name	Definition	Data Source
Dependent Variables		
Investment (d)	Binary dummy variable equal to 1 if the alliance is investment-based and equal to 0 if the alliance is defined by a product-related collaboration.	Bank Websites (Annual Reports); Google,
Payment Service (d)	Binary dummy variable equal to 1 if fintech operates in the payment service segment and 0 in the other field segment.	Startups. watch
Bank Characteristics		
Ln (Bank age)	Natural logarithm of the bank's age in years.	The Banks Association of Türkiye
Ln (Bank total assets)	Natural logarithm of the bank's total assets	The Banks Association of Türkiye
Bank Type (d)	The binary dummy variable equals one if the bank is domestic and 0 if it is foreign.	The Banks Association of Türkiye
Fintech Specific Characteristics		
Fintech employee (rank)*	The scale of the employees of fintechs. Categories: 1-10, 11-50, 51-100, 101-1000, >1000.	Fintech Webiste; Crunchbase; Linkedin; Google; Startups.watch
Fintech age	Fintech's age in the respective year	Fintech Webiste; Crunchbase; Linkedin; Google; Startups.watch
Fintech Headquarters (d)	The binary dummy variable equals one if the fintech is located in Istanbul and 0 if it is rather than in Istanbul.	Fintech Webiste; Crunchbase; Linkedin; Google; Startups.watch

"Fintek", "fintech", "Fin-Tek","Fin-Tech", "işbirliği", iş birliği", "dijital", "finansal teknoloji", "yatırım" "ödeme sistemleri"etc words and combinations are searched in the banks' annual report.

* 1-10 = 1.00; 11-50 =2.00; 51-100 = 3.00; 101-1000 = 4.00; > 1000 =5.00

Table 3.2: Definition of variables involved in the regression model.

3.4 Empirical Results and Discussion

3.4.1 Descriptive Statistics

Descriptive statistics of this study are presented in Table 3.3. According to Table 3.3, the study sample consists of 430 strategic collaborations between 24 commercial banks and fintech companies. It can be seen that the most significant part of alliances comes from product-related partnerships, and only 7 % of these alliances are investment-type collaborations. Furthermore, the average age of fintech startups is about 13 years, and these companies' headquarters are in Istanbul. Regarding fintech employee size, on average, the number of employees in these startups is between 50 and 100. Figure 3.2 shows an overview of the segments in which fintech startups established strategic alliances with banks, and it figures out that most fintech firms operate in the payment service area.

Variable	#Obs	Mean	Std. dev.	Min	Max
Dependent Variables					
Investment	430	0,07	0,25	0	1
Payment Service	430	0,45	0,50	0	1
Explanatory Variables					
Fintech age	430	13,28	8,68	0	41
Fintech headquarter	430	0,82	0,39	0	1
Fintech employees	430	2,94	1,11	1	5
Ln (Bank total assets)	430	26,12	1,21	24	28
Ln (Bank age)	430	3,69	0,82	2	5
Bank type	430	0,47	0,50	0	1

Table 3.3: Summary statistics of bank fintech alliances in 2021 in Türkiye

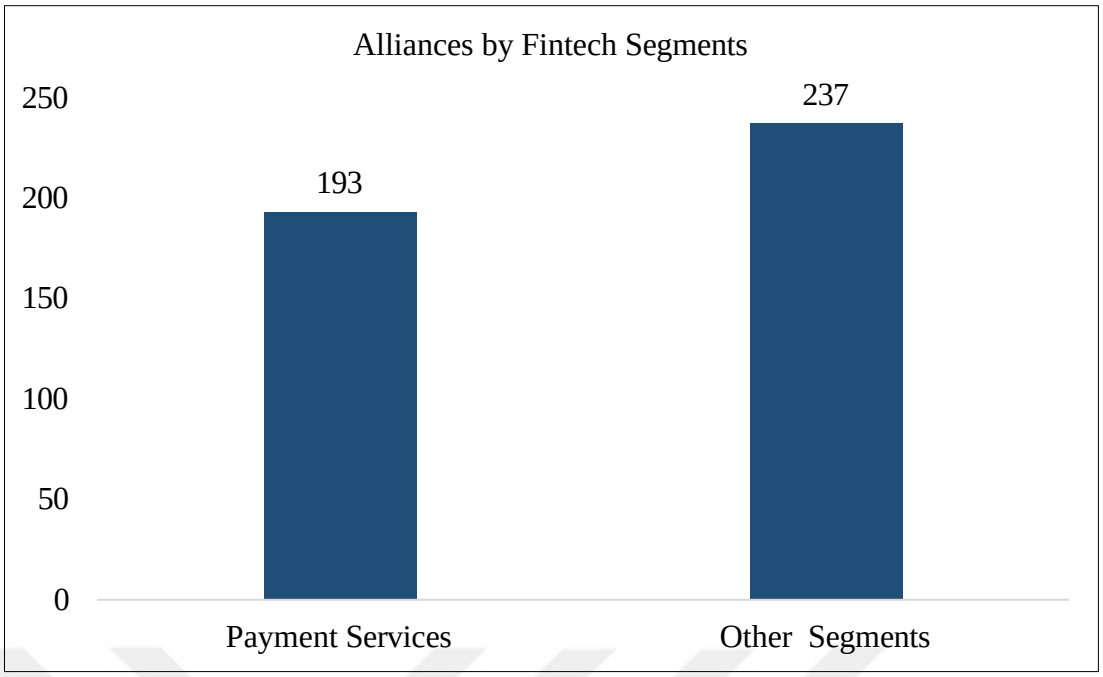


Figure 3.2: Distribution of alliances by fintech segments

The network depicted in Figure 3.3 showcases the collaborative relationships between banks and fintech firms. This network reveals that the primary instigators of these collaborations are private banks, namely Denizbank, İş Bankası, and Albaraka Türk.

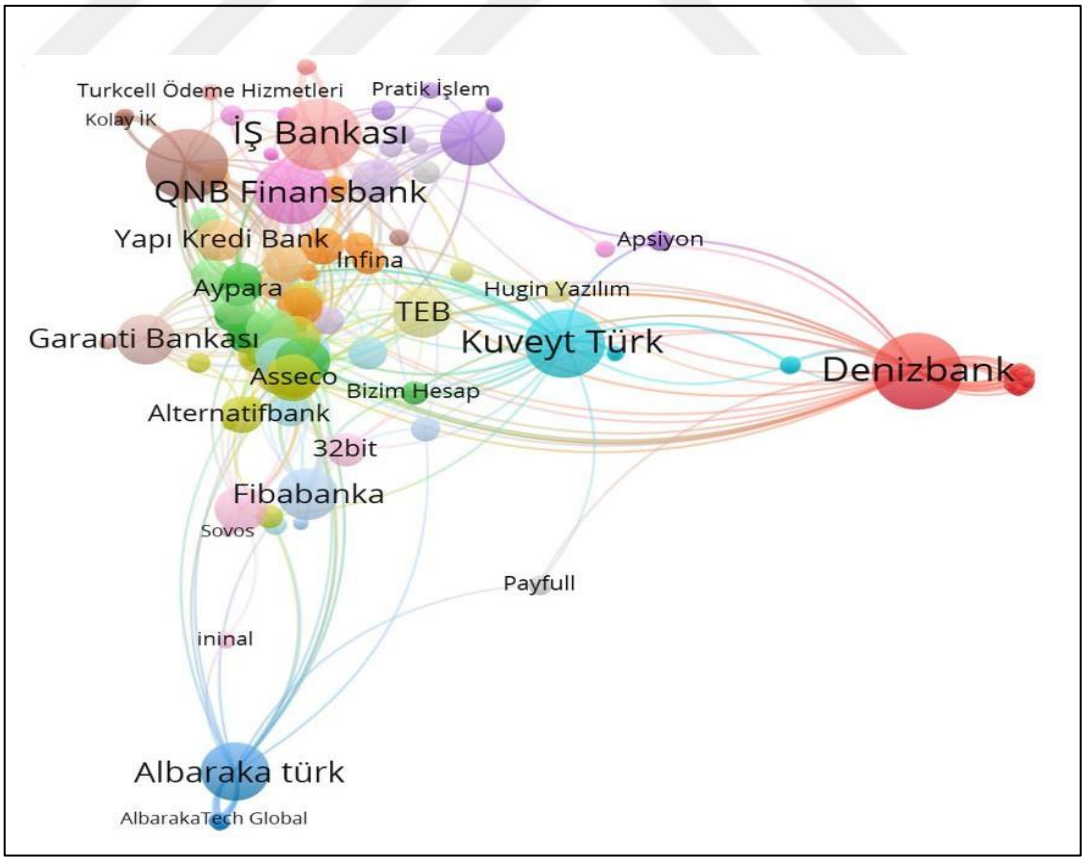


Figure 3.3: Bank and Fintech collaboration network map

3.4.2 Regression Results

The estimated results of the first model are summarized in Table 3.4. According to Table 3.4, only the coefficient of *ln(Bank Total Assets)* is statistically significant at the 1% level and negatively affects this regression model. In other words, a 1% percent change in banks' total assets decreases the probability of investments by 0.1%. Unlike Lars, Milan, Todor, & Armin (2021), existing empirical results prove that large banks collaborated product-related with fintechs rather than investing in startups in Türkiye. This result aligns with the Brandl & Hornuf (2020) study, which analyzes bank-fintech network analysis in Germany. Another primary control variable, *Fintech Employee*s, has a positive and statistically insignificant effect in this model.

Dependent Variable:	Investment (d)				
Explanatory Variables	**Coefficient**	**Std. Err.**	**P-value**	**[95% Conf.**	**Interval]**
Fintech age	-0,012	0,012	0,323	-0,036	0,012
Fintech headquarter (d)	0,200	0,282	0,478	-0,352	0,752
Fintech employees	0,147	0,100	0,140	-0,048	0,343
Ln (Bank total assets)	-0,104***	0,026	0,000	-0,155	-0,052
Ln (Bank age)	0,207	0,156	0,184	-0,098	0,512
Bank type (d)	-0,076	0,216	0,726	-0,498	0,347
Number of obs.	430				
Wald χ^2	251,21				
Prob > χ^2	0,000				

Notes: The table represents the estimated results of cross-sectional probit regression. *, **, and *** denote significance level at 10%, 5% and 1%, respectively. (d) indicates a dummy variable

Table 3.4: Estimation results for investment versus product-related collaboration

Table 3.5 presents the estimated results of our second model when *Payment Service* is used as the dependent variable. Firstly, the *ln(Bank Total Assets)* has a negative and statistically significant impact on Payment Service at a 5% level. This result indicates that large banks make more strategic alliances with fintech firms that operate in the

nonpayment service area. Secondly, a negative and statistically significant association exists between the *Fintech Age* and *Payment Services.* It reveals that older fintech startups mainly collaborate with banks in the payment segment. Lastly, the coefficient of *Fintech headquarters* is positive and statistically significant at the 1% level. It implies that fintech startups located in Istanbul increase the probability of collaborations with banks in the payment service sector.

