

Factors influencing investment into PropTech and FinTech – only new rules or a new game?

Investment
factors for
PropTech and
FinTech

Andreas Joel Kassner

School of Engineering and Design, Technical University of Munich, Munich, Germany

Abstract

Purpose – Many studies have analysed the impact of various variables on the ability of companies to raise capital. While most of these studies are sector-agnostic, literature on the effects of macroeconomic variables on sectors that established over the last 20 years like property technology and financial technology, is scarce. This study aims to identify macroeconomic factors that influence the ability of both sectors and is extended by real estate variables.

Design/methodology/approach – The impact of macroeconomic and real estate related factors is analysed using multiple linear regression and quantile regression. The sample covers 338 observations for PropTech and 595 for FinTech across 18 European countries and 5 deal types between 2000–2001 with each observation representing the capital invested per year for each deal type and country.

Findings – Besides confirming a significant impact of macroeconomic variables on the amount of capital invested, this study finds that additionally the real estate transaction volume positively impacts PropTech while the real estate yield-bond-gap negatively impacts FinTech.

Practical implications – For PropTech and FinTech companies and their investors it is critical to understand the dynamic with macro variables and also the real estate industry. The direct connection identified in this paper is critical for a holistic understanding of the effects of measurable real estate variables on capital investments into both sectors.

Originality/value – The analysis fills the gap in the literature between variables affecting investment into firms and effects of the real estate industry on the investment activity into PropTech and FinTech.

Keywords PropTech, Company financing, Venture capital, Private equity, Quantile regression, FinTech

Paper type Research paper

Received 14 April 2023
Revised 3 September 2023
22 October 2023
18 November 2023
Accepted 15 February 2024

1. Introduction

Property technology companies, so called “PropTech’s” and financial technology companies, so called “FinTech’s”, are sub-industries of real estate and the financial industries, respectively. They emerged over the last decades and showed significant increasing growth since 2010 (PropTech) and 2007 (FinTech). Since research on both sub-industries is overall still scarce and mostly focused on much specialised areas, it offers a variety of areas for analysis (Kassner *et al.*, 2022; Mirchandani *et al.*, 2020).

Sufficient financing is critical for all companies, especially in the earlier stages of their lifetime (from founding until reaching self-sustaining revenues), only a few are in a position to avoid external financing (Parhankangas, 2007) and it is proven that especially venture capital (VC)-backed companies show significantly higher success rates than non-backed firms and higher growth rates than publicly traded companies (Hadley *et al.*, 2018; Chemmanur *et al.*, 2011; Zacharakis and Meyer, 1999; Davis and Stetson, 1985). This is particularly the case for firms with a core business focused on the development of technology and software since they



initially need considerable time to develop their product or service until reaching the go-to-market phase (Zarrouk *et al.*, 2021; Nigam *et al.*, 2020; Manigart *et al.*, 2002). Besides that, financing rounds are a basic indicator of the success of companies – large financings from respected or famous investors give strong signals to the market (other potential investors and customers) as they stand for a high level of trust in the organisation, product or services and management (Bottazzi *et al.*, 2016).

While the factors influencing the amount of capital raised by companies are generally based on individual needs and circumstances, macroeconomic factors have a significant impact on the ability to raise capital (Janeway *et al.*, 2021; Gompers and Lerner, 2006; Balboa and Martí Pellón, 2001; Gompers *et al.*, 1998). The majority of PropTech and FinTech firms are technology- or software-based, and due to the early age of this industry, many companies are falling into the above-described group of companies that require strong financing to succeed (Baum, 2017; Haddad and Hornuf, 2018; Baum *et al.*, 2020; Gauger and Pfnür, 2022). While there is comprehensive research on variables that impact the financing of companies, it is either focused on certain industries, geographies or completely industry-/geography agnostic. When it comes to the variables that are analysed, besides company-internal factors like product-market-fit, management skills and network, macroeconomic factors like the gross domestic product (GDP) growth, unemployment or inflation play a significant role (Taboga, 2022; Chang *et al.*, 2011). Since more than 20 years, a number of articles analysed the effect of various variables on investment into mostly young companies. For example, Fu *et al.* (2023) identify correlations between capital raised by PropTech and several indices in the US, Ning *et al.* (2015), analyse VC investments in the United States over 17 years from 1995 to 2011 and Groh and Wallmeroth (2016), use panel data from 2000 to 2013 covering VC funding in 118 countries. Further articles with highly relevant approaches covering data up to the early 2000s are Félix *et al.* (2013) who used panel data of 23 European countries for the period 1998–2003, Bonini and Alkan (2006) who used data from 16 countries during 1995–2002, Romain and van Pottelsberghe de la Potterie (2003) who used panel data from 16 countries that are part of the Organisation for Economic Co-operation and Development (OECD) during 1990–2000, Jeng and Wells (2000), who focused on the determinants and VC using a sample of 21 countries during 1986–1995 and Gompers *et al.* (1998), who analysed the determinants of VC fundraising in the US between 1972 and 1994. The latter two articles can be understood as the earliest analysing macroeconomic data in the context of VC fund raising [1].

To the best of the authors knowledge, there is no literature on the factors that influence the financing of PropTech and FinTech companies in Europe that takes into account not only macroeconomic factors but also variables that are used as a proxy for the customer market of one industry, in this case the real estate industry. To answer the questions which macroeconomic variables have an impact on the investment into PropTech and FinTech, the effects of GDP, unemployment, government bonds, inflation and 3 variables representing quantitative easing are analysed. Furthermore, real estate transaction volume and the gap between real estate yields and government bonds are added to the model as a proxy for the real estate industry. Both variables were selected as they represent a large sector which represents not only corporate investors but also an investment alternative overall. Additionally, the model includes the deal types VC, private equity (PE), mergers and acquisitions (M&A), initial public offerings (IPO) and debt accounting for the invested capital. As this study aims to identify relevant factors impacting both sub-industries, the models are performed using PropTech and FinTech as the dependent variable, respectively. By using quantile regression, potential non-linearities in the most important variables are identified. The data is structured as an unbalanced panel and is based on 5 deal types in 18 European countries over the period 2000–2021.

The following chapters are structured as follows. Section 2 reviews the literature on the relevance of external financing as well as different macroeconomic and real estate related

factors that have an impact on the capital raising activities of companies. In [section 3](#), the data and model are described, followed by the detailed results analysis in [section 4](#) and the conclusion in [section 5](#).

2. Literature review

2.1 Real estate variables, PropTech and FinTech

A core pillar of every due diligence performed on companies before investing is commercial due diligence. While it covers the existing and potential competition, sales channels and customers satisfactions, a key factor is the market in which the service or product is to be distributed. Within the market, a range of factors are important to be analysed in detail like a clear definition of the market in type of customer and geographical area, market size and segments as well as latest and forecasted trends which in sum lead to market potential and growth assumptions (Golis, 2010; Schefczyk, 2005; Camp, 2002). The before mentioned factors influence the willingness of the target customers to purchase the product or service, which cannot or only very limited be influenced by the investors (Teppo and Wustenhagen, 2006). When looking at the target market, segmentation can be done on many levels, from much specialised niches to sub-industries in certain countries up to a holistic and global approach, depending on the readiness and demand of the products or services (Camp, 2002). Focussing on PropTech as a vertical and not on specific technologies or services within this sub-sector, the target market is the whole real estate industry. To enable the analysis of this target market in a generalised and cross-country way, the definition of a proxy reflecting the market potential is required: While the real estate market is a mix of private and public companies with different business models (for example, investing directly with balance sheet money/Real Estate Investment Trusts (REITs), investment managers etc.), almost all participants in this market have a few variables in common – the first is real estate transaction volume, which is higher in growth and expansion phases and lower during the economic crisis; the second is the real estate yield, which reflects the return. The gap between real estate yields and government bonds reflects the overperformance of real estate investments compared to risk-free investments which can be used to compare the real estate industry with alternative investment opportunities, for example VC and private equity (PE) investments in PropTech or FinTech (Fisher *et al.*, 2004; Pyhrr *et al.*, 1999).

