Report on FTC&DOJ merger challenges

Filipe Ribeiro Ferreira

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1 Introduction

In a study published by the Federal Trade Commission (FTC), Coate (1994) analyzes the body's decisions in close to 50 mergers between 1982 and 1992, using courts' opinions in the cases as a data source. The author finds that the winning probability of the regulatory body hinges mainly on the economic structure of the merging parties' (consumer) market, namely the Herfindahl–Hirschman index (HHI), barriers to entry, and conditions conducive to anticompetitive behavior. In particular, the HHI alone is not sufficient to ensure success in court, even assuming very high values such as 7000. Instead, barriers to entry seem to be a necessary condition, while the finding of anticompetitive factors ultimately tips the scales. These results are consistent with Baker and Shapiro (2008), who argue that merger authorities have eschewed relying chiefly on the HHI to infer harm to competition and have placed too much weight on barriers to entry and merger efficiencies - likely as a result of court decisions becoming more fact-intensive.

This report aims to empirically characterize the M&As challenged by the Federal Trade Commission (FTC) and Department of Justice (DOJ) since the 2000s. In particular, it seeks to identify the best predictors of merger challenges, including market shares, barriers to entry, and deal size. It therefore aims to contribute to the current, and perhaps unsurprisingly, sparse literature, given the onerous task of collecting data. The ensuing sections are as follows. Section 2 describes our dataset. Section 3 explores its main trends, and Section 4 uses a probit regression to identify the variables that merger authorities most closely examine when deciding whether to challenge a merger. Section 5 concludes.

2 Data

Our dataset covers M&A deals from the Orbis database spanning from 1996 to 2023 (inclusive). Orbis M&A is a database containing information on more than 2.2 million deals, including IPOs, private equity,

and venture capital deals, among others, from 200 countries, spanning mainly the past two decades. We restricted the dataset on the following conditions:

1. Deal is valued at at least 1 Million USD
2. Both merging parties are headquartered in the US
3. Share buy-backs, a minority stake purchase, capital increases, or institutional buy-out deals were excluded.

This resulted in approximately 34k deals encompassing variables such as individual information from the merging parties (e.g. name, country, sector, ticker symbol, operating revenue, total assets, etc.), the regulatory body that oversaw the deal and (if it existed) its type of challenge, i.e., litigation and/or consent order, as well as industry-level data such as sales, number of firms, employees and annual payroll.

This was possible by combining four different data sources that we now describe. First and foremost, Orbis M&A, which was used to retrieve M&A data such as announcement date, deal value, individual information from merging parties, and the regulatory body responsible for the deal.

Second, the Hart-Scott-Rodino (HSR) annual reports, published by the Federal Trade Commission and the Department of Justice. These provide comprehensive descriptions of the cases challenged by each regulatory body - in the form of litigation and/or consent order - as well as basic summary statistics of the cases filed. They were used to identify the FTC or DOJ enforcement decision (if any) for each deal. These had to be manually and individually matched to our dataset by cross-checking the announcement date, merging party names, and matching deal value and type (i.e., majority stake, joint venture, etc.). To be rigorous, this was verified through a combination of the LSEG/Refinitiv workspace, publicly disclosed reports of the deal by the Securities and Exchange Commission (SEC), the FTC, or the DOJ, and, when necessary, media articles.

Third, the Bureau of Economic Analysis (BEA), which provides economic accounts data of the U.S. economy and is responsible for estimating its GDP. Its purpose was to obtain an industry-level gross output value, a measure of an industry's sales or receipts, from 1997 until 2024. The matching was carried out using the first 2 digits of the possible 6 North American Industry Classification System (NAICS) code digits, which are readily available in Orbis.[1]

Lastly, we resorted to the Statistics of U.S. Businesses (SUSB), a program within the U.S. Census Bureau that provides annual statistics on U.S. businesses by industry and enterprise size, from 1997 until 2022. It was used to extract remaining industry-level data, such as the number of firms, employees, and annual payroll.

[1]The NAICS is a system developed in coordination by the U.S., Canada, and Mexico to categorize each firm into economic sectors. It is an updated version of the Standard Industrial Classification (SIC) code. It is a 6-digit code assigned to each business entity, mapping it to one or more sectors (out of 20) based on its production techniques and technology employed, rather than the market it serves.

Similarly to the BEA dataset, it was matched through the 2-digit NAICS code. Resorting to BEA and SUSB, however, we were only able to find industry-level data for US firms.

A key limitation of the dataset is the exclusion of challenges other than litigation and consent orders, as they are not described in detail in HSR reports. Since 2019, those deals have stopped being named altogether. These are typically cases in which the parties abandon their transaction after an investigation by a merger authority or restructure their deal to address the latter's concerns, rendering court action moot. This mainly applies to the DOJ, but can comprise more than half of the transactions it challenged. Therefore, throughout the report, the challenge rate - proportion of mergers notified to FTC and DOJ that were challenged - refers strictly to litigation and consent orders. It thus excludes cases in which parties abandoned or restructured the transaction before even going to court, meaning the regulatory body did not have to file an official complaint.

3 Descriptive statistics

The following section provides summary statistics of the dataset. Subsection 1 does so for the full sample, whereas the subsequent subsection restricts it to the challenged mergers.

3.1 Full sample

Table 1 provides the basic descriptive statistics of all M&As in our sample from 2000 to 2023, grouped into 5-year intervals, except for the last one, which only spans four years (from $2020-23$), as the HSR report has not yet been published for 2024. Notice that all variables specific to the merging party, i.e., market share, operating revenue, and number of firms in the sector, are pre-deal values. This means they were computed for the year preceding the merger announcement year.

Furthermore, throughout the analysis, the sector corresponds to the one in which the primary activity of the firm pertains. This is defined by the first 2 digits of a company's primary NAICS code. In addition, with the exception of the column representing the number of deals, all values are firm-level averages. For example, an entry in the first row of the 4^{th} column denotes the average acquiror pre-deal market share for the period of 2000 to 2004. In this case, 0.25%.

