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Brexit and the fintech revolution in Europe: lessons from the Bulgarian digital finance sector

Brexit and the
fintech
revolution in
Europe

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Abstract

Purpose – This paper aims to investigate the drivers of the resilience of the fintech sector in emerging Europe (EU) by analyzing the performance of 128 Bulgarian fintech companies in the period around the Referendum for Brexit in 2016. The Referendum was followed by a rapid growth of the Bulgarian fintech sector at a moment when venture capital funding was limited, which challenged firms to improve their fundamentals.

Design/methodology/approach – This empirical paper uses descriptive and panel data analysis based on the firm balance sheet and income statement data at the annual level.

Findings – The results show that larger and better-capitalized firms, which outsource their non-core activities and focus on their main competitive strengths, tend to have higher operating income and profit. The authors also find positive real-economy effects as these companies hire more actively to maintain growth. The results are primarily driven by the post-Brexit period of 2016–2019 when the authors find a tighter link between performance and firm fundamentals. These results have important managerial and policy implications and provide interesting directions for future research.

Practical implications – The findings have important management and policy implications. The authors argue that the flexibility of the Bulgarian fintech cluster, including the practice of Bulgarian fintech startups to outsource non-core activities; the readiness of universities to open new master programs to address firm demand for skilled labor and the startup-friendly environment in the main cluster hotspot, Sofia, has contributed to the resilience of the sector and can explain the drivers behind our findings. Fintech firms are very efficient in utilizing external services to foster their performance and growth, which may suggest that public policies that provide financial support for cloud services and outsourcing for startups during downturns or crises may improve economic growth and may have positive externalities for the supporting sectors that provide these services.

Originality/value – This paper fulfills an identified need to study the drivers of Fintech performance to identify best practices for managerial actions during economic or political crises, as well as government policy recommendations. To the best of the authors knowledge, this is one of the first empirical academic studies that examine the impact of Brexit on the European Fintech sector and real economy. The identified managerial strategies for ensuring regional resilience to economic crises and political shocks can be applied in various settings within and outside the EU.

Keywords Resilience, Emerging markets, Startups, Brexit, Fintech, Regional clusters

Paper type Research paper



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

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the European and global economies. However, Brexit also presented opportunities for digital natives in the EU, and especially in Emerging Europe (EE). One of the sectors that managed to take advantage of the split is the sector of financial technologies, which saw exponential growth since 2016, partly driven by an exodus of fintech companies and talent from London to EE (see, e.g. [Beall, 2018](#); [Euractiv, 2021](#); [England, 2021](#)). This transition occurred at a moment of growing maturity of business models and practices driven by a trend of higher selectivity of venture capitalists to distribute their limited funds across an exponentially growing demand for funding ([BVCA, 2022](#)). In this paper, we are interested in whether the rapidly increasing number of fintech firms in EE after the Referendum during a period of limited VC funding has affected the impact of fundamental firm characteristics on key performance financial indicators and indicators relevant to the real economy. 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 the EU are. This paper aims at contributing to bridging that gap and identifying successful business approaches that are replicable in diverse settings.

To answer the question whether the Referendum and the increased competition in an environment of limited VC funding has led to an improved alignment of firm performance with firm fundamentals, we analyze panel data for 128 Bulgarian fintech companies over the period 2000–2021. The sample comprises about 95% of the Bulgarian companies that comply with the definition of a “fintech” by the World Bank (see [CCAF *et al.*, 2020](#)) [1]. Due to the small internal market, 70% 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 fintech companies in small, open economies competing on global markets.

Our results show that 1) larger and more capitalized firms that 2) do not overinvest in tangible assets but 3) take advantage of their core expertise and outsource their noncore activities typically 4) have larger profits and operating income and 5) hire personnel more actively. The results are driven by the post-Referendum period and indicate a higher correlation of firm performance with financial health and solid business models. Our findings indicate that Brexit does not only foster the financial development and productivity in Bulgaria through an increased alignment of fintech firm performance with firm fundamentals but also has positive real economy effects through the labor market.

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 EE. Third, we contribute to the literature on the driving forces of startup performance. Fourth, we contribute to the general corporate finance literature by revealing stronger alignment of firm performance with fundamentals, particularly in the context of venture capital funding. Finally, based on our results, we derive policy recommendations to support regional resilience.