Dependent Variable:	Payment Service (d)				
Explanatory Variables	**Coefficient**	**Std. Err.**	**P-value**	**[95% Conf.**	**Interval]**
Fintech age	-0,032***	0,008	0,000	-0,048	-0,016
Fintech headquarter (d)	0,510***	0,170	0,003	0,177	0,842
Fintech employee size	0,079	0,064	0,216	-0,046	0,205
Ln (Bank total assets)	-0,033**	0,016	0,033	-0,064	-0,003
Ln (Bank age)	0,122	0,095	0,196	-0,063	0,308
Bank type (d)	0,127	0,138	0,356	-0,143	0,398
Number of obs.	430				
Wald χ^2	31,42				
Prob > χ^2	0,000				

Notes: The table represents the estimated results of cross-sectional probit regression. *, **, and *** denote significance level at 10%, 5% and 1%, respectively. (d) indicates a dummy variable

Table 3.5: Estimation results for payment service versus other fintech segments

3.4.3 Discussion

Following the global financial crisis of 2008, many fintech startups have been created with the rise of novel financial technologies. These startups have reshaped the financial industry, establishing new products, services, and business models. Using these new IT-enabled technologies effectively, fintech startups forced traditional banks to change their business models, and these startups became a potential threat to banks in the financial industry. Due to these reasons, traditional banks make strategic alliances with fintech startups, gaining a competitive advantage over the competitors and minimizing their lack of technological infrastructure. This strategic response aligns with the study of Borah & Tellis (2014), which emphasizes alternate routes of firms to innovation.

Using hand-collected data covering 430 bank-fintech alliances in 2021 in Türkiye, the form of alliances chosen by banks and in which fintech segments banks prefer to collaborate are examined. According to the dataset, it can be seen that most of the bank-fintech alliances are product-related collaborations that banks do not have any control over in the fintech's service and product development process. The empirical results suggest that large banks mainly establish product-related collaborations with fintech startups rather than invest in them in Türkiye. It shows that banks widen their service and product portfolio and apply different distribution channels to get new clients through product-related collaborations. Furthermore, it seems that the Turkish fintech ecosystem is limited to investment opportunities, and this sector still needs to grow to become a potential competitor to the traditional financial industry. Another finding shows that while the payment service field is the most common segment, large banks prefer to establish alliances with non-payment fintech startups. It can be explained that almost all banks have already adopted and internalized their payment service technology infrastructure. Furthermore, our result shows that recently established fintech startups primarily operate in the payment service segment, verified by “The State of Fintech Ecosystem in Türkiye” report (Presidency of the Republic of Türkiye Finance Office, 2021). Finally, fintech startups established in Istanbul are more likely to make alliances with banks in payment service segments. In The State of Fintech Ecosystem in Türkiye (2021) report, one of the main goals of the National Fintech Strategy Document is to help Türkiye become a globally competitive actor in the fintech sector. In order to reach this goal, the Istanbul Finance and Technology Base, which aims to support the growth of fintech companies and invest in high-

potential startups, will be established. Thus, our result is consistent with the goal of the National Fintech Strategy that Istanbul will be a global fintech hub.

3.5 Conclusion

This study has practical implications for fintech investors, banks, and policymakers. Collaboration is essential for fintech entrepreneurs who need capital and want to become independent in the industry. This study's results suggest collaboration between small banks and fintech investors who need capital may be more successful. On the other hand, approaching large banks through product-related collaboration will be the appropriate decision for fintech entrepreneurs who need to get new customers and stay independent in the industry. Another practical implication is for policymakers who want to reshape the financial industry by intensively applying financial technologies. In order to provide bank services (e.g., taking deposits, giving loans), fintech needs to get a bank license from supervisory authorities. However, these policymakers' restrictive granting of bank licenses minimizes the growth opportunities of such fintech. This approach leads to making more alliances in the fintech ecosystem. Thus, there will be a need for close monitoring by supervisory authorities.

Taking not into account the duration of bank-fintech alliances is the fundamental limitation of this study. Some alliances could be terminated mainly through banks since they improved their technical solutions. Another reason is that a competitor can acquire fintech startups, or the agreement expires.

Future research could examine which factors determine the success of bank-fintech alliances and whether this strategy is successful for traditional banks in the financial sector. Furthermore, in this study, bank-fintech alliances are taken from the banks' point of view. An opposite study could investigate the viewpoint of fintech startups' incentives to make strategic alliances with incumbents. This research might disclose that while the primary motivation for forming alliances with banks for fintech startups is to reach banks' huge client base rather than new technologies, developing specific digital services by fintech is more advantageous than by large banks.

CHAPTER FOUR
FINTECH AND BANK PERFORMANCE: INSIGHTS FROM AN EMERGING ECONOMY

4.1 Introduction

The traditional financial sector, often viewed as conservative and stable, has undergone significant changes due to the emergence of fintech companies in the financial services industry over the past decade. The fintech industry combines advanced technologies such as big data, blockchain, AI, and cloud computing with financial products and services. According to BIS (2020), fintech activities are categorized into six main fields: (i) payments, clearing, and settlement services; (ii) insurance; (iii) deposits and lending; (iv) asset management; (v) crypto assets and blockchain; (vi) capital raising and alternative sources of funding. Fintech companies develop and use practical IT-based service tools to attract customers through user- friendly, cost-effective, more secure, and transparent goods and services in their niche (Dorfleitner et al., 2017; Navaretti et al., 2017). With the rapid increase of both supply- side drivers (technology developments) and demand-side drivers (consumer prospects of service), global fintech revenues reached 92 billion euros in 2018 and amount of
149.1 billion euros capital invested in the fintech sector with 5091 deals (Deloitte, 2020). The substantial upward revenue trends in the global fintech sector and the rapid taking over of customers from incumbent banks by providing inexpensive and faster financial services are key factors that pose fintech firms as the main threat to traditional banks.

Consumer theory (Aaker & Keller, 1990) and disruptive innovation theory (Christensen, 1997) can be applied to analyze the impact of fintech companies on the banking sector. According to consumer theory, innovative services and goods delivered by new entrants (fintech firms) can substitute for and complement existing services and products incumbent banks provide.

Based on the type of market and provided services and goods, three effects of fintech companies on the traditional banking sector can be observed: (i) Substitution effect and disruptive innovation; (ii) Complementary effect and collaborations; (iii) No impact; (Li, Spigt, & Swinkels, 2017). Fintech firms can provide new services and products that substitute old services offered by incumbent banks and disrupt the

traditional bank sector, which is in line with the term “disruptive innovation” proposed by Christensen (1997). This disruptive development is promoted by fintech startups’ new alternatives, which augments the quality of service and efficiency (Ferrari, 2016). Thanks to disintermediation, customer transaction costs are getting lower, leading to increased efficiency. (PwC, 2016; KPMG, 2016). Furthermore, novel tools such as “blockchain” have a substantial effect on improving efficiency. Due to the low level of legal obligations and uncomplicated organizational structure, unlike traditional banks, fintech firms can adopt new technologies quickly and be more agile (Brandl & Hornuf, 2020). Fintech firms apply advanced technologies such as machine learning to assess customers' risk profiles, enhancing service quality. For example, Avant a fintech company, uses machine learning to underwrite customers impacted by the financial crisis. Furthermore, fintech firms that give online loans attract small-sized risky investors that normally incumbent banks reject. In contrast to traditional banks, fintech companies directly match savers and borrowers on online platforms, thereby avoiding two principal risks: mismatched maturities and leverage. Lending Club, a prominent online marketplace connecting savers and borrowers, has a solid potential substitution effect to the traditional bank sector. While Lending Club and traditional banks provide the same products, such as business and personal loans, the former’s business model differs from incumbent banks. Matching investors and borrowers on the online loan platform, Lending Club does not absorb the borrowers’ risk. Traditional banks take on default risk to transform short-maturity savings into long-maturity loans. Lending Club earns transaction fees rather than interest income, which is fundamental for banks. Besides their substitution effect, researchers might argue that fintech firms provide services and products that can complement existing services and products. Traditional banks can gain a competitive advantage by strategically collaborating with fintech firms. In this case, fintech firms have a beneficial impact rather than a disruptive effect on them. This symbiotic relationship between existing and new players provides benefits to small startups. From the point of fintech firms’ view, collaborating with traditional banks allows them to access a broad customer base of banks, gaining trust in the market and reaching economies of scale. (Bartolacci, Cardoni, Lasak, & Sadkowski, 2022). One successful real-world bank fintech collaboration example is the partnership between Santander and Kabbage. In 2018, Santander partnered with fintech startup Kabbage to offer small business loans to its customers in the UK. Kabbage's technology platform allows Santander to underwrite

and approve loans while giving the bank access to a new pool of small business customers quickly and easily.

It can be detected that there is no impact between fintechs and bank performance, and this case can be explained for several reasons. Firstly, fintech firms can attract risky small-sized customers with new service channels that usually incumbent banks do not cover these services. Using innovative technology, fintech firms evaluate borrowers' risk cheaper than traditional banks (Hayashi, 2016). Secondly, banks might acquire fintech companies, making finding a direct association between fintechs and bank performance more difficult. For example, after Capital One acquired Level Money, the latter became part of Capital One's digital innovation team. Another reason for detecting no impact is that the size of fintech start-ups is too tiny compared to traditional banks in terms of total assets and market value. Lastly, no impact might arise from offsetting the complementary and substitution effects.