As shown in the first column, deals seem to be slightly more concentrated in the first decade of the 2000s, as it contains approximately 6k more deals than the second decade. A sound explanation may lie in the lagged effects of the Great Recession, which may have only fully kicked in in the second decade. Notwithstanding, it would undoubtedly be interesting to explore whether a shift in the FTC/DOJ stance - perhaps towards a more dovish one - or even in the courts' non-partisanship explains part of the story. Regarding the last year bracket even though a more nuanced analysis shows, perhaps surprisingly, a peak in M&A deals in 2021.

Table 1: Pre-deal summary statistics of M&As from 2000 to 2023

			Acquiror			**Target**		
Year interval	N. deals	Deal value	Market share (%)	Operating revenue	N. firms in sector	Market share (%)	Operating revenue	N. firms in sector
2000-2004	9027	389.66	0.25	5562.75	298.15	0.09	572.94	333.50
2005-2009	8674	407.60	0.29	5968.02	311.03	0.07	496.61	357.33
2010-2014	6428	676.48	0.42	8189.52	230.79	0.09	1088.08	280.34
2015-2019	5164	1009.43	0.47	9543.87	229.44	0.10	1163.54	249.99
2020-2023	4508	872.69	0.45	5916.02	246.64	0.06	412.76	294.19
Overall	33801	671.17	0.38	7036.04	263.21	0.08	746.78	303.07

Notes: This table displays summary statistics of all M&A deals concerning only US firms from 2000 to 2023 at both aggregate and merging party level. Due to data sparseness, years outside such interval were removed. All columns are denoted in firm-level averages except for number of deals (column 1) which was summed up. The last row aggregates each column across all the year brackets. In addition, the columns deal value and operating revenue are expressed in millions of 2000 USD while number of firms in sector is expressed in thousands. Market shares were computed using firm and industry sales in the year before the merger announcement/rumour date.

This surge in M&A activity can potentially compensate for all the unprocessed deals in the previous year, as it declines in subsequent years to pre-2021 levels.[2]

The average deal value, on the other hand, shows a non-negligible increase in the second decade, particularly in the period from 2015 to 2019, even after adjusting for inflation.[3] A similar trend can be observed in each merging party's financial information. Their pre-deal operating revenue is, on average, higher in the second decade while the number of firms in the same sector is lower. In addition, acquirors display a considerable increase in their market share, in line with the targets, although for the latter the change is very modest (between 1 and 2 percentage points).

Overall, the patterns seems to be scarcer but larger deals. This evidence corroborates with Baker and Shapiro (2008) exposition that courts are more receptive to merger efficiencies arguments in detriment of market concentration. However, the years from 2020 onward cast some doubt on this view, as the trend appears somewhat reversed across almost all variables, although, once again, this should be taken with a grain of salt, as results can be contaminated (in either direction) by COVID-19 effects.

Concurrently, one can observe from Figure 1 the share of transactions in key sectors of the acquirors - panel (a) - and targets - panel (b). First and foremost, notice there is not a single sector with a share above 50%. Particularly towards the end of the sample, these seem to be somewhat evenly distributed.

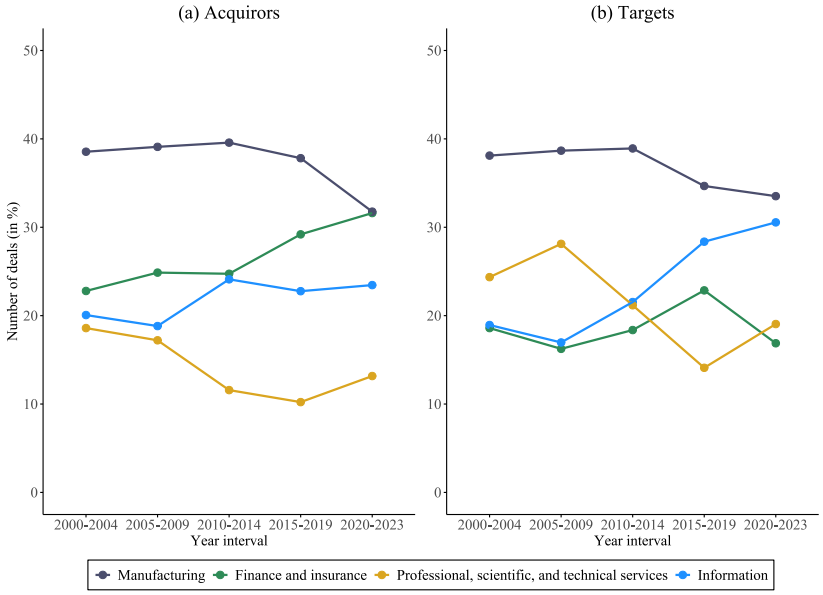
Examining in more detail, it shows a rather pronounced decline over the past two decades of the share of deals in the manufacturing sector regardless of the merging party.[4] Albeit still being the highest represented

[2]See Figure A.1 in the appendix for a full time-series plot of M&A deals in the sample.

[3]All columns in dollar terms were adjusted according to the Consumer Price Index (CPI) to be expressed in 2000 USD.

[4]The manufacturing sector generally consists of establishments that transform materials or raw products into new ones, often in a plant, factory, or mill. The end product may be sold to consumers or businesses. It includes firms in food (e.g. rice milling, sugar, dairy, etc.), tobacco and soft drinks manufacturing, textile and fabric mills, etc.

Figure 1: Share of M&A deals in main sectors by merging party



Notes: The figure displays the share of M&A deals in which the acquiror - panel (a) - and target - panel (b) - belong to the manufacturing (black line), finance and insurance (green line), professional scientific and technical services (yellow line) and information sector (blue line).

sector for both acquirors and targets, its share has fallen to almost 30%, respectively, from nearly 40% in $2000-04$. The vast majority of this decrease took place in the last 10 years. On the reverse side of the coin, the former have registered a notable increase in the share of finance and insurance - the sector with the second highest share across all year brackets - from around 23% to more than 30%.[5] This puts the sector at the same share level as manufacturing. The evolution of the information sector has been relatively steady throughout the years, hovering around $20-23\%$.[6] It never eschewed the 3rd place - a position that became more solidified very recently as the share of the finance and insurance sector increased. At the same time, that of professional, scientific and technical services fell.[7] The latter was only slightly below the finance sector in the early 2000s but began to diverge at the beginning of the second decade as its share fell by almost 10 percentage points to roughly 10%.