We structure the analysis as follows. In the next section, we discuss the conceptual framework of the study and the related literature. In Section 3, we present institutional details about the digital finance sector in Bulgaria. Section 4 presents our empirical model and identification strategy as well as our data, variables and descriptive statistics. Section 5 contains our empirical findings, extensions and robustness checks. Section 6 summarizes the paper and outlines managerial and public policy recommendations.

2. Conceptual framework and related literature

In this section, we present the conceptual framework for our analysis of how Bulgarian fintech companies have responded to Brexit. In our study, we interpret Brexit as a positive event for the fintech sector in Central and Eastern Europe as it is followed by an increase in the number of fintech startups in the region. This interpretation is at a stark contrast with the perceived overall negative political and economic effects of Brexit in Europe (see, [Berg et al., 2021](#)) and is inspired by the seminal paper by [Khwaja and Mian \(2008\)](#). The authors investigate the effect of unexpected nuclear tests in Pakistan in early 1998 on the lending behavior of Pakistani banks. Anticipating a negative international reaction to the nuclear tests, the Pakistani Government imposed capital controls and tried to prevent withdrawal of foreign-denominated bank deposits by legislating withdrawals only in domestic currency at a very unfavorable exchange rate. Pakistani depositors decided to withdraw their savings anyway and to deposit them at other banks, including other banks in Pakistan. This led to *negative* bank-run-like shocks to some banks, and *positive* “windfall” to other banks. [Khwaja and Mian \(2008\)](#) used these circumstances to investigate how the shift of deposits due to the unexpected nuclear tests affects the real economy through bank lending. We apply the same idea to analyze the consequences of the heightened competition after Brexit in an environment of limited funding opportunities on firm performance and hiring activity.

The main motivation and contribution of our paper relates to general asset pricing and corporate finance literature, which predicts a better alignment of firm performance with fundamentals in times of increased competition for funding. Young companies have not gained reputation yet and cannot access external debt markets, and therefore, must rely on funding from venture capitalists and angel investors (see, e.g. [Heirman and Clarysse, 2005](#)). Furthermore, the literature finds that competition improves firm performance in crises times (see, e.g. Fosu, 2013; [Félix and Maggi, 2019](#); [Abbas and Mubeen, 2022](#)). We also find evidence that startups mitigate the “free cash flow problem” by investing or lending unused funds. [Jensen \(1986\)](#) and [Fos \(2017\)](#) argued that the existence of large amounts of cash on a company’s balance sheet causes incentives problems between managers and the providers of funding.

Our paper speaks to several other strands of literature. First, we relate to the research 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](#)). The theory and evidence suggest that small and medium-sized 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 et al., 2015](#)). We argue that the flexibility of the Bulgarian fintech sector, including the practice of Bulgarian fintech startups to outsource noncore activities has contributed to the resilience of the sector. We also expand the literature on resilience and innovation by identifying firm features that can help regional clusters withstand not only economic, but also *political* shocks, such as Brexit.

Second, we contribute to the literature on the driving forces of startup performance. [Chhaochharia and Grinstein \(2007\)](#) and [Hoang et al. \(2022\)](#) found that the larger the startup company, the more business opportunities it has and the more products it can offer to its customers. [Heirman and Clarysse \(2005\)](#) found that the capitalization of a startup company reflects the stability of the enterprise and the amount of funding it attracts. [Vanacker et al. \(2011\)](#) found that firms that do not invest in property and

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outsource services manage to create more value despite their limited resources. We confirm these prior findings and show that using external services improves performance as it allows Bulgarian fintechs to focus on their core services and unique value propositions.

Finally, we relate to the literature examining the economic consequences of Brexit and the broader literature on the real effects of economic shocks. While the impact of the Brexit decision on the British economy and on stock prices of British firms is well documented (see, e.g. [Dhingra et al., 2017](#); [Kierzenkowski et al., 2016](#); [Born et al., 2017](#)), less is known about the exact channels through which it affects financial institutions in the EU and in the CEE region [2]. 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. Aside from the evidence for positive externalities of Brexit on firm performance, we find positive effects on the Bulgarian real economy through the labor market.

