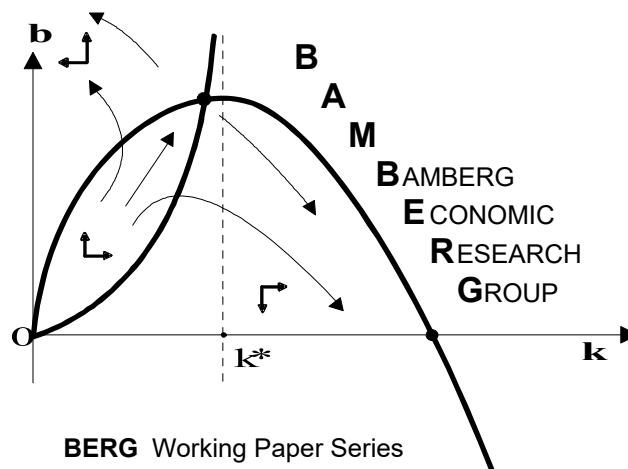# The Impact of Macroeconomic Activity and Yield Valuation on Mergers and Acquisitions in Europe

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The Impact of Macroeconomic Activity and Yield Valuation on Mergers and Acquisitions in Europe[*]

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Abstract

We examine the macroeconomic determinants of mergers and acquisitions (M&A) using panel data over 2006:Q1 - 2022:Q2 for 21 European Union (EU) countries. Across different model specifications we find that bond yields and past 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 earnings before interest, taxes, depreciation and amortization multiple as an additional explanatory variable. A crucial novelty of our study is that bond yields reduce M&A activity because other investors are shifting their portfolios out of bonds and into riskier assets such as equities. We denote this as a "perverse valuation effect" making M&A more expensive. This interpretation and channel is unique to our study.

JEL Classification: E00, E02, G15, G34

Keywords: Mergers and Acquisitions, Financial markets, Macroeconomy, European Union

1 Introduction

Mergers and acquisitions (M&A) are an important corporate mechanism in facilitating the expansion of companies, enabling the best allocation of corporate assets, increasing the capital base and liquidity of companies and concentrating industries (Andrade and Stafford,1999; Rossi and Volpin, 2004). Furthermore, Mueller (1977) and Coeurdacier et al. (2009) identify the potential economic gains associated with M&A such as, capital deployment in the merged firm to the divisions or operations that are most profitable and efficient in production, the replacement of incompetent managers following a merger, rapid expansion, technological advances and higher stock market valuation following a merger, a decline in borrowing costs reinforced by potentially improved profitability and the diversification of income streams, risk reduction and thus improved risk/return outcomes for the merged entity.

According to Refinitiv, in 2021 global M&A volume reached an all-time high at 5.9 trillion US dollars with 63,000 M&A deals.[1] This represents an increase of 134% in total volume and 50% in the total number of M&A deals since 2011. However, this recent increase in M&A activity is not unique. There was a similar episode in M&A activity during the heightened conglomerate M&A in the 1960s. The recurrent nature of M&A has led to theories concerning factors that can drive surges and waves in M&A activity. 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) and Harford (2005) document that M&A activity generally occurs in waves, this activity exhibits clustering in calendar dates and by industry.

M&A research has mostly focused on Anglo-Saxon countries rather than on the European Union (EU). This is because the United States of America (US) is home to the most active M&A market globally. Second, the quality and quantity of data in the US market is unmatched. Moreover, New York and London are the main global financial centres and London has maintained its pre-eminence in international banking even after Brexit, see Demski et al. (2022). In contrast, there is limited research on M&A activity within EU countries and across the EU. Consequently, there is limited research on the association between macroeconomic factors and M&A activity within the EU and across continental Europe. We examine the relationship between M&A activity and macroeconomic variables with emphasis on the heterogeneity across EU countries along with the variation over time.

We focus on this market to better understand the macroeconomic driving factors of M&A in the EU. Our study is relevant because of the rapid EU integration, rapid development of EU financial markets and greater EU financial and trade integration with the rest of the world. Furthermore, our study is motivated by additional factors such as that M&A activity is apparently less hostile in Europe relative to the Anglo-Saxon space. Hostile takeovers are common in the Anglo-Saxon space and are extremely rare in Europe where government intervention supports friendly deals, and this leads to a decrease in competing offers for companies, see Moschieri and Campa (2014).

