

**Center for
Economic Theories and Policies**
Sofia University St. Kliment Ohridski
Faculty of Economics and Business Administration

ISSN: 2367-7082



Brexit and the Fintech Revolution in Europe: Lessons from the Bulgarian Digital Finance Cluster

**Deyan Radev
Georgi Penev**

**BEP 07-2022
Publication: August 2022**

Brexit and the Fintech Revolution in Europe: Lessons from the Bulgarian Digital Finance Cluster¹

Deyan Radev² and Georgi Penev³

August 25, 2022

Abstract

This paper provides insights into the drivers of the resilience of the Fintech sector in Emerging Europe by analyzing the performance of 128 Bulgarian Fintech companies in the period 2000-2021. Our results show that larger and better capitalized Fintech companies which outsource their non-core activities and focus on their main competitive strengths tend to have higher operating income and profit. We also find substantial positive real-economy effects as these companies hire actively on the labor market to maintain their growth. The results are primarily driven by the post-Brexit period of 2016-2019. These results have important managerial and policy implications and provide interesting directions for future research.

JEL classification: G01, R00, R11, P25

Keywords: Brexit, fintech, regional clusters, resilience, emerging markets

¹ This paper has received financial support from of Bulgarian National Science Fund's Scientific Programme "Petar Beron" under grant agreement KP-06-DB-7 from December 16, 2019. We would like to thank Mira Aslanova for excellent research assistance and the members of the Bulgarian Fintech Association for their valuable inputs. All remaining errors are our own.

² PhD, Assistant Professor of FinTech and Banking at the Faculty of Economics and Business Administration at Sofia University. E-Mail: d.radev@feb.uni-sofia.bg

³ Executive Director, Bulgarian Fintech Association, Sofia, Bulgaria. E-Mail: georgi@fintechbulgaria.org

Table of Contents

1. Introduction.....	3
2. Institutional Details.....	5
2.1. The Evolution FinTech Landscape in Bulgaria.....	5
2.2. Key players in the Quadruple Helix Model of Innovation.....	7
2.2.1. Private sector.....	7
2.2.2. Academia	8
2.2.3. Public sector.....	8
2.2.4. Civil Society.....	8
3. Data and Empirical Model	9
3.1. Dataset.....	9
3.2. Empirical Model.....	9
3.3. Descriptive Statistics	12
4. Empirical Results	14
4.1. Baseline Results	14
4.2. Effect of Brexit on Fintech Activity.....	16
5. Conclusion	18

1. Introduction

The outcome of the British Referendum on June 26, 2016 to leave the European Union (EU) was a major setback for the European Project and sent shockwaves to financial markets and the European and Global economies. However, Brexit also presented opportunities for digital natives in the EU, and especially in Emerging Europe. One of the sectors that managed to take full advantage of the split of the UK financial market from the EU is the sector of financial technologies, which saw exponential growth since 2016. To date, there has been no serious academic attempt to identify the drivers of Fintech performance post-Brexit and what the effects on the real economy in EU are. This paper aims at contributing to bridging that gap and identifying successful business approaches during crises that are replicable in other settings.

To answer the research questions above, we analyze the performance of 128 Bulgarian Fintech companies using panel data over the period 2000-2021. The sample comprises about 95 percent of the Bulgarian companies that comply with the definition of a “fintech” by the World Economic Forum, the World Bank and the Cambridge Centre for Alternative Finance (see CCAF, WB and WEF, 2020). The Bulgarian digital finance cluster is a major Fintech hub in the region of Southeast Europe. 70 percent of the sector is export-oriented (BFA, 2021) and competes globally for funding and market share. Therefore, we argue that the Bulgarian Fintech sector is a perfect representative for the conditions and decision-making processes of companies in small, open economies competing on global markets.

Our results show that larger and more capitalized firms that do not overinvest in tangible assets but take advantage of their core expertise and outsource their non-core activities have larger profits and operating income and engage more actively in hiring personnel. The results are driven by the post-Referendum period and corroborate the anecdotal information from our talks with managers, who stressed on focusing on their companies’ “core values” during the recent crises. These results indicate that Brexit does not only foster the financial development in Bulgaria through the expansion of the Fintech sector, but also has positive real economy effects through the labor market.

Our paper speaks to several strands of literature. First, our research is related the literature on resilience, crises and innovation dynamics. The concept of evolutionary resilience relates to the

capacity of a region to sustain long-term economic development, while responding positively to short-term shocks (see, e.g., Holling, 2010; Simmie and Martin, 2010; Boschma, 2015). In this setting, systemic innovation is seen as critical for regions and nations to overcome economic crises (see, e.g., Christopherson, Michie, and Tyler, 2010; Fromhold-Eisebith, 2015). Regions with diverse and connected knowledge networks that fully utilize the capacity of Academia for training human resources, and for producing industry-driven research, consultancy, and public–private partnerships, are shown to have better capacity to respond to shocks and to develop new growth paths (see, e.g., Crespo, Suire, and Vicente, 2014; Pinto and Esquinas, 2013). Furthermore, the theory and evidence suggest that small and medium enterprises (SME), which possess fewer resources, and therefore face bigger difficulties to innovate, need to be able to identify new ways of overcoming their limitations with open innovation strategies and external sources of knowledge, such as knowledge-intensive business services (Pinto, Esquinas, and Uyarra, 2015). We expand the literature on resilience and innovation by identifying firm features that help regional clusters to withstand not only economic, but also *political* shocks, such as Brexit.

