

FINTECH EVOLUTION IN THE EUROPEAN UNION: TRENDS, DRIVERS AND CHALLENGES

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Abstract: *The financial sector industry is fast changing with the rapid emergence of Fintech in Europe. This paper explores the evolution and current state of the Fintech sector in the European Union, focusing on its key dimensions and the challenges it faces. Using comprehensive indexes such as the Aggregate Fintech Activity Index and data from Statista and Eurostat, the study provides a multi-dimensional analysis of Fintech activity in the European Union. It examines trends and key drivers shaping Fintech's development based on four dimensions: the number of Fintech companies, market capitalization, number of users and average transaction value per user. Findings underline regional disparities, with northern European countries leading in Fintech adoption due to advanced digital infrastructure, widespread use of online banking and digital payments, financial literacy and regulatory support. The study highlights Fintech's dual role in advancing financial inclusion and disrupting traditional banking systems, emphasizing the need for strategic regulatory and market approaches to ensure sustainable sector growth.*

Keywords: *Fintech in EU, Fintech Activity Index, online banking, digital payments*

JEL classification: *E44, G23*

1. Introduction

The European Union is important in the global Fintech landscape and the EU's regulatory framework has fostered a competitive environment to promote initiatives that encourage innovation and investment in the sector.

The literature on Fintech in the European Union reveals a dynamic landscape characterized by rapid innovation and growth driven by technological advances, varying impacts on financial capability across member states, changes in consumer behavior and regulatory challenges.

Lavrinenko et al. (2023) analyze the impact of Fintech on financial development across EU countries using the Global Fintech Index and the Financial Development Index. They find positive correlations between Fintech and financial market efficiency and depth but note challenges in improving financial institutions' access.

Mittal and Singh (2024) conclude about the impact of financial technology on financial inclusion. Fintech has significantly enhanced financial inclusion, particularly for unbanked populations, through mobile money and digital lending solutions. Fintech's contribution to economic growth has been associated with a decrease in transaction costs and income disparity. Fintech solutions significantly improve household financial capability, with disparities observed across EU countries; northern nations tend to have higher financial capability levels (Nourallah et al., 2024).

The rise of Fintech has introduced both opportunities and challenges for traditional financial institutions in Europe. While Fintech innovations have led to more efficient financial intermediation, they have also increased profitability pressures on conventional banks. Thus, Fintech companies are both

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complements and substitutes for traditional financial institutions, influencing business models and customer engagement strategies (Choudhary and Thenmozhi, 2024).

There are papers that examine how Fintech regulation is changing. The EU is actively developing legislative initiatives to create a coherent legal environment for Fintech that ensures market integrity and addresses the risks associated with digital finance (Aben and Etti, 2022). Regulatory sandboxes are being implemented to foster innovation while managing risks, allowing Fintech companies to test new products in a controlled environment (Choudhary and Thenmozhi, 2024). The results focus on the need for legislative reforms and new regulatory approaches to cope with technological advances in the financial sector.

This paper investigates the Fintech sector in the EU countries through a two-part analysis. The first part presents the current state of the sector, examining four key dimensions - number of Fintech companies, market capitalization, user base and average transaction value per user - using data from Statista and Eurostat. The second part identifies the drivers of Fintech development across the region, based on the literature and the Aggregate Fintech Activity Index developed by the World Bank for a comprehensive evaluation.

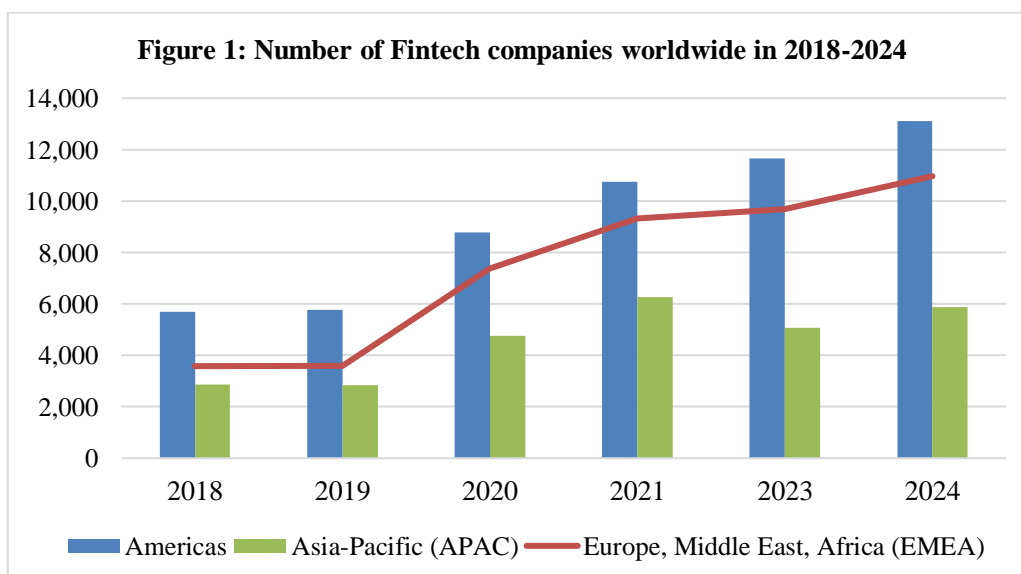
The rest of the paper is structured as follows. Section 2 describes the data and the evolution of Fintech activity across EU countries. Section 3 discusses potential drivers of Fintech development in the European Union. Section 4 concludes.