The present study delves into the effects of bank fintech partnerships on the traditional banking sector's performance in Türkiye from 2013 to 2021, utilizing the aforementioned conceptual framework. As far as we know, this research paper is the first to conduct a quantitative analysis of how collaborations affect bank performance in Türkiye. There are several compelling reasons behind choosing Türkiye as the focal point of this study. Türkiye's status as an emerging economy is accompanied by a tech-savvy young population that extensively uses the internet and smartphones, providing an ideal climate for the development of financial technology (fintech). The country also occupies a significant position in the banking sector, strongly emphasizing technology and digitalization—fintech regulations in Türkiye date back to the early 2010s. In 2012, new-generation payment devices became mandatory, leading to the emergence of many fintech initiatives. The number of initiatives increased rapidly with the issuance of e-money and payment institution licenses in 2015. As of December 2022, a total of 74 companies were granted licenses (Presidency of the Republic of Türkiye Finance Office, 2022). Fintech firms operating in the payment segment have established themselves as leaders in the fintech ecosystem and are poised to challenge the traditional banking sector. Additionally, the study aims to provide valuable recommendations to fintech entrepreneurs, conventional banks, and policymakers.

This paper comprises several sections. The "Literature Review and Hypothesis" section briefly examines related articles about the relationship between banks and fintech and constructs the study's hypothesis. The "Data, Variables and Methodology"

section explains the data sources, describes the variables, and employs the methodology. Thirdly, the " Empirical Results" section captures the regression outcomes. Finally, the "Conclusion" section analyzes the limitations and remarks for future research.

4.2 Literature Review and Hypothesis

The assessment of banking performance is based on a range of factors outlined in existing literature. These can be classified into internal and external variables. Internal variables include bank-specific indicators such as asset quality, cost-income structure, liquidity, and size. External determinants, on the other hand, refer to macroeconomic factors like inflation, economic growth, and interest rates. Numerous studies have investigated the effect of fintech on banking performance at the national and global levels.

In their study, Haddad and Hornuf (2023) analyzed the connection between fintech startups and banks' profitability and default risks across 87 countries from 2005 to 2018. They utilized the Two-Step Generalized Method of Moments (GMM) Model methodology and found that increased fintech startups positively affect bank profitability. Furthermore, fintech startups decrease the stock volatility of traditional financial organizations. As a result, fintech start-ups can improve the financial sector's performance and stability, so policymakers and financial authorities should supervise their development closely. Nguyen et al. (2021) conducted a global study examining the relationship between fintech credit and bank performance in 73 countries from 2013-2018. Fintech credit, as a ratio of credit extended by fintech companies to GDP, undoubtedly impacts bank performance indicators such as ROA and ROE. At the same time, there is a positive relationship between risk-adjusted ROA and ROE and fintech credit. Yoon, Lee, and Oh (2023) investigate the impact of fintech levels and its interaction with GDP per capita on bank performance across 91 countries, using data from the World Bank Global Findex Database for 2014, 2017, and 2021. In this study, they use multiple regression methodology to test the differential effects of the AbFintech variable, which is obtained by regressing fintech levels on GDP per capita on bank performance. The study findings indicate that Abfintech positively and significantly impacts bank performance, especially in less developed countries.

Abfintech reduces the cost-to-income ratio in less developed countries and increases it in developed ones. Banks in underdeveloped nations can benefit by investing in fintech innovation to offer more convenient services to a wider customer base at lower costs.

Various papers have analyzed how fintech has affected the performance of banks in different countries. Phan, Narayan, Rahman, & Hutabarat (2020) examine the influence of fintech growth on the performance of 41 banks in Indonesia. According to empirical findings, fintech firms negatively affect the profitability ratios of banks such as ROA, ROE, NIM, and YEA. Fintech digital banking startups' role in the traditional financial industry is captured by Li, Spigt, & Swinkels (2017). The study uses panel data methodology to analyze the effect of funding volume and startup deals on the stock returns of 47 US retail banks between 2010 and 2016. A definitive and positive correlation exists between the expansion of FinTech funding or deals and the concurrent stock returns of established retail banks. Monika, Azam, and Teguh (2021) studied the effect of fintech growth on the return on assets of ten Sharia commercial banks in Indonesia. The study was conducted from 2017 to 2019 and used peer-to-peer lending transactions as a proxy variable to represent fintech. Fintech's development positively impacts the profitability of private Islamic banks. However, it negatively affects the profitability of state-owned Islamic banks. The research work of Lee, Li, Yu, and Zhao (2021) delves into the effects of fintech sector expansion on cost efficiency and technology adoption in China's banking sector from 2003 to 2017. Fintech industry indices measure the growth of credit, payment, investment management, and market support subindustries. The stochastic meta-frontier approach measures Chinese banks' efficiency scores under different ownership structures. According to the Two-step GMM Dynamic Panel Model, state-owned commercial banks use inferior technology and have lower cost efficiency. Fintech innovations help banks to improve their cost efficiency and enhance the technology they use. Wang, Xiuping, & Zhang (2021) analyze China's fintech bank performance interaction from 2008-2017. In this study, the fintech index of China is constructed using factor analysis. Fintech can transform traditional commercial banks by reducing costs, improving efficiency, and strengthening risk control abilities. This is supported by the results of SYS-GMM and DIF-GMM models. Li, Zhu, & Qin (2022) examine the impact of fintech on 36 Chinese commercial banks from 2003-2019 using textual analysis. Fintech has mixed effects on commercial banks' performance. Technology

basis negatively impacts performance, while electronic payment enhances earnings. Lv, Du, and Liu (2022) used ECM and Granger causality to analyze how fintech affects ICBC's profitability from 2011-2020. Fintechs initially reduce banks' profitability, but their advantages steadily improve in the middle and later stages, increasing profit ratios. The development of Fintechs and the level of bank profitability are Granger causes of each other. Mashamba & Gani (2024) studied the impact of fintech credit on bank lending in Sub-Saharan Africa, considering the influence of financial inclusion measured by bank branch networks from 2013 to 2019. The GMM method results for 19 economies showed that fintech credit has varied effects on bank lending in SSA, depending on the measurement approach. When evaluating fintech credit based on total alternatives (fintech and big tech credit), there is a negative correlation between fintech and bank lending, indicating that some borrowers are opting for fintech solutions. Conversely, when fintech credit is measured solely on fintech credit, there is a positive correlation, suggesting that fintech serves as a complement to traditional financial institutions and broadens access to financial services. Fintech lending growth negatively affects bank lending when traditional banks reduce their branch network, highlighting the importance of physical branches in areas with limited digital financial infrastructure Ntwiga (2020) compared the efficiency of the banking sector in Kenya during the Pre-Fintech (2009-2014) and Post-Fintech (2015-2018) periods. The study analyzed 15 banks and their collaboration with fintech companies. Collaboration between banks and fintech companies improves efficiency, reduces intermediation costs, and enhances the scale of operations, as shown by a data envelopment analysis approach using four intermediation dimension models. Frederica, Augustine, Murwaningsari, & Mayangsari (2021) studied the impact of bank-fintech collaboration on banking performance. The study aimed to examine the effect of fintech and bank collaboration on banking performance while also considering the impact of regulatory implementation. Data from 170 questionnaires was analyzed using structural equation modeling. The study did not prove the impact of the bank and fintech alliance on the bank sector’s performance. The implementation of regulation did not strengthen their influence either. The research highlights the need for special regulations on fintech services and collaboration between banks and fintech. Table 4.1 summarizes prior studies on fintech and bank interaction

Authors	Period	Country	Methodology	Proxy Variable for Fintech	Key Findings
Mashamba et al. (2024)	2013-2019	19 countries	Generalized Method of Moments (GMM) Model	Fintech Credit	When Fintech credit includes both fintech and big tech credit, it negatively affects traditional bank lending, while only fintech credit has a positive impact on bank lending.
Haddad et al. (2023)	2005-2018	87 countries	Two-Step Generalized Method of Moments (GMM) Model	The number of fintech start-ups	Fintech start-ups positively impact incumbent institutions' performance and reduce their stock return volatility and systemic risk exposure.
Yoon et al. (2023)	2014, 2017, 2021	91 countries	Multiple Regression Analyses	AbFintech (Abnormal Fintech) Levels	AbFintech improves bank performance and cost-to-income ratio in different countries.
Lv et al.(2022)	2011-2020	China	Error Correction Model (ECM) and Granger Causality	The Provincial Digital Inclusive Financial Index	The development of Fintechs and the level of bank profitability are Granger causes each other
Li et al. (2022)	2003-2019	China	Panel Data Model	Fintech Index (Textual Factor Analysis)	The negative impact of technology on performance can be mitigated by implementing electronic payments, which can enhance commercial banks' earnings.
Nguyen et al. (2022)	2013-2018	73 countries	Pooled Ordinary Least Squares (OLS)	Fintech Credit /GDP (%)	Fintech credit has a negative correlation with banks' ROE but a positive correlation with the risk-adjusted ROA and ROE. .

Authors	Period	Country	Methodology	Proxy Variable for Fintech	Key Findings
Monika et al.(2021)	2017-2019	Indonesia	Panel Data Model	Fintech Peer-to-Peer Lending Transactions	The development of Fintech positively affects the ROA of private Islamic banks and negatively affects the ROA of state-owned Islamic banks.
Lee et al. (2021)	2003-2017	China	Two-step GMM Dynamic Panel Model	Fintech Development Index	Fintech innovations improve banks' cost efficiency and enhance their technology. This double beneficial effect is more significant for market support service innovations.
Wang et al. (2021)	2008-2017	China	Systematic GMM and Differential GMM.	Fintech Index	The development of Fintech leads to reduced banking operating costs and improved risk control, which in turn improves total factor productivity.
Frederica et al. (2021)	2020	Indonesia	Structural Equation Modeling	3 Dimension with Likert Scale	The sample data cannot prove the effect of bank and fintech collaboration on banking performance.
Ntwigaa (2020)	2009-2018	Kenya	Data Envelopment Analysis	Fintech collaboration (Pre and Post Period)	Fintech collaborations have reduced intermediation costs and increased scale of operations, but their effect on efficiency in the banking sector is not statistically significant.
Phan et al. (2020)	1998-2017	Indonesia	Two-step GMM Dynamic Panel Model	Number of Fintech companies	FinTech negatively predicts bank performance.
Li et al. (2017)	2010-2016	United States	Panel Data Model	Fintech Funding and Number of Fintech Deals	There is a positive correlation between FinTech funding/deals and incumbent retail banks' stock returns.

