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Fintech and Retirement Savings – Contact Points

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Abstract Digitalization has emerged as the primary force reshaping the financial sector in recent years. While certain areas of finance have rapidly embraced technological change, retirement planning has been slower to adapt. This report examines the digital transformation of the private retirement sector, analysing a broad spectrum of fintech solutions - including robo-advisors, chatbots, pension dashboards, gamification, smart contracts, and algorithmic trading - and their potential to improve retirement investment operations and enhance member engagement.

Focusing on the case of Bulgaria, where financial literacy remains below the European average and retirement savings are predominantly managed through defined contribution (DC) schemes, the report illustrates how these technologies can facilitate more personalized, efficient, and informed retirement planning. It also explores the blockchain - driven revival of the tontine concept, alongside the growing convergence of digitalisation and sustainability in the financial sector.

Keywords Fintech, Digitalization, Retirement Savings, Pension Funds.

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Introduction

In recent years, digitalization processes have significantly *reshaped the financial sector*. Flexible fintech solutions have disrupted traditional business models, introducing innovations that are rapidly altering consumer expectations and institutional practices. While banks have actively sought to enhance their institutional capacities, other institutional investors - remain at the periphery of digital transformation. These entities, including life insurance companies and pension funds, have not adapted at the pace demanded by increasingly tech-savvy consumers, placing them at a competitive disadvantage (Kirov, 2021).

The provision of pension products is characterized by high complexity and a focus on long-term investments and associated risks. However, this complexity has not deterred fintech interest. The sheer scale of the pension market - estimated to USD 80.42 trillion by 2025 - makes it a particularly attractive domain for innovation.[1]

[1] According to a study by Mordor Intelligence (2025), assets under management in pension funds are projected to grow by 5.4% annually, reaching USD 104.61 trillion by 2030.

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This report seeks to examine the principal fintech innovations relevant to the private retirement sector and to *assess their applicability within the specific context of the Bulgarian model*. The analysis centers on retirement investments administered through private pension funds (defined contribution schemes), life insurance companies and Pan - European Personal Pension Product (PEPP) providers. Although fintech enterprises, asset management firms, and banks are not currently key providers of retirement services in the Bulgarian financial system, they could still adopt fintech solutions in this context.

1. Transforming consumer retirement planning through fintech

Among the broad spectrum of fintech solutions tailored for retirement savings, several merit particular attention (table 1). These tools vary in function and scope: some are consumer-facing applications that support communication, education, investment advice, or retirement income simulations, while others are integrated into the investment operations of retirement providers to enhance return sustainability, risk management, and operational efficiency.

Table 1. Application field of fintech solutions for retirement providers

Fintech Solution	Application Field
Gamification	Educating participants about pensions and long-term savings
Chatbots / Virtual Assistants	Personalized pension communication
Robo-Advisors	Asset allocation, portfolio rebalancing, and tax-optimized advice
Pension Dashboards	Providing participants with a consolidated view of their current pension savings and projected retirement finances
Smart Contracts based on blockchain solutions	Automated, instantaneous, and error-free execution of predefined actions in recordkeeping, reporting, and account management
Algorithmic Trading (artificial intelligence - powered)	Identifying trading opportunities and risks, and executing orders faster than human traders
Sentiment Analysis	Assessing member attitudes and feedback using machine learning and natural language processing
Blockchain Tontines	Transparent method to guarantee members a lifelong monthly income
GreenTech companies	Sustainable investment advisory and ESG (Environmental, Social and Governance) compliance verification

Source: Author's compilation.

Given that the financial literacy of the Bulgarian population lags behind the European average, *"gamification"* offers a promising approach to improving retirement awareness and engagement. Gamification is the application of game-design elements in non-game contexts, that can serve as an effective educational tool, familiarizing users with concepts such as long-term savings, investment diversification, tax implications, and the structural components of the national pension system. Through simulated decision-making

environments, users can observe the projected impact of varying savings rates and contribution timings. While not universally suitable, gamification has demonstrated effectiveness in enhancing engagement and reducing the anxiety commonly associated with retirement planning. Its applications span pension funds, employers, mutual fund managers, and software developers collaborating with pension recordkeepers (Offerman, 2018).

Another increasingly prevalent solution across the lifecycle of saver members is the deployment of *chatbots*. Chatbots are likely to transform the way members engage with their retirement providers by shifting interactions toward more personalized and technology-driven experiences. Chatbots are automated response tools designed to simulate conversations with a live human consultant. Early chatbot models relied on pre-programmed responses, triggered by specific actions or keywords, whereas current iterations employ natural language processing (NLP) to generate dynamic responses and learn from human interactions. Chatbots can be implemented through text, voice, or multimedia formats and are accessible via websites, social media, email, and other communication platforms.