The targets' trend is somewhat at odds with its counterpart. Indeed, the manufacturing sector displays a gradual decline over the years along with similar shares (although the decrease in the last year interval

[5]The finance and Insurance sector encompasses establishments that either: i) incur risk by raising deposits and/or issuing securities to make loans and/or buy securities; ii) pool risk by underwriting insurance; iii) facilitate financial intermediation and insurance. Among others, it includes funds, trusts, commercial and investment banks, and insurance carriers. Entities with monetary control, such as central banks, are also included in this sector.

[6]The Information sector essentially consists of establishments that: i) produce and/or distribute information; ii) facilitate transmission of information and data; iii) process data. It therefore includes motion picture studios, music/newspaper publishers, book publishers, streaming services, data processing, etc.

[7]The Professional, Scientific, and Technical Services sector comprises entities that provide a high degree of expertise and training to businesses and/or households, such as legal advice, accounting, computer, engineering, or consulting services, among others.

is not as stark). Whereas for the acquirors it was virtually stagnant, the information sector now plays a much more prominent role. Throughout its share rose by more than 10 percentage points to above 30% in $2020-23$, only slightly trailing the manufacturing sector. What ended up disputing the position for the highest share following its remarkable increase throughout the period, the finance and insurance sector has been mostly constant for the targets hovering around 20%. Finally, the professional, scientific, and technical services sector was the 2nd most represented share in the beginning of the century but has recently declined to share values around $15-20\%$.

Overall, Figure 1 suggests a more even distribution of deals across sectors with the rise of the finance and insurance sector in the acquirors and information in the targets being worthy of notice. Insofar as these two sectors are, for instance, more inflated than other sectors, particularly the manufacturing one, or prone to higher concentration levels - claims that would both require more careful examination - then the earlier referenced trend of "larger but scarcer" deals may also be partially explained by a shift in industry across deals.

3.2 Challenged mergers

To add clarity to the discussion, the following subsection zooms in on the analysis of mergers challenged by the FTC or the DOJ. Table 2 shows basic statistics for challenged mergers, i.e., any deal subject to litigation or a consent order by the FTC or DOJ, relative to non-challenged transactions. That is, all columns except for the number of challenges and challenge rate - the proportion of mergers notified to FTC and DOJ that were challenged - have been divided by their respective values in the universe of deals that were not subject to litigation or consent order.[8,9] As per the previous subsection, all variables specific to the merging party are in pre-deal values.

As shown in the first column of Table 2, 323 challenges were registered (with both merging parties from the US) over the period 2000 to 2023. It started at 64 in $2000-04$, reached its peak at 86 in $2010-14$, then slightly fell in the subsequent interval and reached a nadir of 37 challenges in $2020-23$. In relative terms, as measured by the challenge rate, it averaged 0.75% from 2000 to 2023. In particular, it started at nearly 0.6% in $2000-04$, increased to 0.9% in the subsequent five-year interval and reached a maximum of 1.2% in $2010-14$ before reaching its lowest value of 0.4% in $2020-23$.

The remaining figures are as expected. Challenged deals have, on average, a higher market share and sales

[8]Table 1 included all transactions in the sample, both challenged and non-challenged.

[9]Recall that due to data sparseness in HSR reports, DOJ challenges other than litigations and consent orders are yet to be included. As a result, the challenge rate, as the name suggests, refers strictly to challenges in which the merger authority issued a complaint, i.e., litigation and consent orders. In addition, the number of mergers notified to FTC/DOJ in general does not match the number of transactions in our sample, as the latter includes all deals valued above $1 million, while the former's threshold is much higher (in the ballpark of $100 million).

Table 2: Pre-deal summary statistics of challenged M&As relative to non-challenged deals from 2000 to 2023

				Acquiror			**Target**		
Year interval	N. challenges	Challenge rate	Deal value	Market share	Operating revenue	N. firms in sector	Market share	Operating revenue	N. firms in sector
2000-04	64	0.58	30.84	3.64	4.03	0.93	16.21	12.83	0.97
2005-09	73	0.90	15.48	6.86	4.26	1.00	5.93	9.81	0.77
2010-14	86	1.22	7.70	2.02	1.92	1.34	3.43	3.17	1.22
2015-19	69	0.70	10.29	1.64	1.92	1.15	4.87	6.91	1.13
2020-23	37	0.37	4.58	2.58	3.72	1.30	2.19	2.15	1.01
Overall	329	0.75	10.96	3.00	2.95	1.13	6.49	6.46	1.00

Notes: This table displays summary statistics of challenged M&A deals concerning US firms from 2000 to 2023 at both aggregate and merging party level. Except for the first two columns, all variables have been divided by their respective values in non-challenged transactions. For example, a value of 30.84 in the "Deal value" column for the year interval $2000-05$ means that the average deal value of transactions challenged by the FTC or DOJ was 30 times higher in that period than that for non-challenged deals. Due to data sparseness, years outside such interval were removed. Note that these are not the values in Table 1, as it aggregates both non- and challenged deals, although the values should be close. All columns are denoted as firm-level averages, except for the number of deals (column 1), which was summed. The last row aggregates each column across all the year brackets. Market shares were computed using firm and industry sales in the year before the merger announcement/rumour date.

relative to the pool of all transactions - around 3 times higher for acquirors and 6 for targets. The pattern, therefore, seems stronger for the latter than for the former. In addition, they have a considerably higher deal value - 11 times larger! Only the number of firms in the sector seems to display a more muted trend, as one would expect relatively lower values, which indicates higher market concentration. For the targets, it remained the same throughout the whole period, whereas for the acquirors, it rose by 13%. Notwithstanding, overall, this corroborates the view that merger authorities typically challenge larger deals, which are therefore more susceptible to anticompetitive behavior.