2.2 Types of external financing and its relevance

The literature covering factors impacting capital raising activities predominantly focuses on the VC universe or simply “small” or “innovative” companies or does not define the market segments at all (Cincera and Santos, 2015; Bonini and Alkan, 2006; Jeng and Wells, 2000). This paper includes all company stages using various deal types to provide a complete picture of the PropTech and FinTech market. These deal types are clusters of sub-deal types – we use the definitions from PitchBook Data, Inc. Which are: PE incl. i.a. buyouts, public-to-private, growth and expansion and platform creation, VC incl. i.e. seed, early and later stage, M&A, IPO and debt incl. bonds, convertible debt and any other type of credit (PitchBook Data, Inc, 2022). Out of these, debt is the financing type that is least used by especially young and technology-based companies. On the one hand, from the supply side, banks can be reluctant to provide loans at high levels of asymmetric information and without getting any collateral with measurable value. Some countries even prohibit banks from holding equity stakes in companies directly. On the other hand, for the demand side, given the uncertainty in future profits, young and technology-based companies are subjected to a higher probability of default if loans are used (Audretsch and Lehmann, 2004; Jeng and Wells, 2000). This is also consistent with our data sample, where only 2% of all PropTechs and 1% of all FinTechs raised debt.

2.3 Capital raising under macroeconomic conditions

The effect of various macroeconomic variables on capital raising has been analysed in the literature. The following chapter will summarise selected variables and their potential impact. It should be noted that the variables addressed in this chapter represent only a selected subset derived from relevant literature on company financing.

2.3.1 GDP growth. The overall health and growth of the economy can directly and significantly affect companies' fundraising capabilities. In phases of economic expansion (increasing GDP), offering business opportunities is high, leading to an increased demand for external financing. Besides that, higher consumer confidence and spending can increase the demand for goods and services (in the case of consumer-focused products), improving the financial performance of these companies and making them more attractive to investors. The increased opportunities to invest in companies combined with the increased availability of capital leads to a higher financing willingness from investors (Félix *et al.*, 2013). The GDP growth is a variable widely used to measure economic growth and the derived assumption for increased financing activity (Gompers *et al.*, 1998; Audretsch and Acs, 1994). However, mixed results are found in the literature. While in Jeng and Wells' (2000) article, GDP growth did not show any significance, Gompers *et al.* (1998) showed a significant positive effect. Based on these two analyses, a number of other articles analysed this variable and confirmed the significant positive effect (Cherif and Gazdar, 2011; Cumming and MacIntosh, 2006; Romain and van Pottelsberghe de la Potterie, 2003). In this paper, the GDP growth per country during 2000–2021 acts as the proxy for economic growth and is analysed in regards to its effect on PropTech and FinTech investment.

2.3.2 Unemployment. Several theories have to be taken into account in the context of the effect of unemployment on companies financing activities. On the one hand side, high unemployment rates might lead to a higher number of individuals being willing to either start their own ventures or join companies even with a salary cut (which equals a higher availability of workforce), leading to an increased demand for financing. At the same time, high unemployment rates can reduce consumer spending which can in turn negatively affect the revenues of companies and therefore limit companies' ability to secure financing (Groh and Wallmeroth, 2016; Audretsch and Acs, 1994). Furthermore, the availability of capital may be decreased in low employment environments since investors tend to limit new or follow-on investments considering uncertainty about the future. In contrast, during periods with low levels of unemployment, strong economic growth and increased demand for products and services from individuals and institutional clients will increase the demand for additional financing. The improved financial performance makes the investment more attractive to investors. (Konon *et al.*, 2018; Bernoth and Colavecchio, 2014; Meyer, 2006).

Given the differing results in the literature, we have no clear expectation of the effects of the unemployment rate on PropTechs and FinTechs but expect it to be significant.

2.3.3 Government bonds. The effect of government bond rates can generally be seen from two perspectives. On the one hand, as an entrepreneur seeking financing for their company, the attractiveness of private funding in the form of VC or PE increases when traditional financing opportunities like bank loans are more expensive. The cost of bank loans depends i.a. on the overall borrowing costs, so it will increase with rising bond rates. Therefore, a rise in government bond rates would likely lead to increased private financing demand (Bonini and Alkan, 2006; Gompers *et al.*, 1998). On the other hand, from the perspective of investors with a diversified portfolio, the opposite would be the case. Since government bond rates can be seen as an alternative investment opportunity to VC and PE, a higher bond rate makes government bonds more attractive (Janeway *et al.*, 2021; Bergstresser *et al.*, 2006). Additionally, government bonds offer an investment opportunity with low risk. Investors who try to limit their exposure to market volatility will tend to invest in government bonds. Since both perspectives need to be considered, we do not have a clear expectation of the effect of changing government bond rates on the amount invested into PropTech and FinTech.

2.3.4 Inflation rate. Literature investigating the influence of inflation rates on the amount of capital invested into companies remains relatively limited in comparison to the aforementioned variables. Nevertheless, the existing literature underscores a significant and positive relationship. For instance, [Bonini and Alkan \(2006\)](#) find that higher inflation rates increase capital investment in companies which is in contrast to their initial expectation but they do not find a clear explanation for this link. Furthermore, [Ning et al. \(2015\)](#) put forth the hypothesis that the inflation rate decreases the expected real returns of alternative investments, such as bonds. This, in turn, may reduce the attractiveness of lower-yield investment and consequently increases the attractiveness of VC and PE investments as higher yielding investment opportunities. Their findings show that a higher inflation rate not only increases the number of investments but also the volume of capital allocation in the VC sector. Based on these insights and the broader economic context, we assume a significant and positive relationship between the inflation rate and capital investment into PropTech and FinTech.

2.3.5 Quantitative easing. Quantitative easing describes the use of defined bond and asset purchase programs by central banks increasing the overall liquidity in the market with the goal to stimulate the growth of the economy ([Joyce et al., 2010](#); [Berry et al., 2009](#); [Blinder, 2010](#)). Following [De Santis \(2016\)](#), [Andrade et al. \(2016\)](#) and [Gambacorta et al. \(2014\)](#), the ratio of central bank assets to GDP can be used to measure the level of quantitative easing. The direct impact on the market liquidity can be measured by the money supply growth M1, M2 or M3 and represents the effect of quantitative easing ([Ning et al., 2019](#); [Chaitip et al., 2015](#)). While there is limited literature on the impact of quantitative easing on company financing, for example [Ning et al. \(2019\)](#) show that a high money supply to GDP ratio leads to more VC investments. Considering the economic background and literature, a positive effect of quantitative easing on capital raised by PropTech and FinTech companies is expected.

2.3.6 Foreign direct investment. Foreign direct investment (FDI), representing cross-border capital flows, has been extensively analysed in the company financing literature. These capital flows encompass investments by governments, companies and investment firms (including VC and PE in various forms, such as business expansion, M&A, as well as bond purchases ([Duce and España, 2003](#); [Moosa, 2002](#)). Given that FDI is a major source of capital alongside domestic investment, several papers have identified a positive impact ([Arif and Khan, 2019](#); [Munemo, 2017](#); [McAllister and Nanda, 2016](#)). Consequently, a significant positive effect of FDI on FinTech and PropTech fundraising is anticipated.

2.3.7 GDP spending on research and development. GDP spending on research and development (R&D) is characterised as the overall capital expenditure dedicated to R&D activities by companies, research institutions, universities and governments within a country. It includes funding from foreign countries but excludes investment for R&D activities abroad. Leading literature on this factor shows differing results. For example, [Iwasaki \(2013\)](#) and [Gompers et al. \(1998\)](#) prove significant positive effects on company financing activities, while [Bellavitis et al. \(2022\)](#) finds a negative impact and [Bonini and Alkan \(2006\)](#) do not identify significance. Accordingly, we have no clear expectation on the impact of this variable on the fund raising activities of FinTech and PropTech companies.