2. Data and evolutions

We first analyzed the evolution of the Fintech sector in the EU countries in the context of international developments and major challenges using data from Statista and Eurostat.

Over the last decade, the Fintech sector has expanded from small startup companies to multibillion-dollar corporations, with a notable concentration in the Americas. Globally, the number of Fintech users is growing, particularly in digital payments.

In 2024, the Americas (North America, South America, Central America and the Caribbean) leads with over 13100 Fintech companies, followed by EMEA (Europe, Middle East and Africa) with 10969 and Asia-Pacific with 5886 (Statista, 2024a). The Americas continues to attract the most investment, with 78.5 billion USD in 2023, while EMEA and Asia-Pacific experienced a sharper decline (Figure 1).



Source: design with data from Statista (2024a)

Fintech companies originating in the USA and China lead the ranking of the world's largest companies by market capitalization. As of January 2024, Visa and Mastercard were the two largest

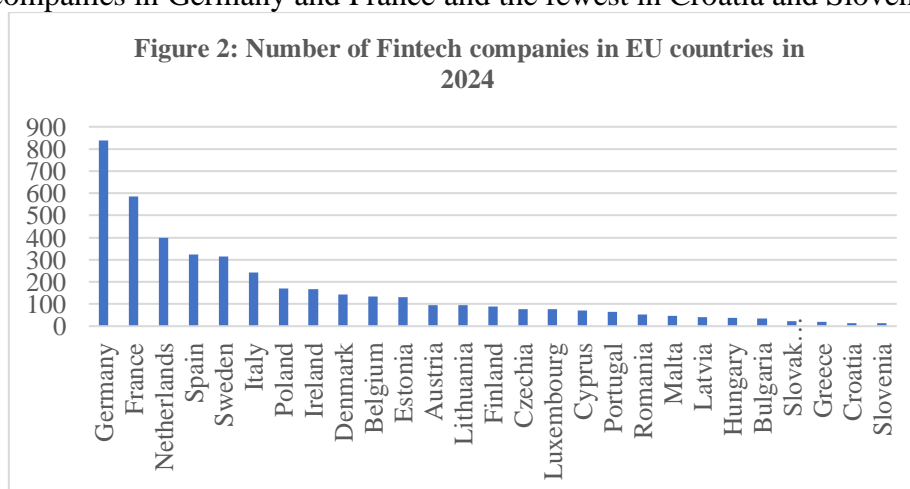
Fintech companies, both headquartered in the United States, with a market capitalization of around 520 and 396 billion USD, respectively. China's Tencent ranked fourth with a market capitalization of 146 billion USD. European companies, such as Stripe, Adyen, Revolut, Ripple, Blockchain and UiPath were also among the top Fintech companies by market capitalization (Table 1).

Table 1: Market capitalization of largest Fintech companies worldwide in 2024 (billion USD)

Companies	Country	Market capitalization (billion USD)
Visa	USA	520.33
Mastercard	USA	395.64
Intuit	USA	169.01
Tencent	China	146.06
Fiserv	USA	79.87
Ant Financial	China	78.50
Paypal	USA	66.26
Stripe	Ireland	50
Square	USA	44.35
Nubank	Brazil	41.50
Adyen	Netherlands	39.18
Coinbase	USA	37.53
Chime	USA	25
Polygon	India	20
Revolut	United Kingdom	18
Ripple	United Kingdom	15
Affirm	USA	14.06
Blockchain	Luxembourg	14
UiPath	Romania	13.47
Plaid	USA	13.40