Our paper also relates to the literature examining the economic consequences of Brexit. Given the severity of the decision, as well as the unpredictable outcome of the Brexit referendum *ex ante*, most pre-Brexit analyses predict a decrease in living standards for UK citizens in the medium and long run (Kierzenkowski et al., 2016). What is more, several early post-Brexit studies find that the exit decision already manifested itself in reduced GDP growth, higher inflation, decline in syndicated loans, and a drop in stock prices of both British and EU firms (see, e.g., Schiereck et al., 2016; Born et al., 2017, Breinlich et al., 2018; Berg et al., 2019; Radev and Waibel, 2022). At the same time, in the years after the referendum, continental Europe, especially the Baltics and Southeast Europe, has witnessed an exponential growth of its Fintech sector (see., e.g., Euractiv, 2021). While the impact of the British exit decision on the economy and on stock prices of firms is well documented, less is known about the exact channels through which the Brexit affects financial institutions. A deep understanding of the mechanisms at work is of utmost importance, especially considering the financial sector’s significant role for the economies of both the UK’s and continental Europe.

To summarize, the contribution of our paper is along several lines. First, this is one of the first empirical academic studies that examines the impact of Brexit on the European Fintech sector and real economy. Second, we identify managerial strategies for ensuring regional resilience to economic

crises and political shocks that can be applied in various settings within and outside Emerging Europe. Third, based on our results, we derive policy recommendations for governments and regulators to support regional resilience.

This paper is organized as follows. Section 2 introduces institutional details about the digital finance cluster in Bulgaria. Section 3 presents the empirical setup of the paper, including data descriptives and empirical models. Section 4 presents the empirical results, while Section 5 concludes.

2. Institutional Details

2.1. The Evolution FinTech Landscape in Bulgaria

With the restructuring of the economy in Bulgaria starting in late 1989 and early 1990 and the switch from a planned economy to a market economy, the first privately-owned companies that applied cutting-edge technologies in financial services, and thus, complying with the definition of fintech companies, appeared. Bankservice JSC (later Borica), founded in 1989, was the first company to implement computing technologies in finance. The company was owned by all Bulgarian banks at that time, with the main shareholder the central bank of Bulgaria - the Bulgarian National Bank (Borica, 2022). The history of digital finance in Bulgaria continued with the founding of Datecs in 1990 which produced POS terminals (Datecs, 2022) and Diners Club Bulgaria JSC in 1996 which started issuing international credit cards (Diners Club Bulgaria, 2022).

The most recent and comprehensive study on the history of digital finance companies was conducted by the Bulgarian Fintech Association in the Annual Fintech Report 2021 (BFA, 2021). The study found that in 2021 there were 135 Fintech companies, 63% of which were founded in the last 7 years (Figure 1) (BFA, 2021).

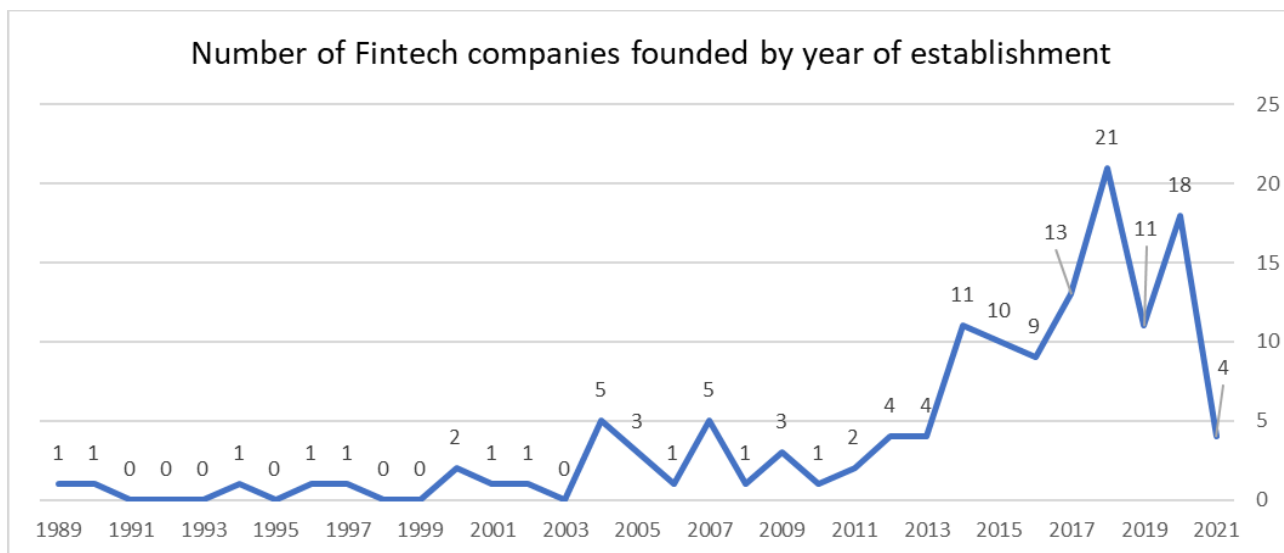


Figure 1. Number of Fintech companies in Bulgaria by year of establishment, Source: Bulgarian Fintech Association, 2021 and Penev and Radev (2022).