3. Data and methodology

3.1 Data

The data of this study is from the following sources: company data (capital invested into PropTech and FinTech) is from PitchBook Data, Inc., which is a comprehensive quantitative database and one of the most used platforms for private capital markets globally. Real estate related variables (real estate transaction volume, real estate yields) are from real capital analytics, a global data and analytics platform for real estate investing and transactions. Macroeconomic data comes from Oxford Economics. Data for money supply M1 and central

bank assets to GDP were collected from World Bank and Federal Reserve Bank of St. Louis. The data covers the period of 2000–2021 across 18 European countries which are: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Norway, Poland, Portugal, Spain, Sweden, Switzerland and the United Kingdom. For each country and year, data for capital invested into PropTech and FinTech companies (along with the number of companies that raised the capital) was collected, categorised by deal type, and expanded by macroeconomic variables resulting in an unbalanced panel.

For PropTech, with over 73%, VC has the largest share of all deal types measured by the number of companies that raised money, followed by M&A (11%), PE (10%), IPO (4%) and Debt (2%). When looking at the amount of capital invested into those companies, the ratio shifts significantly, with VC still being the largest deal type but with only 34%, followed by PE (24%), M&A (19%), Debt (13%) and IPOs (10%). Over the period of 2000–2021, a clear trend of the capital invested and the number of firms raising the capital is visible: until 2012, the amount of capital raised, and the number of companies kept stable at a low level, from 2013, significant growth can be seen (Figure 1).

The initial data set contained 1980 rows distributed over 18 countries, 5 deal types and 22 years. After the removal of missing values, the sample was reduced to 338 observations with complete data. Out of these, the average capital invested per year, country and deal type is c. Euro (EUR) 96 m, the maximum capital invested is c. EUR 2,745 m in the year 2021 in the United Kingdom. The real estate transaction volume showed an average of EUR 26.3 bn with a maximum of EUR 99.2 bn in Germany in 2021. Capital invested into PropTech shows the highest correlation with the company count (0.53), which is a natural result of the dependency of both variables; the second highest correlation of 0.34 is with real estate transaction volume. Furthermore, the lowest correlation of capital invested in PropTech is with the real estate yield-bond-gap (−0.08) and government bonds (−0.09). Further descriptive statistics for PropTech can be found in Table 1 below.

As an additional control, data for FinTech companies was collected for the same period, showing a similar distribution of deal types measured by number of companies that raised capital with VC having the largest share (74%), followed by PE (14%), M&A (13%), debt (1%) and IPO (1%). When looking into the capital raised by deal types, it becomes clear that FinTech is a more mature sector with M&A making up for 39%, followed by PE (38%), VC (10%), Debt (9%) and IPO (5%). The regression models were run with the same variables

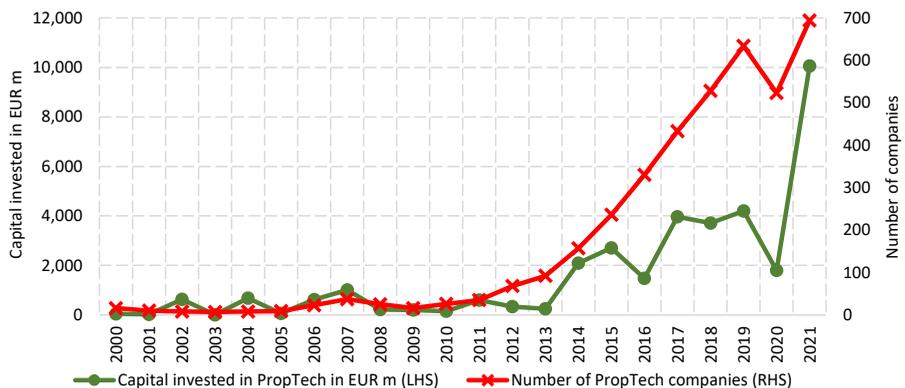


Figure 1. Capital invested in PropTech and number of firms

Source(s): Author’s own creation

Variable	Obs	Mean	Median	Std. dev	Min	Max
Capital invested EUR m	338	95.55	10.51	233.69	0.01	2745.53
Company count	338	10.10	4.00	21.57	1.00	180.00
Real estate transaction vol. EUR bn	338	26.32	13.18	26.93	0.42	99.15
Gross domestic product growth	338	3.43	3.42	4.09	-9.84	34.97
Inflation	338	1.49	1.51	1.16	-1.31	5.22
Unemployment	338	7.69	6.71	4.32	2.03	26.11
Government bonds	338	1.55	1.23	1.49	-0.80	9.21
Real estate yields	338	5.12	5.03	0.88	3.50	8.16
Real estate yield-bond-gap	338	3.57	3.69	1.01	-1.05	5.46
Central bank assets to GDP ratio	338	12.91	3.65	23.58	0.00	119.48
Money supply M1	338	9.15	8.47	7.65	-2.95	94.09
FDI EUR bn	338	39833.24	29484.12	29218.97	2223.29	147737.70
GDP Spending on R&D	338	9.15	8.47	7.65	-2.95	94.09

Correlation coefficients	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1) Capital invested EUR m	1.00												
(2) Company count	0.53	1.00											
(3) Real estate tr. vol. EUR bn	0.34	0.31	1.00										
(4) GDP growth	0.12	0.01	0.05	1.00									
(5) Inflation	0.12	0.04	0.15	0.33	1.00								
(6) Unemployment	-0.05	-0.12	-0.29	-0.16	-0.27	1.00							
(7) Government bonds	-0.09	-0.18	-0.06	0.00	0.25	0.27	1.00						
(8) Real estate yields	-0.08	-0.18	-0.21	-0.04	0.04	0.42	0.75	1.00					
(9) Real estate yield-bond-gap	0.06	0.12	-0.10	-0.04	-0.33	-0.03	-0.82	-0.23	1.00				
(10) Central bank assets to GDP	-0.07	-0.04	-0.23	-0.07	-0.02	0.09	-0.21	-0.04	0.27	1.00			
(11) Money supply M1	-0.04	0.01	-0.05	-0.08	-0.07	-0.07	-0.21	-0.11	0.21	0.02	1.00		
(12) GDP Spending on R&D	-0.16	-0.13	-0.23	-0.05	-0.08	-0.17	-0.28	-0.27	0.17	0.27	0.01	1.00	
(13) FDI EUR bn	0.24	0.20	0.49	0.21	0.12	-0.24	-0.05	-0.02	0.06	-0.11	-0.08	-0.43	1.00

Source(s): Author's own creation

Table 1.
Descriptive statistics
PropTech

except for the dummy variable covering the structural break of investment growth which can be identified in 2013 for PropTech (see Figure 1) and 2010 for FinTech (see Figure 2).

The data set, structured in the same way as for PropTech, contained 595 observations with complete data. With c. EUR 1,060 m, the average capital invested per year, country and deal type is over 11 times higher than for PropTech. While the highest correlation of capital invested in FinTech is with real estate transaction volume (0.29), the lowest is with unemployment (-0.10). Further descriptive statistics for FinTech can be found in Table 2 below.