These tools enhance the member onboarding experience and reduce call center volume, thereby freeing up call center employees to focus on more meaningful, consultative services instead of handling basic participant inquiries. According to Gartner, organizations using chatbots have experienced a 70% reduction in call, chat, and email volumes, alongside notable increases in customer satisfaction metrics (Hayman, 2024: 21; Hadass et al., 2021: 6).[2]

The use of financial advice robots is gaining popularity, but while some retirement providers are integrating them into their products, the business models of others may be significantly threatened. *Robo-advisors* are online platforms that use computer algorithms to provide investment advice and manage portfolios on behalf of clients. They evaluate each client's financial status based on quantifiable factors such as account balance, income, tax situation, investment goals, and risk tolerance, and then generate portfolio recommendations tailored to the client's needs (Hadass et al., 2021: 8). A key advantage of robo-advisory services is their affordability - technical investment advice becomes accessible not only to high-net-worth individuals but also to those with average or lower incomes (Deschenes, Hammond, 2019: 182–183). Breen (2019) therefore speculates that robo-advisors could eventually replace target date funds, even though the latter are often the default option in some pension systems.

In defined contribution (DC) pension plans, participants typically have the option to select the asset allocation of their portfolios and to rebalance them periodically. In this context, robo-advisors can serve as particularly valuable tools. However, their implementation within the Bulgarian pension system remains limited. Despite bearing the full investment risk, members of private pension funds are not permitted to construct individualized

[2]See technology consultant Cantina's case study (Cantina, 2025).

portfolios. Nevertheless, robo-advisors hold potential in the voluntary pension fund segment, offering guidance on contribution levels, based on their disposable income and available tax incentives, and discouraging premature withdrawals during financial crises - times when pension funds often report negative returns, and account balances are substantially reduced. As the OECD (Organisation for Economic Co-operation and Development) has recommended pension reform in Bulgaria to introduce a multi - fund structure, and this topic is once again under discussion, the use of robo-advisors is likely to grow. Furthermore, if individuals begin to diversify their retirement investments - through products like PEPP or other investment vehicles - robo-advisors could realize their full potential.

In collaboration with various fintech development partners, the long-term savings sector is developing technologies that enable individuals to access all their pension information - across different schemes and providers, including the state pension - through a single, centralized platform. These comprehensive retirement services, known as *pension dashboards*, employ an integrated approach to facilitate more effective financial management.[3] Pension dashboards can enhance individuals' understanding of their projected financial situation in retirement by offering a consolidated overview of current pension savings. In addition to presenting future income projections, these platforms can simulate various benefit scenarios, thereby assisting users in determining whether financial advice is necessary and potentially encouraging increased contributions (Pensions Dashboards Programme, 2025). Moreover, pension dashboards support the management of lost accounts[4] and improve transparency by clearly disclosing account balances, investment returns, fund management fees, and administrative charges.

In the Bulgarian context, a pension dashboard could serve as a centralized platform consolidating information from universal, professional, and voluntary pension funds, life insurance policies, PEPP accounts, and state pension forecasts. An especially valuable feature would be the integration of robo-advisors, offering personalized recommendations for the payout phase of retirement. Bulgarian legislation provides several disbursement options from universal pension funds: lifelong payments (with or without guaranteed periods or including a deferred payment option), deferred payments, and lump-sum withdrawals. A well-designed dashboard could offer users personalized simulations showing various payout periods and amounts, along with updates and recalculations. This would

[3] Pension dashboards have already been implemented in several countries, including Israel, Australia, Belgium, Denmark, the Netherlands, and Sweden. The UK government has launched a significant initiative—the Pensions Dashboard Prototype Project. Some researchers have discussed the potential for creating a similar retirement dashboard in the United States (Hadass et al, 2021: 10).

[4] In many countries, pension systems include employer-sponsored accounts. Given that the average person changes jobs about six times during their career - and considering the potential for company mergers, restructures, or closures - the "loss" of pension accounts is a frequent issue. A dashboard that includes an online registry could help individuals track their retirement accounts and accumulated benefits across employment changes.

enable future retirees to make *more informed decisions* and choose the option that best suits their financial goals.

2. Integrating fintech into retirement providers' operations

Some fintech solutions reach consumers indirectly - by being integrated into the operations of retirement providers. Among the most notable are smart contracts and algorithmic trading. A *smart contract* is a computerized transaction protocol that contains no legal terminology or agreements - only code that automatically executes predefined actions when specific conditions are met. These contracts enhance the blockchain's data processing capabilities and allow transactions to be carried out autonomously, without the need for third-party approval or intervention (Zheng et al., 2019; Szabo, 1994).