Table 4.1: Summary of literature review

After reviewing the literature, a gap was noticed in understanding the relationship between bank fintech collaboration and bank performance. Building on a study by Frederica, Augustine, Murwaningsari, & Mayangsari (2021), our current research aims to expand upon their work by utilizing panel data methodology and introducing new variables. In contrast to the study by Frederica et al. (2021) that measures bank and fintech collaboration using a 6-point Likert scale with three dimensions (service, process, and cost), our study focuses on the number of collaborations between banks and fintech companies as the primary variable of interest. Additionally, we have included the number of fintech prepaid credit cards as a percentage of total prepaid

credit cards as a new control variable in our model, serving as a proxy for the development of the fintech sector.

Banks increasingly seek partnerships and collaborations with fintech companies to boost profitability (Temelkov, 2018). The main reasons for banks to collaborate with fintech firms are outsourcing, innovation, business model development, gaining competitive advantage, cost efficiency, improving service quality, and learning. (Bartolacci, Cardoni, Lasak, & Sadkowski, 2022). This article seeks to explore how fintech companies affect the performance of banks under the assumption that banks and fintech firms are collaborating. Thus, in parallel with Monika, Azam, & Teguh (2021), such a hypothesis can be formulated:

Hypothesis: Bank fintech collaboration has a positive effect on banking performance.

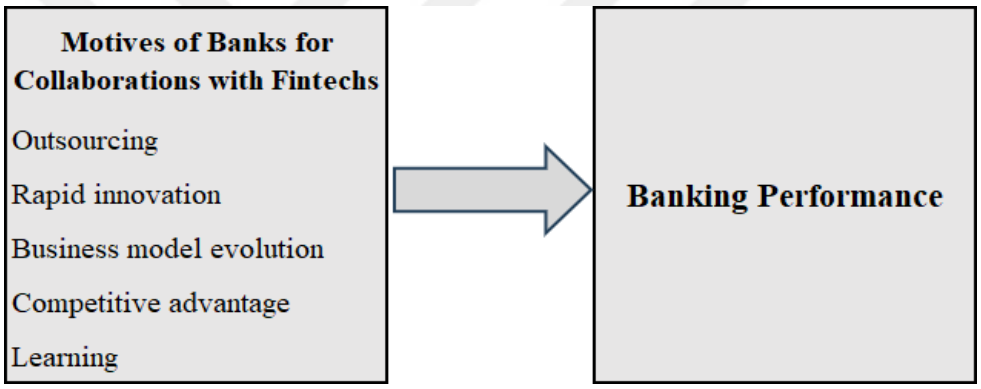


Figure 4.1: Research Framework

Figure 4.1 summarizes the relationship between the variables. Bank fintech collaboration is expected to impact banking performance positively.

4.3 Data, Variables, and Methodology

4.3.1 Data

This paper examines the financial data of 22 (twenty-two) active commercial banks in Türkiye, as shown in Table A.4, including 3 (three) state-owned and 19 (nineteen) privately-owned commercial banks. The data taken from The Banks Association of Türkiye covers 2013 to 2021. Information on bank-fintech collaborations was collected manually through extensive internet searches. Macro-level control variables data used in the model were obtained from the Turkish Statistical Institute

(TURKSAT). Additional data for control variables, such as the development of the fintech industry, were obtained from The Interbank Card Center.

4.3.2 Variables

Table 4.2 summarizes the definition and source of variables involved in the regression model.

Variable Level	Variable Symbols	Variable Name	Definition	Data Source
Dependent Variables	ROA	Bank ROA	The ratio of a bank's net profit to its total assets.	The Banks Association of Türkiye
	ROE	Bank ROE	The ratio of a bank's net profit to its equity	The Banks Association of Türkiye
Bank Specific Independent Variables	ASSET	Asset Size	Natural logarithm of the bank's total assets	The Banks Association of Türkiye
	LOAN	Asset Quality	The ratio of a bank's total loans, its total assets	The Banks Association of Türkiye
	CAPITAL	Capital Adequacy	The ratio of a bank's equity to its total assets.	The Banks Association of Türkiye
	LIQUIDITY	Liquidity	The ratio of a bank's liquid assets to its total assets.	The Banks Association of Türkiye
	INCOME COST	Income Cost ratio	The ratio of the bank's total revenues to its total expenses	The Banks Association of Türkiye
	COLLABORATION	Bank Fintech Collaboration	The number of alliances between bank and fintech companies each year.	Bank Websites (Annual Reports); Google; Fintech Istanbul;
Control Variables	GDP	Economic Activity	Annual Real GDP Growth Rate	Turkish Statistical Institute
	INTEREST	Interest Rate	Real Interest Rate	Turkish Statistical Institute
	DEVELOPMENT	Fintech Development	Number of fintech prepaid credit cards/ Total prepaid credit cards (%)	The Interbank Card Center

Table 4.2:Definition of variables in the model.

Commercial bank performance is generally calculated by the return on equity (ROE) and return on assets (ROA) as proxy variables. ROE measures a company's efficiency in generating profits from equity financing, while ROA measures its profitability relative to its total assets. Following the existing studies by Haddad and Hornuf (2023) and Phan, Narayan, Rahman, and Hutabarat (2020), ROE and ROA are chosen as dependent variables in this model.

Bank-specific variables refer to internal factors banks use to assess their financial health and make decisions. These factors include asset size, capital adequacy, asset quality, liquidity, deposit, and income-expenditure structure. For this study, $Asset_{it}$, $Loan_{it}$, $Capital_{it}$, $Liquidity_{it}$, and $Income\text{-}Cost_{it}$ have been chosen to control for the effects of bank characteristics. The existing study's primary independent variable of interest is $Collaboration_{it}$, which is the yearly number of alliances between banks and fintech companies. When collecting data for this variable, all banks' annual reports and press announcements are checked in the first step. Furthermore, *"Fintek", "fintech", "Fin-Tek", "FinTech", "işbirliği", iş birliği", "dijital","yatırım"* etc. phrases and specific word combinations are scanned in the banks' annual reports (Nabiyev & Ovenc, 2023). Secondly, the Startups. watch (2021) list is applied to identify fintech startups. These alliances cover both product-related and investment-based collaborations of banks with fintech companies.

At the macro level, GDP (Annual Real GDP Growth Rate) measures the effect of total economic activity. Following related papers, there is a positive association between interest rates, the primary indicator of bank revenue and bank performance, so it is added to the model. For the industry level, DEVELOPMENT, which is the share of fintech prepaid credit cards in the total prepaid cards, is used as a proxy control variable for the fintech industry development. When analyzing the Turkish fintech ecosystem by vertical, the payments segment is a leader, and these companies have the potential to be a threat to traditional banks shortly. According to the Interbank Card Center, the percentage of fintech prepaid cards in total prepaid cards (both banks and fintech companies issued) increased significantly from 4.2% to 53.4% between 2017 and 2021.

4.3.3 Methods

Following the previous studies such as Haddad & Hornuf (2023, Phan, Narayan, Rahman, & Hutabarat (2020), Li, Zhu, & Qin (2022), the empirical model is constructed as follows:

$$ROE_{i,t} = \alpha + \beta_1 ASSET_{i,t} + \beta_2 LOAN_{i,t} + \beta_3 CAPITAL_{i,t} + \beta_4 LIQUIDITY_{i,t} + \beta_5 INCOME\text{-}COST_{i,t} + \beta_6 COLLABORATION_{i,t} + \beta_7 GDP_t + \beta_8 INTEREST_t + \beta_9 DEVELOPMENT_t + \varepsilon_{i,t}$$

$$ROA_{i,t} = \alpha + \beta_1 ASSET_{i,t} + \beta_2 LOAN_{i,t} + \beta_3 CAPITAL_{i,t} + \beta_4 LIQUIDITY_{i,t} + \beta_5 INCOME\text{-}COST_{i,t} + \beta_6 COLLABORATION_{i,t} + \beta_7 GDP_t + \beta_8 INTEREST_t + \beta_9 DEVELOPMENT_t + \varepsilon_{i,t}$$

In this study, following Monika, Azam, & Teguh (2021) and Li, Spigt, & Swinkels (2017), panel data with fixed effects is applied to estimate the regression model.

4.4 Empirical Results

4.4.1 Descriptive Statistics

Table 4.3 provides the descriptive statistics for all the variables used in the regression model. The average bank performance, as calculated by Return on Assets (ROA), is 1.09%, while the Return on Equity (ROE) stands at 11%. The primary source of bank income, the interest rate, averages 11.1% over the sample period. Additionally, the average number of alliances between traditional banks and fintech companies is close to 9.00.