3.2 Methodology

We use multiple linear regression to test if the capital invested into PropTech and FinTech (as log values in EUR m) is significantly predicted by the selected independent variables. The model is defined as follows:

$$\begin{aligned}
 CI_{i,t} = & \beta_1 + \beta_2 CC_{i,t} + \beta_3 RETR_{i,t} + \beta_4 GDP_{i,t} + \beta_5 INF_{i,t} + \beta_6 UE_{i,t} + \beta_7 GB_{i,t} + \beta_8 REY_{i,t} \\
 & + \beta_9 YBG_{i,t} + \beta_{10} M1_{i,t} + \beta_{11} CBA_{i,t} + \beta_{12} DT_{i,t} + \beta_{13} QE_{i,t} + \beta_{14} FDI_{i,t} + \beta_{15} R\&D_{i,t} \\
 & + \beta_{16} Year_{i,t} + \beta_{16} Country_{i,t} + \beta_{17} Aft2013/2010_{i,t} + \mu_{i,t}
 \end{aligned} \tag{1}$$

where $CI_{i,t}$ represents the dependent variable (capital invested as log values in EUR m), followed by the independent variables and the *iid*-distributed error term $\mu_{i,t}$. The model is based on our data designed as a matrix in which each row represents one data point.

Since the real estate transaction volume used as a proxy for the economic stage of the real estate sector reflects the profitability and, therefore the ability of the industry to actively invest in technology and innovation, we expect a significant positive effect on the capital invested in PropTech and no significant effect on FinTech. Furthermore, we expect that the GDP growth shows a significant positive effect as economic growth offers not only more investment opportunities but also a higher supply of available capital. For the real estate yield-bond-gap there is no clear expectation on the impact on both sub-industries.

To analyse the marginal effects of the real estate transaction volume and the real estate yield-bond-gap in different levels of the capital investment intensity, we deploy the quantile regression technique (Koenker and Bassett, 1978). This method allows to detect non-linearities within both variables separately.

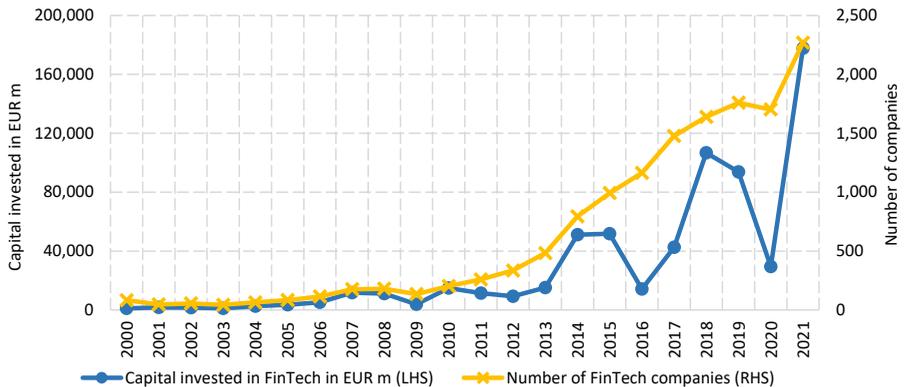


Figure 2. Capital invested in FinTech and number of firms

Source(s): Author's own creation

Variable	Obs	Mean	Median	Std. dev	Min	Max
Capital invested EUR m (FinTech)	595	1059.62	79.87	4570.06	0.01	66842.36
Company count (FinTech)	595	21.13	6.00	63.28	1.00	759.00
Real estate transaction vol. EUR bn	595	20.59	9.72	23.83	0.05	99.15
Gross domestic product growth	595	3.35	3.46	4.38	-9.84	34.97
Inflation	595	1.52	1.47	1.20	-1.69	5.22
Unemployment	595	7.44	6.74	3.67	2.03	26.11
Government bonds	595	1.99	1.64	1.73	-0.80	13.58
Real estate yields	595	5.34	5.28	0.95	3.50	8.69
Real estate yield-bond-gap	595	3.35	3.60	1.17	-5.09	5.83
Central bank assets to GDP ratio	595	10.70	1.41	22.45	0.00	119.48
Money supply M1	595	8.79	8.19	7.46	-4.03	94.09
FDI EUR bn	595	36792.55	26857.08	29580.03	2223.29	147737.70
GDP Spending on R&D	595	0.59	0.50	0.47	0.01	1.73

Correlation coefficients	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1) Capital invest. EUR m (FinTech)	1.00												
(2) Company count (FinTech)	0.18	1.00											
(3) Real estate tr. vol. EUR bn	0.29	0.32	1.00										
(4) GDP growth	0.06	0.00	0.06	1.00									
(6) Inflation	0.07	0.02	0.12	0.24	1.00								
(7) Unemployment	-0.10	-0.10	-0.26	-0.18	-0.19	1.00							
(8) Government bonds	-0.08	-0.14	-0.06	-0.10	0.25	0.29	1.00						
(9) Real estate yields	-0.08	-0.13	-0.23	-0.16	0.06	0.44	0.77	1.00					
(10) Real estate yield-bond-gap	0.06	0.11	-0.09	0.02	-0.32	-0.08	-0.85	-0.33	1.00				
(9) Central bank assets to GDP ratio	-0.06	-0.03	-0.17	0.01	-0.01	0.09	-0.22	-0.09	0.25	1.00			
(11) Money supply M1	-0.05	0.01	-0.01	-0.03	-0.09	-0.08	-0.19	-0.12	0.18	0.02	1.00		
(12) FDI EUR bn	-0.15	-0.16	-0.26	-0.08	-0.16	-0.14	-0.26	-0.25	0.19	0.21	-0.02	1.00	
(13) GDP Spending on R&D	0.23	0.23	0.49	0.22	0.10	-0.20	-0.11	-0.10	0.09	-0.03	-0.04	-0.44	1.00

Source(s): Author's own creation

Table 2.
Descriptive statistics
FinTech

Additionally, estimates of the quantile regression feature robustness against outliers which is helpful considering the standard deviations of our data set. The following equation is estimated to perform the quantile regression:

$$\begin{aligned}
 Q_{C_{i,t}}(\tau|X) = & \alpha_1^\tau + \alpha_2^\tau CC_{i,t} + \alpha_3^\tau RETR_{i,t} + \alpha_4^\tau GDP_{i,t} + \alpha_5^\tau INF_{i,t} + \alpha_6^\tau UE_{i,t} + \alpha_7^\tau GB_{i,t} \\
 & + \alpha_8^\tau REY_{i,t} + \alpha_9^\tau YBG_{i,t} + \alpha_{10}^\tau M1_{i,t} + \alpha_{11}^\tau CBA_{i,t} + \alpha_{12}^\tau DT_{i,t} + \alpha_{13}^\tau QE_{i,t} \\
 & + \alpha_{14}^\tau FDI_{i,t} + \alpha_{15}^\tau R\&D_{i,t} + \alpha_{15}^\tau Year_{i,t} + \alpha_{16}^\tau Country_{i,t} + \alpha_{17}^\tau Aft2013/2010_{i,t} \\
 & + \mu_{i,t}^\tau
 \end{aligned} \tag{2}$$

where $Q_{C_{i,t}}(\tau|X)$ reflects the τ -quantile of the capital invested and τ represents the [0.05; 0.10; ...; 0.90; 0.95] quantile, respectively. In line with [equation \(1\)](#) we expect a significant effect of the real estate transaction volume but assume that this effect is non-linear on different levels of investment intensity. For the real estate yield-bond-gap there is no clear expectation. The variables FDI and GDP Spending on R&D did show any significance in the models while decreasing adjusted R^2 and were therefore excluded in the further analysis.

4. Results

4.1 Baseline model

[Table 3](#) shows the results of the multiple linear regression for PropTech and FinTech. While Model (1) and (2) use PropTech as the dependent variable, Model (3) and (4) use FinTech. All models include macroeconomic and real estate variables as well as dummies to test for quantitative easing, countries and years. Model (2) and (4) additionally tests for differences after the year 2013 and 2010, respectively, to test if the variables show differing impact after significant growth in capital invested started and are in the following used as the final models. The parameters β are shown as ratios and indicate the effect of the variable on the capital that is invested into PropTech/FinTech companies if the independent variable is multiplied by the respective parameter when changing by one unit. While $\beta < 0$ indicates a decrease of the invested capital, $\beta > 0$ indicates increased investments.