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3. Institutional details

3.1 The evolution of the FinTech landscape in Bulgaria

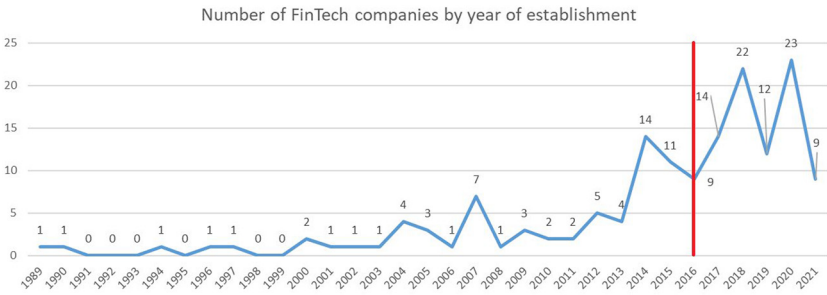
With the restructuring of the economy in Bulgaria starting in late 1989 and early 1990 and the switch from a planned economy to a market economy, the first privately-owned companies that applied state-of-the-art financial technologies appeared. Bank service JSC (later Borica), founded in 1989, was the first company to implement computing technologies in finance. The company was owned by all Bulgarian banks at that time, with the main shareholder the Bulgarian National Bank ([Borica, 2022](#)). The history of digital finance in Bulgaria continued with the founding of the producer of point-of-sale terminals Datecs in 1990 ([Datecs, 2022](#)) and Diners Club Bulgaria JSC in 1996 ([Diners Club BG, 2022](#)).

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

F1

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 SMEs with less than €50m turnover and 250 employees ([BFA, 2021](#), p. 18). 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 the segment of payments ([Radev and Penev, 2024](#)).

Figure 1. Number of Fintech companies in Bulgaria by year of establishment. The red vertical line marks the year of the Referendum for Brexit, 2016



Source: Bulgarian Fintech Association (BFA, 2021) and Radev and Penev (2024)

The online supplemental data contains information about all key players in the Quadruple Helix of Innovation of the digital finance cluster in Bulgaria.

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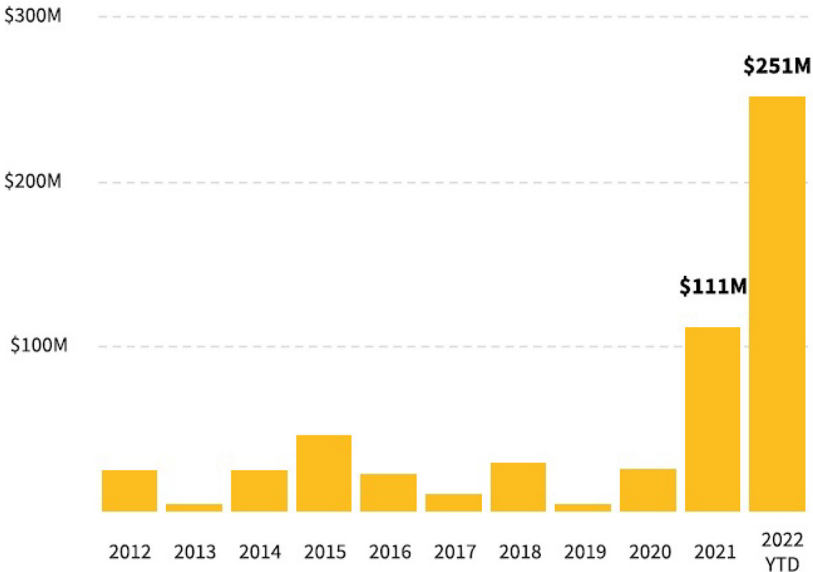
3.2 *Brexit and the evolution of Bulgarian venture capital funding*

In [Figure 1](#) above, we observe the largest spike in the number of fintech companies in the years after the Brexit referendum in 2016 (marked by the red vertical line), when 71 new Fintech companies were established, 23 of which being foreign direct investments. These included branches of some of the largest global fintechs such as the UK-based Tide and OpenPayd, as well as Crypto.com, Bunq, etc. ([BFA, 2021](#), p. 23). The slowdown in 2021 reflected the uncertainty around the COVID-19 pandemic.