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

Government protection and intervention is higher in the EU and governments are often shareholders in companies that perform duties of national interest like telecommunication, banking, and electricity generation (Alcade and Powell, 2022). Therefore, the degree to which EU governments do not want outside investors to take control over these crucial industries will vary. Consequently, the macroeconomic driving factors of M&A in the EU may diverge from the Anglo-Saxon space. 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 relative to the Anglo-Saxon space.

Although, the quality and quantity of data varies between EU countries, we analyze a panel data set of 21 EU countries over 2006:Q1 – 2022:Q2. We use panel data methods to examine the impact of macroeconomic variables and earnings before interest, taxes, depreciation and amortization (EBITDA) multiples on M&A activity. Furthermore, we use lagged explanatory variables because this allows us 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 allows 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 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 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 and moderation in sovereign bond markets driven by greater policy and multilateral interventions in the US and the EU, see also Ehrmann and Fratzscher (2017). Estimating our model over the three sample periods allows us to establish whether each explanatory variable generates a quantitative and statistically significant effect on M&A activity across different economic regimes that had a significant impact on the EU.

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

Our simple approach allows us to contribute to the literature in several ways. First, while many authors 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 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 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 (Liu et al., 2002; Lie and Lie 2002). 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; Vydržel, Soukopová, 2012). 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 has two main 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. Furthermore, and according to a survey conducted by Vydržel and Soukopová (2012), EBITDA is by far the most widely used market multiple by professionals, where 94% of participants use EBITDA multiples in the valuation process relative to 42% of participants that use other profitability measures such as the P/E ratio. Despite the importance of the EBITDA multiple in M&A deals, to the best of our knowledge, no existing studies examine the relationship between EBITDA multiples and M&A activity along with controlling for a wide array of macroeconomic variables. Relative to our approach, numerous studies examine the microeconomic factors, industry level, firm level, and macroeconomic level factors that drive M&A activity, mainly for the US, see for e.g., Hines (1996), Garkusha et al. (2015) and Bai et al. (2021). Interestingly, higher EBITDA multiples often occur during periods of M&A waves. Thus, understanding M&A activity over different economic situations is important because of the potential positive impact on the acquired companies and the economy (Alexandridis et al., 2017).

The second contribution of our study is that we find that rising and higher bond yields across EU countries and over time, negatively affect M&A activity across EU countries. Thus, an increase in bond yields reduces M&A activity. This result is robustly quantitatively and statistically significant across all model specifications over the total sample period. 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. Further, this market outcome is typically 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 other 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.

Rather, the higher valuation may be due to financial market activity, expectations, excess money supply and possibly due to asset price bubbles. Thus, potential acquisitions become expensive and this negatively affects M&A activity and delays M&A activity up until there is a correction in the valuation of firms. Therefore, acquisitions become expensive not because of a higher cost of funding/credit channel through short-term rates as in Becketti (1986) and Fischer and Horn (2021) but because of higher valuations of firms possibly driven by higher economy wide equity prices.[2] We denote this as a "perverse valuation effect" making M&A more expensive.[3] This interpretation and channel is unique to our study and is the second contribution of our study.[4]

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

2 Literature Review

Concerning M&A activity within European countries and across continental Europe, existing studies differ from our paper. For e.g., Coeurdacier et al. (2009) examine the main forces driving bilateral cross-border M&A among Euro area manufacturing and services firms over 1985–2004.[5] 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&As 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

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[2] To capture the cost of funding channel, Becketti (1986) uses 3-month treasury bill rates and Fischer and Horn (2021), use the 1-year US Treasury rate as monetary policy instrument. In contrast, we use OECD data on long term government bond yields 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 https://www.ecb.europa.eu/press/key/date/2022/html/ecb.sp221011~5062b44330.en.html

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

[4] 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.

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

mainly informed by the structural characteristics of the EU business environment; along with EU regulations. Concerning the largest EU economy, 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.[6]

Using 1,832 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.

Nelson (1959) is one of the first researchers to examine M&A activity by examining the first modern merger wave in detail using US data over 1895-1956. His study analyzes mergers and their relationship with specific periods of the business cycles, connected growth rates of industries, and the clustered appearance of mergers in industries.[7] During this period, it was mainly production related industries that were the main merger candidates. Another earlier study is by Melicher et al. (1983) who show that macroeconomic and financial market variables are associated with M&A activity. Melicher et al. (1983) report that stock price changes and bond yields are significantly correlated with M&A activity; particularly, mergers respond inversely to changes in lagged bond yields, these 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.[8] Continuing in this tradition, Becketti (1986) uses a wide array of US 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) examine the impact of US macroeconomic variables on M&A activity. However, they only use companies worth over 10 million US Dollars in the manufacturing and mining sector. Their results suggest that GNP has a consistently positive and statistically significant effect on US M&A activity, and they emphasize that Tobin's Q has a strong positive effect on US M&A activity.