As a robustness check, Table B.1 in the appendix extends Table 2 to include additional variables, such as the bid premium, operating revenue two years before the merger year, payroll, and the number of establishments. All variables display a remarkably similar trend, although somewhat scaled down. Bid premium - the amount paid over and above the target's market cap - is 35% lower when compared to its counterpart of non-challenged transactions when averaged across all time periods. In line with evidence suggesting that larger deals tend to be associated with lower bid premiums (see study by Alexandridis et al., 2013), stemming from lower competition and greater uncertainty in valuing larger firms, this finding further supports the claim that FTC and DOJ target larger deals. Furthermore, payroll and number of establishments both display a somewhat muted response, at least when compared to the operating revenue (two years before the merger date), which over the past two decades was 2.75 higher for the acquirors and 4 times higher for the targets. All consistent with evidence from Table 1.

However, one might argue that merger authorities may be particularly concerned about the degree of

competition between the merging parties. In fact, this is one of the merger guidelines, as of 2023, defined by the FTC and DOJ. To proxy this, we have disaggregated the share of deals challenged by the similarity of the primary NAICS code across merging parties. Recall that NAICS is a classification system in which entities are grouped according to their production techniques and technology. It has 6 digits, where the first 2, 3, 4, and 5 digits denote, respectively, the sector, subsector, industry group, and NAICS industry to which the firm belongs.[10] The primary NAICS pertains to the production processes of the good or service that defines the core value added of the firm, i.e. its primary activity., in It is hierarchical in the sense that each subsequent categorization is a subset of the previous one.

To that end, Figure 2 displays the percentage of deals challenged by the FTC/DOJ, grouped by the closeness of the primary production activities of the two merging parties, or, more precisely, by the number of equal digits in their primary NAICS codes. The first point to note is that a staggering 75% of the challenged transactions occurred for merging parties within the same sector. Perhaps even more remarkably, over 50% of the challenged deals were targeted at firms within the same industry! For reference, 60% of the deals in our full sample were in the same sector, which reduced to 35% after filtering to the same industry.

Furthermore, note that this is a production-based proxy of competition. In contrast, FTC and DOJ are typically more concerned with market-based measures, that is, the degree of substitutability of their outputs by consumers.[11] Even so, the similarity of merging parties' NAICS codes seems to be a very promising predictor of the FTC and DOJ decision to challenge a transaction. Perhaps implying market competition from the similarity of production processes may not be all that far-fetched.

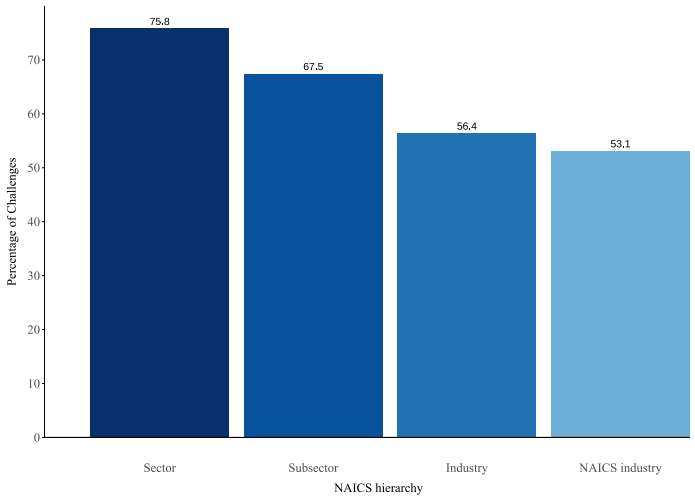
4 Empirical evidence

The following section builds on the previous analysis to adopt a more structural approach, aiming to empirically identify the most relevant predictors of FTC or DOJ merger challenge decisions. To conclude, we employ a probit model to determine which deal variables have a larger effect on the probability of a merger challenge. Table 3 shows the results. The dependent variable represents the FTC/DOJ's enforcement decisions and equals 1 if a transaction was challenged and 0 otherwise. The first regression used as regressors the acquiror's pre-deal market share between $0 - 1$, a dummy equal to 1 if the merging parties belong to the same sector and 0 otherwise, as defined by the first 2 digits of their primary NAICS code being equal, plus the average growth rate in the number of firms in the sector of each party. As such, we estimated the

[10] For example, a firm with the NAICS code 31223 is in the manufacturing sector (31), beverage and tobacco product subsector (312), tobacco industry group (3122), tobacco NAICS industry (31223). Here, we have ignored the 6^{th} digit, as its role is to distinguish industry definitions across the US, Mexico, and Canada and thus does not suit our purpose.

[11] As stated in their 2023 merger guidelines: "*The outer boundaries of a relevant product market are determined by the reasonable interchangeability of use or the cross-elasticity of demand between the product itself and substitutes for it.*"

Figure 2: Share of challenges by similarity in NAICS classification



Notes: The figure displays the share of merger challenges by FTC or DOJ that occurred for merging parties within the same "sector", "subsector", "industry", and "NAICS industry". The primary NAICS is a $6-$digit hierarchical code where the first 2, 3, 4, and 5 digits denote, respectively, the sector, subsector, industry group, and NAICS industry to which the firm belongs. The primary NAICS pertains to the production processes of the good or service that defines the core value added of the firm, i.e., its primary activity. It is hierarchical, in that each subsequent categorization is a subset of the previous one. For example, if the first 4 digits of the merging parties are equal, then they belong to the same industry.

following equation:

$$\begin{aligned}\mathbb{1}\{\text{Merger } i \text{ is challenged}\}_{i,t} = \alpha_0 + \alpha_1 \text{Acq.Mkt.Share}_{i,t} + \\ \alpha_2 \text{Tgt.Mkt.Share}_{i,t} + \alpha_3 \mathbb{1}\{\text{Same Sector}\}_{i,t} + \\ \delta_1 AnnualGr.RateAcq.Sector_t + \delta_2 AnnualGr.RateTgt.Sector_t + \epsilon_{i,t} \qquad (1)\end{aligned}$$