According to Sarker and Datta (2022), each pension-related process can be broken down into three key actions: verifying records, settling funds (such as collection, payment, or investment), and updating records. While the first and third actions can be executed within the blockchain layer, the settlement of funds still relies on existing pension IT systems. To address this, the application programming interface (API) for each pension process can be designed as a set of constituent APIs. Each of these smaller APIs would handle a specific task, with smart contracts managing the sequence of their execution according to the underlying business logic. If any of the APIs fail during processing, the smart contract will halt and prevent the execution of subsequent APIs. After each pension-related transaction - whether financial (e.g., contributions or withdrawals) or non-financial (e.g., enrollment in a pension scheme) - the updated state is recorded on the respective distributed ledger. This ensures that each action is executed automatically, instantly, and without errors. Thus, within a pension blockchain network, smart contracts can be programmed to manage a wide array of *regulatory and business complexities*, such as individual eligibility criteria, tax implications, and scheme-specific variations. APIs facilitate communication both among smart contracts and with external systems and entities (Sarker, Datta, 2022: 5–15).

Integrating smart contracts into recordkeeping, reporting, and account management not only helps minimize human error but also enables the early identification of potential issues before they are reviewed by pension authorities or other regulatory bodies. This can lead to *cost reductions*, with the potential for passing these savings on to pension holders (Hayman 2024: 26).

Algorithmic trading refers to the use of computer programs to execute trades based on predefined criteria and mathematical models. These algorithms can process vast amounts of data at high speed, allowing them to identify trading opportunities and execute orders far more quickly than human traders. Artificial intelligence (AI) enhances this process by incorporating machine learning and predictive analytics to refine and optimize trading strategies.

AI algorithms can analyze both historical and real-time market data to develop sophisticated trading strategies. They can uncover patterns and trends that may not be immediately visible to human analysts, enabling more informed decision-making. Furthermore, AI-powered trading systems continuously learn from new data, allowing them to adapt and improve their strategies over time. This dynamic adaptability enables them to respond to shifting market conditions more effectively than static models.

While high-frequency trading - one of the most prominent applications of AI in finance - is not typically a focus for pension providers, algorithmic trading can still play a critical role in risk management. By analyzing both historical and real-time data, AI systems can detect potential risks and implement mitigation strategies proactively. Advances in NLP and sentiment analysis also enable AI algorithms to incorporate unstructured data - such as news articles and social media content - into their decision-making processes. This enhances their ability to anticipate market movements and manage risk. Additionally, AI can conduct stress testing and scenario analysis, helping traders and institutions evaluate how various market conditions might impact a strategy. This foresight supports more robust and informed decision-making (Ena VC, 2025).

To better understand member attitudes and enhance engagement, retirement providers could benefit from leveraging *sentiment analysis*. Sentiment analysis involves using NLP and text mining to gather and evaluate subjective information - such as thoughts, opinions, and feelings about various topics or products. It enables pension providers to assess member attitudes and feedback, ultimately helping them better understand their membership and design products and services that meet members' needs (Hayman, 2024: 24). In the context of implementing a multifund pension system in Bulgaria, sentiment analysis can also be used to gauge member sentiment regarding new products and services. Additionally, it can assess attitudes toward broader topics such as environmental, social, and governance (ESG) investing and retirement planning.

Among the most innovative concepts being revived by fintech is the *tontine*. A tontine is a retirement investment pool shared among a group of subscribers. As members of the pool pass away, their remaining assets are redistributed to the surviving members, rather than to their heirs. This system benefits the longer-lived participants at the expense of those who die earlier. The additional assets redistributed in this manner are known as “mortality credits.” Investments in tontines are typically irreversible. Tontines can provide lifetime income comparable to annuities and pensions. Notably, a tontine can never be underfunded because it makes no explicit financial promises or guarantees. The benefits paid to participants adjust dynamically, based on the group’s mortality and financial market experience, ensuring that the present value of payouts never exceeds the present value of the pool's assets. Like a defined contribution plan, tontines carry no unfunded liabilities, as benefit payments are strictly based on the available assets. As

such, tontine pools are insulated from investment risk, longevity risk, and underfunding risk (Fullmer, 2019: 4–5).