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

[7] In recent times, M&A activity is evident in many industries and on a large scale, however, specific industries show more M&A activity than others during periods of high investor interest for e.g., the internet bubble.

[8] 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 US.

However, Guerard (1989) finds that stock prices and industrial production (IP) are not statistically significantly associated with M&A activity in the US. In contrast and for Australia, Finn and Hodgson (2005) document 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 a statistically significant relationship between, stock prices, GDP and M&A activity, however inflation does not exhibit a statistically significant relationship with M&A activity. Choi and Jeon (2011) examine the impact of the performance of the US economy on M&A activity. They 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 US - 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 the same policy uncertainty index, however based on US macroeconomic and firm level data, Bonaime et al. (2018) show that policy uncertainty negatively affects M&A activity.[9] Fischer and Horn (2021) use a multivariate-multi-equation system to examine the impact of monetary policy on M&A activity using US data. They estimate a Bayesian proxy structural VAR that incorporates variables such as monthly aggregate (inflation adjusted) deal value (or the total number of deals), 1 year US 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.

Furthermore, 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 linear probability 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 macroeconomic control variables are the same as those in the Bayesian proxy 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

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[9]Bonaime et al. (2018) explain that this index accounts for policy uncertainty unrelated to elections and this is important 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 US 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.

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. And, these findings vary based on the market structure and economic performance of each country along with policy and regulations associated with each economy.

3   Data

We use several data sources to construct our panel data set that covers 2006:Q1-2022:Q2. We also divide our total sample period into two separate periods. The first subsample covers the 2007:Q1-2013:Q4 period and characterizes 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 mulitples data is derived from Refinitiv's database.[10] We only consider M&A transactions that fulfil the criteria of a deal value greater or equal to 1 million Euros and the acquired company is in the EU, see also Nguyen and Phan (2017) and Boiname et al. (2018) for the consensus approach about the criteria of deal values examined in the literature. Our M&A activity data is based on 32,601 single transactions. Therefore, our dependent variable of M&A activity is the total number of deals per quarter with a deal value greater or equal to 1 million Euros and the acquired company is in the EU and this covers 21 EU member states over 2006:Q1-2022:Q2.[11]

The EBITDA data consists of 4,741 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.[12] A significant deficiency of this database is that for some countries not all deals have an

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[10] A subsidiary of London Stock Exchange Group and this data is available on a paid subscription.

[11] 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.

[12] For e.g., if the EBITDA of a company is 90 Million Euros and the associated average EBITDA multiple for privately held companies in this range is 60, then this would imply a current valuation of 540 Million Euros in enterprise value.

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 and 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 gross domestic product (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 an explanatory variable. In our model, GDP is an explanatory variable because higher economic activity may generate higher corporate net revenue, profitability after taxes 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). Thus, we control for short-term global financial uncertainty that affects all the EU countries.

We use bond yields data from the Organisation for Economic Co-operation and Development (OECD) and St. Louis Federal Reserve. This data is for long term government bond yields of 10-year maturity. We include bond yields as an explanatory variable because government bonds are a safe alternative asset to equities and other riskier financial assets. Furthermore, there is an inverse relationship between bond prices and bond yields. Thus, higher and rising government bond prices, are associated with falling bond yields. In contrast, rising bond yields are associated with falling bond prices. This may be driven by a lower demand for bonds and a higher supply of bonds of a specific EU region, especially in the secondary market. This market dynamic is typically 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 about future economic activity. With other 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.[13]

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&As, the valuation of target firms, the impact of peeks 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 Mulherin et al. (2017) who provide a comprehensive historical and modern review on the evidence of M&A activity.

3.1 Stylized Facts and Observed Patterns

During the last century, M&A has developed into a regular phenomenon in the US. However, over the same period, M&A in Europe and Asia has remained largely underdeveloped. Moschieri and Campa (2014) explain that in some European countries, investor protection has not advanced as much as in the US and UK. However, these authors describe that in France and Germany, the regulatory protection of the stakeholder is regarded higher and this has generated a higher prevalence of cash-only bids in Europe. Figure 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, which 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. Figure 1 shows a similar trajectory and positive systematic association between the sum of M&A activity and the average EBITDA multiple across the EU. However, aggregate M&A activity has a lower bound of 300 transactions per quarter (left y-axis) and a lower bound of an EBITDA multiple of 7 (right y-axis). These lower bounds may be considered as the minimum in which investors are willing to bargain for

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[13]Consistent with our "perverse valuation effect", Becketti (1986) discuss that acquisitions are more expensive when the market value of all firms is higher. In contrast, if equity prices of firms are undervalued, this will increase the number of mergers.