Source: Statista (2024b)

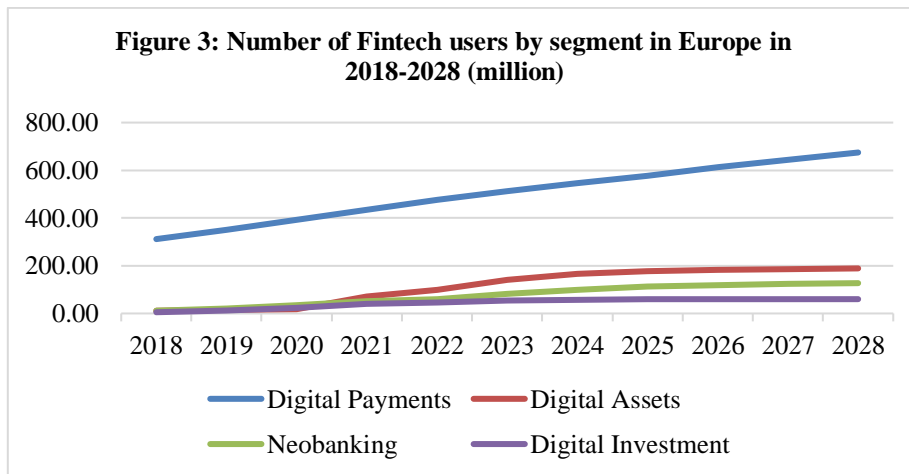
Figure 2 shows the number of Fintech companies in the European Union countries in 2024, based on data from EU Digital Finance Platform. In total EU, there are 4294 companies in December 2024, with the most companies in Germany and France and the fewest in Croatia and Slovenia.



Source: design with data from <https://digital-finance-platform.ec.europa.eu/eu-fintech-map>

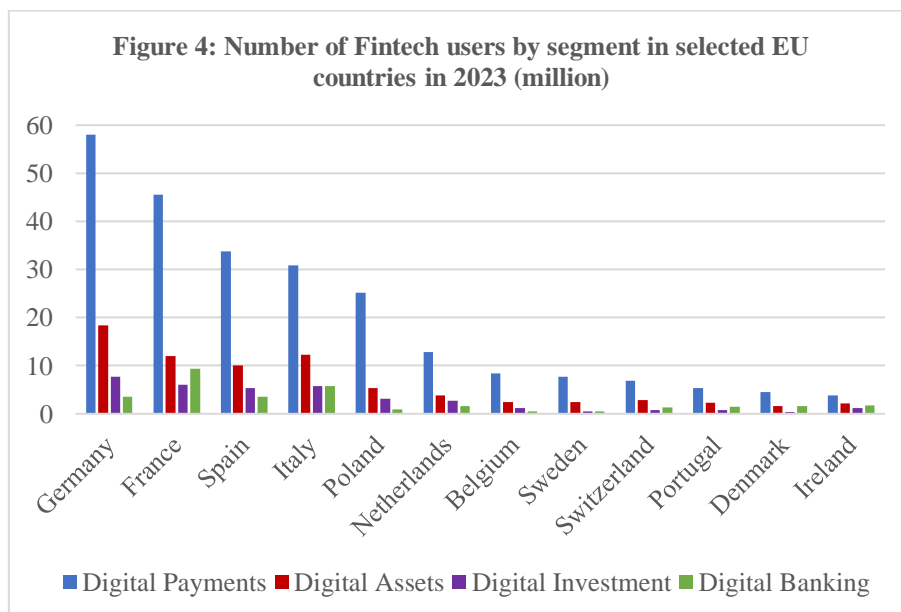
The number of Fintech users has increased significantly in recent years, particularly in digital payments, reaching 547 million in Europe in 2024 and 675 million estimated for 2028, thus decreasing

dependency on traditional banking channels. Some of the most important trends are users on other segments: digital assets (165.48 million), neobanking (100.20 million) and digital investment (57.44 million) (Figure 3).