Variable	Obs	Mean	Std. dev.	Min	Max
Dependent Variables					
ROA	198	0.01	0.01	-0.02	0.03
ROE	198	0.11	0.07	-0.31	0.27
Explanatory Variables					
COLLABORATION	198	8.94	6.79	1.00	45.00
DEVELOPMENT	198	0.16	0.20	0.00	0.53
ASSET	198	25.03	1.31	22.35	27.95
LOAN	198	0.64	0.09	0.39	1.52
CAPITAL	198	0.10	0.03	0.04	0.20
LIQUIDITY	198	0.24	0.09	0.08	0.76
INCOME COST	198	1.48	0.25	0.91	2.54
GDP	198	0.05	0.03	0.01	0.12
INTEREST	198	0.11	0.04	0.05	0.19

Table 4.3: Descriptive Statistics

Figure 4.2 of the study indicates a noticeable increase in bank fintech collaborations after Covid-19. Additionally, the figure implies that privately owned banks in Türkiye are more interested in establishing strategic alliances than state-owned banks from 2013 to 2021.[2]

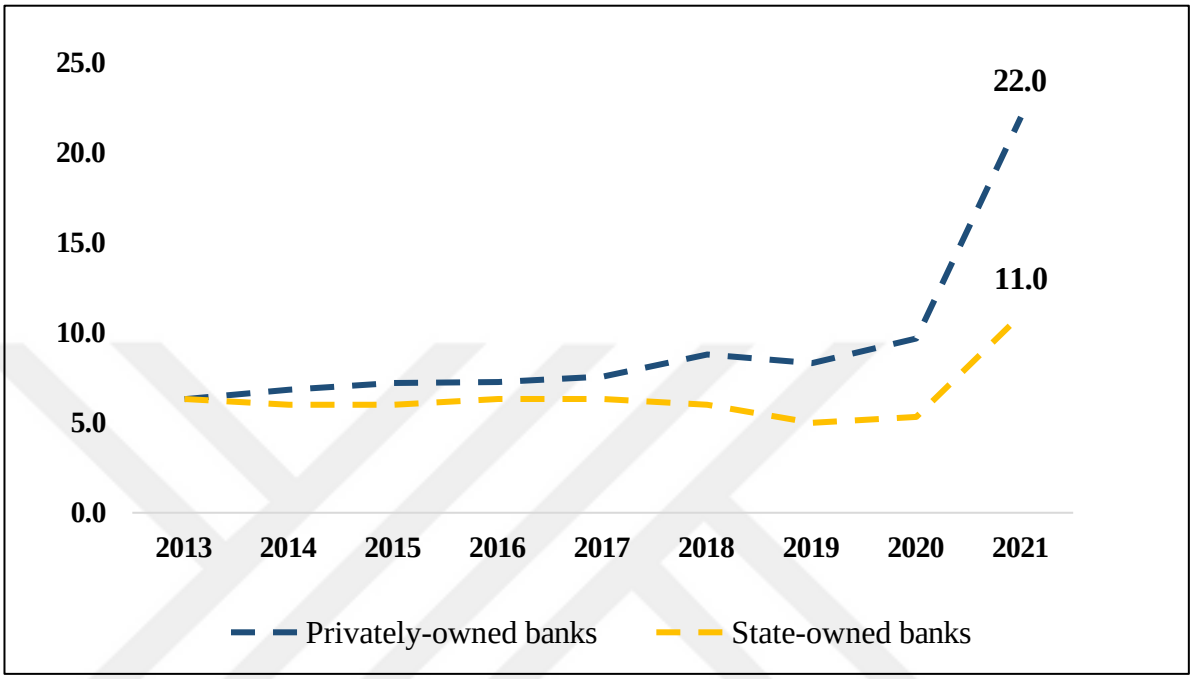


Figure 4.2 Average number of collaborations by bank type
Source: Author calculations

Table A.1 displays the pairwise correlation coefficients of the independent variables with the dependent variables ROA and ROE. The table indicates that bank-fintech collaborations positively correlate with ROA and ROE. Additionally, the correlation coefficients are low (less than 0.7), indicating that multicollinearity is not an issue for the sample. Lastly, diagnostic tests for heteroskedasticity and serial correlation are presented in Tables A.2 and A.3, respectively.

4.4.2 Regression Results

The results of the Panel A model, which covers all banks in our study, are presented in Table 4.4, which is estimated using a fixed-effect model. According to Table 4.4,

[2] The updated version of the Figure 4.2 data is shown in Figure A.1 on page 106.

the primary interest variable of the study, Collaboration, is statistically significant and has a negative impact on banks' Return on Assets (ROA). To check the robustness of this impact, another leading bank performance indicator, Return on Equity (ROE), is tested. There is no statistically significant association between Collaboration and banks' ROE. The results imply that the effect of collaborations can change according to bank performance measurements, and this negative effect is not robust. Another finding reveals that the development of the fintech sector has a statistically significant, negative, and robust impact on both bank profitability measures. For bank characteristics, Banks' Asset size, Capital, and Income-Cost variables positively affect bank performance, while the Loan variable has a negative effect on bank profitability; for macroeconomic factors, the growth rate of GDP and Interest rate positively influence banks' ROA. However, only GDP has a statistically significant effect on banks' ROE. In other words, GDP is one of the most essential determinants of Turkish banks' performance.

Panel A: All Banks	**ROA**			**ROE**		
Variables	**Coefficients**	**t-Stat**	**p-Value**	**Coefficients**	**t-Stat**	**p-Value**
INTERCEPT	-0.12 **	-2.39	0.02	-1.47 ***	-3.19	0.00
COLLABORATION	-0.0002 **	-2.39	0.02	-0.001	-1.49	0.14
DEVELOPMENT	-0.02 ***	-3.25	0.00	-0.21 ***	-4.62	0.00
ASSET	0.00 **	2.08	0.04	0.05 ***	2.93	0.00
LOAN	-0.02 **	-2.48	0.01	-0.20 ***	-3.34	0.00
CAPITAL	0.18 ***	5.44	0.00	1.16 ***	3.83	0.00
LIQUIDITY	0.00	0.11	0.91	0.05	0.73	0.47
INCOME COST	0.01 ***	4.18	0.00	0.16 ***	5.81	0.00
GDP	0.07 ***	4.44	0.00	0.65 ***	4.49	0.00
INTEREST	0.02 *	1.87	0.06	0.19	1.56	0.12
N	198			198		
R^2	0.38			0.24		

Notes: The table represents the estimated results of panel regression. *, **, and *** denote significance level at 10%, 5% and 1%, respectively.

Table 4.4: Fixed effect model results of Panel (A)

Table 4.5 shows the estimated results of the Panel B model. Panel B covers large banks; these 9 (nine) banks account for 89% of the total assets of the Turkish bank sector. By contrast to the results of Panel A, the coefficients of collaboration are positive in Panel B. The Collaboration variable is positive and statistically significantly influences large banks' ROE, which aligns with the hypothesis. Still, there is no significant relationship when bank performance is proxied by the ROA. As in Panel A, Development has a negative and significant impact on banks' performance in terms of ROA and ROE. While the Loan variable has a negative impact on bank profitability, the Income-Cost ratio has a positive influence. Furthermore, Asset size has a positive effect on only banks' ROE.

Panel B: Large Banks	**ROA**			**ROE**		
Variables	**Coefficients**	**t-Stat**	**p-Value**	**Coefficients**	**t-Stat**	**p-Value**
INTERCEPT	-0.08	-1.1	0.28	-1.39 **	-2.91	0.01
COLLABORATION	0.00	0.19	0.85	0.00 **	2.08	0.04
DEVELOPMENT	-0.03 ***	-3.34	0.00	-0.32 ***	-5.57	0.00
ASSET	0.00	1.42	0.16	0.06 ***	3.28	0.00
LOAN	-0.05 **	-2.33	0.02	-0.34 **	-2.65	0.01
CAPITAL	0.09	1.61	0.11	0.23	0.67	0.50
LIQUIDITY	-0.01	-0.74	0.46	-0.001	-0.01	0.99
INCOME COST	0.01 **	2.85	0.01	0.12 ***	5.38	0.00
GDP	0.03	1.11	0.27	0.06	0.45	0.65
INTEREST	0.02	0.80	0.43	0.06	0.51	0.62
N	81			81		
R^2	0.52			0.30		

Notes: The table represents the estimated results of panel regression. *, **, and *** denote significance level at 10%, 5% and 1%, respectively.

Table 4.5: Fixed effect model results of Panel (B)

The findings from the Panel C model, which considers small banks, are presented in Table 4.6. The results show that Collaboration has a negative and statistically significant impact on the profitability of small commercial banks. The fintech industry's growth negatively and robustly affects bank performance across all panels. Regarding bank characteristics, the Asset, Capital, and Income-Cost variables positively impact both banks' ROA and ROE. However, the Loan variable only has a negative impact on banks' ROE. As for macroeconomic factors, only GDP strongly and positively influences banks' performance.

Panel C: Small Banks	**ROA**			**ROE**		
Variables	**Coefficients**	**t-Stat**	**p-Value**	**Coefficients**	**t-Stat**	**p-Value**
INTERCEPT	-0.20 ***	-3.05	0.00	-1.99 ***	-2.99	0.00
COLLABORATION	-0.001 ***	-2.94	0.00	-0.004 **	-2.09	0.04
DEVELOPMENT	-0.01 **	-2.4	0.02	-0.21 ***	-3.4	0.00
ASSET	0.01 ***	2.67	0.01	0.07 **	2.61	0.01
LOAN	-0.01	-1.2	0.23	-0.16 *	-1.91	0.06
CAPITAL	0.20 ***	4.92	0.00	1.43 ***	3.44	0.00
LIQUIDITY	-0.01	-1.17	0.24	-0.06	-0.58	0.56
INCOME COST	0.02 ***	3.91	0.00	0.22 ***	5.02	0.00
GDP	0.09 ***	4.53	0.00	0.97 ***	4.64	0.00
INTEREST	0.02	0.97	0.33	0.18	1.01	0.32
N	117			117		117
R^2	0.26			0.25		0.43

Notes: The table represents the estimated results of panel regression. *, **, and *** denote significance level at 10%, 5% and 1%, respectively.

Table 4.6: Fixed effect model results of Panel (C)

4.5 Conclusion

In recent years, the rapid rise of the fintech industry has started to reshape the traditional bank industry in Türkiye, an emerging economy. Fintech startups are using new technologies to force traditional banks to change their business models, which could potentially threaten their position in the financial industry. Banks collaborate with fintech startups to enhance their technological infrastructure and gain a competitive advantage. This study investigates the impact of collaborations between banks and fintech companies on commercial banks' performance using a panel dataset from 2013 to 2021 in Türkiye. Furthermore, the influence of fintech development is captured. The empirical results reveal that the impact of bank fintech collaboration varies based on our panels and bank performance indicators. First, for all banks, the Collaboration has a negative and significant effect on banks' ROA, but there is no significant effect on banks' ROE. When it comes to large banks, collaboration has a positive influence on only banks' ROE. For small banks, the results show that collaborations have a negative and robust effect on both bank performance indicators, which implies the possibility of substitution effect of fintech companies. Another important finding is that Fintech Development (the share of Fintech prepaid credit cards in total prepaid credit cards) has a negative impact on banks' profitability in all panels. In other words, it implies that this fintech service and product has the potential to substitute traditional bank products. While the results indicate a substitution effect, it is not easy to detect it. Because the profit from this type of novel product is much smaller than loan interest offered by traditional banks directly to clients. In Türkiye, fintech companies operating in the payment field constitute a significant part of the fintech industry; there is a need for the establishment of new fintech companies and platforms, such as Lending Club, which facilitates loans to small-sized investors and is a potential rival to traditional financial institutions. In this case, fintech companies offer the same products and services as traditional banks and become substantial players in the financial industry.