F2

At the same time, the availability of venture capital in Bulgaria in the period before 2021 has been limited: on average, about \$20m for the period between 2012 and 2020, against an average GDP of about \$55bn for the period [\[3\]](#) (i.e. about 0.03% of Bulgarian annual GDP [\[4\]](#) against 0.20% in Latvia and France over the same period [\[5\]](#)). In [Figure 2](#), we notice that the funding provided to the whole Bulgarian industry (i.e. not only to the fintech sector) saw a decline immediately after the Referendum. Therefore, the rising number of Bulgarian fintech companies had a smaller amount of funding to compete for, which inevitably increased the selectivity of venture fund managers. This naturally leads them to demand stronger fundamentals to grant funding [\[6\]](#).

Considering these data and the features of the digital finance cluster outlined in the online supplemental data, we can conclude that the post-Referendum period was marked by a growing number of fintech companies, which faced a low level of funding opportunities, but a favorable business environment, educated work force and a growing demand for alternative financial products. This environment is the setup for our empirical study in the following sections.



Source: Bulgarian Private Equity and Venture Capital Association (BVCA, 2022)

Figure 2.
Venture Capital
Investments in
Bulgaria in the period
2012–2022

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4. Data, empirical model and descriptive statistics

4.1 Dataset and empirical model

To construct our data set, we start with annual firm balance sheet and income statement data for the period 2000–2021 from Ciela Norma [7]. 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 data set comprises 679 annual observations. In our baseline setup, we investigate how these balance sheet characteristics of Fintech companies and macroeconomic factors affect key corporate performance indicators. Later on, we split the sample into pre- and post-Brexit-Referendum subsamples.

To this end, we estimate variations of the following fixed-effects panel data model:

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

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; $MacroVariables_{kt}$ is a vector of macroeconomic variables, related to the Bulgarian economy at time t ; γ_i is a firm fixed effect for fintech firm i , which controls for any time-invariant factors at the firm level, including geographic proximity. Table A1 in the online supplemental data presents the dependent and independent variables used in our analysis, along with their definitions.

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. The online supplemental data contains more details about our identification strategy.

4.2 Variable choice

4.2.1 Firm-level variables

4.2.1.1 Dependent variables. We chose the dependent variables to gauge the effect of fundamentals before and after Brexit on important *key firm performance indicators* such as operating income and profits (see, e.g. Opler and Titman, 1994; Agrawal, 2013); and *indicators, related to the real economy*, such as employment, proxied by personnel costs and personnel number (see, e.g. Card and Krueger, 1994). Our expectation is that post-Brexit, the relationship of firm fundamentals with these financial and real economy indicators will be stronger due to the higher level of competition for the limited amount of funds, which forces firms to focus on fundamentals-driven performance as venture capitalists are increasingly scrutinizing the project proposals for funding.

4.2.1.2 Independent firm-level variables. Our independent variables serve to test our hypotheses and to reduce the omitted variable bias. Relating to our main hypotheses, we expect that due to the higher competition for funding after Brexit, these fundamental characteristics have a stronger statistical link to economic performance and hiring policy.

Size. The size of the company is a proxy for its market share and maturity (see Chhaochharia and Grinstein, 2007; Hoang *et al.*, 2022). It reflects the traction (i.e. the impetus) that the business has managed to gain. The larger the fintech company, the more business opportunities it has and the more products it can offer to its customers.

Capitalization. The capitalization of the company reflects the stability of the enterprise and the amount of funding it is able to attract. Young companies have not gained a reputation yet and therefore, they do not have access to the external debt markets and must

rely on a number of funding rounds with venture capitalists and angel investors (see, e.g. [Heirman and Clarysse, 2005](#)). We expect that the more capitalized a firm is, the higher the performance indicators and the attracted labor force.

Tangible assets. The level of the tangible assets in a firm's balance sheet reflects the endowment of the labor force with traditional capital: office spaces, computer hardware, etc. [8] Because fintech companies are part of the technological sector, where the productivity is scaled up using (external) cloud services, we expect this indicator to have an insignificant or negative coefficient (see [Coleman et al., 2016](#)). We control for cloud services with the variable "Reliance on external services" below.