In Figure 1, we note that the largest spike in the number of Fintech companies is observed in the years after the Brexit referendum, between 2016-2021, when 71 new Fintech companies were established, 23 of which being foreign direct investments (FDIs). These included branches of some of the largest global Fintechs such as the UK-based Tide and OpenPayd, as well as Crypto.com, Bunq, Safecharge (now Nuvei), etc. (BFA, 2021, p. 23). The slowdown in 2021 reflected the uncertainty around the COVID-19 pandemic. Nonetheless, the overall upward trend is projected to continue throughout 2022 and beyond.

The Fintech community in Bulgaria is centered in the three biggest cities in the country - Sofia, Plovdiv and Varna, with the capital Sofia hosting 115 of all 135 Bulgarian Fintechs (BFA, 2021, p. 18). Although the privately-owned Fintech industry in Bulgaria dates back to the 1990s, the Annual Fintech Report 2021 documents that it is a relatively young, but growing part of the economy. Almost all Bulgarian Fintech firms (95%) are small and medium enterprises (SMEs) with less than €50 million turnover and 250 employees (BFA, 2021, p. 18). The business model of every third Fintech firm in Bulgaria is in digital payments, followed by 14% in digital asset exchange, 13% in digital lending, etc. (BFA, 2021, p. 20). The digital payments segment is the main contributor to the BGN 1.4 billion (~ EUR 0.7 billion) total revenue of the sector in 2020, accounting for about two-thirds of that figure (BFA, 2021, p. 23). The Bulgarian digital payments segment consists of both Bulgarian-

owned companies such as Paynetics, Borica, Paysera Bulgaria, etc., and foreign direct investments - Paysafe, SumUp, Nuvei, etc. The Bulgarian ecosystem attracted a significant amount of attention in early 2022 with the emergence of the first Bulgarian unicorn - Payhawk - a fintech firm in that particular segment (Penev and Radev, 2022).

2.2. Key players in the Quadruple Helix Model of Innovation

The success of the Bulgarian Fintech sector can be attributed to the joint efforts of the public and private sectors, academia, as well as the civil society in Bulgaria. In this section, we present the Quadruple Helix Model of Innovation in Bulgaria, which helped the country to become the leading Fintech hub in Southeast Europe.

2.2.1. Private sector

Before the fall of communism, innovation in the sector was driven by the public sector and policymakers, who decided to incorporate computing power for more effective and efficient work of the Bulgarian National Bank. After 1990, and especially from the start of the 21st century on, the implementation of innovative digital finance solutions is driven primarily by the private sector.

With the emergence of new technologies and solutions throughout the years, a need arose for a private-sector-led organization that would unite the industry and coordinate the interactions with the remaining actors in the sector. The Bulgarian Fintech Association (BFA) was established in 2017 by 7 of the most active players in the Fintech space. Since its inception, the Association has been applying the Quadruple Helix Model of Innovation to develop the ecosystem further and to consolidate Bulgaria's position as a Fintech hub in the region. As of July 2022, BFA has 65 member organizations, among which 45 Fintech companies, 2 universities, 1 Bulgarian Fintech-active VC fund and 2 banking institutions. The Association is an associate member of the International Network for Financial Education at the OECD and a co-founder of the European Digital Finance Association.

2.2.2. Academia

According to the analysis of BFA, in 2021 there were 12,900 university and high school students enrolled in STEM programmes that could potentially choose a career or continue their studies in Fintech-related fields (BFA, 2022, p.16). At the same time, Bulgarian academia has been working intensively on incorporating financial innovation into their educational programs. The most noteworthy steps toward Fintech education have been taken by the Faculty of Economics and Business Administration (FEBA) at Sofia University with their Master's Programme in Finance, Investments, and Fintech that commenced in the fall of 2020. However, the topic of Fintech is being taught in one form or another in almost every economics faculty in Bulgaria – Plovdiv University, VUZF University, Varna University of economics, South-western University, and others. In all of the above, private sector representatives give guest-lectures and share their experiences with students. The Appendix in Penev and Radev (2022) contains a detailed overview of the core awareness and educational activities of BFA related to the Quadruple Helix of Innovation.