These variables are meant to proxy the concerns raised in the 2023 FTC and DOJ merger guidelines - market concentration of the merger parties, degree of competition between the two, and barriers to entry/exit in the sector - as well as anecdotal evidence concerning their decision-making. As such, they are not without pitfalls. As previously mentioned, the market share was computed for a sector delineated by similarity in production processes rather than a market in which the merging parties compete. Insofar as these two differ substantially, and FTC/DOJ pays more attention to the latter, as postulated in their guidelines, our results can be contaminated. Analogously, two firms may share similar production techniques and thus be grouped according to the same sector by the NAICS code, but not be competitors in the eyes of the regulator. In addition, regulators are also concerned with how the transaction will affect barriers of entry as outlined in the 4th merger guideline of 2023. In particular, if the deal pertains to a market with a historically high ease of

entry/exit, then it is expected that merger authorities are less inclined to target the deal and their concerns are disregarded by the court. Furthermore, notice we have hitherto proxied competitors as sharing the first 2 digits of the NAICS code, but we shall later revisit this for 5 digits, i.e., belonging to the same NAICS industry.[12]

The results of the regression are displayed in the first column of Table 3 with the standard errors reported inside parentheses. First of all, the target's market share is statistically significant at the 1% level and has a remarkably high point estimate (of 13.8). Its acquiror's counterpart also displays a positive coefficient (of 1.3), as one would expect, albeit with a considerably lower magnitude and is only significant at the 10%. This discrepancy should not come as a surprise as, after all, the former is the relevant market when discussing potential harm to competition and should therefore play a more prominent role in the regulator's decision to challenge a transaction. The sector dummy is the only statistically significant variable apart from the target's market share and has a positive estimate of 0.2. This is consistent with the notion that transactions concerning firms within same sector are more likely to collude.[13]

The parameter of the rate of change of the firms in the acquiror's sector has a negative value (of -0.2) which is consistent with our prior: transactions concerning markets with higher rates of entry or exit are more likely to suggest lower barriers thus assuaging the regulators' concerns (even though it does not have any statistical power). Following this train of thought, it came as a surprise that the respective coefficient of the targets was positive although this bears little weight given its statistical insignificance. This fact is not altered even if we run the regression without the growth rate of the acquirer's sector and vice-versa. Thus, it comes at almost no surprise that removing it from the regression altogether produces little to no changes.

At this point, one may inquire whether the data supports the view that merger authorities are more concerned with the rate of entry in a sector rather than the number of firms in itself (or perhaps both). To that end, we estimated the following regression:

$$\begin{aligned}\mathbb{1}\{\text{Merger } i \text{ is challenged}\} = \alpha_0 + \alpha_1 \text{Acq.Mkt.Share}_{i,t} + \\ \alpha_2 \text{Tgt.Mkt.Share}_{i,t} + \alpha_3 \mathbb{1}\{\text{Same Sector}\}_{i,t} + \\ \delta_1 Gr.Acq.Sector_t + \delta_2 Gr.Tgt.Sector_t + \\ \delta_3 ln(FirmsInAcq.Sector)_t + \delta_4 ln(FirmsInTgt.Sector)_t + \epsilon_{i,t} \qquad (2)\end{aligned}$$

As shown in column (2) of Table 3, we find the δ_3 and δ_4 coefficients to be marginally positive and satisfying the

[12] There was no particular reason to $ex-ante$ exclude the rate of change in the number of firms for the sector of either the acquiror or the target. If it existed, it would be grounded on theoretical arguments, as, in principle, the regulator may be more wary of the latter belonging to a sector with high barriers to entry than the former.

[13] Refining the dummy for merging parties within same industry, i.e. same first 5 of the NAICS code, does not qualitatively alter the results only that overall the regression marginally loses some statistical power.

Table 3: Probit regression of merger challenge probability

	Merger challenged (1 = Yes)		
	(1)	(2)	(3)
Acquiror pre-deal mkt. share	1.316*	1.708**	1.066
	(0.675)	(0.687)	(0.810)
Target pre-deal mkt. share	13.873***	15.743***	13.213***
	(4.059)	(4.256)	(4.630)
Same sector (1 = Yes)	0.226***	0.263***	0.324***
	(0.085)	(0.088)	(0.110)
Annual gr. rate in # of firms in acquiror sector	−0.208	−0.130	0.333
	(1.002)	(1.099)	(1.586)
Annual gr. rate in # of firms in target sector	−0.566	−0.746	−0.904
	(1.029)	(1.108)	(1.529)
Ln (# of firms in acq. sector)		0.024	
		(0.055)	
Ln (# of firms in tgt. sector)		0.094*	
		(0.055)	
FTC enforcement (1 = Yes)			2.361***
			(0.122)
Constant	−2.247***	−3.712***	−2.621***
	(0.074)	(0.532)	(0.101)
Observations	6,083	6,083	6,083
Log Likelihood	−581.033	−576.914	−394.828
Akaike Inf. Crit.	1,174.065	1,169.827	803.657
	*p<0.1; **p<0.05; ***p<0.01		

Notes: This table reports the probit estimates from the regression (1), (2) and (3) which attempts to pin down the variables characterizing the FTC/DOJ challenge decision. The dependent variable in all regressions is a dummy that equals 1 if the merger was challenged. The independent variables in column (1) are the acquiror and target's pre-deal market share (computed as a % of the sales of the sector defined by the first two digits of their NAICS code), a dummy that equals 1 if both merging parties belong to the same sector and the growth rate of the number of firms in the sector of acquiror and target separately. The second column keeps same variables but adds the logarithm of the number of firms in the acquiror and target's sector, separately. Finally, column (3) removes the previous two regressors and adds a dummy flagging whether the case was challenged by the FTC with the baseline case being DOJ challenges. Its positive significant coefficient signals that the FTC tends to tackle more cases. Throughout all specifications, the coefficients of the target's pre-deal market share and sector dummy remained positive and significant, particularly the former suggesting they bear some weight in the regulator's decision. Standard errors are provided inside the parentheses.

VIF-multicollinearity test, with the latter being statistically significant at the 10% level. Very similar results hold even in lieu of their respective growth rates. However, upon including the number of firms in only one of the merging party's sector (alongside their growth rates) then the variable becomes statistically significant albeit still with a coefficient only marginally positive.[14] As both their point estimates and standards errors are stable across different model specifications and they share a moderately high correlation of 0.6, it is likely they were capturing the same effect.[15] Dropping one of them seems thereby appropriate. Therefore, while the model may support a more pronounced inclination of the regulator towards the change rather than the number of firms in the sector *per se*, we cannot entirely dismiss the case that it also considers the latter.