Financial assets and Lending. Financial assets capture the ability of fintech companies to identify opportunities to invest their free cash flows. The existence of large amounts of cash on a company's balance sheet are considered an incentives problem in corporate finance literature (see, e.g. [Jensen, 1986](#); [Fos, 2017](#)). Therefore, we expect the larger the financial investments, the lower these incentives problems and the higher the performance indicators [9]. Lending is another form of tying in of free cash into more profitable interest-bearing instruments. Analogously to the effect of investments in financial assets, we expect a positive effect of lending on performance and hiring.

Reliance on external services. Fintech companies rely on external services to scale their business, instead of tying in large amounts of capital to develop and test these services themselves (see, e.g. [Baker and Nelson, 2005](#); [Vanacker et al., 2011](#)). [Vanacker et al. \(2011\)](#) found that startup firms that do not invest in property and outsource services manage to create more value despite their limited resources. Using external services allows fintechs to focus on their core business and unique value propositions. We expect this variable to have a strong positive effect on performance and hiring.

4.2.2 Macroeconomic variables. Our macroeconomic variables capture the economic conditions in Bulgaria during the sample period. To this end, we use three variables to capture macroeconomic conditions:

- (1) *Annual GDP Growth in Bulgaria in the sample period.* This variable reflects the overall health of the Bulgarian economy, as well as its potential growth opportunities (see [Peek and Rosengren, 1997](#); [Radev, 2022](#)). We expect that the higher the annual growth, the higher the level of the coefficients of the performance indicators in our regression.
- (2) *Annual Unemployment.* This is another indicator for the health of the economy (see [Peek and Rosengren, 2017](#); [Barth and Radev, 2022](#); [Radev, 2021](#)), but it also reflects the ease with which firms manage to hire personnel. We expect that it has negative correlation with personnel costs and positive correlation with hired personnel.
- (3) *Annual Inflation.* This indicator proxies for the turnover of goods and services in the economy (see [Barth and Radev, 2022](#)), and we expect it to be positively correlated with our performance indicators.

Table A4 in the online supplemental data presents the pairwise correlations between our main control variables. There are no obvious signs of multicollinearity issues.

4.3 Descriptive statistics

Tables 2 and 3 in the online supplemental data 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. The largest company in our sample is iCard AD, with total

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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, 1,295 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% to 80%. Throughout the period, which also includes the global financial crisis, the Bulgarian economy has remained relatively stable, with an average GDP growth of 1.6%, average inflation of 1.7% and average unemployment at 7% of the work force. In Table A3, we notice that the period after the Referendum in 2016 has much more favorable macroeconomic conditions, with an average GDP growth of 3.2% and average unemployment of 5.8%. We also observe an increase in average operating income average profit by about 25% after the Referendum. This is coupled with an increase in the use of external services by over 50%. We notice a drop in average personnel number after the Referendum. This is driven by the influx of new startups during the period which nearly doubles our firm sample [10].

Overall, we notice an increase in the unconditional averages of all key performance indicators after the Brexit referendum. Our remaining analysis attempts to disentangle whether the influence of fundamental firm characteristics has changed after the Referendum and whether these changes comply with our theoretical predictions.

5. Empirical results

5.1 Baseline results

Table 1 presents our baseline results. Columns (1) and (2) reflect 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. As predicted, the more the companies rely on external services, the larger the operating income. This could be explained by efficient outsourcing of noncore activities and focusing on the main operations where Fintechs have competitive advantages. 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. Intuitively, a higher 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. Because 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 toward 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.

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	Operating income (1)	Operating income (2)	Personnel costs (3)	Personnel costs (4)	Personnel number (5)	Personnel number (6)	Profit (7)	Operating income (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	0.1033** (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)	0.1546*** (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)	0.5846*** (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
R ²	0.8853	0.8878	0.9356	0.9376	0.9517	0.9530	0.9114	0.9117
R ² (adjusted)	0.8573	0.8596	0.9199	0.9219	0.9399	0.9412	0.8853	0.8858

Notes: All variables are defined in Table A1. in the online supplemental data. Statistical significance at the 1, 5 and 10% levels is denoted by ***, ** and * respectively

Source: Authors representation

Table 1.
Baseline results:
determinants of
performance of
Bulgarian Fintech
firms

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5.2 Effect of Brexit on fintech activity