2.2.3. Public sector

The Fintech-related public sector initiatives include educational policies (e.g., the National Financial Literacy Strategy that incorporates digital finance into educational plans for all age groups⁴); support for internationalization and foreign direct investments; regulatory activities for the banking sector (which includes all banking institutions, electronic money issuers, lending institutions, and payment providers) through the Bulgarian National Bank and the non-banking sector (e.g., capital, insurance, and pension markets, investment funds and other investment intermediaries) through the Financial Supervision Commission (FSC) of Bulgaria; municipal, regional and supranational support.

2.2.4. Civil Society

Every key stakeholder in the Bulgarian Digital Finance cluster undertakes specific projects targeted at civil society. For example, the Ministry of Finance and the Ministry of Education and Science

⁴ See MinFin (2021).

included the digitalization of financial services in the Bulgarian National Financial Literacy Strategy and has started the process of incorporating digital finance topics into the new textbooks of pupils from Grade 1 to 7. Educational materials targeted at young adults and adults are currently being prepared, which is eventually expected to help every Bulgarian citizen to respond adequately to the fast-changing financial sector and to make better financial decisions. In parallel, the non-banking regulator FSC reaches out to the society through an educational website and an Innovation hub for Fintech startups.

3. Data and Empirical Model

3.1. Dataset

To construct our dataset, we start with annual bank balance sheet and income statement data for the period 2000-2021 from Ciela Norma, one of the most reputable providers of accounting and regulatory data for Bulgarian companies.⁵ We end up with 128 Fintech companies that provide information for all variables in our regression analysis. For macroeconomic data, we rely on World Bank's World Development Indicators. The final dataset comprises 679 annual observations.

3.2. Empirical Model

In this paper, we investigate how balance sheet characteristics of Fintech companies and macroeconomic factors affect key corporate performance indicators. Later on, we split the sample into the pre- and post-Brexit-Referendum periods to analyze whether and how the public vote has affected company performance of Bulgarian Fintechs and what the exact channels of transmission are. To account for unobservable time-invariant firm characteristics, we include firm-fixed effects. To this end, we estimate variations of the following fixed-effects panel data model:

⁵ Ciela Norma provides access to raw accounting data collected from the National Commercial Registry of the Republic of Bulgaria.

$$Y_{i,t} = \alpha_0 + \alpha_1 \cdot FirmVariables_{i,t} + \alpha_2 \cdot MacroVariables_t + \gamma_i + \epsilon_{i,t}, \quad (1)$$

where $Y_{i,t}$ is a vector of dependent variables that include Operating Income, Personnel Costs, Personnel Number and Profit of firm i at time t ; $FirmVariables_{i,t}$ is a vector of balance sheet and income statement variables that include proxies for size, capitalization, tangible and financial assets, lending and reliance on external services; $MacroControls_{kt}$ is a vector of macroeconomic variables, related to the overall Bulgarian economy at time t , such as GDP growth, unemployment and inflation; γ_i is a firm fixed effect for Fintech firm i . Table 1 presents the dependent and independent variables used in our analysis, along with their definitions.

For the sample split before and after the Brexit referendum, we consider the period from 2000 to 2015 as the pre-Brexit sample and the period from 2016 to 2019 as the post-Brexit sample. We exclude the COVID-19 period of 2020 and 2021 for a cleaner identification of the effect of Brexit.

Table 1. Regression Variables. This table presents a description of the regression variables used in our analysis and their respective data sources.

Variable	Description	Source
Dependent Variables		
Operating Income	Natural logarithm of total individual company operating income, denominated in thousands of BGN	Ciela Norma
Personnel Costs	Natural logarithm of total individual company personnel costs, denominated in thousands of BGN	Ciela Norma
Personnel Number	Natural logarithm of average individual company personnel number	Ciela Norma
Profit	Natural logarithm of total individual company profit, denominated in thousands of BGN	Ciela Norma
Independent Variables		
Size	Natural logarithm of total individual company assets, denominated in thousands of BGN	Ciela Norma
Capitalization	Ratio of total individual company equity to total individual company assets (in %)	Ciela Norma
Tangibles	Natural logarithm of total individual company tangible assets, denominated in thousands of BGN	Ciela Norma
Financial Assets	Natural logarithm of total individual company financial assets, denominated in thousands of BGN	Ciela Norma
Lending	Natural logarithm of total individual company lending, denominated in thousands of BGN	Ciela Norma
Ext. Services Expenses	Natural logarithm of total individual company expenses for external services, denominated in thousands of BGN	Ciela Norma
Ann. GDP Growth	Annual country GDP growth (in %)	World Bank's WDI
Inflation	Annual country inflation (in %)	World Bank's WDI
Unemployment	Total unemployment (in %)	World Bank's WDI

3.3. Descriptive Statistics

Table 2 and 3 present the descriptive statistics of the main variables in our regression analysis for the overall sample and for the sample split before and after the Brexit Referendum in 2016. The values of the regression variables are usually logarithmic and difficult to interpret outright, but for instance, the largest company in our sample is iCard AD, with total assets of 554 million BGN and, respectively, the highest operating income of 262 million BGN, both for 2021. The largest company in terms of personnel number and personnel costs is Paysafe with, respectively, 1295 people and 75 million BGN in 2021. The companies are usually very well-capitalized, with ratios of common equity to total assets ranging from 13 percent to 80 percent. Throughout the period, which also includes the Global Financial Crisis and the Sovereign debt crisis in the euro area, the Bulgarian economy has remained relatively stable, with an average GDP growth of 1.6 percent, average inflation of 1.7 percent and average unemployment at 7 percent of the work force. In Table 3, we notice that the period after the referendum in 2016 has much more favorable macroeconomic conditions, with an average GDP growth of 3.2 percent and average unemployment of 5.8 percent.