Column (3) in Table 3 extends regressions (1) and (2) to analyze whether the FTC tends to challenge more cases than the DOJ. To do so, it includes a dummy equal to 1 if the former oversaw the case and 0 if it was the latter. We ran the following regression:

$$\begin{aligned}\mathbb{1}\{\text{Merger } i \text{ is challenged}\}_{i,t} = \alpha_0 + \alpha_1 \text{Acq.Mkt.Share}_{i,t} + \\ \alpha_2 \text{Tgt.Mkt.Share}_{i,t} + \alpha_3 \mathbb{1}\{\text{Same Sector}\}_{i,t} + \\ \delta_1 Gr.Acq.Sector_t + \delta_2 Gr.Tgt.Sector_t + \\ \delta_3 ln(FirmsInAcq.Sector)_t + \delta_4 ln(FirmsInTgt.Sector)_t + \qquad (3) \\ \delta_5 (FTCenforcement)_i + \epsilon_{i,t} \qquad (4)\end{aligned}$$

The coefficient δ_5 is positive (2.4), in line with our prior, given that the FTC litigates cases in its own internal court, where it may face a higher chance of success than the DOJ does in federal court. However, as previously mentioned in the text, our dataset under reports DOJ actions as it misses out on many enforcement decision whose court action was never necessary. It is therefore expected that the point estimate has an upward bias. Notwithstanding, we still opted to report for reference.

For completeness, we have studied two more trends in the dataset. One concerning time and the other sectors. The former is detailed in Table B.3 in the appendix where we have dropped the variable containing the average annual growth rate in the number of firms of the target's sector (for it produces virtually no changes to the results). Its first column includes a dummy for the $5-$year intervals with the period of $2020-23$ being the reference variable so we can compare FTC/DOJ stance in the first two decades with its current one. Except for the year interval from 2015 to 2019, all periods are statistically significant and have a positive coefficient indicating that the previous four years have been a time of relatively scarce enforcement action. However, given the evidence shown in Table 2, we were intrigued by the statistical significance registered

[14] Inclusion of the growth rates is crucial here otherwise results are not qualitatively altered.
[15] All the different specifications hereby mentioned are detailed in Table B.2 of the appendix.

in the period $2010-14$ as challenged transactions in that time were not as large in size relatively to their non-challenged counterparts. What may instead explain part of the story is the sharp decline in HSR-filings (see Figure A.2 in the appendix).[16]

The second column shows how merger challenges vary across quarters in which Q1 denotes the reference dummy. All dummies display a negative coefficient although only Q3 is statistically significant (at the 10% level). This might suggest there is a slight tendency for challenges to occur at the beginning of the year.

Finally, Table B.4 in the appendix displays the point estimates of the probit regression with sector-specific dummies. Column (1) includes dummies equaling 1 if acquiror belongs to the manufacturing, finance and insurance, information or professional, scientific and technical services sector alongside the acquiror's market share, dummy flagging if merging parties belong to same sector and growth rate of the number of firms in the acquiror's sector. Regarding the acquiror, only the manufacturing and finance and insurance dummies are statistically significant (former at 10% level and latter at 1%). The former has a positive coefficient perhaps unsurprisingly given that we saw in Figure 1 how manufacturing is the most represented sector for the acquirors. What is slightly unexpected is the negative estimate of the latter as it was the 2^{nd} most represented sector tied for 1^{st} with the manufacturing sector in the period $2020-23$. Concerning the target, all dummies but the professional, scientific and professional services sector were statistically significant. Their point estimates were very similar to those of the acquiror.

One last remark before concluding - the logarithm of the deal value (in '000 of 2000 USD) proved to be a remarkably robust predictor of merger challenges by FTC/DOJ as previously hinted in Table 2. Irrespective of the probit specification it consistently remained statistically significant, at the expense of statistical significance in the acquiror's pre-deal market share, although with a coefficient around 2 units lower in the interval of $0.3-0.4$. However, based on case files, merger guidelines and media articles there are scarce theoretical arguments one can state to justify the inclusion of such variable *ex-ante*. As such, we have excluded it throughout the analysis even though the data seems to indicate it is a strong predictor of a merger challenge.

5 Conclusion

This report analyzed the key variables pinning down the FTC and/or DOJ's decision to challenge a merger. Overall, the target's (pre-deal) market share and the merging parties belonging to the same sector (as defined by having the same first 2 of the primary NAICS code) played the most prominent role. The intuition for this finding is rather straightforward. A larger market share of the target signals a higher likelihood that

[16] Further to this point we shall only state that, following the Great Recession, it was a period marked by a remarkably high financial scrutiny which may have resulted in a more hawkish stance by the regulators, whether exo- or endogenously if, for instance, few but unprecedentedly large deals took place at this time.

the acquiror can dominate the market and therefore harm competition. Noticeably, we found little evidence that the acquiror's market share influences the regulator's decision. However, this discrepancy should not come as a surprise as, after all, it is the former that is the relevant market when evaluating anticompetitive behavior. The sector variable indicates that the acquiror is more likely to be directly eliminating competition and to collude with remaining market participants. Therefore, both variables are expected to generate higher scrutiny from the merger authority.

A key limitation of this study is the under reporting of DOJ's enforcement decisions of transactions whose court action was never warranted. In some years, these can comprise more than half of DOJ's actions. Alas, they are not as granularly described as litigated cases and ceased being mentioned altogether since 2019.

In addition, firms were assigned to sector to which their primary activity pertains - as defined by the first 2 digits of its primary NAICS code. However, the latter is a production-based definition of sectors while merger authorities are typically more concerned in establishing the market of consumers over which the two parties compete. This may have contaminated our results in either direction depending on how input- and output-based methods of delineating the sector affect market share's calculations.