The number of companies raising financing is significantly and positively influencing the amount of capital invested for PropTech and FinTech (0.027 and 0.005, respectively at $p < 10\%$) but due to the natural dependency between both, endogeneity is assumed. Furthermore, in line with our expectation and the literature, our results show that also the GDP growth is significantly and positively impacting the invested capital (PropTech: 0.072 at $p < 5\%$, FinTech: 0.107 at $p < 10\%$). In this analysis, the gap between the real estate yields and government bonds was used to integrate the real estate factor into the regression. The real estate yield-bond-gap does not show significance for PropTech. For Fintech, a significant negative impact of -0.253 at $p < 5\%$ is shown which indirectly confirms the results of [Janeway et al. \(2021\)](#) and [Bergstresser et al. \(2006\)](#) who showed a negative impact of government bond rates. No significance was found for the unemployment rate, inflation as well as money supply and central bank assets to GDP which were used to test for quantitative easing effects. Deal types show differences between PropTech and FinTech – while M&A and PE have significant positive effects on PropTech (0.826 and 0.775 at $p < 1\%$), IPO, M&A and VC have significant negative impacts on FinTech (-0.895 at $p < 5\%$, -0.593 at $p < 1\%$, -1.585 at $p < 10\%$). The most important results are the significant positive effect of the real estate transaction volume on PropTech (0.775 at $p < 5\%$) and the significant negative effect of the real estate yield-bond-gap on FinTech. To the best of the authors' knowledge, this is the first analysis shedding light on this effect. A possible explanation of this is that high levels of

Investment
factors for
PropTech and
FinTech

Dependent variable Observations Model	Capital invested in PropTech In EUR m (log) 338		Capital invested In FinTech in EUR m (log) 595		
	(1)	(2)	(3)	(4)	
Company count	0.027*** [0.006]	0.027*** [0.006]	0.005*** [0.001]	0.005*** [0.001]	
Real estate transaction volume (log)	0.641* [0.356]	0.775** [0.371]	-0.195 [0.192]	-0.192 [0.191]	
Gross domestic product growth	0.066** [0.033]	0.072** [0.033]	0.101*** [0.021]	0.107*** [0.021]	
Inflation	0.191 [0.130]	0.113 [0.143]	-0.072 [0.081]	-0.073 [0.080]	
Unemployment	0.012 [0.065]	0.026 [0.066]	-0.081* [0.043]	-0.044 [0.047]	
Real estate yield-bond-gap	-0.102 [0.170]	-0.080 [0.170]	-0.290*** [0.097]	-0.253** [0.099]	
Money supply M1	0.004 [0.016]	0.004 [0.016]	-0.008 [0.011]	-0.011 [0.011]	
Central bank assets to GDP	0.007 [0.022]	0.001 [0.022]	0.007 [0.015]	0.002 [0.015]	
Deal type	Initial public offering	1.032* [0.597]	0.985 [0.597]	-0.853** [0.380]	-0.895** [0.380]
	Mergers and acquisitions	0.861* [0.447]	0.826* [0.448]	-0.562* [0.332]	-0.593* [0.332]
	Private equity	0.811* [0.444]	0.775* [0.444]	0.271 [0.339]	0.242 [0.339]
	Venture capital	0.031 [0.448]	0.011 [0.448]	-1.574*** [0.342]	-1.585*** [0.341]
	R^2	0.441	0.444	0.552	0.554
Adjusted R^2	0.385	0.386	0.527	0.529	
Quantitative easing dummy	yes	yes	yes	yes	
Year dummy	yes	yes	yes	yes	
Country dummy	yes	yes	yes	yes	
Period after 2013 dummy	no	yes	no	no	
Period after 2010 dummy	no	no	no	yes	

Note(s): Dependent variable: Capital invested in PropTech (as log values in EUR m); Parameters in the first line is expressed as β ; The standard errors are in parenthesis “[]”; Statistical significance is expressed as “***” < 10% “**” < 5% and “*” < 1%. To test for the effect of extreme outliers, regression was also performed with winsorized data leading to no significant changes of the results; as a stability test, the generalised variance inflation factor following Fox and Monette (1992) was tested and showed no multicollinearity; testing for Granger-causality following Granger (1969) confirmed the one-way causal link between capital invested in PropTech and real estate transaction volume

Source(s): Author’s own creation

Table 3.
Regression results

real estate transaction volume indicate an active and profitable real estate market leading to disposable capital which can be used to invest in the transformation of mostly traditionally managed real estate companies. An explanation for impact of the real estate yield-bond-gap on FinTech could be that the majority of FinTech investors have diversified portfolios and allocate less capital in riskier asset classes like VC and PE when less risky alternatives like real estate exist.

Comparing the effects for PropTech before and after 2013, only the deal type IPO becomes insignificant after 2013 while for FinTech the negative impact of unemployment becomes insignificant after 2010. For the further analysis, model (2) and (4) are used.

4.2 Quantile regression

As described in chapter 3.2, quantile regression is used to analyse a potential non-linear effect of the real estate transactions volume and the real estate yield-bond-gap on PropTech and FinTech.

Since this the real estate transaction volume is insignificant for FinTech and the yield-bond-gap for PropTech, the quantile regressions are done accordingly. Figures 3 and 4 show the results of equation (2) which are estimated using quantile-levels from 0.05 to 0.95 in 0.05 steps representing different levels of investment into PropTech and FinTech, respectively. The green (blue) line represents the coefficient while the grey lines symbolise the confidence intervals given a particular quantile level τ .

The coefficients provide evidence for a non-linear effect of the real estate transaction volume on the capital invested in PropTech. While the effect is positive in all quantiles, in the first two quantiles (0.05, 0.10) as well as in quantiles higher than 0.70 the effect is lower compared to quantiles 0.15 to 0.70 in which it is around 1.00.

A possible explanation for this non-linear effect could lie in the fact that real estate companies as strategic investors tend to limit investments in technology in times of low profitability, while they increase the investment in growth phases but only up to a certain level at which all companies willing to invest in PropTech reach a threshold of investment activity in PropTech compared to their core business. While the decreasing effect in the higher quantiles could possibly be explained by an extension of investment activities of real estate companies into areas not related to PropTech (for example FinTech) when investment

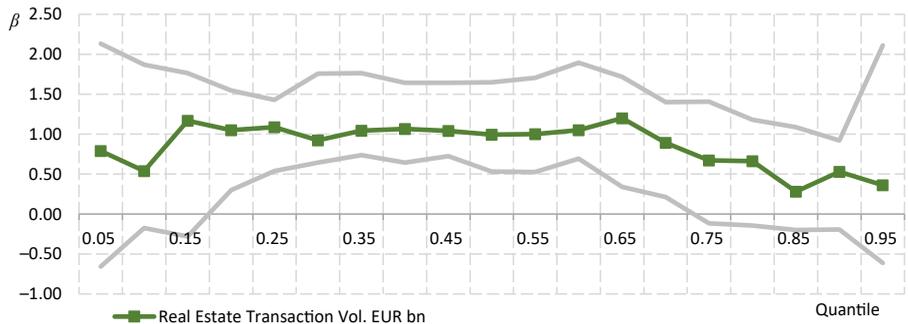


Figure 3. Non-linear effect of real estate transaction volume on investment in PropTech

Source(s): Author's own creation

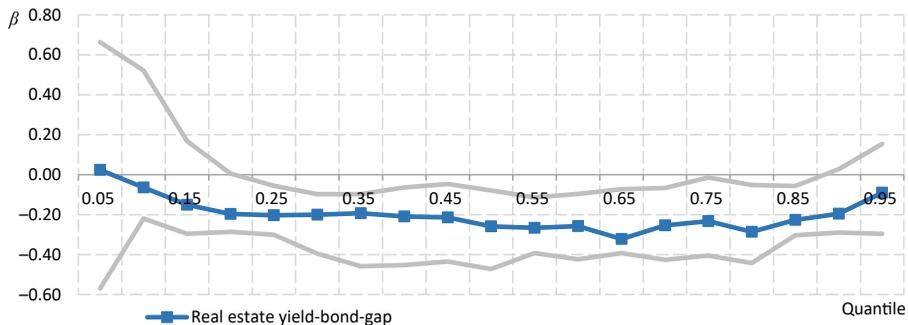


Figure 4. Non-linear effect of the real estate yield-bond-gap on investment in FinTech

Source(s): Author's own creation

level into PropTech has already reached a high level, further research is required to fully explain this effect. Another possible explanation for the non-linear effect could be the influence of investment companies that are not related to real estate. As PropTech only makes up for a small percentage of the overall VC and PE market, such a niche becomes especially interesting for financial investors once significant amounts of money are invested and the market reaches a certain level of liquidity. Considering having a higher share of purely financial investors with no relation to real estate would explain why the effect of real estate transaction volume decreases.

