Economic Modelling 142 (2025) 106928

Contents lists available at ScienceDirect

Economic Modelling

journal homepage: www.journals.elsevier.com/economic-modelling

The Perverse Valuation Effect on Mergers and Acquisitions in Europe ☆

Fabio E.G. Röhrer [a,*], Lebogang Mateane [d,b], Christian R. Proaño [b,c]

[a] EDHEC Business School, 393 Prom. des Anglais, 06200 Nice, France
[b] Otto-Friedrich-Universität Bamberg, Feldkirchenstr.21, D-96045 Bamberg, Germany
[c] Centre for Applied Macroeconomic Analysis, Australian National University, Australia
[d] University of Cape Town, School of Economics, Rondebosch, 7700, Cape Town, South Africa

ARTICLE INFO

Dataset link: https://data.mendeley.com/datasets/s5yk5nv8t2/1

JEL classification:
E00
E02
G15
G34

Keywords:
Mergers and Acquisitions
Macroeconomy and Financial Markets
Long-term government bond yields
European Union

ABSTRACT

We investigate the macroeconomic and financial determinants of mergers and acquisitions (M&A) in Europe and address the gap in understanding how financial market dynamics influence corporate decisions. While previous literature has examined macroeconomic factors affecting M&A, the impact of (10-year government) bond yields remains underexplored. We fill this gap using panel data of 21 European Union Countries over 2006:Q1–2022:Q2. Across different model specifications we find that bond yields and real gross domestic product growth are robust determinants of M&A, even after controlling for other determinants. A novelty of our study is that rising and higher bond yields are associated with a reduction in M&A activity because investors are shifting their portfolios out of bonds and into riskier assets like equities, thereby increasing acquisition costs. We denote this as a "perverse valuation effect" offering new insights into M&A dynamics.

1. Introduction

Mergers and acquisitions (M&A) are an important strategic corporate mechanism in facilitating the expansion of companies (Hossain, 2021; Tang et al., 2022; Kellner, 2024). In 2021 the global volume of M&A reached 63,000 M&A deals at an all-time high value of 5.9 Trillion U.S. dollars. According to the Refinitiv database, a subsidiary of the London Stock Exchange, this represents an increase of 134% in total volume and an increase of 50% in the total number of M&A deals since 2011.[1] As of June 2024, the global volume of M&A has an estimated 31,622 transactions at a value of 2.45 Trillion U.S. dollars, whereas the number of European M&A transactions is estimated at 11,863 transactions at a value of 1.23 Trillion Euros.[2] These features put the European M&A market as the second largest globally behind the North American M&A market with an estimated 16,245 transactions at a value of 1.83 Trillion U.S. dollars.

Even though these developments are not unique historically speaking (there was a similar increase in M&A activity during the heightened conglomerate M&A in the 1960s), this recent M&A surge reflects the significant changes in the global entrepreneurial landscape over the last decade. Earlier researchers such as Nelson (1959) and Melicher et al. (1983) studied the impact of macroeconomic factors for M&A activity because macroeconomic measures are the result of the aggregation of firm-level conditions, they set the overall environment in an economy and inform entrepreneurial activities. Additionally, Becketti (1986) describes that M&A waves can be associated with policy and legal changes in an economy, for e.g. during the relaxation of antitrust enforcement in 1982 and 1984.

Furthermore, Mitchell and Stafford (2000), Harford (2005) and Martynova and Renneboog (2006) document that M&A activity generally occurs in waves, clustering in calendar dates and by industry. Bianconi and Tan (2019) identify that the global economy has observed waves of horizontal, vertical, diversified and conglomerate mergers, congeneric mergers, hostile takeovers and corporate raiding, cross-border mergers and a wave of shareholder activism, private equity and leveraged buyouts, see also Faulkner et al. (2012).

☆ We would like to thank the Editor Sushanta Mallick, the Associate Editor, two anonymous referees and Thomas Hochdorfer for very helpful comments and suggestions that have significantly improved this paper. We would also like to thank Maybrit Wächter for excellent editorial and research assistance. This research did not receive any specific grant from public, commercial, or non-profit funding agencies.

* Corresponding author.
E-mail addresses: fabio.rohrer@edhec.com (F.E.G. Röhrer), Lebogang.Mateane@uct.ac.za (L. Mateane), christian.proano@uni-bamberg.de (C.R. Proaño).

[1] https://www.refinitiv.com/en/financial-data/deals-data/mergers-and-acquisitions-deals-database

[2] See https://imaa-institute.org/mergers-and-acquisitions-statistics/ and Kellner (2024) for an interpretation concerning 2019 statistics.

https://doi.org/10.1016/j.econmod.2024.106928
Received 17 January 2024; Received in revised form 2 September 2024; Accepted 28 October 2024
Available online 2 November 2024

So far, empirical research on the determinants of M&A activity has mostly focused on the U.S. because the U.S. has the most active M&A market globally and the quality and quantity of data in the U.S. market is unmatched. Together with London, which has maintained its pre-eminence in international banking even after Brexit, New York is a leading global financial centre (Demski et al., 2022). In contrast, there is limited research on M&A activity, also regarding its link with macroeconomic factors, within European Union (EU) countries and across continental Europe.

Against this background, we examine the relationship between M&A activity and macroeconomic and financial variables, along with an emphasis on the heterogeneity across EU countries and with variation over time. Our study is motivated by additional factors such as M&A activity being apparently less hostile in the EU, especially relative to the U.S. and the United Kingdom (UK). Indeed, while hostile takeovers are common in the U.S., they are rarer in the EU where government intervention supports friendly deals leading to a decrease in competing offers for companies (Moschieri and Campa, 2014).

Moreover, government protection and intervention are higher in the EU, where governments are often shareholders in companies that perform duties of national interest like telecommunication, banking, and electricity generation (Alcalde and Powell, 2022). However, the degree to which EU governments do not want outside investors to take control over these crucial industries will vary and, consequently, the macroeconomic driving factors of M&A in the EU may diverge from the U.S. and the UK. Thus, our approach may provide us with more insights concerning these factors and the extent to which these influence M&A activity in the EU.

Although the quality and quantity of data varies between EU countries, we analyse a panel data set of 21 EU countries over 2006:Q1–2022:Q2. We use an econometric panel data approach to examine the impact of macroeconomic and financial variables and earnings before interest, taxes, depreciation and amortization (EBITDA) multiples on M&A activity. Furthermore, we use lagged explanatory variables to determine lagged dependencies between variables that may not be captured with contemporaneous effects.

Using panel data methods such as a panel OLS regression with fixed effects can allow us to capture individual country time-invariant factors that impact M&A activity, for e.g. the tax policy, financial regulation in a country and the market structure of each economy. Furthermore, incorporating time effects in a panel model can allow us to capture effects such as technological change and productivity improvements that vary over time and that can positively affect M&A activity.

We also divide our total sample period into two separate periods. The first period over 2007:Q1–2013:Q4 covers the turbulent times of the Global Financial Crisis (GFC) up until the end of the Euro debt crisis with its fragmentation and contagion period. The second period over 2014:Q1–2022:Q2 covers a period of greater stability, despite the COVID-19 pandemic. Recent studies on M&A activity do cover up to this COVID-19 pandemic period, see for e.g. Kellner (2024) and Zheng and Mao (2024). Additionally, the period after 2014:Q1 is associated with greater moderation in sovereign bond markets driven by greater policy and multilateral interventions in the U.S. and the EU, see also Ehrmann and Fratzscher (2017). Estimating our model over the total sample period and two sub-periods allows us to establish whether each explanatory variable exhibits a quantitative and statistically significant association with M&A activity across different economic regimes that have generated a significant impact on the EU.

We find that real gross domestic product (GDP) growth and (10-year government) bond yields have a robust quantitatively and statistically significant association with M&A activity. This is typically with a lag and especially over the total sample period. Hence, M&A activity in the EU is a process that takes time from the initial preparation to completion. In addition, our model's coefficient estimates are jointly significant at standard levels of significance. Furthermore, macroeconomic factors exhibit long, variable and different impacts on M&A during the timeline of a deal.

Our approach allows us to contribute to the literature in several ways. First, while many studies analyse the relationship between M&A and conventional "firm valuation" measures such as Tobin's Q, for e.g. Golbe and White (1988), Bris et al. (2008) and Fischer and Horn (2021), or, the (price-to-earnings) P/E ratio, for e.g. Steiner (1975), Mueller (1977) and Robert Shiller's cyclically adjusted P/E ratio as in Bonaime et al. (2018) and Fischer and Horn (2021), we examine the EBITDA multiple, along with other macroeconomic factors and analyse their impact on M&A activity.

The EBITDA multiple is a market valuation multiple measure that is widely used in actual M&A deal valuations, see Liu et al. (2002) and Lie and Lie (2002).[3] Furthermore, Bianconi and Tan (2019) describe that in recent times more companies quote EBITDA, particularly in the technology sector. Potential buyers and sellers typically use EBITDA multiples for the valuation process, to compare the current deal with previous ones, and to evaluate market maturity (Liu et al., 2002). As a financial metric, EBITDA has the added advantage of boiling down companies' financials and identifying their operational profitability.

Using the EBITDA multiple as an explanatory variable for M&A activity has several advantages and allows us to contribute to the literature. First, it complements other valuation measures, such as Tobin's Q or the P/E ratio because the EBITDA multiple can include publicly traded companies and private companies that are not publicly listed on stock exchanges. By contrast, the P/E ratio and Tobin's Q can generally only include M&A activity associated with companies that are publicly listed, see also Bonaime et al. (2018). Consequently, the advantage of the EBITDA multiple becomes highly relevant when M&A activity is heterogeneously distributed between publicly traded and private companies. Second, EBITDA multiples provide a measure that is commonly used by professionals and is therefore more relevant than Tobin's Q or the P/E ratio.