Several suggestions have been made to banks, fintech companies, and policymakers. Small commercial banks should innovate customer-oriented services and goods, such

as mobile payments and strengthen R&D of critical technologies by joint innovation or establishing fintech subsidiaries. Moreover, small banks can achieve digital transformation through strategic alliances with fintech startups without requiring additional investment. For fintech companies, forming more strategic alliances with banks leads to an increase in their customers and gaining trust in the market. Policymakers should closely monitor these strategic alliances in the financial industry and implement all necessary regulations.

It should be noted that this study has certain limitations. Firstly, the sample size of the data collected is relatively small as it only covers 2013 to 2021. Secondly, the number of collaborations this study includes is taken from secondary data sources such as annual reports that banks disclose. However, it is essential to note that some banks may have formed fintech partnerships or other alliances that were not fully declared or disclosed in detail. Future research can develop better measurements through questionnaires and qualitative research. Moreover, opposite research can analyze the impact of bank fintech collaborations on the performance of fintech companies.

CONCLUSION

Since the 2008 financial crisis, the financial services sector has evolved with technological innovations, leading to disruptive players known as fintech firms. These firms are reshaping the financial landscape by offering specialized products and enhancing customer experiences. This doctoral thesis consists of four chapters that discuss the collaboration between fintech companies and traditional banks. The first chapter explores the evolution of global financial technology, detailing the diverse fintech ecosystem and various business models. It provides an overview of the current state of the global fintech landscape, highlighting key players and innovations. Additionally, the chapter anticipates future trends that may significantly shape the industry. The second section analyzes the current fintech landscape in Türkiye and includes case studies on collaborations between traditional banks and fintech companies. The analysis demonstrates that Türkiye has significant potential for fintech sector development and attracting foreign investors, owing to its tech-savvy young population, implementation of key regulations, and establishment of the Istanbul Fintech Center. The latter part of the second chapter offers a detailed analysis of how fintech firms threaten traditional banks and how these banks are strategically responding. It also explains both parties' collaboration models and motivations within the context of an innovation management strategy. After completing detailed exploratory case studies across various global regions, we applied the same research methods to the specific cases in Türkiye to conduct a thorough and rigorous analysis. The collaborations between Turkish banks and fintech companies primarily focus on the payment segment, aligning with the global fintech landscape. Traditional banks in Türkiye hold significant positions in the financial sector, while fintech companies are expanding and set to become strong competitors with the recent authorization of digital banks in 2022 and the forthcoming emergence of peer-to-peer lending platforms.

In the third chapter, the empirical analysis explores the types of collaboration banks prefer with fintech firms and the specific segments in which these firms operate. Using a meticulously gathered dataset, a probit model is utilized to analyze 430 bank-fintech

alliances in Türkiye in 2021. The research suggests that large banks in Türkiye tend to collaborate with fintech startups for product-related initiatives rather than investing in them. This strategy allows banks to diversify their product offerings and reach new clients through various distribution channels. The Turkish fintech ecosystem is currently limited in investment opportunities and needs to grow to compete with traditional financial institutions. Although payment services are the most common segment, large banks prefer partnerships with non-payment fintech startups. The study indicates that recently established fintech startups in Istanbul are likelier to form alliances with banks in the payment service segment.

The last chapter investigates the impact of partnerships between banks and fintech companies on the performance of commercial banks in Türkiye using fixed effect panel methodology from 2013 to 2021. The study also examines the influence of fintech development. The findings reveal that the impact of bank fintech collaborations varies based on bank size and performance indicators. For all banks, the collaboration has a negative and significant effect on banks' return on assets (ROA), with no significant effect on return on equity (ROE). However, for large banks, collaborations only positively influence ROE. In contrast, for small banks, collaborations have a negative and robust effect on ROA and ROE, indicating the potential substitution effect of fintech companies. Another important finding is that fintech development (the share of fintech prepaid credit cards in total prepaid credit cards) negatively impacts banks' profitability in all panels, suggesting the potential for fintech products to substitute traditional bank products. However, this substitution effect is challenging to detect, as the profit from these new products is much smaller than the interest income from loans offered by traditional banks. In Türkiye, fintech companies in the payment field play a significant role, highlighting the need to establish new fintech companies and platforms, such as Lending Club, which serve small-sized investors and pose a potential challenge to traditional financial institutions. Consequently, fintech companies offering similar products and services as traditional banks could emerge as significant players in the financial industry soon.

This study provides implications for investors, bankers, and policymakers. Chapter 2 emphasizes the importance of strategic partnerships between small and medium-sized banks and fintech companies and strategic investment decisions for large banks. The case studies also provide insights for fintech investors and business owners planning to sell ownership. Additionally, the study emphasizes the need for continuous

oversight and regulatory measures to address financial risks in the fintech industry. Lastly, fostering a collaborative environment is crucial for ongoing innovation and entrepreneurship within the fintech ecosystem. The findings of Chapter 3 highlight the potential for successful collaboration between small banks and fintech investors seeking capital. Conversely, fintech entrepreneurs looking to acquire new customers and maintain independence in the industry may find it beneficial to approach large banks for product-related collaboration. Furthermore, policymakers' restrictive granting of bank licenses hinders fintech growth, prompting increased collaboration within the industry and necessitating closer regulatory oversight. Finally, Chapter 4 emphasizes that small commercial banks should focus on innovating customer-oriented services and products, including mobile payment solutions, and enhancing research and development of essential technologies through collaborative innovation or establishing fintech subsidiaries. Additionally, small banks can undergo digital transformation by forming strategic partnerships with fintech startups without the need for additional investments. For fintech companies, cultivating more strategic alliances with banks results in expanding their customer base and gaining market trust

The fintech realm presents many advantages, reshaping the financial landscape through technological innovation. Fintech endeavors to broaden the accessibility of financial services, catering to a broader demographic, including those in underserved or remote areas. The advent of mobile banking and digital wallets has facilitated the attainment of financial services sans the necessity of visiting a physical banking institution. Furthermore, fintech solutions often reduce operational costs inherent in traditional banking procedures through process automation, diminished reliance on physical infrastructure, and elimination of intermediaries. Consequently, this engenders decreased fees for both consumers and enterprises. Moreover, fintech paves the way for expedited transaction processing, ranging from instantaneous fund transfers to swift loan approvals. This swiftness proves particularly advantageous for businesses necessitating prompt access to capital and individuals seeking immediate financial services. Leveraging data and artificial intelligence, fintech entities can supply personalized financial counsel, investment advice, and tailored products, augmenting customer satisfaction and engagement. Fintech epitomizes a vital role in ensuring financial inclusion, extending services to the unbanked and underbanked segments of the populace. Microloans, mobile payments, and peer-to-peer lending platforms cater to individuals lacking access to traditional banking amenities.

Moreover, the fintech sphere has revolutionized payment mechanisms, introducing pioneering alternatives such as mobile payments, cryptocurrencies, and contactless transactions, endowing users with heightened convenience and security. Further fortifying the security of financial transactions, fintech solutions employ cutting-edge encryption techniques, biometric authentication, and blockchain technology, consequently minimizing the likelihood of fraud and identity theft. Prioritizing user experience, fintech companies offer user-friendly interfaces, round-the-clock customer support, and seamless cross-device integration, elevating consumer expectations and industry standards. Fintech confers enhanced financial management tools upon consumers and businesses, contributing to more effective management of their financial well-being. Budgeting applications, investment platforms, and financial management tools offer users more excellent agency over fiscal affairs. Many fintech solutions are engineered to assist businesses in navigating regulatory requirements with greater ease, fostering transparency in their operations, thereby mitigating the risk of penalties and building trust with customers and regulatory bodies.

Although the fintech sector offers unique advantages, it is essential to acknowledge that it has significant obstacles. These obstacles can range from regulatory challenges to technological limitations, and addressing them is crucial for the continued growth and success of the fintech industry. Fintech companies operate in a highly regulated industry, and navigating the complex and often fragmented regulatory landscape across different countries and regions can be challenging. As fintech continues to innovate, regulations are constantly evolving to keep up. This can create uncertainty and make it difficult for companies to plan long-term strategies. As fintech relies heavily on digital infrastructure, it becomes a prime target for cybercriminals. Ensuring robust cybersecurity measures is critical to maintaining trust and preventing data breaches. Handling large volumes of sensitive financial data requires stringent privacy protections. Failing to safeguard customer information can lead to severe legal and reputational damage. The fintech space is highly competitive, with numerous startups and established companies vying for market share. This competition can drive innovation and lead to market saturation and margin pressure. Large tech companies and traditional banks are increasingly entering the fintech space, leveraging their resources and customer bases to challenge smaller fintech firms. Despite the convenience and benefits of fintech, some consumers still need to be more confident to trust digital-only financial services, particularly older generations or those

unfamiliar with technology. Encouraging widespread adoption of fintech solutions requires overcoming resistance to change, ensuring user-friendly interfaces, and providing education on the benefits and security of these services. As fintech companies grow, scaling their operations, technology infrastructure, and customer service capabilities without compromising quality or security can be complicated. Heavy reliance on technology means system failure or outage can have significant repercussions. Ensuring reliable and resilient infrastructure is crucial. While fintech has made strides in financial inclusion, reaching the most underserved populations, particularly in developing regions, remains challenging due to limited internet access and digital literacy. Ensuring that fintech services are accessible to all, regardless of technological capabilities or geographical location, is vital for true financial inclusion. Fintech companies must continually innovate to stay ahead, which requires significant investment in research and development. Adapting to emerging technologies like AI, blockchain, and quantum computing will be essential. Innovating in a heavily regulated environment requires balancing pushing boundaries and staying compliant with legal and regulatory requirements. Economic instability or recessions can impact the availability of funding, consumer spending, and overall confidence in the financial system, posing risks to fintech companies. Cross-border fintech operations may be affected by geopolitical tensions, trade restrictions, or changes in international regulations, which could disrupt business operations. As fintech increasingly relies on AI and data analytics, ensuring the ethical use of these technologies, particularly in areas like credit scoring or customer profiling, will be critical. Fintech companies must consider their social impact, particularly in areas like lending, to avoid exacerbating financial inequalities or contributing to predatory practices. Fintech requires highly specialized data science, cybersecurity, and software development skills. Attracting and retaining top talent in a competitive market is a significant challenge. Maintaining a dynamic and innovative culture while scaling operations and integrating diverse teams can be challenging as fintech companies grow. Addressing these challenges will be crucial for the continued success and sustainability of the fintech sector in the coming years.