Table 2. Descriptive statistics: Overall sample. This table presents the descriptive statistics of the dependent variables and the company and macroeconomic variables in our regression analysis. The sample comprises 128 Fintech companies in the period 2000-2021.

Overall Sample					
Variable	Mean	St. Dev.	Minimum	Maximum	N
Operating Income	7.236	2.234	0.000	12.488	679
Personnel Costs	6.739	2.031	0.000	11.215	679
Personnel Number	3.302	1.764	0.000	7.166	679
Profit	5.623	2.121	0.000	10.982	503
Size	7.505	2.311	1.099	13.226	679
Capitalization	45.187	27.033	13.182	79.977	679
Tangibles	6.960	2.409	1.099	13.214	679
Financial Assets	5.546	2.397	0.000	13.052	679
Lending	5.942	2.769	0.000	11.600	679
Ext. Services Expenses	6.109	2.010	0.000	11.351	679
Ann. GDP Growth	1.600	2.902	-4.387	4.178	679
Inflation	1.783	1.588	-1.418	4.220	679
Unemployment	7.002	2.766	4.230	12.940	679

Table 3. Descriptive statistics: Before and After the Brexit Referendum. This table presents the descriptive statistics of the dependent variables and the company and macroeconomic variables in our regression analysis before (Panel A) and after (Panel B) the British referendum to leave the EU. The sample comprises 56 and 105 Fintech companies in Panel A and Panel B, respectively. The period in Panel A is 2000-2015, and in Panel B: 2016-2019.

Panel A. Before Brexit Referendum					
Variable	Mean	St. Dev.	Minimum	Maximum	N
Operating Income	7.404	2.159	0.000	11.733	185
Personnel Costs	6.804	1.996	0.693	10.155	185
Personnel Number	3.759	1.713	0.000	6.682	185
Profit	5.402	2.164	0.693	9.978	146
Size	7.751	2.319	2.398	11.770	185
Capitalization	42.694	27.091	13.182	79.977	185
Tangibles	7.310	2.360	2.197	11.587	185
Financial Assets	5.770	2.309	0.000	10.670	185
Lending	6.268	2.805	0.000	11.553	185
Ext. Services Expenses	6.234	1.956	0.000	9.986	185
Ann. GDP Growth	1.528	1.413	-0.560	3.428	185
Inflation	0.835	1.971	-1.418	4.220	185
Unemployment	11.147	1.382	9.140	12.940	185

Panel B. Before Brexit Referendum					
Variable	Mean	St. Dev.	Minimum	Maximum	N
Operating Income	7.112	2.290	0.000	12.488	313
Personnel Costs	6.683	2.032	1.099	11.118	313
Personnel Number	3.180	1.751	0.000	7.056	313
Profit	5.686	2.170	0.000	10.982	232
Size	7.471	2.304	1.099	12.537	313
Capitalization	45.285	26.859	13.182	79.977	313
Tangibles	6.841	2.429	1.099	12.499	313
Financial Assets	5.413	2.409	0.000	12.062	313
Lending	5.854	2.765	0.000	11.600	313
Ext. Services Expenses	6.063	2.010	1.099	11.351	313
Ann. GDP Growth	3.189	0.582	2.685	4.038	313
Inflation	2.043	1.438	-0.799	3.104	313
Unemployment	5.571	1.201	4.230	7.570	313

4. Empirical Results

In this section, we present the results from our regression analysis. We start with the results for the overall sample in Section 5.1 and proceed with splitting the sample period into pre- and post-Brexit-Referendum years, 2000-2015 and 2016-2019, respectively.

4.1. Baseline Results

Table 4 presents our baseline results. The coefficients in Columns (1) and (2) are from regressions of operating income on firm variables, and firm and macroeconomic variables, respectively. The larger the size, lending and financial assets and the lower the tangible assets, the higher the operating income. Interestingly, the more the companies rely on external services, the larger the operating income. This could be explained by efficient outsourcing of non-core activities and focusing on the main operations where Fintechs have competitive advantages. This finding confirms the anecdotal information from our talks with managers, who stressed on focusing on the company's "core values" during the recent crises. Inflation understandably increases nominal operational income. Country unemployment also seems to be positively correlated with the level of operating income.