For instance, Vydržel and Soukupová (2012) examine valuation methods adopted by private equity professionals and financial advisors in the Czech Republic and find that the most widely used valuation market multiples concern EBITDA, with specifically 94% of participants using Enterprise Value (EV) relative to EBITDA in the valuation process as compared to 42% of participants who use the P/E ratio as a valuation measure. Interestingly, higher EBITDA multiples often occur during periods of M&A waves. Thus, understanding M&A activity over different economic conditions is important because of the potential positive impact on the acquired companies and the economy (Alexandridis et al., 2017).

Third, and as described by Bianconi and Tan (2019), EBITDA is an indicator of a company's financial performance that is relevant for examining and comparing the profitability between companies and industries because it eliminates the effects of financing and accounting decisions. However, EBITDA is not a good indicator of cash flow because it does not account for changes in working capital, capital expenditures, taxes and interest. More recently, Shaffer (2023) provides a comprehensive overview about valuation multiples in M&A advisory and documents that EBITDA is a crucial and common value driver denominator, it has a higher ranking relative to net income, revenue, book equity and EBIT. Reinforcing this outcome is what Shaffer (2023) describes as a greater preference in the use of EBITDA as a value driver while relegating EBIT and net income. Additionally, he outlines that the most frequently used valuation measures by M&A advisors are enterprise value multiples rather than equity value multiples, a practice that has gained substantial preference over the past two decades.

Despite the importance of EBITDA and the EBITDA multiple in M&A deals, to the best of our knowledge, no existing studies examine the

[3] For e.g. if the EBITDA of a company is 90 Million Euros and the associated average EBITDA multiple for companies in this range is 60, then this would imply a current valuation of 540 Million Euros in enterprise value, see also https://www.forbes.com/sites/forbesbusinesscouncil/2022/06/16/a-guide-to-ebitda-multiples-and-their-impact-on-private-company-valuations/.

relationship between EBITDA multiples and M&A activity along with controlling for a wide array of macroeconomic variables, short-term global financial uncertainty and across 21 EU countries. Relative to our approach, there are numerous studies that examine the microeconomic factors, innovation in the financial sector, industry level, firm level and macroeconomic factors that drive M&A activity, mainly for the U.S., see for e.g. Hines (1996), Garkusha et al. (2015), Bai et al. (2021) and Dang (2023) and more recently, Zheng and Mao (2024) for M&A of fintech companies by U.S. public banks, nonbank financial institutions, and tech companies.

Moreover, Hsu et al. (2021) use M&A deals from 57 countries and find that cross-border M&A are a crucial factor for the innovation strategies of firms and thus innovative firms in low innovation countries are more likely to conduct cross-border M&A deals. Additionally, and for the U.S., other studies such as Doukas and Zhang (2021) investigate the effect of corporate social responsibility on shareholder wealth when M&A are conducted by managers with different skill sets, see also Dong and Doukas (2021). Furthermore, Ellahie et al. (2024) use accounting theory and finance principles to construct a measure of M&A quality that quantifies the improvement in the return on equity based on M&A between U.S. public firms.

The second and main contribution of our study is that we find that rising and higher bond yields across EU countries and over time, are negatively associated with M&A activity across EU countries. Thus, an increase in bond yields is associated with a reduction in M&A activity. This result is quantitatively and statistically significant across all model specifications over the total sample period and exhibits consistently the highest association with M&A activity over the total sample and relative to the other explanatory variables. Rising bond yields are associated with falling bond prices. This market dynamic can be driven by a lower demand for bonds or a higher supply of bonds, especially long-term bonds and particularly in the secondary market.

The BIS (2023) also describes current global bond market dynamics and the associated volatility of bond yields driven by investor perceptions about future monetary policy rate paths, financial conditions, expectations about future economic activity and the reporting by major ratings agencies. Similarly, Cuaresma and Fernández (2024) and Barbieri et al. (2024) describe the relationship between government bond yields and investors perception associated with Eurozone countries and that government bond yields exhibit country-specific factors of the individual Eurozone countries.

Rising bond yields are also associated with a higher demand for alternative riskier and higher return (financial) assets, especially equities. The higher demand for alternative riskier and higher return assets may be driven by higher positive expectations concerning profitability and positive expectations in general about future economic activity. Thus, with investors shifting their portfolios out of bonds and into riskier assets such as equities, this will generate rising overall equity prices and may improve the valuation of some or most corporations/firms, even if this improved valuation may not be due to the internal mechanisms and past and current profitability of corporations. Additionally, the BIS (2023) documents that the hallmark portfolio structure of passive investors includes government bonds as a hedge against the swings of riskier assets such as equities.

Our findings and assertions are also in line with Kumar et al. (2023) who describe investor conduct concerning risk-tolerance and portfolio re-balancing between equities and long-term government bonds, along with their interaction with monetary policy and how risk-tolerance and portfolio re-balancing can generate changes in bond yields over different global market conditions. These authors document that during periods of economic and financial stability, investors may shift their portfolios towards riskier assets such as equities and this can generate swings in bond yields. Using a time varying vector autoregression (VAR) model, they find that a positive shock to the Chicago Board Options Exchange Volatility Index (VIX) reduces the term premium because of lower (long-term) government bond yields. This finding corroborates the fact that investors re-balance their portfolios out of riskier assets (such as equities) during periods of greater risk aversion and uncertainty and re-balance towards government bonds. This market dynamic is associated with a higher demand for government bonds, higher government bond prices and a reduction in government bond yields.

Thus, concerning our study, the higher valuation of firms may be due to financial market activity, expectations, excess money supply and possibly due to asset price bubbles. Therefore, potential acquisitions or targets become expensive, negatively affecting M&A activity and delaying M&A activity up until there is a correction in the valuation of firms. Our results show that over the total sample period, on average, EU countries with a 5 percentage points increase in bond yields experience an average reduction of approximately 7 M&A deals. This is for M&A deals that fulfil the criteria of a deal value equal to or greater than 1 million Euros and the acquired company is in the EU and these are deals conducted per quarter. Therefore, acquisitions become expensive not because of a higher cost of funding/credit channel through short-term rates as in Becketti (1986), Adra et al. (2020) and Fischer and Horn (2021), but because of higher valuations of firms possibly driven by higher economy wide equity prices.[4] We denote this as a "perverse valuation effect" making M&A more expensive.[5] This interpretation and channel are unique to our study, representing the main and second contribution of our study.[6] Our results and the "perverse valuation effect" are robust to Poisson regressions and these are reported in the Appendix. Thus, the Poisson regressions reinforce the negative association of an increase in bond yields on M&A and this result is quantitatively and statistically significant.[7]

The rest of the paper is structured as follows: Section 2 presents a literature review, Section 3 describes the data, Section 4 explains the methodology, Section 5 presents the results and Section 6 concludes.

2. Literature review

Consistent with our "perverse valuation effect", Becketti (1986) discusses that acquisitions are more expensive when the market value of all firms is higher. In contrast, if firms' equity prices are undervalued, this will increase the number of mergers. Hsueh et al. (2014) find that changes in stock prices influence and lead M&A activity in six OECD countries based on data over the 1980–2010 period. Additionally, and as pointed out by Adra and Barbopoulos (2018) and Hsu et al. (2021), higher equity prices of acquiring firms relative to equity prices of target firms can encourage M&A, whereas higher equity prices allow overvalued acquiring firms to engage in stock-financed acquisitions of target firms.

Bianconi and Tan (2019) describe a stock-for-stock M&A transaction in which Comcast Corporation wanted to acquire Time Warner Cable shares in exchange for equity in its corporation and this transaction

[4] To capture the cost of funding channel, Becketti (1986) uses 3-month treasury bill rates and Fischer and Horn (2021) use the 1-year U.S. Treasury rate as monetary policy instrument. In contrast, we use data on long-term government bond yields, particularly of 10-year maturity for the EU countries in our analysis. This reinforces our "perverse valuation effect" rather than a cost of funding channel because changes in monetary policy rates only directly affect very short-term money-market interest rates, see also the European Central Bank.

[5] We do not control for the overall stock market index of each EU country because of data unavailability.

[6] We do not examine the cost of funding channel because of data unavailability on short term rates such as interbank rates or short term government bonds across the EU, whether using Eurostat, the ECB, OECD or St. Louis FRED.

[7] We would like to thank an anonymous referee for the suggestion of Poisson regressions for robustness based on the usage of level data in regressions and aligned with Cohn et al. (2022).

was unsuccessful. However, these authors describe a different and successful M&A transaction between Facebook and WhatsApp which involved cash, shares and vested restricted stock. Relatedly and in an earlier study, Vasconcellos and Kish (1998) examine cross border acquisitions between firms in the U.S., Germany, Italy, the UK and France. Using a logit model, they find an increase in the occurrence of foreign acquisitions when the bond yields of a country in which target firms are operating in, are lower than the bond yields of the country of the acquiring firms. However, their interpretation is based on bond yields through a cost of debt channel informed by firms being able to raise capital in bond markets.