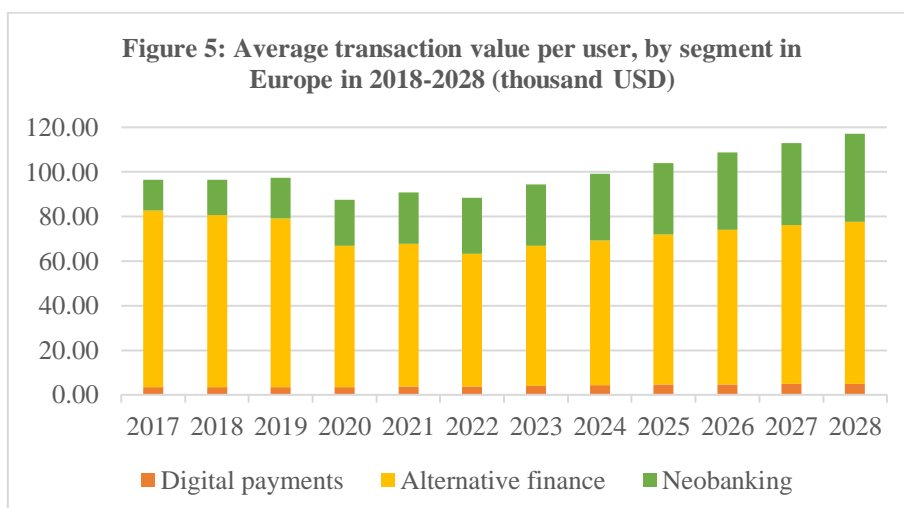
Source: design with data from Statista (2024c)

In 2023, Germany had the highest number of digital payments users, followed by France and Spain. France, on the other hand, had the most digital banking users, followed by Italy and Germany (Figure 4).



Source: design with data from Statista (2024d)

The average transaction value per user differs between the EU countries and on segments (Figure 5): alternative finance remains dominant and relatively stable over the years; neobanking demonstrates slow but steady growth over time, increasing from 13.56 in 2017 to 39.35 thousand USD per user by 2028; digital payments remain consistently low across the years, showing negligible growth throughout the period.



Source: design with data from Statista

Alternative finance is proving to be the most important category and neobanking is showing constant progress. In fact, neobanks have revolutionized the traditional banking industry by offering innovative, customer-centric solutions tailored to the needs of today's tech-savvy customers.

3. Drivers of Fintech development in the EU countries

In its development, Fintech relies on the fundamental elements of digital infrastructure, including widespread internet access and adoption of online banking services. Online banking penetration rates vary over time and by EU countries, with an average of 49.8% in 2017 and 63.4% in 2024. High penetration rates indicate widespread adoption of online banking, which is a positive sign for the development of the Fintech industry.

The correlation between Fintech users, online banking penetration and internet users is evident, strong and statistically significant.

	Online banking penetration	Internet users	Fintech users
Online banking penetration (% of population)	1		
Internet users (mobile internet penetration, % of population)	0.959488	1	
Fintech users (million)	0.963244	0.959393	1

This relationship has been widely studied. Baba et al. (2020) consider that emergence of Fintech in Europe comes against a backdrop of already high levels of financial development compared to other regions. While focusing on risk preferences, Yurong Hong et al. (2022) find that increased Fintech adoption correlates with greater engagement in financial services, which may be facilitated by prior online banking experience. Mahmud et al. (2023) underline the importance of internet and mobile internet penetration in facilitating Fintech adoption, highlighting the need for robust digital infrastructure to promote financial inclusion and the utilization of digital financial services. Mothobi and Kebotsamang (2024) explain how internet and mobile technologies enable previously excluded populations to utilize digital financial services, emphasizing the role of network coverage in Fintech adoption. Wu and Peng (2024) examine factors driving Fintech adoption in rural areas, finding that internet accessibility is a crucial determinant.

Fintech innovations often expand the capabilities of online banking. As more consumers use online banking, they become more accustomed to digital financial services, increasing the demand for Fintech solutions. The convenience of online banking encourages users to explore additional Fintech offerings. This relationship fosters a more competitive environment and drives both traditional banks