In [Table 2](#), we split the sample before and after the Brexit Referendum. Columns (1) through (5) correspond to Columns (2), (4), (6), (7) and (8) in [Table 1](#), respectively, and cover the period before 2016. Columns (6) through (10) correspond to the same columns in [Table 1](#) for the period 2016–2019. We notice much lower association between company financials and their performance and hiring before Brexit. After 2016, fundamentals play a much larger role for company performance and the post-Referendum period is what drives the overall results in [Table 1](#). Capitalization and size play a significant role for profits and revenue, while investments in tangibles tend to reduce performance. Financial assets and lending increase the overall activity of the firm in terms of operational revenue, personnel costs and personnel number, but do not increase profits. What remains almost invariably statistically significant across both periods is the effect of outsourcing of non-core activities. These results support the findings of [Vanacker *et al.* \(2011\)](#), who identified external services as a major source of performance growth in startups.

Overall, we find support that the outcomes in [Table 1](#) in the previous section are 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 the higher focus on fundamentals after the referendum does not only foster the financial development in Bulgaria, but also contributes to the real economy through the labor market.

5.3 Robustness

While [Table 2](#) presents interesting post-Referendum developments, it does not fully answer the question whether something fundamentally has changed after 2016. The reason for that is the rapid increase in the sample of the firms due to the establishment of new startups, which may be structurally different to older companies. To investigate the specificities of our sample, we divide the fintech firms operating after the Referendum into firms founded prior to 2016 and firms founded from 2016 onwards. [Table A5](#) in the online supplemental data presents the results from this robustness check. Overall, we do not find many systematic differences between old and new fintech firms, and the lack of relationships between size and capitalization and performance for new firms is usual for early startups ([Heirman and Clarysse, 2005](#)). These results mean that the differences after 2016 have been driven by a structural difference *in the environment* and not by a difference in the type of business model companies use. We believe that the referendum for Brexit plays a large role in this structural change in the relationship between fundamental characteristics and performance. We find compelling evidence that the exponential growth in new firms competing for the limited financial resources in the region have improved the link between fundamentals and firm performance and hiring.

We perform several additional robustness tests. [Table A6](#) in the online supplemental data presents results with unemployment growth, instead of unemployment rate (Model (2) vs Model (1)), as well as profit to invested equity instead of profit level (Model (4) vs Model (3)) [[11](#)]. In either case results remain qualitatively similar. In Models (5–8), we split the samples of Models (3) and (4) to before and after the Referendum. We find that the link between financial assets and profitability is driven by the post-Referendum period. Furthermore, in unreported robustness checks, we lag the independent variables to address further the simultaneity in our model, but the reduction of the already limited number of years we focus on after the referendum yields imprecise estimates. Nevertheless, the point estimates are in the same direction as in our baseline specification. We furthermore use

	Operating income (1)	Personnel costs (2)	Before Brexit Referendum Personnel number (3)	Profit (4)	Operating income (5)
Size	-0.3664 (0.343)	0.2724 (0.158)	0.2255 (0.132)	1.6586*** (0.000)	-0.4561 (0.432)
Capitalization	0.0104 (0.139)	0.0035 (0.620)	0.0043 (0.396)	0.0250*** (0.003)	0.0060 (0.423)
Tangibles	0.6817* (0.098)	-0.0577 (0.806)	-0.0117 (0.954)	-0.2495 (0.558)	0.5949 (0.226)
Financial assets	0.0416 (0.688)	0.0182 (0.850)	0.0303 (0.704)	-0.1627 (0.260)	0.0804 (0.441)
Lending	-0.0037 (0.980)	0.1589 (0.135)	-0.0008 (0.994)	0.0184 (0.916)	0.1490 (0.274)
Ext. services	0.7988*** (0.000)	0.4904*** (0.002)	0.4551*** (0.002)	-0.3381* (0.073)	0.6606*** (0.000)
Firm FE	Yes	Yes	Yes	Yes	Yes
Macro variables	Yes	Yes	Yes	Yes	Yes
Observations	185	185	185	146	146
Nr. of Fintechs	56	56	56	48	48
R ²	0.9220	0.9498	0.9597	0.9405	0.9517
R ² (adjusted)	0.8804	0.9231	0.9382	0.9031	0.9214

Notes: All variables are defined in Table A1. in the online supplemental data. Statistical significance at the 1%, 5% and 10% levels is denoted by ***, **, and *, respectively

Source: Authors representation

(continued)

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Table 2.
Effect of Brexit on
the performance of
Bulgarian Fintech
firms

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Table 2.