Furthermore, and using an OLS regression model, Vasconcellos and Kish (1998) find that stock market activity influences M&A and particularly, lower U.S. stock market activity and valuation relative to foreign stock markets, provides an incentive for foreign companies to acquire U.S. companies. Indeed, our "perverse valuation effect" contrasts with earlier findings by Vasconcellos and Kish (1998), who attribute bond yield effects to the cost of debt channel in cross-border acquisitions. Moreover, recent studies such as Adra et al. (2020) and Fischer and Horn (2021) explore the impact of monetary policy on M&A and find that contractionary policy dampens M&A activity in the U.S. Our study complements this literature by examining the effects of bond yields in the EU, showing that rising and higher bond yields are associated with higher costs of acquisitions and thus reduce M&A activity. Furthermore, while Nguyen and Phan (2017) and Bonaime et al. (2018) discuss policy uncertainty's impact on U.S. M&A, our research extends on this by considering policy uncertainty, short term global financial uncertainty and bond yield effects within the EU context.

Earlier studies such as Nelson (1959) and Melicher et al. (1983) focused on the U.S. and highlighted the role of macroeconomic factors in M&A activity, noting significant correlations between stock price changes, bond yields, and M&A activity. However, our study diverges by highlighting the "perverse valuation effect" of bond yields within the European context, an area less explored in the literature. While Melicher et al. (1983) find that mergers respond inversely to changes in lagged bond yields and in the context of the U.S. economy, our research uniquely identifies that rising bond yields are robustly associated with a reduction in M&A activity as a result of portfolio shifts by investors towards equities rather than solely by changes in credit conditions.[8]

Continuing in this tradition, Becketti (1986) uses a wide array of U.S. variables such as GNP, the S&P 500 index, 3-month treasury bill rates, the stock of money and domestic nonfinancial debt to examine their relationship with M&A activity. Becketti (1986) finds that changes in interest rates have the greatest influence on M&A activity and concludes that changes in the 3-month treasury bill rate decreases the number of mergers. Golbe and White (1988) also examine the impact of U.S. macroeconomic variables on M&A activity. Their results suggest that GNP has a consistently positive and statistically significant effect on U.S. M&A activity, and they emphasize that Tobin's Q has a strong positive effect on U.S. M&A activity.

In contrast, Guerard (1989) finds that stock prices and industrial production (IP) are not statistically significantly associated with M&A activity in the U.S. In turn, Finn and Hodgson (2005) document for Australia that IP has a positive and significant effect on merger activity and Cook (2007) notes the same effect for the UK. Using a two-state Markov switching model on UK data, Resende (2008) finds that traditional indicators such as real output growth, real money supply growth and real stock market returns are statistically associated with M&A activity. Choi and Jeon (2011) find that the stock market and monetary policy is crucial for the transaction values associated with M&A activity.

Recent studies using accounting data such as Nguyen and Phan (2017), show that policy uncertainty for the U.S. – based on the Baker et al. (2016) policy uncertainty index – negatively affects M&A activity and it delays the completion time of M&A deals along with reducing the overall number of M&A deals. Similarly, and using U.S. macroeconomic and firm level data, Bonaime et al. (2018) show that policy uncertainty negatively affects M&A activity.[9] In contrast, Adra et al. (2020) find that tighter monetary policy, rather than monetary policy uncertainty, is associated with a negative market reaction to M&A announcements, a higher likelihood of M&A deal withdrawals and an increase in financing constraints for acquirers after acquisition. Adra et al. (2020) use M&A data that covers 12,350 U.S. public, private, and subsidiary target acquisitions announced by U.S. public companies.

Similarly, Fischer and Horn (2021) examine the impact of monetary policy on M&A activity using U.S. data by estimating a Bayesian proxy structural VAR that incorporates variables such as monthly aggregate (inflation adjusted) deal value (or the total number of deals), 1-year U.S. Treasury rate as a monetary policy instrument, IP, consumer prices, the excess bond premium as a measure of credit market sentiment and Robert Shiller's adjusted price–earnings ratio of the S&P500 as a measure of market valuation. They find that contractionary monetary policy significantly dampens M&A activity and reduces the overall deal value. Additionally, Fischer and Horn (2021) specify a linear probability model to estimate the likelihood of a firm to initiate a M&A transaction in each period as a function of the monetary policy stance. Their model includes firm and macroeconomic control variables such as the leverage ratio, firm age, real assets, the ratio of net liquidity to total assets, Tobin's Q, the EBITDA to asset ratio as measure of profitability, a dummy indicating whether the firm has paid dividends over the past year, a dummy variable indicating whether a firm has already acquired another firm in the five years prior and the same macroeconomic control variables as in their VAR.

They find that the acquisition probability decreases significantly following contractionary monetary policy and financially constrained firms exhibit a lower acquisition likelihood. They argue that this is possibly due to a strong credit channel in monetary policy transmission to firms' M&A decisions. Furthermore, firm size, liquidity, valuations in the form of Tobin's Q and profitability increase acquisition likelihood. In contrast, higher leverage, prior acquisition history and firm age decrease acquisition likelihood. As a result, inflation and the excess bond premium reduce acquisition likelihood and aggregate valuations positively affect the transaction likelihood.

The contrasting findings concerning macroeconomic, financial and policy variables that influence M&A activity, including the differences between countries, show that the M&A process is consistently evolving. Additionally, these findings vary based on the market structure and economic performance of each country along with policy and regulations associated with each economy.

Concerning M&A activity within European countries and across continental Europe, our paper differs from existing studies. For e.g. Coeurdacier et al. (2009) examine the main forces driving bilateral cross-border M&A among Euro area manufacturing and services firms

[8] In Melicher et al. (1983), mergers respond inversely to changes in lagged bond yields and these bond yields are based on the Standard & Poor's Industrial Bond Index. Moreover, their study shows that an increase in M&A negotiation activity reflects anticipated stock price increases, see also Gort (1969) for macroeconomic and financial market variables such as productivity changes and changes in average asset size of a firm as factors that influence merger rates in the U.S.

[9] Bonaime et al. (2018) explain that this index accounts for policy uncertainty unrelated to elections and this is relevant because of the high variation in M&A activity in non-election years. They describe that this index is a weighted average of (i) the frequency of articles related to policy uncertainty in ten leading U.S. newspapers, (ii) tax code change uncertainty, (iii) monetary policy forecast disagreement, and (iv) fiscal policy forecast disagreement. Furthermore, they explain that this index significantly correlates with events ex-ante expected to generate policy-related uncertainty and withstands extensive checks, including a detailed human audit.

over 1985–2004.[10] They find that European integration has mainly benefitted manufacturing relative to the services sector because it has improved the restructuring of capital within the same sector of manufacturing activity among Euro area firms. Furthermore, European integration has favoured both horizontal and vertical mergers. However, the level of protection and barriers to entry in the services sector has not accelerated the benefits of integration because they have discouraged cross-border M&A in this industry.

In a framework for the key determinants of the likelihood of completion of M&A in the EU over 1997–2007, Moschieri and Campa (2014) find that deal attitude and the presence of competing bids are crucial for the completion of a deal, especially relative to the deal origin and the payment method or industry regulation. Consequently, they argue that these characteristics of M&A in the EU are mainly informed by the structural characteristics of the EU business environment along with EU regulations. Mager and Meyer-Fackler (2017) examine the long-term abnormal returns and the operating performance of German publicly listed acquiring firms for M&A transactions over 1981–2010. Their results support the method-of-payment hypothesis and they do not find significant negative abnormal long-term returns.[11]

Using a sample that consists of several key EU countries such as Austria, Belgium, France, Italy and Germany, Maung et al. (2021) examine how religion and risk aversion affects cross-border M&A decisions over the January 1990–December 2017 period. They also include several key control variables such as industry variables, legal frameworks, GDP and trade as a share of GDP. They find that the more religious the country of an acquirer is, the fewer are the cross-border M&A transactions conducted and this variable typically has the largest effect and is consistently statistically significant across several panel data regression specifications.

Regarding securities regulation enacted by the EU, Loureiro and Silva (2021) examine the impact of securities regulation on the information environment concerning stock-financed acquisitions and with a sample over the January 2000–December 2018 period. Following the enactment of this regulation (the Transparency Directive), they find a significant increase in announcement returns of stock-paid acquisitions by European acquirers, and that this result is specific to companies with better firm-specific information quality and those that reside in EU countries with better institutional quality and shareholder protection.

Using 1832 non-banking European firms over 2002–2020, García and Herrero (2022) find that board size and the percentage of external directors are related to the number of acquisitions and that firm acquisitions create value for the acquiring firm. Furthermore, risky acquisitions are associated with larger firms and a lower proportion of female directors. This is in contrast to smaller firms where the CEO is also the chair of the board.

Alcalde and Powell (2022) examine the role of government intervention in shaping M&A in Europe and in particular government opposition to cross-border European M&A over 1997–2017 and its impact on returns. They find that rivals of intervened targets earn significantly lower returns relative to rivals of non-intervened targets on deal announcement. More recently and using multiple OLS regressions, Kellner (2024) examines short-term stock price reactions to EU M&A announcements over the period 2010–2021 and finds that target companies exhibit strong and positive price reactions whereas the prices of acquirers exhibit insignificant changes.

In summary, the existing literature provides a foundation for understanding the macroeconomic and financial determinants of M&A activity, but our study contributes by highlighting the specific and underexplored role of bond yields in the European context. Therefore, our "perverse valuation effect" offers a new perspective and insights into the relationship between the macroeconomy, financial markets and M&A activity in the EU.

3. Data

We use several data sources to construct our panel data set that covers the 2006:Q1–2022:Q2 period. We also divide our total sample period into two separate periods. The first subsample covers the 2007:Q1–2013:Q4 period that was characterized by high volatility and uncertainty in the EU and global economy. The second subsample covers the 2014:Q1–2022:Q2 period and captures greater stability in the EU. Throughout our paper, M&A activity is the dependent variable and the remaining variables described are explanatory variables. M&A activity and EBITDA multiples data is derived from Refinitiv's database.