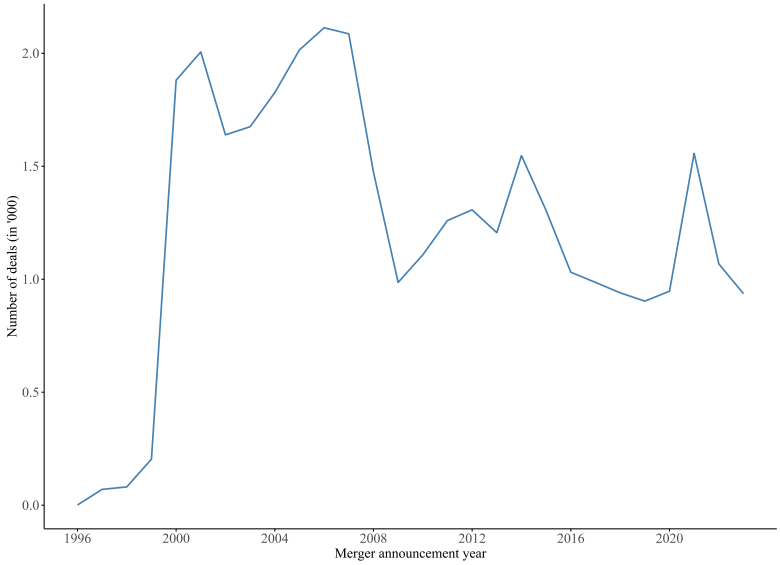
Following the previous point, throughout we computed the pre-deal market shares whereas merger authorities actions may be more a result of post-merger ones. In fact, in the 2023 merger guidelines, the FTC and DOJ explicitly mention the threshold for the post-deal Herfindahl–Hirschman Index (HHI).[17] We now turn to addressing these limiations.

[17]The HHI is defined as sum of the squares of each firm's market share. For example, if firm A has a share of 50% and firm B of 30%, then they have an HHI of $50^2 + 30^2 = 3400$.

Appendix

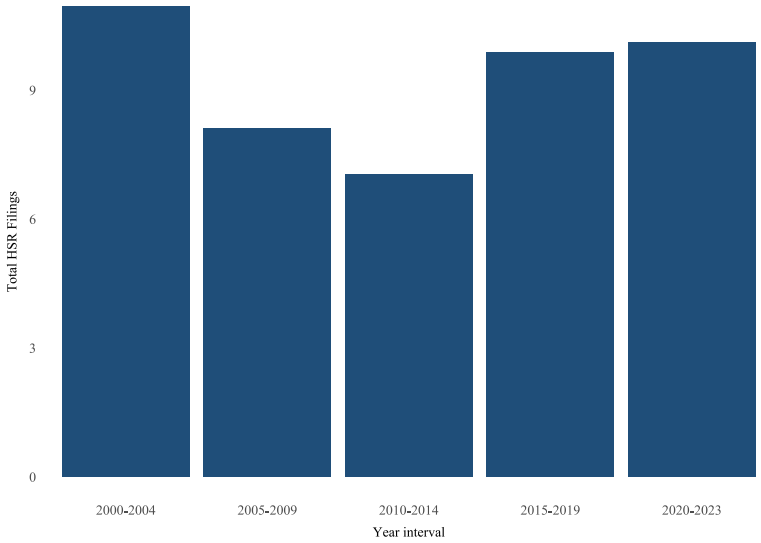
A Complementary figures

Figure A.1: Number of M&A deals from 1996 − 2023



Notes: The figure displays the number of M&A deals (in '000) of US firms from 1996 − 2023.

Figure A.2: Number of HSR filings by year interval



Notes: The figure displays the total number of HSR filings grouped by 5 − year intervals from 2000 to 2023. Data was extracted from HSR reports published in coordination by FTC and DOJ.

B Complementary tables and regressions

Table B.1: Additional pre-deal summary statistics of challenged M&As from 2000 to 2023

				Acquiror			**Target**		
Year interval	N. challenges	Challenge rate	Bid premium	Operating revenue	Payroll	N. of establishments	Operating revenue	Payroll	N. of establishments
00-2004	64	0.58	0.62	3.78	1.06	0.90	8.96	1.08	0.94
05-2009	73	0.90	0.56	4.47	1.08	0.99	6.33	1.03	0.80
10-2014	86	1.22	0.45	1.65	1.29	1.40	1.97	1.28	1.28
15-2019	69	0.70	0.75	1.90	1.35	1.21	4.14	1.36	1.14
20-2023	37	0.37	0.85	2.90	1.19	1.35	1.68	1.06	1.12
Overall	329	0.75	0.65	2.74	1.18	1.14	4.04	1.15	1.04

Notes: This table complements table 1 in the text by displaying additional summary statistics of challenged M&A deals for US firms from 2000 to 2023 at both aggregate and merging party level. Due to data sparseness, years outside such interval were removed. All columns are denoted in firm-level averages except for number of deals (column 1) which was summed up. The last row aggregates each column across all the year brackets. In addition, the columns operating revenue (two fiscal years prior to merger announcement) and number of firms in sector are expressed in millions. Deal value and operating revenue are expressed in 2000 USD. Market shares are computed using firm and industry sales of the year prior to the merger announcement/rumour date.

Table B.2: Probit estimates of Merger Challenge Probability

	Merger challenged (1 = Yes)				
	(1)	(2)	(3)	(4)	(5)
Acquiror pre-deal mkt. share	1.549**	1.476**	1.531**	1.576**	1.694**
	(0.679)	(0.682)	(0.677)	(0.685)	(0.685)
Target pre-deal mkt. share	18.761***	16.972***	18.799***	14.948***	15.743***
	(4.106)	(4.258)	(4.124)	(4.136)	(4.257)
Same sector (1 = Yes)	0.283***	0.265***	0.291***	0.241***	0.269***
	(0.086)	(0.085)	(0.086)	(0.086)	(0.088)
Gr. rate in # of firms in acquiror sector				−0.336	−0.070
				(1.008)	(1.105)
Gr. rate in # of firms in target sector				−0.499	−0.803
				(1.036)	(1.111)
Ln (# of firms in acq. sector)	0.031	0.088**		0.088**	
	(0.053)	(0.038)		(0.039)	
Ln (# of firms in tgt. sector)	0.081		0.103***		0.111***
	(0.053)		(0.038)		(0.039)
Constant	−3.630***	−3.319***	−3.530***	−3.325***	−3.633***
	(0.512)	(0.469)	(0.481)	(0.485)	(0.500)
Observations	6,199	6,205	6,202	6,083	6,083
Log Likelihood	−611.708	−612.756	−611.952	−578.421	−577.012
Akaike Inf. Crit.	1,235.416	1,235.512	1,233.905	1,170.842	1,168.024
					*p<0.1; **p<0.05; ***p<0.01