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

and enter in M&A; this may coincide with periods of economic downturn of which M&A transactions continue to take place (Steiner, 1975).

Figure 1: Average EU EBITDA multiple and Total EU M&A activity
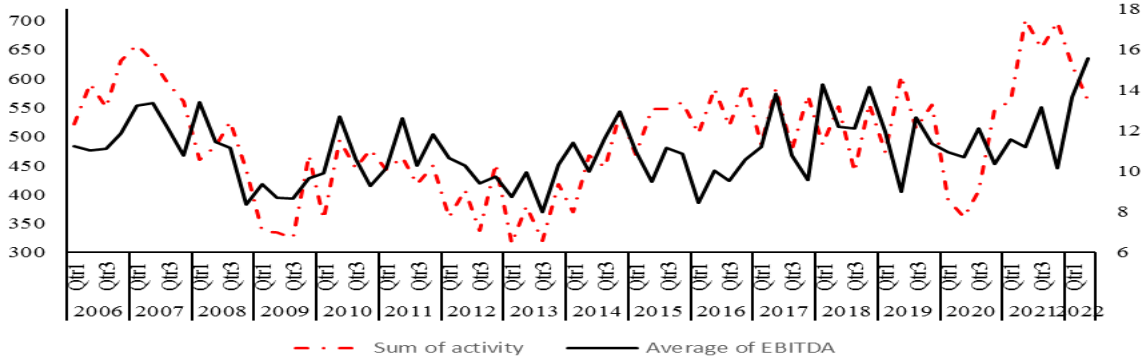
However, profitability and M&A activity exhibit a steep decrease over the 2007-2009 period coinciding with the Great Financial Crisis (GFC). This steep decrease may have been driven by greater global risk aversion along with increasing difficulty to access financial capital. Furthermore, investors had to recover after losses during the GFC and they were very risk averse in the years after the GFC. After the Euro crisis, 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 and largely and possibly driven by the low-interest rate policy of the European Central Bank (ECB) and the US Federal Reserve (Fed). Furthermore, the greater global financial 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, global energy and inflation shocks in 2022, have resulted in central banks such as the US Fed, the ECB, the Bank of England and the Swiss National Bank raising policy rates substantially and reducing their bond purchases. These central banks continue to follow a trajectory of policy tightening. This is consistent with a reduction in EU M&A activity over the first two quarters of 2022 and may influence the trajectory of M&A activity, profitability and valuations in the following quarters of 2022-2023. In addition, the 2023 cross-Atlantic banking crises concerning Silicon Valley Bank and Signature Bank in the US, and Credit Suisse and Deutsche Bank in Europe, may influence the trajectory of M&A activity over 2023.

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:

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

where $M\&A_{i,t}$ is M&A activity (in country i in the EU at time t), and in particular, the subscripts $i = 1, ..., N$ and $t = 1, ..., T$ 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 and this affects all 21 EU countries.

κ_t is $T \times 1$ vector of time effects that controls for factors such as technological change and economy wide productivity improvements that may positively affect M&A activity. 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, for 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 captures 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

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[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.

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 a M&A deal, 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. Concerning EBITDA multiples, we have an unbalanced data set because when no value is reported in the data, we remove it from the data set.[16]

Table 1 shows that independently of whether or not time effects are included in the panel regressions, higher economic growth increases 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. Furthermore, over the total sample, this result is statistically significant at all standard levels of significance.

In contrast, rising and higher bond yields decrease M&A activity. This result is statistically significant at all standard levels of significance. Therefore, over the total sample period, EU countries with a 10 percentage points increase in bond yields will have an average reduction of approximately 13 M&A deals.[17] This is for M&A deals that fulfil the criteria of a deal value greater or equal to 1 million Euros and the acquired company is in the EU. Our findings reinforce the heterogeneity in market valuation concerning EU bonds, the differences in EU bond yields and the fragmentation in EU bonds, see also Ehrmann and Fratzscher (2017). Consequently, our "perverse valuation effect" shows that rising and higher bond yields make M&A 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.