Following the consensus approach about the criteria of deal values examined in the literature (see e.g. Nguyen and Phan, 2017; Bonaime et al., 2018), we only consider M&A transactions that fulfil the criteria of a deal value equal to or greater than 1 million Euros and the acquired or target company is in the EU.[12] Our dependent variable of M&A activity is the total number of deals per quarter with a deal value equal to or greater than 1 million Euros and the acquired company is in the EU which covers 21 EU member states over 2006:Q1–2022:Q2.[13]

The EBITDA data consists of 4741 EBITDA multiple points. We use the EBITDA multiple as an explanatory variable because it is a comprehensive valuation measure and it accounts for publicly traded companies and private companies that are not publicly listed on stock exchanges. We use an adjusted EBITDA multiple dataset with a maximum EBITDA multiple of 30. When undertaking a random test, some data points over 30 proved to be unrealistic and can be considered as outlier values. A significant deficiency of this database is that for some countries not all deals have an attached deal value. Therefore, for some countries, M&A activity data has zero transactions and consequently zero deals. This contrasts to the EBITDA multiple dataset where we could not detect any patterns in the industry sector, countries, or years that have more missing values. Hence, the deals with no value appear to be random.

We use the Harmonized Index of Consumer Prices (HICP) from the International Monetary Fund's International Financial Statistics (IMF's IFS). Therefore, we compute and use annualized quarter-on-quarter inflation as an explanatory variable. For robustness, we also use annual inflation (based on the previous year's quarter) because it is an inflation measure crucial for monetary policy conduct. Therefore, cross country inflation differences can generate higher investment expenditure uncertainty and this may negatively affect M&A activity.

We use real GDP data that is seasonally adjusted from the IMF's IFS. Thus, we use annualized quarter-on-quarter GDP growth as an explanatory variable and for robustness, we also use annual GDP growth as

[10] They put emphasis on ten acquiring manufacturing sectors and ten acquiring service sectors.

[11] This hypothesis states that acquirers prefer to pay with stock when their own stocks are overvalued, or acquirers are uncertain about the target valuations.

[12] Kellner (2024) follows a similar criterion for the M&A data that he sources from Refinitiv and in particular with using M&A data that concerns target companies that are located in a country in the EU over the period 2010–2021. Additionally, he also accounts for an extra criterion that the target company is publicly traded so that he can account for stock price data of target companies that are publicly traded on an European stock exchange. For data purposes, he uses the STOXX Europe 600 price index as the market index because it covers the majority of the European market capitalization.

[13] The list of countries is as follows: Austria, Belgium, Bulgaria, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, the Netherlands, Poland, Portugal, Romania, Slovenia, Spain and Sweden. We had initially included Cyprus, Estonia, Luxembourg and Malta in our sample, however, there is no data available for the uncertainty index of each of these economies. Furthermore, we do not include Croatia because there is no data available for long term government bond yields for Croatia. This data is not available on Eurostat, the ECB's Statistical Warehouse, St Louis FRED, the IMF and the OECD.

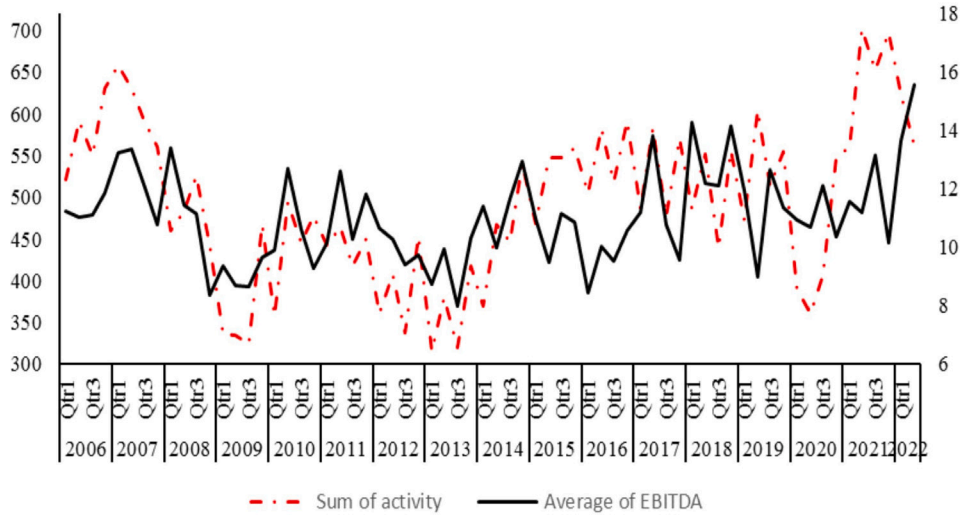

Fig. 1. Average EU EBITDA multiple and Total EU M&A activity.
Source: Refinitiv database and authors' calculations.

an explanatory variable. In our model, GDP is an explanatory variable because higher economic activity may generate higher corporate net revenue and profitability and thus generate higher M&A activity. We use quarter-on-quarter percentage changes in the Chicago Board Options Exchange Volatility Index (VIX) sourced from the Federal Reserve Bank of St. Louis. This index is a measure of global financial uncertainty and higher positive percentage changes in VIX can be interpreted as higher short-term global financial uncertainty and this is associated with higher short-term global risk aversion (Bonaime et al., 2018; Han and Wei, 2018). Thus, we control for short-term global financial uncertainty that affects all the EU countries.

Finally, we use long-term government bond yields of 10-year maturity from the Organisation for Economic Co-operation and Development (OECD) and St. Louis Federal Reserve. We include bond yields as an explanatory variable because government bonds are a safe alternative asset to equities and other riskier financial assets, as previously discussed. The higher demand for alternative riskier and higher return assets may be driven by higher positive expectations concerning profitability and positive expectations about future economic activity, see also the BIS (2023). With market participants shifting their portfolios out of bonds and into riskier assets such as equities, this will generate rising overall equity prices and may improve the valuation of some or most corporations/firms even if this improved valuation may not be due to the internal mechanisms and profitability of corporations. Therefore, generating a "perverse valuation effect" making M&A more expensive.

Along these lines, Shleifer and Vishny (2003) examine stock-market-driven acquisitions and emphasize the behavioural corporate finance aspect, for which the purchase of equity and issuance of debt is a response to market mispricing. In their setting, mispricing is taken as given and they emphasize the incentive for firms to get their equity overvalued. This follows based on the assertion that overvalued equity can be used to acquire assets and allow growth, whereas undervalued firms become targets of a hostile takeover. Related to our perverse valuation effect is the literature on stock price reactions to the announcement of M&A, the valuation of target firms, the impact of peaks in stock prices influencing bids and the role of expectations exhibiting a feedback in acquisition prices. These factors are documented to influence the success of M&A deals, see among others, Baker et al. (2012), Betton et al. (2014), Ye (2014) and Liao et al. (2021). Furthermore, Mulherin et al. (2017) and Cumming et al. (2023) provide a comprehensive historical and modern review on the evidence and trajectory of M&A activity.

3.1. Stylized facts and observed patterns

Fig. 1 shows the sum of M&A activity of EU countries over 2006:Q1–2022:Q2 and the average EBITDA multiple across the EU.[14] M&A activity has increased over this period and one of the crucial factors that may have driven this increase is the advantage of a single currency in the Eurozone. This outcome has eliminated currency risks and transaction costs associated with currency volatility concerning cross border mergers, see also Campa and Hernando (2006) and Moschieri and Campa (2014). The elimination of barriers, a single currency union and internationalization of markets has allowed a more competitive market with easier access to debt. This has generated an increase in profitability measures in the form of the average EBITDA multiple across the EU and an increase in aggregate M&A activity across the EU.

Fig. 1 shows a similar trajectory and positive systematic association between the sum of M&A activity and the average EBITDA multiple across the EU. As it can be observed, aggregate M&A activity has a lower bound of approximately 300 transactions per quarter (left y-axis) and a lower bound of an approximate EBITDA multiple of 7 (right y-axis). These lower bounds may be considered as the minimum in which investors are willing to bargain for and enter in M&A. This may coincide with periods of economic downturn in which M&A transactions continue to take place (Steiner, 1975). However, profitability and M&A activity exhibit a steep decrease over the 2007–2009 period coinciding with the GFC. This steep decrease may have been driven by greater global risk aversion along with increasing difficulty to access financial capital. Furthermore, investors had to recover after losses during the GFC, becoming more risk averse in the subsequent years. After the Euro crisis and at the beginning of 2014, substantial investments started to take place again on a larger basis in Europe. These events followed a trend of corporate restructuring and many large multinational enterprises were eager to be active in the M&A market. Fund sizes increased and generated higher M&A activity. Moreover, the increasingly stable EU economy attracted more foreign investment from North America and China (Garkusha et al., 2015).

In the last 10 years, the market has recovered, partially due to the low-interest rate policy of the European Central Bank (ECB) and the U.S. Federal Reserve (Fed). Furthermore, the greater global financial

[14] This is the sum of the total number of deals per quarter with a deal value equal to or greater than 1 million euros and the acquired company is in the EU and this covers 21 EU member states over 2006:Q1–2022:Q2.

Table 1
Panel OLS regressions with M&A activity as a dependent variable.