The coefficients for FinTech provide evidence for a non-linear effect as well, in this case of the real estate yield-bond-gap on the capital invested in FinTech. Notably, this effect is consistently negative across all quantiles, with the exception of the highest (0.95) and lowest (0.05–0.15) quantiles, where the negativity is notably reduced. One plausible explanation for this phenomenon could be the influence of investors primarily motivated by returns who are holding diversified portfolios. During periods of minimal investment in FinTech, which might be considered crisis phases, investors might tend to allocate more selectively and less capital in response to reduced alternative investment opportunities, such as real estate. Conversely, during periods of extensive investments in FinTech, which might represent hype-driven phases, investments appear to be less grounded in rational decision-making, thereby diminishing the significance of other investment classes.

5. Conclusion

PropTech and FinTech are not brand-new phenomena, those sub-sectors of the real estate and financial industry have evolved and grown strongly over the last decade. Even though this growth received lots of attention from the industry and even governments, there has been limited academic research so far. Especially when it comes to investments into/financing for FinTechs and especially PropTechs, literature covering the space is scarce. In this paper we focus on the key variables that influence the amount of capital raised by both as specialised sub-industries. Our contribution to the existing literature is the introduction of real estate variables to traditional macroeconomic variables widely used in the analysis of factors influencing investment and fundraising activities of firms. To estimate the effect of the various analysed variables, we use multiple linear regression as well as quantile regression. The main results of our analysis can be summarised as follows: Based on annual data from 18 European countries in the period of 2000–2021, in the multiple linear regression, we discovered that the GDP growth has a significant positive impact on the capital invested into PropTech and FinTech, in line with relevant literature. Besides that, we discovered that the real estate transaction volume has an even higher positive impact on the capital invested into PropTech but no significant impact on FinTech. The reason for this effect could be that strategic investors with real estate as their core business are a main driver of investment in PropTech and investors with a pure financial focus are making up for a smaller share of the invested capital. Furthermore, we discovered that the real estate yield-bond-gap has a significant negative impact on the investment activities in FinTech which is indirectly in line with the results of [Janeway *et al.* \(2021\)](#), [Bergstresser *et al.* \(2006\)](#), [Bonini and Alkan \(2006\)](#) and [Gompers *et al.* \(1998\)](#). One theory is that the much more mature FinTech industry is strongly influenced by financial investors seeking high returns and therefore see FinTech only as an alternative to other investment opportunities (like bonds). Furthermore, we employ quantile regression to demonstrate the non-linear impact of real estate transaction volumes on investments in PropTech and the real estate yield-bond gap on FinTech. Our results, in addition to contributing to the relatively limited existing literature, offer opportunities for further empirical research, particularly in differentiating between strategic and financial investors. While the selection of variables in this study was inspired by prior research, future

studies could focus on additional variables with potentially significant effects. Given the focus on European countries and the global reach of PropTech and FinTech firms, variables of global scale may also come into play. Additionally, considering that most private investment transactions are not immediately disclosed, data on these transactions may lag behind by several months or even years. Hence, future research could cover data during and post the COVID-19 and inflation crises to examine potential changes in effects. Besides that, future research covering longer periods would also allow for additional tests (for example cointegration) of the variables, allowing deeper insights into this topic. For the FinTech sector, the inclusion of variables representing strategic investors from the finance industry, such as banks and financial services providers, might provide deeper insights into their influence within the sector.

Notes

1. For further reading, an extensive overview covering 314 articles about VC and private equity including 22 papers examining the influence of macroeconomic conditions can be found in Tykvová (2018).

References

- Andrade, P., Breckenfelder, J., De Fiore, F., Karadi, P. and Tristani, O., (2016), "The ECB's asset purchase programme: an early assessment", ECB Working Paper No. 1956, European Central Bank, September 2016, doi: [10.13140/RG.2.2.36754.25284](https://doi.org/10.13140/RG.2.2.36754.25284).
- Arif, I. and Khan, L. (2019), "FDI & new business startups: does financial development Matter?", *South Asian Journal of Management Sciences*, Vol. 13 No. 1, pp. 1-12, doi: [10.21621/SAJMS.2019131.01](https://doi.org/10.21621/SAJMS.2019131.01).
- Audretsch, D.B. and Acs, Z.J. (1994), "New-firm startups, technology, and macroeconomic fluctuations", *Small Business Economics*, Vol. 6, pp. 439-449, doi: [10.1007/BF01064858](https://doi.org/10.1007/BF01064858).
- Audretsch, D.B. and Lehmann, E.E. (2004), "Financing high-tech growth: the role of banks and venture capitalists", *Schmalenbach Business Review*, Vol. 56 No. 4, pp. 340-357, doi: [10.1007/BF03396700](https://doi.org/10.1007/BF03396700).
- Balboa, M. and Martí Pellón, J. (2001), "The determinants of private equity fundraising in western Europe", In Social Science Research Network Working Paper, presented at the EFMA 2001 Lugano Meetings. doi: [10.2139/ssrn.269789](https://doi.org/10.2139/ssrn.269789).
- Baum, A. (2017), *PropTech 3.0: the Future of Real Estate*, University of Oxford, Said Business School, Oxford, available at: <https://www.sbs.ox.ac.uk/sites/default/files/2018-07/PropTech3.0.pdf>
- Baum, A., Saull, A. and Braesemann, F. (2020), *PropTech 2020: the Future of Real Estate*, University of Oxford, Said Business School, Oxford, available at: <https://www.sbs.ox.ac.uk/sites/default/files/2020-02/proptech2020.pdf>
- Bellavitis, C., Fisch, C. and Vismara, S. (2022), "Negative central bank rates and venture capital markets", available at: <https://dx.doi.org/10.2139/ssrn.3838267> (accessed 18 December 2022).
- Bergstresser, D., Desai, M. and Rauh, J. (2006), "Earnings manipulation, pension assumptions, and managerial investment decisions", *The Quarterly Journal of Economics*, Vol. 121 No. 1, pp. 157-195, doi: [10.1093/qje/121.1.157](https://doi.org/10.1093/qje/121.1.157).
- Bernoth, K. and Colavecchio, R. (2014), "The macroeconomic determinants of private equity investment: a European comparison", *Applied Economics*, Vol. 46 No. 11, pp. 1170-1183, doi: [10.1080/00036846.2013.866306](https://doi.org/10.1080/00036846.2013.866306).
- Berry, S., Benford, J., Nikolov, K., Young, C.H. and Robson, M. (2009), *Quantitative Easing*, Bank of England Quarterly Bulletin, Q2, available at: <https://ssrn.com/abstract=1420042>
- Blinder, A.S. (2010), "Quantitative easing: entrance and exit strategies", *Federal Reserve Bank of St. Louis Review*, Vol. 92 No. 6, pp. 465-479, doi: [10.20955/r.92.465-80](https://doi.org/10.20955/r.92.465-80).