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[16]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. Calculating the Akaike Information Criterion and the Bayesian Information Criterion is not possible. Both criteria use maximum likelihood to calculate the optimum lag and several variables for some countries have missing observations. Therefore, in this model, they are not usable.

[17]This is an average effect across all specifications in table 1.

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

Explanatory variables	(1) Sample 2006:Q1-2022:Q2	(2) Sample 2006:Q1-2022:Q2	(3) Sample 2006:Q1-2022:Q2	(4) Sample 2006:Q1-2022:Q2
$Bond\_Yields$	-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
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.

Irrespective of the specification in table 1, an increase in annual or annualized inflation, decreases
M&A activity. However, except for one specification, this effect is not statistically significant at stan-
dard levels of significance. Concerning the EBITDA multiple, table 1 shows that positive percentage
changes in the EBITDA multiple and thus higher firm valuations, make M&A deals more expensive.
However, just like with inflation, this effect is not statistically significant at standard levels of signifi-
cance.[18] We find a similar effect with respect to the short-term global financial uncertainty measure.

[18]Noting that firm valuation based on the EBITDA multiple differs to firm valuation based on equities and thus the

However, 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 2: Panel OLS regressions with M&A activity as a dependent variable

	(1)	(2)	(3)	(4)
	Turbulent 2007:Q1-2013:Q4	Turbulent 2007:Q1-2013:Q4	Turbulent 2007:Q1-2013:Q4	Turbulent 2007:Q1-2013:Q4
Explanatory variables				
$Bond\_Yields$	-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.

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

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basis of our "perverse valuation effect".

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.

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

Explanatory variables	(1) Moderate 2014:Q1-2022:Q4	(2) Moderate 2014:Q1-2022:Q4	(3) Moderate 2014:Q1-2022:Q4	(4) Moderate 2014:Q1-2022:Q4
$Bond\_Yields$	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.

Next, we interpret our model results concerning the high volatility and uncertainty in the EU and global economy sample (2007:Q1-2013:Q4) in table 2 and the second subsample captures a period of

greater stability in the Euro area (2014:Q1-2022:Q2) in table 3. One key result that is robust and is consistent in table 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.

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 does 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 address these issues and try and improve 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. 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). These reports are comprehensive to the extent to which they analyze 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.

Based on preliminary findings, we found that positive percentage changes in economic and policy uncertainty negatively affect M&A activity. However, this effect is not quantitatively and statistically significant across all specifications.[19] Ahir et al. (2022) describe the accuracy, reliability and consistency of the economic and policy uncertainty index data. This is validated when examining the data for countries such as the US and also for emerging economies such as South Africa. When examing 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 to 2012 with a spike in public debt to GDP and bond yields rising over 30 %, the economic and policy uncertainty index reports multiple zero values and thus no economic and policy uncertainty. 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

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

countries, the index does not provide values consistent with high uncertainty and this is also evident for big 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 in reality, economic and policy uncertainty affects M&A activity and with better accurancy and sufficient information to compile the index for some EU countries, regression results may show this effect.

6 Conclusion

The expansion of firms and companies is facilitated by M&A activity. 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. And, this 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 determinants of M&A activity using panel data over 2006:Q1 - 2022:Q2 for the EU. Across different model specifications we find that bond yields and past 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 reduce M&A activity because other investors are shifting their portfolios out of bonds and into riskier assets such as equities. We denote this as a "perverse valuation effect" making M&A more expensive. This interpretation and channel is 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.

For future research, we may 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), see also Proaño et al. (2014). Secondly, we may pursue a panel vector autoregression (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 variables. Thereafter, we will complement the dynamic responses by examining the forecast error variance decomposition of M&A activity and determine which structural shocks account for a large share in the forecast error variance of M&A activity and the associated forecast horizons.

Lastly, we may pursue a structural VAR approach for two countries, namely Germany and France and compare the M&A dynamics across these countries. We can compare these countries because they have the most active and significant M&A activity in the EU. Further, these countries have a wide array of data that is available. By using individual countries, we can control for their individual cost of funding/credit channel by using a key ECB monetary policy rate, namely the marginal lending facility rate or a short term rate such as an interbank rate in each country.

Consequently, we can examine our "perverse valuation effect" using yields on long term government bonds of 10-year maturity for each country, while controlling for a cost of funding/credit channel using short term rates and controlling for percentage changes in the associated aggregate stock market index of each country. We can also control for a global financial volatility measure and thus different global risk aversion using the Chicago Board Options Exchange's Volatility Index. Following such an approach, may provide us with more insights about the macroeconomic determinants of M&A activity.

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