Explanatory variables	Sample: 2006:Q1–2022:Q2			
	(1)	(2)	(3)	(4)
$Bond\_Yields$	−1.02*** (−3.74)	−0.70*** (−2.61)	−1.99*** (−7.02)	−1.57*** (−5.83)
$\pi(annualized)$	−0.01 (−0.08)	:	0.55*** (3.72)	:
$\pi(annual)$	:	−0.06 (−0.16)	:	−0.46 (−1.54)
$GDP\_G(annualized)$	0.2*** (3.20)	:	0.2*** (2.61)	:
$GDP\_G(annual)$	:	0.84*** (5.70)	:	0.90*** (6.29)
$\Delta EBITDA\_Mult$	−0.01 (−1.40)	0.07 (0.82)	−0.01 (−1.42)	−0.01 (−1.54)
ΔVIX	0.03 (1.44)	0.04* (1.82)	0.05** (2.43)	0.03 (1.35)
Number of observations	732	731	730	728
Number of EU countries	21	21	21	21
Country fixed effects	Yes	Yes	Yes	Yes
Time effects	No	No	No	No
F-statistic	6.36*** (0.00)	11.18*** (0.00)	17.74*** (0.00)	21.19*** (0.00)
R^2	0.04	0.07	0.11	0.13

Note: Robust t-statistics for parameter estimates, *p < 0.10, **p < 0.05, ***p < 0.01 significance levels. For the F-statistics, p-values are in the parentheses. For (specification) (1), Bond yields, inflation, real GDP growth and changes in EBITDA, all enter with a 1 lag term and changes in VIX enters with a 5 lag term. For (2) Bond yields, inflation and real GDP growth enter with a 1 lag term. Changes in EBITDA and changes in VIX enter with a 2 and 5 lag term, respectively. For (3) inflation, real GDP growth and changes in VIX enter contemporaneously. Bond yields and changes in EBITDA enter with a 7 and 1 lag term, respectively. For (4) real GDP growth and changes in VIX enter contemporaneously, Bond yields, inflation and changes in EBITDA enter with a 9, 3 and 1 lag term, respectively.

liquidity driven by central bank bond purchases especially following the 2020 COVID-19 pandemic induced global recession, may have influenced M&A activity recovery. However, the global energy and inflation shocks in 2022 have resulted in central banks such as the U.S. Fed, the ECB, the Bank of England, the Bank of Canada and the Swiss National Bank raising policy rates substantially and reducing their bond purchases. These central banks continued to follow a trajectory of policy tightening in 2023, influencing the reduction in EU M&A activity over the first two quarters of 2022 and possibly influencing the trajectory of M&A activity, profitability and valuations in the following quarters of 2023. Additionally, the 2023 cross-Atlantic banking crises concerning Silicon Valley Bank and Signature Bank in the U.S., as well as Credit Suisse and Deutsche Bank in Europe, may influence the trajectory of M&A activity over 2023–2025.

4. Methodology

We use panel OLS regressions to examine how changes in macroeconomic activity and financial measures influence M&A activity across the EU over the 2006:Q1–2022:Q2 period. This allows us to establish insights about M&A activity across EU countries and the dynamic relationship between M&A activity and a wide array of macroeconomic variables. We estimate different specifications of the following general panel regression model:

$$M\&A_{i,t} = \alpha_i + \kappa_t + \alpha_1 Bond\_Yields_{i,t-j} + \alpha_2 \pi_{i,t-j} + \alpha_3 GDP\_G_{i,t-j} + \alpha_4 \Delta EBITDA\_Mult_{i,t-j} + \alpha_5 \Delta VIX_{t-j} + \varepsilon_{i,t}, \quad (1)$$

where $M\&A_{i,t}$ is M&A activity (in country i in the EU at time t), and in particular, the subscripts $i = 1, \ldots, N$ and $t = 1, \ldots, T$ denote the EU countries in our sample and the quarterly time periods, respectively. Therefore, $Bond\_Yields_{i,t-j}$, $\pi_{i,t-j}$, $GDP\_G_{i,t-j}$, and $\Delta EBITDA\_Mult_{i,t-j}$ are $N \times 1$ vectors containing lagged values of bond yields, inflation, the growth rate of real GDP and percentage changes in the EBITDA multiple. Furthermore, ΔVIX_{t-j} are percentage changes in the Chicago Board Options Exchange Volatility Index, assumed to possibly affect all 21 EU countries.

κ_t is $T \times 1$ vector of time effects that controls for factors such as technological change, economy wide productivity improvements that may positively affect M&A activity and possibly common trends in M&A activity, see also Croci et al. (2023) for a related outline. Whereas α_i is a $N \times 1$ vector of country fixed effects that controls for country-specific time-invariant factors that may impact M&A activity, e.g. the tax policy and the market structure of each economy. The fixed effects model is suitable for our purposes because EU countries like Germany and France have higher M&A activity relative to Austria and Belgium even if observed macroeconomic variables such as interbank interest rates and inflation may be very similar for these countries. Fixed effects also capture that M&A activity may not necessarily show the same patterns across different regions in the same monetary union. For e.g. macroeconomic shocks might influence M&A in Germany differently than they would in Italy or Greece because of different regulations and market structures.[15]

Lastly, $\varepsilon_{i,t}$ is an $N \times 1$ vector of uncorrelated disturbances with zero mean and heteroskedastic country-specific variances of the form $\sigma^2_{i,\varepsilon}$. We use lagged values of the explanatory variables because this allows us to potentially address endogeneity issues in our model, see also De Haan et al. (2022) and Proaño et al. (2022). Moreover, and in our context, using lagged explanatory variables is compatible with the actual implementation of M&A activity for which deals take time for completion. Consequently, contemporaneous changes in macroeconomic activity may not be captured in M&A deals within the same quarter. Rather, changes in macroeconomic activity may only be captured in M&A deals with long and variable lags, see also Mulherin et al. (2017) for a comprehensive discussion concerning the structure of M&A deals, the types of offers and market conditions that influence the rate at which M&A deals are executed.

5. Results

Table 1 reports regression results based on multiple panel OLS regression specifications that include different lag structures and variable definitions. The significance levels reported in Table 1 are based on heteroskedasticity-robust standard errors. For M&A activity, we use level data rather than the log transformations because for some periods and some countries, there are no actual transactions. This is reported in the actual data as zero deals and we define this as zero M&A activity. Furthermore, with consecutive zero M&A activity data points, calculating a growth rate is infeasible. Therefore, we do not use log transformations on M&A activity.[16]

Concerning EBITDA multiples, we have an unbalanced data set because when no value is reported in the data, we remove it from

[15] We also considered pooled, random effects, the between estimator and first difference estimator methods. To test which of these models – along with the time and fixed effects – is the most suitable for our data, we use the Breusch Pagan multiplier test, Hausman test, and F-test. The tests indicate that the time and fixed effects models are the most suitable for the data.

[16] Other recent studies such as Zheng and Mao (2024) and that concern U.S. M&A of fintech companies, resort to excluding observations with missing transaction values and proceed to construct the log of the transaction value in U.S. Dollar millions for the remaining sample and use these in their regression model. Their procedure reduces an initial sample of 34,649 M&A transactions to a refined sample of 16,441 M&A transactions, see also Ellahie et al. (2024).

the data set.[17] Table 1 shows that independently of whether or not time effects are included in the panel regressions, higher economic growth is associated with higher M&A activity. This is consistent with well-established knowledge that better economic performance – in the form of GDP or GNP – improves M&A activity. In our setting, this is irrespective of annual or annualized real seasonally adjusted GDP growth and it reinforces that M&A activity benefits from better economic performance. Therefore, countries with higher economic growth will generate higher M&A activity. Furthermore, over the total sample, this result is statistically significant at all standard levels of significance.

In contrast, rising and higher bond yields are associated with a reduction in M&A activity. This result is statistically significant at all standard levels of significance. Therefore, over the total sample period, on average, EU countries with a 5 percentage points increase in bond yields experience an average reduction of approximately 7 M&A deals.[18] This is for M&A deals that fulfil the criteria of a deal value equal to or greater than 1 million Euros and the acquired company is in the EU.

Our findings also reinforce the heterogeneity in market valuation concerning EU bonds, the differences in EU bond yields and the financial market fragmentation in the EU, see also Horváth (2016), Ehrmann and Fratzscher (2017), Cuaresma and Fernández (2024) and Barbieri et al. (2024). Consequently, our "perverse valuation effect" shows that rising and higher bond yields are associated with M&A being more expensive over time. Our data and estimation methodology support the assertion that better economic performance and rising and higher bond yields are significantly associated with M&A activity in the EU.

Irrespective of the specification in Table 1, an increase in annual or annualized inflation is associated with a reduction in M&A activity. However, except for one specification, this effect is not statistically significant at standard levels of significance. Concerning the EBITDA multiple, Table 1 shows that positive percentage changes in the EBITDA multiple and thus higher firm valuations, are associated with a reduction in M&A activity. However, just like with inflation, this effect is not statistically significant at standard levels of significance.[19]

We find a similar effect with respect to the short-term global financial uncertainty measure. Additionally, the F-statistics that measure the joint significance of the model's parameters for all regression specifications in Table 1 show that the model's coefficient estimates are jointly significant at standard levels of significance. Table 1 shows that real GDP growth and bond yields have the highest influence on M&A deals. Moreover, these effects are based on lag effects, rather than contemporaneous effects within the same quarterly period. This reinforces that the actual implementation of M&A activity and deals takes time for completion.

Consequently, contemporaneous changes in crucial macroeconomic variables may not be captured in M&A deals within the same quarter. Rather, changes in macroeconomic activity may only be captured in M&A deals with long and variable lags. We now interpret our model results concerning the high volatility and uncertainty in the EU and global economy sample (2007:Q1–2013:Q4), these results are reported in Table 2. Additionally, the second subsample captures a period of greater stability in the Euro area (2014:Q1–2022:Q2) and the associated results are reported in Table 3. One key result that is robust and is consistent in Tables 1, 2 and 3 is that M&A activity benefits from better economic performance. Therefore, countries with higher economic growth will generate higher M&A activity.