Notes: This table reports the probit estimates under different specifications of regression (1) which attempts to pin down the variables characterizing the FTC/DOJ challenge decision. The dependent variable in all regressions is a dummy that equals 1 if the merger was challenged. The independent variables in column (1) are the acquiror and target's pre-deal market share (computed as a % of the sales of the sector defined by the first two digits of their NAICS code), a dummy that equals 1 if both merging parties belong to the same sector and the logarithm of the number of firms in the acquiror and target's sector, separately. The second excludes the latter variable while column (3) remove the logarithm of the firms in the acquiror's sector. The final two columns follow the same procedure but throughout they add the growth rate of the number of firms in the sector of acquiror and target, separately. The fact that the logarithm variable with the number of firms in the merging party's sector is only statistically significant when one of them is dropped indicates that the regressors were likely capturing the same effect. Throughout all specifications, the coefficients of the target's pre-deal market share and sector dummy remained positive and significant, particularly the former suggesting they bear some weight in the regulator's decision. Standard errors are provided inside the parentheses.

Table B.3: Merger challenge probability with time-dummies

	Merger challenged (1 = Yes)	
	(1)	(2)
Acquiror pre-deal mkt. share	1.319*	1.293*
	(0.685)	(0.678)
Target pre-deal mkt. share	13.731***	14.031***
	(4.072)	(4.082)
Same sector (1 = Yes)	0.226***	0.232***
	(0.086)	(0.086)
Gr. rate in # of firms in acquiror sector	−0.523	−0.683
	(0.508)	(0.480)
2000-04	0.329**	
	(0.156)	
2005-09	0.359**	
	(0.155)	
2010-14	0.472***	
	(0.148)	
2015-19	0.266*	
	(0.154)	
Q2		−0.067
		(0.102)
Q3		−0.187*
		(0.108)
Q4		−0.131
		(0.106)
Constant	−2.569***	−2.160***
	(0.144)	(0.095)
Observations	6,089	6,089
Log Likelihood	−575.103	−579.540
Akaike Inf. Crit.	1,168.206	1,175.079
	*p<0.1; **p<0.05; ***p<0.01	

Notes: This table reports the probit estimates of regression (1) which attempts to pin down the variables characterizing the FTC/DOJ challenge decision with time-dummies and the without the regressor of the growth rate of the firms in the target's sector due to its lack of statistical power. The dependent variable in all regressions is a dummy that equals 1 if the merger was challenged. The independent variables in column (1) are the acquiror and target's pre-deal market share (computed as a % of the sales of the sector defined by the first two digits of their NAICS code), a dummy that equals 1 if both merging parties belong to the same sector and a set of dummies denoting a $5-$year interval from 2000 to 2023. The last interval was kept as the baseline variable. The significant positive point estimates suggest that such interval was marked by a relatively lower enforcement action by FTC and DOJ. Column (2) removes these year dummies and adds quarter dummies with $Q1$ acting the reference variable. The results lack statistical power but if anything they suggest the first quarter to be more pronounced in terms of regulatory action. Throughout all specifications, the coefficients of the target's pre-deal market share and sector dummy remained positive and significant, particularly the former suggesting they bear some weight in the regulator's decision. Standard errors are provided inside the parentheses.

Table B.4: Merger challenge probability with sector-dummies

	Merger challenged (1 = Yes)	
	(1)	(2)
Acquiror pre-deal mkt. share	1.206*	1.213*
	(0.698)	(0.697)
Target pre-deal mkt. share	13.512***	13.939***
	(4.113)	(4.138)
Same sector (1 = Yes)	0.266***	0.235***
	(0.088)	(0.089)
Gr. rate in # of firms in acquiror sector	−0.392	−0.482
	(0.856)	(0.660)
Acquiror in manufacturing (1 = Yes)	0.230**	
	(0.099)	
Acquiror in finance and insurance	−0.851***	
	(0.200)	
Acquiror in information	0.172	
	(0.118)	
Acquiror in professional, scientific and technical services	−0.582**	
	(0.247)	
Target in manufacturing		0.280***
		(0.100)
Target in finance and insurance		−0.795***
		(0.206)
Target in information		0.222*
		(0.117)
Target in professional, scientific and technical services		−0.264
		(0.166)
Constant	−2.261***	−2.278***
	(0.100)	(0.098)
Observations	6,089	6,089
Log Likelihood	−546.145	−549.959
Akaike Inf. Crit.	1,110.291	1,117.917
	*p<0.1; **p<0.05; ***p<0.01	

Notes: This table reports the probit estimates of regression (1) which attempts to pin down the variables characterizing the FTC/DOJ challenge decision with sector-dummies and the without the regressor of the growth rate of the firms in the target's sector due to its lack of statistical power. The dependent variable in all regressions is a dummy that equals 1 if the merger was challenged. The independent variables in column (1) are the acquiror and target's pre-deal market share (computed as a % of the sales of the sector defined by the first two digits of their NAICS code), a dummy that equals 1 if both merging parties belong to the same sector and flagging key sectors of the acquirors and the targets, separately. The significant positive point estimate of the acquiror's manufacturing sector suggest it was relatively more targeted than other sectors. In addition, the coefficient of the finance and insurance sector was negative and statistically significant across merging parties indicating it might come under less scrutiny of FTC enforcement. Throughout all specifications, the coefficients of the target's pre-deal market share and sector dummy remained positive and significant, particularly the former suggesting they bear some weight in the regulator's decision. Standard errors are provided inside the parentheses.