Columns (3)-(4) and (5)-(6) present results for personnel costs and personnel number, respectively. We notice similar patterns as for operating income, meaning that growing companies invest in their employees, both on the intensive (salaries) and extensive (head count) margins. Interestingly (and intuitively), a higher country unemployment rate tends to decrease salaries, which helps companies to hire more talent. Column (7) presents a regression of total profit on the full set of independent variables. We notice that larger and more capitalized firms tend to be more profitable. Since we have a lower number of observations of company profits, for the sake of comparison, in Column (8), we replicate Column (2) for the subset where data for both operating income and profit are available. The results are very similar to these in Column (2), meaning that they are very stable within our sample of companies. What is notable is the highly significant positive relationship between capitalization and firm profit and operating income. That means that Fintech companies manage to use shareholder funding efficiently and may point towards effective use of venture capitalist and angel investor

expertise that is not necessarily available through non-equity funding such as loans or corporate bonds (see, e.g., Grant et. al. 2019).

Overall, our results suggest that larger and more capitalized firms that outsource their non-core activities have larger profits and operating income and engage actively in hiring personnel.

*Table 4. Baseline results: Determinants of performance of Bulgarian Fintech firms. This table reports the results from the estimation of Equation 1. The sample comprises 128 Bulgarian Fintech companies in the period 2000-2021. The dependent variables are Operating Income (Columns (1), (2) and (8)), Personnel Costs (Columns (3) and (4)), Personnel Number (Columns (5) and (6)), and Profit (Column (7)). The bank controls are size, capitalization, tangible assets, financial assets, lending and external services expenses. The “Macro Variables” vector contains GDP growth, inflation and unemployment. All variables are defined in Table 1. The fixed effects are at the firm level. The numbers in parentheses are robust standard errors. Statistical significance at the 1%, 5% and 10% levels is denoted by ***, **, and *, respectively.*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Size	0.2529** (0.029)	0.2641** (0.018)	0.1925*** (0.008)	0.1612** (0.029)	0.1612*** (0.005)	0.1799*** (0.002)	0.6975*** (0.000)	0.1783 (0.226)
Capitalization	0.0007 (0.785)	0.0012 (0.633)	0.0016 (0.472)	0.0013 (0.550)	0.0035** (0.034)	0.0038** (0.021)	0.0138*** (0.000)	0.0060** (0.017)
Tangibles	-0.2915*** (0.010)	-0.2815** (0.011)	-0.1498* (0.062)	-0.1509* (0.066)	-0.0989 (0.112)	-0.0969 (0.108)	-0.2263 (0.132)	-0.1439 (0.239)
Financial Assets	0.1093** (0.046)	0.1190** (0.028)	0.0400 (0.264)	0.0264 (0.471)	0.0081 (0.778)	0.0187 (0.491)	0.1106 (0.166)	0.1872*** (0.000)
Lending	0.3933*** (0.000)	0.3827*** (0.000)	0.1631*** (0.001)	0.1548*** (0.002)	0.0596 (0.164)	0.0632 (0.125)	0.1395* (0.078)	0.3220*** (0.000)
Ext. Services	0.4099*** (0.000)	0.4105*** (0.000)	0.5895*** (0.000)	0.5849*** (0.000)	0.4002*** (0.000)	0.4045*** (0.000)	0.0981 (0.222)	0.3685*** (0.000)
GDP Growth		-0.0121 (0.283)		0.0009 (0.908)		0.0020 (0.737)	-0.0088 (0.499)	0.0007 (0.946)
Inflation		0.0735*** (0.007)		-0.0148 (0.442)		0.0216 (0.147)	-0.0070 (0.777)	0.0233 (0.355)
Unemployment		0.0412** (0.029)		-0.0450*** (0.001)		0.0332*** (0.002)	-0.0129 (0.539)	0.0481** (0.018)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	679	679	679	679	679	679	503	503
Nr. of Fintechs	128	128	128	128	128	128	106	106
R2	0.8853	0.8878	0.9356	0.9376	0.9517	0.9530	0.9114	0.9117
R2 (adjusted)	0.8573	0.8596	0.9199	0.9219	0.9399	0.9412	0.8853	0.8858

4.2. Effect of Brexit on Fintech Activity

In Table 5, we provide the results for the sample split before and after the Brexit Referendum. Columns (1) through (5) correspond to Columns (2), (4), (6), (7) and (8) in Table 4, respectively, and cover the period before 2016. Columns (6) through (10) correspond to the same columns in Table 4 for the period 2016-2019. We notice much lower correlation between company financials and its performance and hiring before Brexit, evidenced by the low number of significant effects. After 2016, the fundamentals play a much higher role in company performance and the post-Referendum period is what drives the overall results in Table 4. What is also noticeable is the much larger number of observations for the much shorter time period, reflecting the growth in the number of Fintech companies in the past decade that we observed in Figure 1.

Overall, the intuition from Table 4 is driven by the post-Referendum period and larger and more capitalized firms that do not overinvest in tangible assets, but take advantage of their core expertise, appear to perform better and manage to be more active in the hiring market. The latter effect indicates that Brexit does not only foster the financial development in Bulgaria, but also contributes to the real economy through the labor market.