	Operating income (6)	Personnel costs (7)	After Brexit referendum Personnel number (8)	Profit (9)	Operating income (10)
Size	0.5923** (0.015)	0.0545 (0.525)	-0.0196 (0.816)	0.7739*** (0.003)	0.6622* (0.051)
Capitalization	0.0009 (0.823)	0.0027 (0.401)	0.0011 (0.631)	0.0173*** (0.003)	0.0099** (0.046)
Tangibles	-0.4663*** (0.005)	-0.2693** (0.022)	-0.1602** (0.034)	-0.1745 (0.360)	-0.1838* (0.094)
Financial assets	0.1652** (0.050)	0.1119*** (0.008)	0.0696** (0.020)	0.1929* (0.056)	0.0412 (0.382)
Lending	0.3014*** (0.003)	0.2250*** (0.008)	0.1385*** (0.003)	0.0454 (0.641)	0.0758 (0.116)
Ext. services	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
Macro variables	Yes	Yes	Yes	Yes	Yes
Observations	313	313	313	232	232
Nr. of Fintechs	105	105	105	84	84
R ²	0.9370	0.9728	0.9788	0.9463	0.9589
R ² (adjusted)	0.9013	0.9573	0.9667	0.9107	0.9318

specifications without logarithmic transformation of the variables, and they yield qualitatively similar results.

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6. Conclusion

This paper analyzes the resilience of the digital finance sector in Bulgaria in the aftermath of external shocks such as Brexit. Examining data from 128 Bulgarian fintech companies between 2000 and 2021, the study aims to uncover how the fintech sector responds to intense competition and limited external funding.

Our results show that good fundamentals play a big role for economic performance of startups, especially after the Referendum in 2016. The heightened competition made investors more selective, pushing startups to display stronger performance and a robust business model to secure funding. Larger, well-capitalized fintech firms, relying less on tangible assets and outsourcing non-core activities, exhibited higher operating income and profits. These results underline the importance of solid business models and a focus on core activities, especially in challenging environments.

Our findings have important management and policy implications. They underscore the importance of public policies supporting startups through financial aid for cloud services and outsourcing, which can potentially spur economic growth and benefit the sectors offering these services. Ultimately, our findings hold implications for both policy-making and business strategies, advocating for strong fundamentals and a focus on core values for sustained growth in a competitive environment with limited funding opportunities.

The limitations of the study relate to the focus on quantitative analysis and to the limited data available for early startups. Future research can include a qualitative survey to validate the results in the paper and further refinement of the identification strategy by applying the empirical model to cross-country panel data. A larger sample would also allow for slicing the industry to a finer level and for identifying the most successful fintech business models.

AQ: 7 Our empirical setup can also be readily applied to other settings and startup sectors.

Notes

1. CCAF *et al.* (2020) define fintech as "...encompassing advances in technology and changes in business models that have the potential to transform the provision of financial services through the development of innovative instruments, channels and systems."
2. See, e.g., Radev and Waibel (2022) for one of the few examples of such studies.
3. Source of GDP data: Eurostat, <https://ec.europa.eu/eurostat/data/database>, visited on 20.10.2023.
4. Authors' own calculations.
5. Source: EBRD (2022).
6. Although there is no study on the topic of selectivity of Bulgarian venture capital funds, Gompers *et al.* (2021) provided insights into VC managers' thought processes in the last decade, which applies for the Bulgarian case as well.
7. Ciela Norma provides access to raw accounting data collected from the National Commercial Registry of the Republic of Bulgaria.
8. In Bulgaria, computer hardware is considered a long-term tangible asset for the purposes of accounting.
9. Unfortunately, Ciela Norma does not report cash holdings of fintech companies, which does not allow us to test for the free cash flow problem directly.

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10. In Table A5 of the online supplemental data, we split the sample into old and new firms and confirm that the main fundamental indicators affect the dynamics of hiring of both groups in a similar fashion.
11. To avoid simultaneity and mechanical relationship due to having equity on both sides of the equation, in Models (4), (6) and (8), we drop capitalization from the regression model.

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