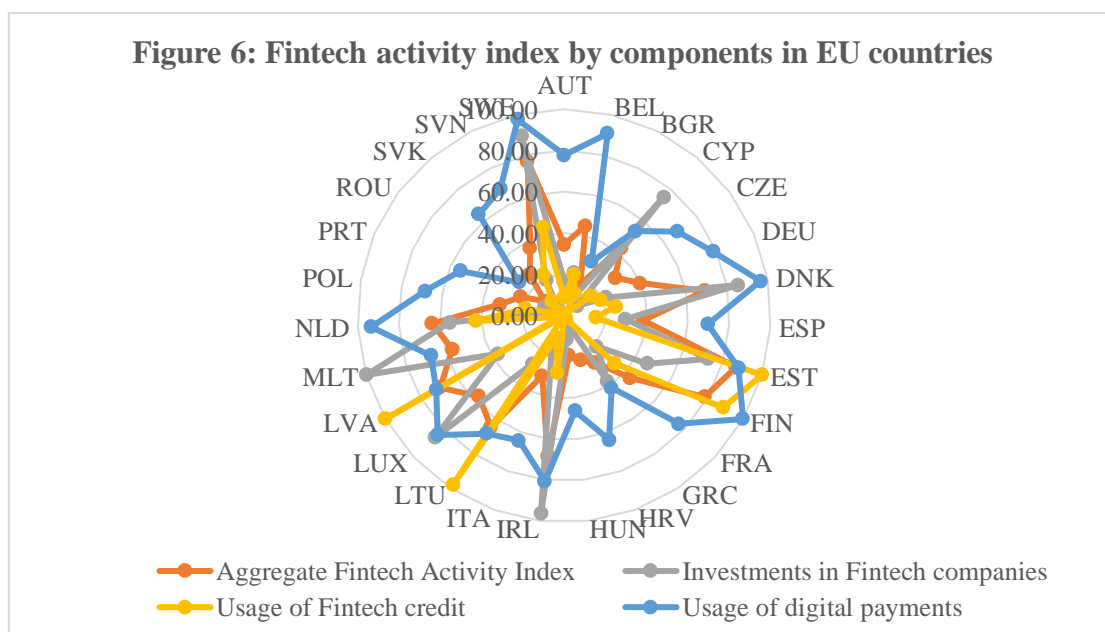
and Fintech companies to innovate and improve their services. Feyen et al. (2021) consider that digital innovation is bringing changes in the production of financial services and financial sector could have a structure in which large multi-product institutions exist alongside more specialized niche institutions.

The growth of online banking and increased internet accessibility not only supports the expansion of Fintech solutions but also enhances consumer engagement and financial inclusion. Future financial services will probably be shaped by these factors as they develop further, encouraging more innovation and collaboration between Fintech companies and traditional banking institutions. With lower entry barriers and customized financial products and services, this transformation is expected to produce a more equitable financial ecosystem.

While literature often focuses on analyzing specific aspects of Fintech activity, we next choose to use a multi-dimensional measure of Fintech activity through comprehensive indexes of Fintech development.

We extract data for EU countries using the three-pillar Aggregate Fintech Activity Index developed by the World Bank, measured over the period 2014-2018 and covering 125 countries (Didier et al., 2022). It falls between 0 and 100 and includes the following: investments in Fintech companies, usage of Fintech credit index and usage of digital payments index.

Figure 6 shows the Aggregate Fintech Activity Index comprised of three sub-components across EU countries.



Source: design with data from World Bank (2022)

The Aggregate Fintech Activity Index displays positive and statistically significant correlations of 0.75, 0.74 and 0.79 with its components.

	<i>Aggregate Fintech Activity Index</i>	<i>Investments in Fintech companies</i>	<i>Usage of Fintech credit</i>	<i>Usage of digital payments</i>
Aggregate Fintech Activity Index	1			
Investments in Fintech companies	0.753889	1		
Usage of Fintech credit	0.746396	0.193728	1	
Usage of digital payments	0.792232	0.493389	0.469754	1

The data show a positive correlation between usage of digital payments and investments in Fintech companies (0.49), respectively the usage of Fintech credit (0.46) in EU countries. Empirical

research provides evidence that more developed equity markets support faster growth of innovative-intensive industries. Equity investments in Fintech companies are particularly large in offshore financial centers, with countries like Malta at the top of the distribution among EU countries. Developed financial markets generally follow in the ranking: Ireland, Sweden, Denmark and Luxembourg.

The usage of Fintech credit index is characterized by a larger presence of less developed countries in the first positions. Estonia and Latvia are at the top with an index of 100, while most countries have an index between 0.3 and 25.4. Generally, countries with relatively large volumes of Fintech credit display high usage of digital payments (Finland, Lithuania, Sweden and Netherlands). There are also countries with relatively high volumes of Fintech credit but low usage of digital payments - Luxembourg (84.1 with 0.3) and Croatia (63.9 with 0.9). In other words, digital payments can be seen as a pre-condition for investments in Fintech companies and usage of Fintech credit.

Overall, Fintech activities are less developed in Europe than in other regions. There is a wide dispersion across EU countries, both for the aggregate and the 3 pillars of the Fintech activity index. Five EU countries register the highest level of Fintech activity: Estonia, Finland, Sweden, Latvia and Denmark. They are among the top 10 countries at the global level: Estonia (rank 3), Finland (rank 5) and Sweden (rank 7).