Table 5. Effect of Brexit on the performance of Bulgarian Fintech firms. This table reports the results from the estimation of Equation 1 before and after the British referendum to leave the EU. The sample comprises 56 Bulgarian Fintech companies in the period 2000-2015 in Columns (1)-(5) and 105 Bulgarian Fintech companies in the period 2016-2019 in Columns (6)-(10). The dependent variables are Operating Income (Columns (1), (5), (6) and (10)), Personnel Costs (Columns (2) and (7)), Personnel Number (Columns (3) and (8)), and Profit (Column (4) and (9)). The bank controls are size, capitalization, tangible assets, financial assets, lending and external services expenses. The “Macro Variables” vector contains GDP growth, inflation and unemployment. All variables are defined in Table 1. The fixed effects are at the firm level. The numbers in parentheses are robust standard errors. Statistical significance at the 1%, 5% and 10% levels is denoted by ***, **, and *, respectively.

	Before Brexit Referendum					After Brexit Referendum				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Size	-0.3664 (0.343)	0.2724 (0.158)	0.2255 (0.132)	1.6586*** (0.000)	-0.4561 (0.432)	0.5923** (0.015)	0.0545 (0.525)	-0.0196 (0.816)	0.7739*** (0.003)	0.6622* (0.051)
Capitalization	0.0104 (0.139)	0.0035 (0.620)	0.0043 (0.396)	0.0250*** (0.003)	0.0060 (0.423)	0.0009 (0.823)	0.0027 (0.401)	0.0011 (0.631)	0.0173*** (0.003)	0.0099** (0.046)
Tangibles	0.6817* (0.098)	-0.0577 (0.806)	-0.0117 (0.954)	-0.2495 (0.558)	0.5949 (0.226)	-0.4663*** (0.005)	-0.2693** (0.022)	-0.1602** (0.034)	-0.1745 (0.360)	-0.1838* (0.094)
Financial Assets	0.0416 (0.688)	0.0182 (0.850)	0.0303 (0.704)	-0.1627 (0.260)	0.0804 (0.441)	0.1652** (0.050)	0.1119*** (0.008)	0.0696** (0.020)	0.1929* (0.056)	0.0412 (0.382)
Lending	-0.0037 (0.980)	0.1589 (0.135)	-0.0008 (0.994)	0.0184 (0.916)	0.1490 (0.274)	0.3014*** (0.003)	0.2250*** (0.008)	0.1385*** (0.003)	0.0454 (0.641)	0.0758 (0.116)
Ext. Services	0.7988*** (0.000)	0.4904*** (0.002)	0.4551*** (0.002)	-0.3381* (0.073)	0.6606*** (0.000)	0.2547 (0.135)	0.5494*** (0.000)	0.3050*** (0.000)	0.0453 (0.787)	0.4366*** (0.005)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Macro Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	185	185	185	146	146	313	313	313	232	232
Nr. of Fintechs	56	56	56	48	48	105	105	105	84	84
R2	0.9220	0.9498	0.9597	0.9405	0.9517	0.9370	0.9728	0.9788	0.9463	0.9589
R2 (adjusted)	0.8804	0.9231	0.9382	0.9031	0.9214	0.9013	0.9573	0.9667	0.9107	0.9318

5. Conclusion

The topic of resilience of regional and national economies in the European Union has gained importance in recent years, especially during the COVID-19 pandemic and the current War in Ukraine. This paper provides insights into the drivers of the success of the Fintech sector in Emerging Europe by analyzing the performance of 128 Bulgarian Fintech companies in the period 2000-2021.

Our results show that bigger and better capitalized fintech companies that rely less on tangible assets and outsource non-core activities tend to have higher operating income and profits. This also has real-economy implications as such companies are also more active on the labor market. Also, a higher country unemployment rate tends to decrease salaries, which helps companies to hire more employees. Interestingly, the overall results are driven by the post-Referendum period of 2016-2019. These empirical results corroborate the accounts of managers on how they deal with the crisis, expressed in private talks. They also show how the Fintech sector in Emerging Europe has managed to take advantage of Brexit in the turbulent time for EU after the Referendum.

Our findings have important management and policy implications. Fintech firms appear to use own funding efficiently and effectively, which may point towards effective use of VC and angel investor expertise that is not necessarily available through non-equity funding, such as loans or corporate bonds. Fintech firms are also very efficient in utilizing external services to foster their performance and growth. In terms of government policies on the labor market, the growth of the Fintech sector offers ample employment opportunities, which warrants further liberalization of the labor market and more active efforts in attracting foreign talent. It also provides support for the growing interactions between the fintech sector and Academia for training and re-training of current and prospective employees.