REFERENCES

Aaker, D., & Keller, K. 1990. Consumer evaluations of brand extensions. **Journal of Marketing.**

Adrian, T., & Mancini-Griffoli, T. 2019. The rise of digital money. International Monetary Fund.

Aghion, P., & Bolton, P. 1992. An incomplete contracts approach to financial contracting. **The Review of Economic Studies**, 473-494.

Arner, D. W., Barberis, J. N., & Buckley, R. P. 2016. The Evolution of Fintech: A New Post-Crisis Paradigm? University of Hong Kong Faculty of Law Research .

Bartolacci, F., Cardoni, A., Lasak, P., & Sadkowski, W. 2022. An analytical framework for strategic alliance formation between a cooperative bank and a fintech start-up: An Italian case study. **Journal of Entrepreneurship, Management and Innovation,** 115-156.

Bayram, O., Talay, I., & Feridun, M. 2022. Can Fintech Promote Sustainable Finance? Policy Lessons from the Case of Turkey. **Sustainability.**

Birgl, M., Gorss-Selbeck, S., Dehnert, N., Florian, S., & Simon, S. 2019 After the Honeymoon Ends: Making Corporate-Startup Relationships Work. The Boston Digital Ventures.

BIS. 2019. BIS Annual Economic Report 2019. Retrieved from https://www.bis.org/publ/arpdf/ar2019e.pdf

BIS. 2020. Policy responses to fintech: a cross-country overview.

BKM. 2024, August. BKM. Retrieved from BKM: https://bkm.com.tr/mobil-temassiz-karekodla-yapilan-odeme-islemleri/

Borah, A., & Tellis, G. J. 2014. Make, buy, or ally? Choice of and payoff from announcements of alternate strategies for innovations. **Marketing Science,** 114-133. doi:https://doi.org/10.1287/mksc.2013.0818.

Bömer, M., & Maxin, H. 2018. Why fintech cooperate with banks – evidence from Germany. **Zeitschrift Fu¨r Die Gesamte Versicherungswissenschaft**, 107(4), 359-386.

Brandl, B., & Hornuf, L. 2020. Where did Fintechs come from, and where do they go? The transformation of the financial industry in Germany after digitalization. **Frontiers in Artificial Intelligence,** 1-12.

Brogaard, J., Hendershott, T., & Riordan, R. 2014. High-frequency trading and price discovery. **The Review of Financial Studies,,** 2267-2306.

Carbó-Valverde, S., Cuadros-Solas, P. J., & Rodríguez-Fernández, F. 2021. **FinTech and Banking: An Evolving Relationship. In Disruptive Technology in Banking and Finance:** An International Perspective on FinTech. Rome: Palgrave Macmillan.

Christensen, C. 1997. The innovator's Dilemma: When New Technologies Cause Great Firms to Fail. Boston: **Harvard Business Review Press.**

Committee on the Global Financial System and the Financial Stability Board. 2017. FinTech credit: market structure, business models and financial stability implications.

Crunchbase. 2023. Retrieved from Crunchbase: https://www.statista.com/statistics/893954/number-fintech-startups-by-region/

Deloitte. 2020. Fintech - On the brink of further disruption.

Deutsche Börse Group. 2021 Retrieved from Deutsche Börse Group: https://www.deutsche-boerse.com/dbg-en/media/press-releases/Deutsche-B-rse-and-Commerzbank-jointly-invest-in-new-digital-marketplaces-of-the-future-2629326

Diemers, D., Lamaa, A., Salamat, J., & Steffens, T. 2015. Developing a FinTech ecosystem in the GCC. Strategy&.

Divya, A., & Murali, K. M. 2019. Responding to disruptive business model innovations: the case of traditional banks facing fintech entrants. **Journal of Banking and Financial Technology**, 19-31.

Drasch, B. J., Schweizer, A., & Urbach, N. 2018. Integrating the 'Troublemakers': A taxonomy for cooperation between banks and fintechs. **Journal of Economics and Business,** 26-42.

EY. 2019. Global FinTech Adoption Index.

Ferrari, R. 2016. FinTech Impact on Retail Banking – From a Universal Banking Model to Banking Verticalization. London: Wiley.

FinTech İstanbul. 2022 Retrieved from FinTech İstanbul: https://fintechistanbul.org/turkiye-banka-fintech-is-birlikleri-haritasi-beta-1-0/

Frederica, D., Augustine, Y., Murwaningsari, E., & Mayangsari, S. 2021. THE EFFECT OF FINTECH AND BANK COLLABORATION ON BANKING PERFORMANCE IN INDONESIA MODERATED BY THE IMPLEMENTATION OF REGULATIONS. **International Journal of Business, Economics and Law.**

Frost, J. 2020. The economic forces driving FinTech adoption across countries. **BIS Working Papers.**

Gold, M., & Ali, P. 2019. FinTech Challengers and Incumbents' Responses: A Window into Innovation Management Strategy Modes within Australia's Financial Services Sector. **SSRN Journal**.

Grossman, S. J., & Hart, O. D. 1986. The costs and benefits of ownership: a theory of vertical and lateral integration. **Journal of Political Economy**, 691-719.

Haddad, C., & Hornuf, L. 2018. The emergence of the global fintech market: Economic and technological determinants. **Small Business Economics**, 1-25.

Haddad, C., & Hornuf, L. 2023. How do fintech start-ups affect financial institutions' performance and default risk? **The European Journal of Finance**, 1761-1792.

Hayashi, Y. 2016. Consumer Watchdog Chief Sees Role for Fintech in Payday Lending. **The Wallstreet Journal.**

Holland FinTech. 2015. The future of finance: The socialization of finance.

Hua, X., & Huang, Y. 2020. Understanding China's fintech sector: development, impacts and risks. **European Journal of Finance.**

Hung, J., & Luo, B. 2016. FinTech in Taiwan: a case study of a Bank's strategic planning for an investment in a FinTech company. **Financial Innovation**, 2(15). doi:10.1186/s40854-016-0037-6

Inc42 Plus. 2021, May 19. Retrieved from Inc42: https://inc42.com/datalab/how-robo-advisors-are-changing-the-financial-advice-industry-in-india/

International Association of Insurance Supervisors. 2017. Report on fintech developments in the insurance indsutry.

Kamuyu Aydınlatma Platformu. 2018, January 19. Retrieved from Kamuyu Aydınlatma Platformu: https://www.kap.org.tr/tr/Bildirim/654672

Kamuyu Aydınlatma Platformu. 2021, January 05. Retrieved from Kamuyu Aydınlatma Platformu: https://www.kap.org.tr/tr/Bildirim/897265

Klus, M. F., Lohwasser, T. S., Holotiuk, F., & Moormann, J. 2018 Strategic alliances between banks and fintechs for digital innovation: Motives to collaborate and types of interaction,. **Journal of Entrepreneurial Finance,** 1-23.

Kohtamäki, M., Parida, V., Oghazi, P., Gebauer, H., & Baines, T. 2019. Digital servitization business models in ecosystems: a theory of the firm. **Journal of Business Research**, 380-392.

KPMG. 2016. The Pulse of Fintech. London: KPMG.

KPMG. 2022. Pulse of Fintech H2'21.

KPMG. 2023. Pulse of Fintech H2'23.

Lars , H., Milan, F. K., Todor, S. L., & Armin, S. 2021. How do banks interact with fintech startups? **Small Business Economics**, 1505-1526. Retrieved from https://ideas.repec.org/a/kap/sbusec/v57y2021i3d10.1007_s11187-020-00359-3.html

Lee, C.-C., Li, X., Yu, C.-H., & Zhao, J. 2021. Does fintech innovation improve bank efficiency? Evidence from China's banking industry. **International Review of Economics and Finance**, 468-483.

Lee, I., & Shin, Y. J. 2018. Fintech: Ecosystem, business models, investment decisions, and challenges,. **Business Horizons**, 35-46. doi:https://doi.org/10.1016/j.bushor.2017.09.003.

Li, P. 2016. Current and Future Years of E-Commerce. In Encyclopedia of E-Commerce Development, Implementation, and Management (pp. 1031-1044). IGI Global.

Li, Y., Spigt, R., & Swinkels, L. 2017. The impact of FinTech start-ups on incumbent retail banks' share price. **Financial Innovation.**

Locatelli, R., Schena, C., & Tanda, A. 2021. A Historical Perspective on Disruptive Technologies. In Disruptive Technology in Banking and Finance. **Palgrave Macmillan.**

Lv, S., Du, Y., & Liu, Y. 2022. Retrieved from Logo Yazılım: https://www.logo.com.tr/logo-basari-hikayeleri/garanti-bbva-logo-j-Platform-sayesinde-entegre-yapiya-sahip-oldu

Lv, S., Du, Y., & Liu, Y. 2022. How Do Fintechs Impact Banks' Profitability?—An Empirical Study Based on Banks in China. **FinTech**, 1, 155-163. doi:https://doi.org/10.3390/fintech1020012

Mashamba, T., & Gani, S. 2024. Upstarts vs incumbents: the interaction between fintech credit and bank lending in Sub-Saharan Africa**. Cogent Economics & Finance**. doi:https://doi.org/10.1080/23322039.2024.2375643

McKinsey. 2023. Fintechs: A new paradigm of growth.

Menkveld, A. J. 2013. High frequency trading and the new market makers. **Journal of Financial Markets**, 712-740.

Mollick, E. 2014. The dynamics of crowdfunding: An exploratory study. **Journal of Business Venturing**, 1-16.

Monika, A., Azam, A., & Teguh, S. 2021. The Impact of Fintech Development to Profitability of Islamic Bank. International **Journal of Research and Review**.

Moore, J F. 1996. The Death of Competition: Leadership and Strategy in the Age of Business Ecosystems. New York: Wiley Harper Business.

Moore, J. F. 1993 Predators and prey: a new ecology of competition. Harvard Business Review.