The dispersion of Fintech activity in the European Union has been analyzed in several studies. The World Bank report (Didier et al., 2022) provides a comprehensive analysis of Fintech activity worldwide, including EU countries and attributes it to enabling factors like internet penetration and regulatory support. Buckley et al. (2023) examine the levels of Fintech development across European countries, highlighting disparities due to differences in regulatory environments, market structures and technological adoption. Lavrinenko et al. (2023) investigate the impact of Fintech on financial development within the EU, noting significant variations in Fintech activity among member states, influenced by factors such as financial infrastructure and innovation capacity.

An advanced digital infrastructure, supporting legislative frameworks, high financial literacy, a robust innovation culture and a preference for cashless transactions are the main drivers of Fintech activity in European Union. Countries like Estonia, Finland and Sweden are recognized for their high levels of internet penetration, digital connectivity and advanced technology. Estonia, for example, has implemented the `e-Estonia` initiative, which promotes digital government services and fosters innovation in financial technology. Sweden and Denmark have proactive regulatory authorities that encourage Fintech development while balancing consumer protection. Nordic countries consistently rank high in financial literacy and digital adoption. These attributes enable citizens and businesses to adopt Fintech solutions quickly, creating demand for services like digital payments and online banking. The Nordic and Baltic regions have a culture that encourages innovation and entrepreneurship. This is supported by robust startup ecosystems and access to venture capital, particularly in Sweden and Estonia. Estonia`s reputation as a `startup nation` is supported by successful Fintech companies like TransferWise (now Wise). The smaller populations in countries like Latvia and Denmark enable quicker adoption of digital payment solutions due to the scalability of such innovations in a compact market. Moreover, the preference for cashless transactions has driven investments in Fintech payment systems.

4. Conclusions

The development of Fintech in EU countries reflects a dynamic interaction of innovation, market potential and regulatory support. Although the growth and sustainability prospects are promising, significant challenges remain that require a strategic approach to ensure the long-term viability and competitiveness of the sector.

Keeping in line with the global trend, the EU member states have been proactive in adopting Fintech innovations in recent years. A growing number of Fintech companies, users and transaction values, as well as high penetration rates, could suggest a thriving Fintech sector, but there are differences between countries. Countries like Germany, France, the Netherlands and Spain have the highest number

of Fintech companies in the EU, due to factors including high mobile and internet penetration, improved regulatory environments and the dominance of digital payments.

Alternative finance is proving to be the most important segment and neobanking is showing constant progress. The development of neobanks or digital-only banks represents a significant trend in Europe's financial landscape. By providing low fees, user-friendly interfaces and customer-centric solutions that are suited to the needs of today's tech-savvy clients, neobanks have transformed the conventional banking industry.

Fintech's growth depends on the core components of digital infrastructure, such as the broad use of online financial services and internet connectivity. These developments highlight the ongoing evolution and regional disparities in the global Fintech sector. Both the overall and the three pillars of the Fintech Activity Index show significant variation among EU economies. Fintech activity is strongest in five EU countries: Estonia, Finland, Sweden, Latvia and Denmark. Estonia (ranked 3), Finland (ranked 5) and Sweden (ranked 7) and are all in the top 10 nations in the world.

In these countries, Fintech activity is driven by advanced digital infrastructure, supportive regulatory frameworks, high financial literacy, a strong culture of innovation and a preference for cashless transactions. Countries like Estonia, Finland and Sweden are recognized for their high levels of internet penetration, digital connectivity and advanced technological ecosystems. Sweden and Denmark have proactive regulatory authorities that encourage Fintech development while balancing consumer protection. Nordic countries consistently rank high in financial literacy and digital adoption what makes Fintech solutions to be swiftly adopted by businesses and consumers, increasing demand for services like online banking and digital payments. In addition, the Nordic and Baltic regions stimulate a culture of innovation and entrepreneurship. Smaller populations in countries such as Latvia and Denmark allow for faster adoption of digital payment systems due to their scalability in a limited market. Furthermore, investments in Fintech payment systems have been fueled by consumers' preference for cashless transactions.

While Fintech advancements provide significant potential to improve financial services and inclusion, as well as financial development within EU countries, challenges remain, particularly in ensuring equitable access and managing regulatory systems and cybersecurity risks. Future research will consider specific factors driving regional disparities in Fintech adoption across EU countries, focusing on underdeveloped regions, and evolving interaction between Fintech and traditional finance, watching especially their integration in the EU financial system.

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