References

- Berg, T., Saunders, A., Schäfer, L., Steffen, S., 2016. 'Brexit' and the contraction of syndicated lending. Working Paper.
- Bircan, C. and De Haas, R., 2020, 'The limits of lending? Banks and technology adoption across Russia', *Review of Financial Studies* 33(2), 536–609.
- BFA, 2021, Annual Fintech Report 2021, Bulgarian Fintech Association, Available at: <https://fintechbulgaria.org/annual-fintech-report-2021-is-here-download-it-now/>
- BFA, 2022, BFA Strategy 2022 - Public discussion, Available at: https://docs.google.com/forms/d/e/1FAIpQLSe0J925xBkmhOjaoJ9PyBzllhl_91LZ0cbbLP7Qm7cvRpsA7w/viewform
- Borica, 2009, 'History of Bank Service Ltd. 1968-2009', Borica Ltd, Available at: <https://www.borica.bg/about/istoriya>.
- Borica, 2022, 'History of Borica Ltd.', Borica Ltd, Available at: <https://www.borica.bg/about/istoriya>.
- Born, B., Müller, G., Schularick, M., Sedlacek, P., 2017. The economic consequences of the Brexit vote. Tech. rep., Cesifo Working Paper.
- Boschma, R., 2015, 'Towards an evolutionary perspective on regional resilience', *Regional Studies*, 49(5): 733–751.
- Breinlich, H., Leromain, E., Novy, D., Sampson, T., Usman, A., 2018, 'The economic effects of Brexit: Evidence from the stock market', *Fiscal Studies* 39 (4), 581–623.
- CCAF, WB and WEF, 2020, The Global Covid-19 FinTech Market Rapid Assessment Report , Cambridge Centre for Alternative Finance, World Bank and World Economic Forum (2020); Available at https://www3.weforum.org/docs/WEF_The_Global_Covid19_FinTech_Market_Rapid_Assessment_Study_2020.pdf
- Christopherson, S., Michie, J., and Tyler, P., 2010, 'Regional resilience: theoretical and empirical perspectives', *Cambridge Journal of Regions, Economy and Society*, 3(1): 3–10.
- Crespo, J., Suire, R., and Vicente, J., 2014, 'Lock-in or lock-out? How structural properties of knowledge networks affect regional resilience', *Journal of Economic Geography*, 14(1): 199–219.
- Datecs, 2022, 'History of Datecs', Datecs Ltd; Available at: <https://www.datecs.bg/bg/about>
- DinersClub BG, 2022, 'History of Diners Club Bulgaria', Diners Club JSC; Available at: <https://www.diners.bg/bg/page/25/za-nas>

Dimitrova, M., 2008, The Golden Age of Bulgarian Electronics, Publishing House 'Trud', Sofia, Bulgarian. In Bulgarian Available at: <https://books.google.bg/books?id=jqJ6OcqI0XIC&printsec=frontcover&hl=bg#v=onepage&q&f=false>

Euractiv, 2021, UK fintechs seek 'cure for Brexit' in Lithuania, February 21, 2021, available at: <https://www.euractiv.com/section/uk-europe/news/uk-fintechs-seek-cure-for-brexit-in-lithuania/>.

Grant, K.A., Croteau, M. and Aziz, O., 2019, The Survival Rate of Startups Funded by Angel Investors. I-INC WHITE PAPER SERIES: MAR, 2019, pp.1-21.

Holling, C., 2010, The Resilience of Terrestrial Ecosystems, in L.H. Gunderson, C.R. Allen, and C.S. Holling (eds) Foundations of Ecological Resilience, Washington, DC: Island Press, 67–119.

Kierzenkowski, R., Pain, N., Rusticelli, E., Zwart, S., 2016, The economic consequences of Brexit. OECD Economic Policy Papers (16).

MinFin, 2021, National Strategy for Financial Literacy and its Action Plan (2021-2025), Ministry of Finance of Bulgaria, available at <https://www.minfin.bg/en/1491>.

Penev, G. and Radev, D., 2022, Digital Finance Cluster in Bulgaria, Working Paper, Faculty of Economics and Business Administration, Sofia University, available at: <http://dx.doi.org/10.13140/RG.2.2.11008.10249>

Pinto, H., and Esquinas, M., 2013, Exploring Knowledge-Transfer Dynamics in a South European region: Breadth, Intensity and Informality of University– Industry Interactions in Andalusia, in T. Baycan, and R. Stough (eds) Knowledge Commercialization and Valorization, Cheltenham, UK and Northampton, MA, USA: Edward Elgar Publishing, 209–237.

Pinto, H., Esquinas M.F., and Uyarra, E., 2015, Universities and KIBS as sources of knowledge for innovative firms in peripheral regions, *Regional Studies*, 49(11): 1873–1891.

Radev, D., and Waibel, M., 2022, Vox Populi, Vox Dei? The effect of Brexit on banks and the real economy, Working paper, FEBA at Sofia University and Stockholm School of Economics.

Schiereck, D., Kiesel, F., Kolaric, S., 2016, 'Brexit:(not) another Lehman moment for banks?' *Finance Research Letters* 19, 291–297.

Simmie, J., and Martin, R., 2010, 'The economic resilience of regions: towards an evolutionary approach', *Cambridge Journal of Regions, Economy and Society*, 3: 27–43.