Table 2
Panel OLS regressions with M&A activity as a dependent variable.

Explanatory variables	Subsample 2006:Q1–2013:Q4			
	(1)	(2)	(3)	(4)
$Bond\_Yields$	−0.05 (−0.14)	0.50 (1.40)	0.43 (1.14)	0.61** (1.85)
$\pi(annualized)$	−0.16 (−0.83)	:	0.59*** (3.14)	:
$\pi(annual)$	:	−0.61 (−1.14)	:	0.61 (1.27)
$GDP\_G(annualized)$	0.46*** (3.50)	:	0.42*** (3.22)	:
$GDP\_G(annual)$	:	1.14*** (5.49)	:	1.23*** (6.02)
$\Delta EBITDA\_Mult$	0.013 (1.23)	−0.01 (−1.21)	0.01 (1.30)	−0.01 (−1.50)
ΔVIX	0.09 (4.00)	0.08*** (3.24)	0.09*** (4.26)	0.08 (3.57)
Number of observations	330	330	326	325
Number of EU countries	21	21	21	21
Country fixed effects	Yes	Yes	Yes	Yes
Time effects	No	No	No	No
F-statistic	7.19*** (0.00)	11.29*** (0.00)	9.35*** (0.00)	12.93*** (0.00)
R^2	0.11	0.16	0.13	0.18

Note: Robust *t*-statistics for parameter estimates, *p < 0.10, **p < 0.05, ***p < 0.01 significance levels. For the F-statistics, p-values are in the parentheses. For (specification) (1), Bond yields, inflation, and real GDP growth, all enter with a 1 lag term. Changes in EBITDA and changes in VIX enter contemporaneously. For (2) Bond yields, inflation, real GDP growth and changes in EBITDA enter with a 1 lag term. Changes in VIX enter contemporaneously. For (3) inflation, changes in VIX and changes in EBITDA enter contemporaneously. Real GDP growth enters with a 1 lag term. Bond yields enter with a 9 lag term. For (4) real GDP growth, changes in VIX enter and bond yields enter contemporaneously, inflation enters with a 8 lag term and changes in EBITDA enters with 1 lag term.

This finding is statistically significant at all standard levels of significance. The other explanatory variables do not deliver parameter estimates that are statistically and economically significant over the different subsamples associated with different volatility regimes. However, the F-statistics that measure the joint significance of the model's parameters for all regression specifications, show that the model's coefficient estimates are jointly significant at standard levels of significance. Across all sample periods, including time effects do not generate better individual parameter estimates relative to a model based only on fixed effects. Therefore, we do not report estimates for model specifications that account for time effects.

To account for additional explanatory variables in our model especially over the subsamples, we had initially controlled for economic and policy uncertainty unique to each country and this is a longer horizon uncertainty measure which is associated with a country's long-term future development potential. Thus, we used a newly constructed economic and policy uncertainty index by Ahir et al. (2022) based on text-mining the country reports from the Economist Intelligence Unit (EIU) and this data spans from 1952Q1–2022Q3. These reports are comprehensive to the extent to which they analyse the economy, policies, and politics of each country. A higher index value means higher uncertainty in a specific country and this index tends to rise closer to political elections. Therefore, increasing uncertainty across EU countries may generate lower M&A activity, particularly, for the acquired or target companies operating in countries with higher uncertainty.

Based on preliminary findings, we found that positive percentage changes in economic and policy uncertainty are negatively associated

[17] To estimate the influence of the explanatory variables on M&A activity, we follow a simple approach by choosing lag values that maximize the R-squared measure, along with robustness between annual and annualized inflation and real GDP growth.

[18] This is an average effect across all specifications in Table 1.

[19] Noting that firm valuation based on the EBITDA multiple differs to firm valuation based on equities and thus the basis of our "perverse valuation effect".

Table 3
Panel OLS regressions with M&A activity as a dependent variable.

Explanatory variables	Subsample 2014:Q1–2022:Q4			
	(1)	(2)	(3)	(4)
$Bond\_Yields$	0.14 (0.14)	−1.35 (−1.47)	−0.76 (−0.93)	0.19 (0.22)
$\pi(annualized)$	−0.17 (−0.89)	:	0.77*** (3.90)	:
$\pi(annual)$	:	−0.45 (−0.98)	:	−1.14 (−2.45)
$GDP\_G(annualized)$	0.22*** (3.16)	:	0.17*** (2.69)	:
$GDP\_G(annual)$	:	0.84*** (4.10)	:	1.07*** (5.30)
$\Delta EBITDA\_Mult$	−0.002 (−0.24)	−0.003 (−0.28)	−0.02 (−0.21)	0.01 (0.83)
ΔVIX	0.10 (2.97)	−0.07** (−1.97)	0.09** (2.59)	0.04 (1.30)
Number of observations	349	349	346	353
Number of EU countries	21	21	21	21
Country fixed effects	Yes	Yes	Yes	Yes
Time effects	No	No	No	No
F-statistic	3.19*** (0.00)	3.74*** (0.00)	6.57*** (0.00)	7.19*** (0.00)
R^2	0.05	0.06	0.093	0.098

Note: Robust *t*-statistics for parameter estimates, *p < 0.10, **p < 0.05, ***p < 0.01 significance levels. For the F-statistics, p-values are in the parentheses. For (specification) (1), Bond yields, inflation, real GDP growth and changes in EBITDA, all enter with a 1 lag term and changes in VIX enters with a 5 lag term. For (2) Bond yields, inflation and real GDP growth enter with a 1 lag term. Changes in EBITDA enters with a 6 lag term and changes in VIX enters contemporaneously. For (3) inflation enters contemporaneously, real GDP growth enters with a 1 lag term and bond yields enter with a 5 lag term. Changes in VIX and in EBITDA enter with a 7 and 9 lag term, respectively. For (4) real GDP growth enters contemporaneously, changes in VIX, bond yields and inflation enter with a 3 lag term and EBITDA with a 2 lag.

with M&A activity. However, this effect is not quantitatively and statistically significant across all specifications.[20] The accuracy, reliability and consistency of the economic and policy uncertainty index data is validated when examining the data for countries such as the U.S. and for emerging economies such as South Africa. When examining the data for EU countries in our sample, in many instances, the index does not exhibit values that are consistent with actual periods of high uncertainty.

In many instances and for the EU, the index measure does not provide values to back and validate its accuracy. For e.g. for Greece at the height of the Euro Debt crisis, especially over 2011:Q1 to 2012:Q1 with a spike in public debt to GDP and bond yields rising to 30%. This is also documented by Horváth (2016) as the peak of financial market fragmentation in the Eurozone because of substantial bond yield spreads between core Eurozone countries such as Germany and France relative to periphery Eurozone countries such as Greece, Portugal, Ireland, Italy, Spain and Cyprus.

Unfortunately, the economic and policy uncertainty index in Ahir et al. (2022) reports multiple zero values and thus no economic and policy uncertainty during this tumultuous period in the Eurozone. However, the highest uncertainty value is reported for Greece in 2012:Q2. In contrast, an EU country such as Belgium, the index does provide values to back and validate its accuracy and consistent with actual events.

This suggests insufficient information to compile the index to accurately capture uncertainty associated with important economic events. Thus, during periods of high uncertainty for some EU countries, the index does not provide values consistent with high uncertainty and this is also evident for core EU countries like Germany. Therefore, in our final results and model specifications, we removed this uncertainty measure as an explanatory variable for M&A activity. However, we do believe that economic and policy uncertainty, which is associated with a country's long-term future development potential, affects M&A activity and with better accuracy and sufficient information to compile the index for some EU countries, regression results may show this effect. In a related manner, Sha et al. (2020) examine the relationship between economic policy uncertainty and M&A in China. Contrary to the behaviour of Western firms, they show that Chinese firms are more likely to conduct acquisitions during periods of high economic policy uncertainty.

6. Concluding remarks and outlook

The growth of companies is facilitated by M&A activity and the potential economic gains associated with M&A incentivize this process. However, the contrasting findings concerning macroeconomic, financial and policy variables that influence M&A activity, including the differences between countries, show that the M&A process is consistently evolving. This also varies based on the market structure and economic performance of each country along with policy and regulations associated with each economy. We examine the macroeconomic and financial determinants of M&A activity using panel data over 2006:Q1–2022:Q2 for 21 EU countries. Across different model specifications we find that bond yields and real GDP growth are robust quantitatively and statistically significant determinants of M&A even after controlling for inflation and short-term global financial uncertainty. Additionally, we investigate the effect of the EBITDA multiple as an additional explanatory variable.

A crucial novelty of our study is that bond yields are negatively associated with M&A activity because investors shift their portfolios out of bonds and into riskier assets such as equities. We denote this as a "perverse valuation effect" that makes M&A more expensive. This interpretation and channel are unique to our study. Our findings show that bond yields and the "perverse valuation effect" has the highest influence on M&A deals across the total sample period. Moreover, there are lag effects associated with macroeconomic activity, rather than contemporaneous effects within the same quarter. This reinforces that the actual implementation of M&A activity and deals, takes time for completion. Consequently, changes in macroeconomic activity may only be captured in M&A deals with long and variable lags.