Tontines were first introduced in France in 1653. By the 19th century, private insurance companies began issuing tontines, and the concept gained popularity in both Europe and the United States. However, widespread misuse, misappropriation, and fraud by issuers led to regulatory crackdowns in several countries during the early 20th century. As a result, tontines largely disappeared from the financial landscape. Today, fintech and blockchain innovators are reimagining tontines as a viable retirement solution. Blockchain technology offers a path to restoring trust in the tontine model. Its transparent, decentralized record-keeping creates an immutable audit trail that prevents fund misuse or fraud (Benjamin, 2018).

A case study highlights a Swedish regulated fintech trust company that provides monthly lifetime income. The firm uses blockchain technology with pseudonymous, immutable ledgers and biometric authentication to ensure transaction transparency while maintaining user privacy. Its authentication system leverages smartphone technology and 3D facial mapping to verify that a live individual, rather than a static image, is accessing the platform. The company offers its services to individuals, corporations, and governments, charging a 1% annual fee.[5]

In Europe, and specifically in Bulgaria, tontines can be legally offered also through life insurance companies, regulated by Directive 91/674/EEC, as well as by PEPP providers. The PEPP legal framework allows for structures similar to tontines. For example, consumers without spouses or children might prefer to "leverage" their retirement investments by choosing a PEPP that follows the tontine principle. In doing so, they forego inheritance in exchange for the potential to increase their investment returns (Meerten, Hooghiemstra, 2017: 79).

Blockchain technology underpins many digital pension solutions. One notable application is in pension risk transfers[6]. Legal & General, the UK's largest retail life insurer, is rolling out a blockchain-based platform for pension risk transfers via Legal & General Reinsurance. Although pension risk transfer is not common in Bulgaria's pension model, a blockchain system could fundamentally reshape the organization of long-term life-insurance business. Blockchain is uniquely suited to the annuities market's long duration contracts: it enables data and transactions to be signed, recorded, and preserved securely and immutably over the lifetime of each agreement. By automating the entire reinsurance workflow - including pricing, claims management, financial reporting, and

[5] See case study of fintech company Tontine Trust, which offers products such as Tontine Pensions, Tontine Trust Funds, and the TontineIRA™, guaranteeing members a monthly income for life (Tontine Trust, 2025).

[6] Pension risk transfer occurs when a defined-benefit plan sponsor offloads its plan liabilities to an insurance company.

collateral management - a blockchain solution should drive down costs and streamline operations (Hadass et al., 2021: 19–20).

Alongside fintech innovations, sustainability remains a key priority in the financial sector. At the EU level, two distinct regulatory frameworks currently govern the digitalization and the sustainability of finance. However, there is growing interest in exploring their interconnection and the ways in which *digital and sustainable finance can reinforce each other*. GreenTech firms lie at the intersection of these two transformative trends. These companies specialize in sustainable investment advisory and ESG verification, offering sophisticated tools that streamline the selection, implementation, monitoring, and management of ESG products, portfolios, and rules. Some GreenTech companies employ proprietary methodologies. For instance, Conser's ESG Consensus® uses a reverse-engineered, collective-intelligence model to capture the full spectrum of market opinions on a company's ESG profile.[7] By reconstructing an investable "best-in-class" universe from key ESG asset managers, this methodology delivers a representative, unbiased assessment of sustainability risk-drawing on multiple recognized ESG sources and reporting both the average opinion and the degree of consensus.

The expertise of GreenTech firms could be highly valuable to all retirement providers and wealthy individuals interested in sustainable investments, *particularly pension funds*. In Bulgaria, sustainable investing is still only marginally integrated into the investment policies of private pension funds (Beneva, 2022: 53–55). Key barriers identified by pension providers include the lack of comprehensive, objective, and independently verified ESG data; uncertainty about the impact of ESG risks on investment returns; and the additional costs associated with implementing ESG policies. Collaboration with GreenTech companies can help overcome these challenges by enabling pension schemes to identify long-term ESG risks, capitalize on opportunities for stable positive returns, and contribute to carbon reduction and global sustainability goals.

Conclusion

While unlikely to replace the importance of building client relationships through human interaction, the digital transformation of the private retirement sector offers significant opportunities to enhance customer experience and modernize the business models of retirement providers. To fully realize the benefits of fintech innovations, stakeholders have to foster regulatory support, improve digital infrastructure, and strengthen collaboration across the financial ecosystem.

[7] Conser, one of the first advisory firms wholly dedicated to sustainable investing, serves over 80 institutional clients—including pension funds, foundations, and asset managers—according to their website (www.conser.ch/en/about-us). For a more comprehensive overview of green fintech providers, see the Green Fintech Network's directory (https://www.greenfintechnetwork.org/).

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