- Bonini, S. and Alkan, S. (2006), "The macro and political determinants of venture capital investments around the world", *Paper Presented At The European Financial Management Association Annual Meetings*, Vienna, Austria, 27-30 June, available at: <https://efmaefm.org/0efmameetings/EFMA%20ANNUAL%20MEETINGS/2007-Austria/papers/0576.pdf> (accessed 18 December 2022).
- Bottazzi, L., Da Rin, M. and Hellmann, T. (2016), "The importance of trust for investment: evidence from venture capital", *The Review of Financial Studies*, Vol. 29 No. 9, pp. 2283-2318, doi: [10.1093/rfs/hhw023](https://doi.org/10.1093/rfs/hhw023).
- Camp, J.J. (2002), *Venture Capital Due Diligence: A Guide to Making Smart Investment Choices and Increasing Your Portfolio Returns*, John Wiley & Sons, New York, NY.
- Chaitip, P., Chokethaworn, K., Chaiboonsri, C. and Khounkhalax, M. (2015), "Money supply influencing on economic growth-wide phenomena of AEC open region", *Procedia Economics and Finance*, Vol. 24, pp. 108-115, doi: [10.1016/S2212-5671\(15\)00626-7](https://doi.org/10.1016/S2212-5671(15)00626-7).
- Chang, C.Y., Wang, F., Chen, J. and Fu, H.P. (2011), "Analysis of the factors that influence venture capital fundraising: an empirical study in China", *African Journal of Business Management*, Vol. 5 No. 12, pp. 4765-4774, doi: [10.5897/AJBM.9000087](https://doi.org/10.5897/AJBM.9000087).
- Chemmanur, T.J., Krishnan, K. and Nandy, D.K. (2011), "How does venture capital financing improve efficiency in private firms? A look beneath the surface", *The Review of Financial Studies*, Vol. 24 No. 12, pp. 4037-4090, doi: [10.1093/rfs/hhr096](https://doi.org/10.1093/rfs/hhr096).
- Cherif, M. and Gazdar, K. (2011), "What drives venture capital investments in Europe? New results from a panel data analysis", *Journal of Applied Business and Economics*, Vol. 12 No. 3, pp. 122-139.
- Cincera, M. and Santos, A. (2015), "Innovation and access to finance – a review of the literature", Working paper, iCite 014, Solvay Brussels School of Economics and Management, Université libre de Bruxelles, Bruxelles, December 2015.
- Cumming, D.J. and MacIntosh, J.G. (2006), "Crowding out private equity: canadian evidence", *Journal of Business Venturing*, Vol. 21 No. 5, pp. 569-609, doi: [10.1016/j.jbusvent.2005.06.002](https://doi.org/10.1016/j.jbusvent.2005.06.002).
- Davis, T.J. and Stetson, C.P. (1985), "Creating successful venture-backed Companies", *Journal of Business Strategy*, Vol. 5 No. 3, pp. 45-58, doi: [10.1108/eb039074](https://doi.org/10.1108/eb039074).
- De Santis, R. (2016), "Impact of the asset purchase programme on euro area government bond yields using market news", *Economic Modelling*, Vol. 86, pp. 192-209, doi: [10.1016/j.econmod.2019.06.011](https://doi.org/10.1016/j.econmod.2019.06.011).
- Duce, M. and España, B.D. (2003), "Definitions of foreign direct investment (FDI): a methodological note", *Banco de España*, Vol. 6 No. 2, pp. 43-49, available at: <https://www.bis.org/publ/cgfs22bde3.pdf>
- Félix, E.G.S., Pires, C.P. and Gulamhussen, M.A. (2013), "The determinants of venture capital in Europe - evidence across countries", *Journal of Financial Services Research*, Vol. 44 No. 3, pp. 259-279, doi: [10.1007/s10693-012-0146-y](https://doi.org/10.1007/s10693-012-0146-y).
- Fisher, J., Gatzlaff, D., Geltner, D. and Haurin, D. (2004), "An analysis of the determinants of transaction frequency of institutional commercial real estate investment property", *Real Estate Economics*, Vol. 32 No. 2, pp. 239-264, doi: [10.1111/j.1080-8620.2004.00091.x](https://doi.org/10.1111/j.1080-8620.2004.00091.x).
- Fox, J. and Monette, G. (1992), "Generalized collinearity diagnostics", *Journal of the American Statistical Association*, Vol. 87 No. 417, pp. 178-183, doi: [10.1080/01621459.1992.10475190](https://doi.org/10.1080/01621459.1992.10475190).
- Fu, L., Lu-Andrews, R. and Yu-Thompson, Y. (2023), "An overview of the capital raising activities among proptech firms", *Journal of Applied Business and Economics*, Vol. 25 No. 2, pp. 112-131, doi: [10.33423/jabe.v25i2.6101](https://doi.org/10.33423/jabe.v25i2.6101).
- Gambacorta, L., Hofmann, B. and Peersman, G. (2014), "The effectiveness of unconventional monetary policy at the zero lower bound: a cross-country analysis", *Journal of Money, Credit and Banking*, Vol. 46 No. 4, pp. 615-642, doi: [10.1111/jmcb.12119](https://doi.org/10.1111/jmcb.12119), available at: <http://www.jstor.org/stable/42920143>
- Gauger, F. and Pfnür, A. (2022), "Erfolgsdeterminanten von Start-ups am Beispiel von PropTechs in der DACH-Region", *ZfKE – Zeitschrift für KMU und Entrepreneurship*, Vol. 70 No. 1, pp. 23-49, doi: [10.3790/zfke.70.1.23](https://doi.org/10.3790/zfke.70.1.23).