In the current setting, our study uses a data structure aggregated at the transaction level consistent with numerous studies including the recent study by Kellner (2024) that concerns M&A in the EU. For future research we will consider the proportion of the deal number (or deal amount) of cross-border M&A as an additional control variable to capture the systemic differences between domestic and cross-border transactions and for each of the 21 EU countries in our sample with a data set that spans 2006:Q1–2024:Q4 once the data becomes available. We could then reconstruct systematically the proportion of the deal numbers (or deal amount) of cross-border M&A for each of the 21 EU countries and over 2006:Q1–2024:Q4 and augment this with updated macroeconomic and financial indicators for each of the 21 EU countries. Following this approach may provide us with more insights concerning domestic and cross-border M&A, the associated macroeconomic and financial determinants of M&A within such an environment and this may allow us to explore other research questions.

Additionally, for future research, we may also examine non-linearities between M&A activity and a wide array of macroeconomic and financial variables. In particular, we may establish a threshold value of bond yields beyond which the "perverse valuation effect" on M&A activity may become particularly strong. For this, we plan to use a dynamic panel threshold model following Kremer et al. (2013) and

[20] We also wanted to use a trade uncertainty index for each country, however, for most of the EU countries there are consecutive zero values.

Proaño et al. (2014). Secondly, as in Jawadi et al. (2016), we may pursue a panel VAR approach to describe the reaction of M&A activity following several structural shocks. Thus, we may establish whether bond yields generate significant M&A dynamic responses, especially relative to other macroeconomic and financial variables, and determine which structural shocks account for a large share in the forecast error variance of M&A activity and the associated forecast horizons.

As in Primiceri (2005), we may pursue a structural time-varying Bayesian VAR approach for two countries, namely Germany and France and compare the M&A dynamics across these countries, see also Garcia et al. (2024). We can compare these countries because they have the most active and significant M&A activity in the EU. Furthermore, these countries have a wide array of data that is available. By using individual countries, we can control for an economy wide credit channel by using a monetary policy rate such as the ECB marginal lending facility rate, the ECB deposit facility rate, an interbank rate of each country and thus a short-term nominal rate consistent with each economy in line with other empirical and monetary policy related studies (see for e.g. Clarida et al., 1998; Lubik and Schorfheide, 2007; Mateane and Proaño, 2020; Finck et al., 2023; Mateane et al., 2024). Using a structural time-varying Bayesian VAR may allow us to characterize time-variation in the transmission mechanism of monetary policy and bond yield shocks on M&A. This may potentially allow us to capture time-variation in the perverse valuation effects of bond yields on M&A in a system that controls for a wide array of macroeconomic and financial indicators.

Consequently, we can examine our "perverse valuation effect" using yields on 10-year government bonds for each country, while controlling for a credit channel using short-term rates and controlling for percentage changes in the associated aggregate stock market index of each country. For e.g. the DAX for Germany because this stock market index consists of 40 major German companies trading on the Frankfurt Stock Exchange and for France, the CAC 40 because this stock market index consists of 40 of the top listed companies trading on the Paris Stock Exchange. We can also control for short-term global financial uncertainty using the Chicago Board Options Exchange's Volatility Index and potentially alternative long term economic and policy uncertainty measures for each country. Following such an approach may provide us with more insights about the financial and macroeconomic determinants of M&A activity in the EU and core EU countries.

Declaration of competing interest

The authors have no potential conflict of interest to declare.

Appendix. Robustness — poisson regressions with M&A activity as a dependent variable

This appendix reports Poisson regressions results in Tables 4 and 5 for our model for which M&A activity is a dependent variable and the explanatory variables are the same as in the panel OLS regressions. Additionally, these results are for the total sample period 2006:Q1–2022:Q2 as in Table 1. For optimal lag selection, calculating the Akaike Information Criterion (AIC) and the Bayesian Information Criterion (BIC) tests suggest 5 and 4 lags respectively. Thus, for our Poisson regressions we use 4 lag terms for the explanatory variables.

Irrespective of the specification in the Poisson regressions, with (annual or annualized) real GDP growth and inflation, rising and higher bond yields are associated with a reduction in M&A activity. This result is quantitatively and statistically significant across all Poisson regressions over the total sample period and exhibits consistently the highest association with M&A activity over the total sample and relative to the other explanatory variables. Therefore, EU countries with rising and higher bond yields experience a reduction in M&A deals.

The Poisson regressions reinforce the "perverse valuation effect" and thus rising and higher bond yields are associated with a reduction in M&A activity. This highlights that this interpretation and channel that are unique to our study, are robust to different regression models and alternative regression specifications. Consistent with our panel OLS regressions, the Poisson regressions also show that an increase in annual inflation is associated with a reduction in M&A activity and these results are quantitatively and statistically significant at all levels of significance. Additionally, annual economic growth exhibits a statistically significant association with M&A, yet with the lowest quantitative association relative to inflation and bond yields and with a negative coefficient.

Lastly, across the multiple regression models and specifications, we find that changes in macroeconomic activity may only be captured in M&A deals with long and variable lags and thus the actual implementation of M&A activity and deals, takes time for completion rather than occurring contemporaneously and within the same quarter.

Table 4
Poisson regression with M&A activity as a dependent variable.

Explanatory variables	Estimate	Std. Error	z value
Intercept	4.1368***	0.0124	332.438
Change in EBITDA_Mult	0.0003	0.0001	1.883
Change in VIX	0.0001	0.0003	0.397
Inflation(annual)	−0.0444***	0.0069	−6.458
GDP(annual)	−0.0183***	0.0017	−10.797
Bond yields	−0.0760***	0.0046	−16.655
Number of observations		351	
Residual deviance		7645.1	
AIC		9576.0	

Note: * p < 0.10, ** p < 0.05, *** p < 0.01 for significance levels.

Table 5
Poisson regression with M&A activity as a dependent variable.

Explanatory variables	Estimate	Std. error	z value
Intercept	4.0813***	0.0115	353.426
Change in EBITDA_Mult	0.0003*	0.0001	1.968
Change in VIX	0.0002	0.0003	0.629
Inflation(annualized)	0.0361***	0.0088	4.091
GDP(annualized)	−0.0104***	0.0025	−4.105
Bond yields	−0.0920***	0.0044	−21.026
Number of observations		351	
Residual deviance		7785.3	
AIC		9716.2	

Note: * p < 0.10, ** p < 0.05, *** p < 0.01 for significance levels.

Data availability

Mendeley Link for Data: https://data.mendeley.com/datasets/s5yk5nv8t2/1.

References

Adra, S., Barbopoulos, L., 2018. The valuation effects of investor attention in stock-financed acquisitions. J. Empir. Financ. 45, 108–125.
Adra, S., Barbopoulos, L., Saunders, A., 2020. The impact of monetary policy on M & A outcomes. J. Corp. Finance 62, 101529.
Ahir, H., Bloom, N., Furceri, D., 2022. World Uncertainty Index. NBER Working Paper 29763.
Alcalde, N., Powell, R., 2022. Government intervention in European mergers and acquisitions. North Am. J. Econ. Finance 61, 101689.
Alexandridis, G., Antypas, N., Travlos, N., 2017. Value creation from M & As: New evidence. J. Corp. Finance 45, 632–650.
Bai, J., Jin, W., Serfling, M., 2021. Management practices and mergers and acquisitions. Manage. Sci. 68, 2141–2165.
Baker, S., Bloom, N., Davis, S., 2016. Measuring economic policy uncertainty. Q. J. Econ. 131, 1593–1636.
Baker, M., Pan, X., Wurgler, J., 2012. The effect of reference point prices on mergers and acquisitions. J. Financ. Econ. 106, 49–71.
Barbieri, C., Guerini, M., Napoletano, M., 2024. The anatomy of government bond yields synchronization in the Eurozone. Macroecon. Dyn. 1–38.