Nabiyev, A. B., & Ovenc, G. 2023. The symbiotic relationship and collaboration between commercial banks and fintechs in Turkey. **Humanities and Social Sciences Communications**, 10(1). doi:10.1057/s41599-023-02429-9

Navaretti, G. B., Calzolari, G., Mansilla-Fernandez, J. .., & Pozzolo, A. F. 2017 Fintech and banking. Friends or foes? European Economy – banks, regulation, and the real sector,, 9-30. Retrieved from https://european-economy.eu/2017-2/fintech-and-banks-friends-or-foes/?did=2045.

Nguyen, L., Tran, S., & Ho, T. H. 2021.0 Fintech credit, bank regulations and bank performance: a cross-country analysis. **Asia-Pacific Journal of Business Administration**.

Ntwiga, D. B. 2020. Fintech and banks collaboration: Does it influence efficiency in the banking sector? **KBA Centre for Research on Financial Markets and Policy Working Paper** Series 40.

P27 Nordic Payments (2021). P27 Nordic Payments.

PPRO. 2024 Retrieved from PPRO: https://www.ppro.com/payment-methods/ideal/

Presidency of the Republic of Türkiye Finance Office. 2021. The State of Fintech Ecosystem in Türkiye. İstanbul: Presidency of the Republic of Türkiye Finance Office.

Presidency of the Republic of Türkiye Finance Office. 2022. The State of Turkish Fintech Ecosystem 2022.

Presidency of the Republic of Türkiye Finance Office. 2023. The State of Turkish Fintech Ecosystem 2023.

PwC. 2016. Blurred lines: How FinTech is shaping Financial Services. London: PwC.

Riikkinen, M., & Pihlajamaa, M. 2022. Achieving a strategic fit in fintech collaboration – A case study of Nordea Bank**. Journal of Business Research**, 152, 461-472. Retrieved from https://doi.org/10.1016/j.jbusres.2022.05.049

Ruhland, P., & Wiese, F. 2023. FinTechs and the financial industry: partnerships for success. Journal of Business Strategy, 44(4), 228-237.

Santander. 2016, April 4. Retrieved from Santander: https://www.santander.co.uk/about-santander/media-centre/press-releases/online-working-capital-solution-to-give-uk-smes-access

Startups.watch. 2021. Retrieved from Startups.watch: https://startups.watch/

Stoll, H. R. 2006. Electronic Trading in Stock Markets. **Journal of Economic Perspectives,** 153-174.

Takeda, A., & Ito, Y. 2021 A review of FinTech research. **International Journal of Technology Management,** 67-88. doi:10.1504/IJTM.2021.115761

Temelkov, Z. 2018. Fintech Firms Opportunity or Threat for Banks? **International Journal of Information, Business and Management**, 137-144.

Wang, Y., Xiuping, S., & Zhang, Q. 2021. Can fintech improve the efficiency of commercial banks? —An analysis based on big data. **Research in International Business and Finance.**

Yoon, S. S., Lee, H., & Oh, I. 2023. Differential Impact of Fintech and GDP on Bank Performance: Global Evidence. **Journal of Risk and Financial Management.**

APPENDICES

Table A.1: Correlation matrix (*n=198*)

Variables	1*	2	3	4	5	6	7	8	9	10
1*	1.00									
2	0.16	1.00								
3	-0.03	0.47	1.00							
4	0.27	0.29	0.33	1.00						
5	-0.10	-0.29	-0.42	-0.24	1.00					
6	0.53	-0.11	-0.27	0.05	0.28	1.00				
7	0.02	0.08	-0.16	-0.17	-0.02	-0.05	1.00			
8	0.38	0.41	0.55	0.44	-0.37	0.09	0.10	1.00		
9	0.07	0.36	0.07	0.03	-0.15	-0.20	0.26	-0.08	1.00	
10	0.04	0.31	0.65	0.25	-0.31	-0.12	-0.23	0.35	-0.21	1.00

(1) * ROA (2) COLLABORATION (3) DEVELOPMENT (4) ASSET (5) LOAN (6) CAPITAL (7) LIQUIDITY (8) INCOME EXPENSE (9) GDP (10) INTEREST

Variables	1*	2	3	4	5	6	7	8	9	10
1*	1.00									
2	0.25	1.00								
3	0.06	0.47	1.00							
4	0.28	0.29	0.33	1.00						
5	-0.21	-0.29	-0.42	-0.24	1.00					
6	0.22	-0.11	-0.27	0.05	0.28	1.00				
7	0.11	0.08	-0.16	-0.17	-0.02	-0.05	1.00			
8	0.46	0.41	0.55	0.44	-0.37	0.09	0.10	1.00		
9	0.15	0.36	0.07	0.03	-0.15	-0.20	0.26	-0.08	1.00	
10	0.09	0.31	0.65	0.25	-0.31	-0.12	-0.23	0.35	-0.21	1.00

(1)* ROE (2) COLLABORATION (3) DEVELOPMENT (4) ASSET (5) LOAN (6) CAPITAL (7) LIQUIDITY (8) INCOME EXPENSE (9) GDP (10) INTEREST

Table A.2: Modified Wald test for heteroskedasticity

The Modified Wald test for heteroskedasticity in fixed-effects models was conducted for each panel and dependent variable. Table A.2 results imply rejecting the null hypothesis and concluding heteroskedasticity.

Dependent Variable	Panel A		Panel B		Panel C	
	chi2 Value	p-Value	chi2 Value	p-Value	chi2 Value	p-Value
ROA	chi2 (22)=657.94	0.0000	chi2 (9)=112.57	0.0000	chi2 (13)=361.43	0.0000
ROE	chi2 (22)= 622.01	0.0000	chi2 (9)=125.44	0.0000	chi2 (13)=353.21	0.0000

Table A.3: Wooldridge test for serial correlation

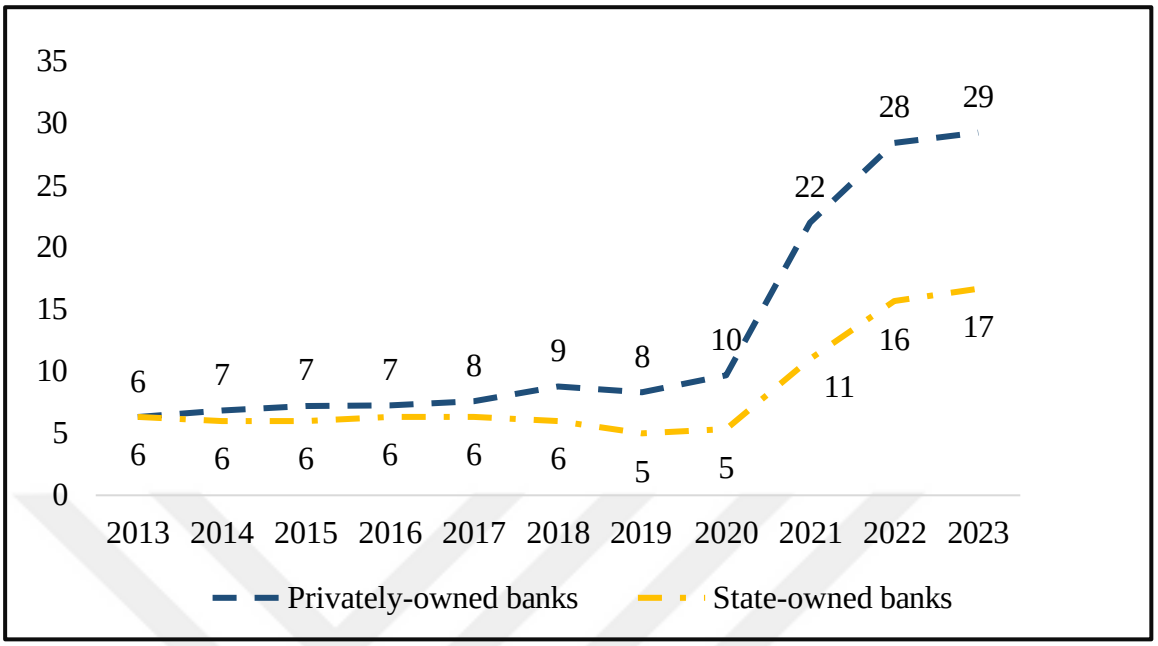
The Wooldridge test approach was employed to test serial correlation. This test's null hypothesis is that there is no first-order autocorrelation. Table A.3 results indicate that the p-value from the Wooldridge test is greater than 0.01, which means the null hypothesis cannot be rejected, suggesting there is no serial correlation at the %1 significance level.

Dependent Variable	Panel A		Panel B		Panel C	
	F-Value	p-Value	F-Value	p-Value	F-Value	p-Value
ROA	4.805	0.0398	1.39	0.2723	2.628	0.1310
ROE	2.226	0.1506	9.297	0.0158	2.585	0.1338

Table A.4: List of Banks

Bank Name	Bank Ownership Type
Akbank T.A.Ş.	privately-owned
Aktif Yatırım Bankası A.Ş.	privately-owned
Albaraka Türk Katılım Bankası A.Ş.	privately-owned
Alternatifbank A.Ş.	privately-owned
Anadolubank A.Ş.	privately-owned
Burgan Bank A.Ş.	privately-owned
Denizbank A.Ş.	privately-owned
Fibabanka A.Ş.	privately-owned
HSBC Bank A.Ş.	privately-owned
ING Bank A.Ş.	privately-owned
Kuveyt Türk Katılım Bankası A.Ş.	privately-owned
Odea Bank A.Ş.	privately-owned
QNB Finansbank A.Ş.	privately-owned
Şekerbank T.A.Ş.	privately-owned
Türk Ekonomi Bankası A.Ş.	privately-owned
Türkiye Cumhuriyeti Ziraat Bankası A.Ş.	state-owned
Türkiye Finans Katılım Bankası	privately-owned
Türkiye Garanti Bankası A.Ş.	privately-owned
Türkiye Halk Bankası A.Ş.	state-owned
Türkiye İş Bankası A.Ş.	privately-owned
Türkiye Vakıflar Bankası T.A.O.	state-owned
Yapı ve Kredi Bankası A.Ş.	privately-owned

Figure A.1: Average number of collaborations by bank type



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OTHER PUBLICATIONS

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