-
- Golis, C. (2010), *Enterprise & Venture Capital: A Business Builder's and Investor's Handbook*, Allen & Unwin, Crows Nest, New South Wales.
- Gompers, P.A. and Lerner, J. (2006), *The Venture Capital Cycle*, 2nd ed., The MIT Press, Cambridge, Massachusetts.
- Gompers, P.A., Lerner, J., Blair, M.M. and Hellmann, T. (1998), "What drives venture capital fundraising?", *Brookings Papers on Economic Activity. Microeconomics*, Vol. 1998, pp. 149-204, doi: [10.2307/2534802](https://doi.org/10.2307/2534802).
- Granger, C.W.J. (1969), "Investigating causal relations by econometric models and cross-spectral methods", *Econometrica*, Vol. 37 No. 3, pp. 424-438, doi: [10.2307/1912791](https://doi.org/10.2307/1912791).
- Groh, A.P. and Wallmeroth, J. (2016), "Determinants of venture capital investments in emerging markets", *Emerging Markets Review*, Vol. 29, pp. 104-132, doi: [10.1016/j.ememar.2016.08.020](https://doi.org/10.1016/j.ememar.2016.08.020).
- Haddad, C. and Hornuf, L. (2018), "The emergence of the global fintech market: economic and technological determinants", *Small Business Economic*, Vol. 53 No. 1, pp. 81-105, doi: [10.1007/s11187-018-9991-x](https://doi.org/10.1007/s11187-018-9991-x).
- Hadley, B., Gloor, P.A., Woerner, S.L. and Zhou, Y. (2018), "Analyzing VC influence on startup success: a people-centric network theory approach", in Grippa, F., Leitão, J., Gluesing, J., Riopelle, K. and Gloor, P. (Eds), *Collaborative Innovation Networks. Studies on Entrepreneurship, Structural Change and Industrial Dynamics*, Springer, Cham, pp. 3-14, doi: [10.1007/978-3-319-74295-3_1](https://doi.org/10.1007/978-3-319-74295-3_1).
- Iwasaki, I. (2013), "Global financial crisis, corporate governance, and firm survival: the Russian experience", *Journal of Comparative Economics*, Vol. 42 No. 1, pp. 178-211, doi: [10.1016/j.jce.2013.03.015](https://doi.org/10.1016/j.jce.2013.03.015).
- Janeway, W.H., Nanda, R. and Rhodes-Kropf, M. (2021), "Venture capital booms and startup financing", *Annual Review of Financial Economics*, Vol. 13, pp. 111-127, doi: [10.2139/ssrn.3832337](https://doi.org/10.2139/ssrn.3832337).
- Jeng, L.A. and Wells, P.C. (2000), "The determinants of venture capital funding: evidence across countries", *Journal of Corporate Finance*, Vol. 6 No. 3, pp. 241-289, doi: [10.1016/S0929-1199\(00\)00003-1](https://doi.org/10.1016/S0929-1199(00)00003-1).
- Joyce, M., Lasaosa, A., Stevens, I. and Tong, M. (2010), "The financial market impact of quantitative easing", Bank of England Working Paper No. 393, England, UK, August 2010, doi: [10.2139/ssrn.1638986](https://doi.org/10.2139/ssrn.1638986).
- Kassner, A.J., Cajias, M. and Zhu, B. (2022), "The PropTech investors' dilemma – what are the key success factors that secure survival?", *Journal of Property Investment and Finance*, Vol. 41 No. 1, pp. 76-91, doi: [10.1108/JPIF-01-2022-0007](https://doi.org/10.1108/JPIF-01-2022-0007).
- Koenker, R. and Bassett, G. (1978), "Regression quantiles", *Econometrica*, Vol. 46 No. 1, pp. 33-50, doi: [10.2307/1913643](https://doi.org/10.2307/1913643).
- Konon, A., Fritsch, M. and Kritikos, A.S. (2018), "Business cycles and start-ups across industries: an empirical analysis of German regions", *Journal of Business Venturing*, Vol. 33 No. 6, pp. 742-761, doi: [10.1016/j.jbusvent.2018.04.006](https://doi.org/10.1016/j.jbusvent.2018.04.006).
- Manigart, S., Baeyens, K. and Van Hyfte, W. (2002), "The survival of venture capital backed companies", *Venture Capital*, Vol. 4 No. 2, pp. 103-124, doi: [10.1080/13691060110103233](https://doi.org/10.1080/13691060110103233).
- McAllister, P. and Nanda, A. (2016), "Does real estate defy gravity? An analysis of foreign real estate investment flows", *Review of International Economics*, Vol. 24 No. 5, pp. 924-948, doi: [10.1111/roie.12228](https://doi.org/10.1111/roie.12228).
- Meyer, T. (2006), "Private equity - spice for European economies", *Journal of Financial Transformation*, Vol. 18, pp. 61-69, available at: <https://ssrn.com/abstract=1027563>
- Mirchandani, A., Gupta, N. and Ndiweni, E. (2020), "Understanding the fintech wave: a search for a theoretical explanation", *International Journal of Economics and Financial Issues*, Vol. 10 No. 5, pp. 331-343, doi: [10.32479/ijefi.10296](https://doi.org/10.32479/ijefi.10296).
- Moosa, I.A. (2002), *Foreign Direct Investment: Theory, Evidence and Practice*, Palgrave Macmillan London, London. doi: [10.1057/9781403907493](https://doi.org/10.1057/9781403907493).

- Munemo, J. (2017), "Foreign direct investment and business start-up in developing countries: the role of financial market development", *The Quarterly Review of Economics and Finance*, Vol. 65, pp. 97-106, doi: [10.1016/j.qref.2016.08.010](https://doi.org/10.1016/j.qref.2016.08.010).
- Nigam, N., Benetti, C. and Johan, S.A. (2020), "Digital start-up access to venture capital financing: what signals quality?", *Emerging Markets Review*, Vol. 45, 100743, doi: [10.1016/j.ememar.2020.100743](https://doi.org/10.1016/j.ememar.2020.100743).
- Ning, Y., Wang, W. and Yu, B. (2015), "The driving forces of venture capital investments", *Small Business Economics*, Vol. 44 No. 2, pp. 315-344, doi: [10.1007/s11187-014-9591-3](https://doi.org/10.1007/s11187-014-9591-3).
- Ning, Y., Xu, G. and Long, Z. (2019), "What drives the venture capital investments in China?", *Chinese Management Studies*, Vol. 13 No. 3, pp. 574-602, doi: [10.1108/CMS-07-2017-0193](https://doi.org/10.1108/CMS-07-2017-0193).
- Parhankangas, A. (2007), "An overview of research on early stage venture capital: current status and future directions", in Landström, H. (Ed.), *Handbook of Research on Venture Capital*, Edward Elgar Publishing, Cheltenham, pp. 253-280, doi: [10.4337/9781847208781.00018](https://doi.org/10.4337/9781847208781.00018).
- PitchBook Data, Inc. (2022), "Understanding deal type methodology & definitions", available at: <https://help.pitchbook.com/s/article/List-of-Deal-Types> (accessed 6 November 2022), access restricted to license holders.
- Pyhrr, S.A., Roulac, S.E. and Born, W.L. (1999), "Real estate cycles and their strategic implications for investors and portfolio Managers in the global economy", *The Journal of Real Estate Research*, Vol. 18 No. 1, pp. 7-68, doi: [10.1080/10835547.1999.12090986](https://doi.org/10.1080/10835547.1999.12090986), available at: <http://www.jstor.org/stable/24887181>
- Romain, A. and van Pottelsberghe de la Potterie, B. (2003), "The determinants of venture capital: a panel data analysis of 16 OECD countries", Working Paper, Université Libre de Bruxelles, Solvay Business School, Brussels, December 2003.
- Schefczyk, M. (2005), "Innovations finanzierung und Venture Capital-Markt", in Albers, S. and Gassmann, O. (Eds), *Handbuch Technologie- und Innovationsmanagement*, Gabler Verlag, Wiesbaden, pp. 603-620. doi: [10.1007/978-3-322-90786-8_33](https://doi.org/10.1007/978-3-322-90786-8_33).
- Taboga, M. (2022), "Cross-country differences in the size of venture capital financing rounds: a machine learning approach", *Empirical Economics*, Vol. 62 No. 3, pp. 991-1012, doi: [10.1007/s00181-021-02066-8](https://doi.org/10.1007/s00181-021-02066-8).
- Teppo, T.K. and Wustenhagen, R. (2006), "Do venture capitalists really invest in good industries? Risk-return perceptions and path dependence in the emerging European energy VC market", *International Journal of Technology Management*, Vol. 34 Nos 1/2, pp. 63-87, doi: [10.1504/IJTM.2006.009448](https://doi.org/10.1504/IJTM.2006.009448).
- Tykvová, T. (2018), "Venture capital and private equity financing: an overview of recent literature and an agenda for future research", *Journal of Business Economics*, Vol. 88 Nos 3-4, pp. 325-362, doi: [10.1007/s11573-017-0874-4](https://doi.org/10.1007/s11573-017-0874-4).
- Zacharakis, A.L. and Meyer, G.D. (1999), "A lack of insight: do venture capitalists really understand their own decision process?", *The Journal of Private Equity*, Vol. 2 No. 2, pp. 56-71, available at: <http://www.jstor.org/stable/43503212>
- Zarrouk, H., El Ghak, T. and Bakhouch, A. (2021), "Exploring economic and technological determinants of FinTech startups' success and growth in the United Arab Emirates", *Journal of Open Innovation: Technology, Market, and Complexity*, Vol. 7 No. 1, pp. 1-23, doi: [10.3390/joitmc7010050](https://doi.org/10.3390/joitmc7010050).

Corresponding author

Andreas Joel Kassner can be contacted at: andreas.kassner@tum.de

For instructions on how to order reprints of this article, please visit our website:

www.emeraldgrouppublishing.com/licensing/reprints.htm

Or contact us for further details: permissions@emeraldinsight.com