Becketti, S., 1986. Corporate mergers and the business cycle. Econ. Rev. 71, 13–26, Federal Reserve Bank of Kansas City.
Betton, S., Eckbo, B., Thompson, R., Thorburn, K., 2014. Merger negotiations with stock market feedback. J. Finance 69, 1705–1745.
Bianconi, M., Tan, C., 2019. Evaluating the instantaneous and medium-run impact of mergers and acquisitions on firm values. Int. Rev. Econ. Finance 59, 71–87.
Bank for International Settlements, 2023. International banking and financial market developments. Q. Rev. 2023.
Bonaime, A., Gulen, H., Ion, M., 2018. Does policy uncertainty affect mergers and acquisitions? J. Financ. Econ. 129, 531–558.
Bris, A., Brisley, N., Cabolis, C., 2008. Adopting better corporate governance: Evidence from cross-border mergers. J. Corp. Finance 14, 224–240.
Campa, J.M., Hernando, I., 2006. M & As performance in the European financial industry. J. Bank. Financ. 30, 3367–3392.
Choi, S.H., Jeon, B., 2011. The impact of the macroeconomic environment on merger activity: evidence from US time-series data. Appl. Financial Econ. 21, 233–249.
Clarida, R., Galí, J., Gertler, M., 1998. Monetary policy rules in practice: Some international evidence. Eur. Econ. Rev. 42, 1033–1067.
Coeurdacier, N., De Santis, R., Aviat, A., 2009. Cross-border mergers and acquisitions and European integration. Econ. Policy 57, 55–106.
Cohn, J., Liu, Z., Wardlaw, M., 2022. Count (and count-like) data in finance. J. Financ. Econ. 146, 529–552.
Cook, S., 2007. On the relationship between mergers and economic activity: Evidence from an optimized hybrid method. Phys. A 379, 628–634.
Croci, E., Mazur, M., Salganik-Shoshan, G., 2023. Coordinated monitoring and mergers and acquisitions. Eur. Financial Manag. 1–38.
Cuaresma, J.C., Fernández, O., 2024. Explaining long-term bond yields synchronization dynamics in Europe. Econ. Model. 133, 106684.
Cumming, D., Jindal, V., Kumar, S., Pandey, N., 2023. Mergers and acquisitions research in finance and accounting: Past, present, and future. Eur. Financial Manag. 1–41.
Dang, T., 2023. Does innovation drive mergers and acquisitions in the financial sector? Eur. Financial Manag. 1–33.
De Haan, J., Pleninger, R., Sturm, J.-E., 2022. Does financial development reduce the poverty gap? Soc. Indic. Res. 161, 1–27.
Demski, J., McCauley, R., McGuire, P., 2022. London As a Financial Centre Since Brexit: Evidence from the 2022 BIS Triennial Survey. BIS Bulletin No. 65.
Dong, F., Doukas, J., 2021. The effect of managers on M & As. J. Corp. Finance 68, 101934.
Doukas, J.A., Zhang, R., 2021. Managerial ability, corporate social culture, and M & As. J. Corp. Finance 68, 101942.
Ehrmann, M., Fratzscher, M., 2017. Euro area government bonds – Fragmentation and contagion during the sovereign debt crisis. J. Int. Money Finance 70, 26–44.
Ellahie, A., Hshieh, S., Zhang, F., 2024. Measuring the quality of mergers and acquisitions. Manag. Sci. Forthcoming.
Faulkner, D., Teerikangas, S., Joseph, R., 2012. The Handbook of Mergers and Acquisitions. Oxford University Press, USA (Eds).
Finck, D., Schmidt, J., Tillmann, P., 2023. Mortgage debt and time-varying monetary policy transmission. Macroecon. Dyn. 27, 506–531.
Finn, F., Hodgson, A., 2005. Takeover activity in Australia: endogenous and exogenous influences. Account. Finance 45, 375–394.
Fischer, J., Horn, C.-W., 2021. Does monetary policy affect mergers and acquisitions? In: Beiträge zur Jahrestagung des Vereins für Socialpolitik 2021: Climate Economics. ZBW – Leibniz Information Centre for Economics, Kiel, Hamburg.
Garcia, M., Guillen, D., Ribeiro, B., Cavaleiro, J., 2024. International macroeconomic vulnerability. J. Int. Money Finance 146, 103105.
García, C., Herrero, B., 2022. Corporate entrepreneurship and governance: Mergers and acquisitions in Europe. Technol. Forecast. Soc. Change 182, 121845.
Garkusha, V., Joyce, P., Lloyd, C., 2015. Corporate tax rate and recent inbound and outbound mergers and acquisitions activity in the United Kingdom. Procedia Econ. Finance 30, 271–282.
Golbe, D., White, L., 1988. A time-series analysis of mergers and acquisitions in the U.S. economy. In: Auerbach, Alan J. (Ed.), Corporate Takeovers: Causes and Consequences. University of Chicago Press, pp. 265–310.
Gort, M., 1969. An economic disturbance theory of mergers. Q. J. Econ. 83, 624–642.
Guerard, Jr., J., 1989. Mergers, stock prices, and industrial production: Further evidence. Econom. Lett. 30, 161–164.
Han, X., Wei, S.-J., 2018. International transmissions of monetary shocks: Between a trilemma and a dilemma. J. Int. Econ. 110, 205–219.
Harford, J., 2005. What drives merger waves? J. Financ. Econ. 77, 529–560.
Hines, J., 1996. Tax Policy and the Activities of Multinational Corporations. NBER Working Paper 5589.
Horváth, R., 2016. Financial market fragmentation and monetary transmission in the Euro area. In: Financial Market Fragmentation in the Euro Area: State of Play. Economic and Scientific Policy - European Parliament, Policy Department A.
Hossain, M., 2021. Merger & Acquisitions (M & As) as an important strategic vehicle in business: Thematic areas, research avenues & possible suggestions. J. Econ. Bus. 116, 106004.
Hsu, P.-H., Huang, P., Humphery-Jenner, M., Powell, R., 2021. Cross-border mergers and acquisitions for innovation. J. Int. Money Finance 112, 102320.
Hsueh, S., Tsao, Y., Tu, C., Chiu, Y., Liu, S., 2014. Can M & A activities act as a predictor of the performance of economic growth or stock prices? Econ. Model. 42, 430–438.
Jawadi, F., Mallick, S., Sousa, R., 2016. Fiscal and monetary policies in the BRICS: A panel VAR approach. Econ. Model. 58, 535–542.
Kellner, T., 2024. The impact of M & A announcements on stock returns in the European Union. Int. Rev. Econ. Finance 89, 843–862.
Kremer, S., Bick, A., Nautz, D., 2013. Inflation and growth: new evidence from a dynamic panel threshold analysis. Empir. Econ. 44, 861–878.
Kumar, A., Mallick, S., Mohanty, M., Zampolli, F., 2023. Market volatility, monetary policy and the term premium. Oxf. Bull. Econ. Stat. 85, 208–237.
Liao, R., Wang, X., Wu, G., 2021. The role of media in mergers and acquisitions. J. Int. Final. Mark. Inst. Money 74, 101299.
Lie, E., Lie, H., 2002. Multiples used to estimate corporate value. Financ. Anal. J. 58, 44–54.
Liu, J., Nissim, D., Thomas, J., 2002. Equity valuation using multiples. J. Account. Res. 40, 135–172.
Loureiro, G., Silva, S., 2021. The impact of securities regulation on the information environment around stock-financed acquisitions. J. Int. Final. Mark. Inst. Money 73, 101374.
Lubik, T., Schorfheide, F., 2007. Do central banks respond to exchange rate movements? A structural investigation. J. Monetary Econ. 54, 1069–1087.
Mager, F., Meyer-Fackler, M., 2017. Mergers and acquisitions in Germany: 1981–2010. Glob. Finance J. 34, 32–42.
Martynova, M., Renneboog, L., 2006. Mergers and Acquisitions in Europe, Vol. 2006-003. TILEC Discussion Paper.
Mateane, L., Proaño, C., 2020. Does monetary policy react asymmetrically to exchange rate misalignments? Evidence for South Africa. Empir. Econ. 58, 1639–1658.
Mateane, L., Proaño, C., Röhrer, F., 2024. The impact of aggregate demand shocks on Germany's trade balance and industry. Appl. Econ. Lett. 1–7. http://dx.doi.org/10.1080/13504851.2023.2298417.
Maung, M., Tang, Z., Wilson, C., Xu, X., 2021. Religion, risk aversion, and cross border mergers and acquisitions. J. Int. Final. Mark. Inst. Money 70, 101262.
Melicher, R., Ledolter, J., D'Antonio, L., 1983. A time series analysis of aggregate merger activity. Rev. Econ. Stat. 65, 423–430.
Mitchell, M., Stafford, E., 2000. Managerial decisions and long-term stock price performance. J. Bus. 73, 287–329.
Moschieri, C., Campa, J.M., 2014. New trends in mergers and acquisitions: Idiosyncrasies of the European market. J. Bus. Res. 67, 1478–1485.
Mueller, D., 1977. The effects of conglomerate mergers: A survey of the empirical evidence. J. Bank. Financ. 1, 315–347.
Mulherin, J., Netter, J., Poulsen, A., 2017. The evidence on mergers and acquisitions: A historical and modern report. In: The Handbook of the Economics of Corporate Governance. Vol. 1, pp. 235–290.
Nelson, R., 1959. Merger Movements in American Industry, 1895-1956. National Bureau of Economic Research and Princeton University Press, pp. 33–70, Chapt. 3.
Nguyen, N., Phan, H., 2017. Policy uncertainty and mergers and acquisitions. J. Financ. Quant. Anal. 52, 613–644.
Primiceri, G., 2005. Time varying structural vector autoregressions and monetary policy. Rev. Econ. Stud. 72, 821–852.
Proaño, C., Peña, J., Saalfeld, T., 2022. Inequality, macroeconomic performance and political polarization: a panel analysis of 20 advanced democracies. Rev. Soc. Econ. http://dx.doi.org/10.1080/00346764.2022.2047768.
Proaño, C., Schoder, C., Semmler, W., 2014. Financial stress, sovereign debt and economic activity in industrialized countries: Evidence from dynamic threshold regressions. J. Int. Money Finance 45, 17–37.
Resende, M., 2008. Mergers and acquisitions waves in the UK: a Markov-switching approach. Appl. Financial Econ. 18, 1067–1074.
Sha, Y., Kang, C., Wang, Z., 2020. Economic policy uncertainty and mergers and acquisitions: Evidence from China. Econ. Model. 89, 590–600.
Shaffer, M., 2023. Which multiples matter in M & A? An overview. Rev. Account. Stud. 1–29.
Shleifer, A., Vishny, R., 2003. Stock market driven acquisitions. J. Financ. Econ. 70, 295–311.
Steiner, P., 1975. Mergers: Motives, Effects, Policies. University of Michigan Press, Ann Arbor, 1975.
Tang, H., Fang, S., Jiang, D., 2022. The market value effect of digital mergers and acquisitions: Evidence from China. Econ. Model. 116, 106006.
Vasconcellos, G., Kish, R., 1998. Cross-border mergers and acquisitions: the European-US experience. J. Multinatl. Final. Manag. 8, 431–450.
Vydržel, K., Soukupová, V., 2012. Empirical examination of valuation methods used in private equity practice in the Czech Republic. J. Priv. Equity 16, 83–99.
Ye, P., 2014. Does the disposition effect matter in corporate takeovers? evidence from institutional investors of target companies. J. Financ. Quant. Anal. 49, 221–248.
Zheng, H., Mao, M., 2024. Fintech mergers and acquisitions. J. Int. Money Finance 143, 103076.