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Does Common Ownership Influence the Financial Strategy of the French Pharmaceutical Firms?

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Abstract

This paper provides evidence on the growing degree of common ownership in the French pharmaceutical industry, on the associated anticompetitive risks and on the substantial differences across product markets within the industry. The assessment relies on the traditional Herfindahl-Hirschman Index, its modified version adopted by the common ownership literature and a new simpler alternative. These measures are then correlated with financial performance indicators collected at firm level. We find a positive and statistically significant relationship of concentration due to common ownership with the return on equity and the leverage level for some products.

Keywords: Antitrust, Common Ownership, France, Index funds, Institutional Investors, Financial strategy, Market Power, Pharmaceuticals, Regulation, Shareholding

JEL Classifications: D21, D43, G30, G32, G34, K21, K22, L13, L21, L22

1.Introduction

The presence of institutional investors on the board of many large firms has become well documented around the "developed" world in the last 20 years or so. For instance, for the United States (US), Greenspon (2019) notes that about 80% of the 500 most valuable companies are at least partially "owned" by institutional investors. For Europe, Rosati et al. (2020) find that, in 2016, institutional investors were involved in at least 67% of the listed companies of the continent.

Competition and regulatory agencies have become increasingly interested in the growing presence of these stakeholders through minority stakes in various firms of the same industry, i.e. in firms that are supposed to compete with each other.[1] This is because this omnipresence boils down to an effective increase in the degree of concentration of some markets. An obvious associated risk is that these investors could favour decisions across firms that rank industry returns higher than firm specific returns. Higher average prices than those that would prevail under a more competitive environment would be the natural instrument to achieve these industry returns. Moreover, for some markets, it could also imply adjustments to quality and/or lower incentives to invest in research and development or to reallocate investment to less socially relevant activities (i.e. more investments in concentrating patents or acquiring potential competitors).

The country specific case studies documenting the spread of this phenomenon now known as "common ownership" (CO) in strategic sectors have tended to focus on OECD countries. Azar (2019), Banol-Estanol (2020), Schmalz (2018), Elhauge (2020) and others provide evidence for strategic sectors in the United States.[2] Rosati et al. (2020) focus on five sectors in the European Union. Seldeslachts et al. (2017) and Monopolkommission (2018) contribute to the debate with evidence from a detailed study of the German case . And the Australian Government Productivity Commission (2018) provides a detailed assessment of the risks associated with CO in the context of the *Australian Financial System.*

Despite this growing volume of evidence on the effects of CO, there is still no clear convergence on the associated risks. There is even less convergence on the diversity of dimensions regulatory and competition agencies would have to focus on to take decisions that balance properly the interests of all stakeholders, including investors, producers, consumers and taxpayers. This paper adds some partial evidence with a case study of the French pharmaceutical experience, focusing on some of the effects of CO on the financial performance of firms in strategic sectors, an issue largely ignored by the literature so far.

France is the world's 5th largest healthcare market, only behind the US, China, Japan, and Germany. In 2019, total healthcare spending in France amounted to approximately EUR 270 billion, equivalent to 11.2% of the nation's GDP. France exceeds the EU average by nearly 3% and ranks second, nearly on par with Germany. French spending specifically on pharmaceuticals makes up roughly 13% (equalling EUR 36 billion in 2019) of total health expenditures.

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[1] See Burnside and Kidane (2020) for an overview of the relevant policy debates in Europe or Elhauge (2020) for an equivalent review for the US.

[2] Elhauge (2016) labels the phenomenon as "horizontal shareholdings" and Rosati et al. (2020) rely on the common shareholding as their preferred terminology.

We investigate market structures and levels of CO in the main high-turnover product markets of the sector. We focus specifically on the markets for: (i) pain treatment, (ii) blood glucose monitoring, (iii) digestive health, and (iv) respiratory tract infection treatment. Considering only a global view of the sector would not do justice to the extraordinary diversity and complexity reflected in its myriad of niche markets. For each of these niche markets, we document the financial performance effects of CO. More specifically, we look at the correlation between on the one hand CO and on the other hand, return on assets (ROA), return on equity (ROE) and debt to asset ratio (D/A). We rely on a basic statistical correlation analysis, refined with a simple econometric treatment of the data panel allowed by the information collected on the 4 markets for the 2013-1019 period. Considered jointly, the results of these tests provide a first order indication of the impact of CO on the degree of concentration in each business line as a driver of the level of returns and of changes in the financing strategy of the firms.

These results suggest that CO appears to be correlated with the degree of concentration in some pharmaceutical product markets in France but not all of them. They also show that increases in the degree of concentration associated with CO can be correlated with the evolution of some of the financing decisions of "Big Pharma" firms in that country but not all of them. While these are preliminary insights limited by data availability, they are statistically robust enough to raise concerns that should be of interest to regulators and competition agencies in France, confirming those raised by similar experiences in other countries for this sector. The main related policy concern is the possibility that the financial indicators could be associated with a reallocation of resources towards activities favouring less the health concerns of the sector than short term financial returns concerns of key owners.

Section 2 provides a brief survey of the global evidence available on some of the main effects of the growth of CO in the pharmaceutical sector. Section 3 describes the French pharmaceutical sector and discusses the characteristics necessary to assess the risks of CO. Section 4 summarizes the main methods available to assess concentration in a market, distinguishing the tools available accounting to whether CO is accounted for or not and showing how the complex approaches relied upon to account for CO can be simplified without much loss of information. Section 5 reports the various measures of concentration for four key pharmaceutical products in France. Section 6 analyses the correlation of these measures with various financial performance indicators. Section 7 concludes.

2. Evidence on the effects of CO in "pharma" markets and its limitations

The academic evidence on the effects of growth of CO in the pharmaceutical industry has so far had a relatively specific focus.[3] The impact on market entry of generic drugs and on the incentive to innovate have concentrated most of the attention as they are both crucial to push healthcare costs down while the demand for healthcare is expected to follow an upward trend for the foreseeable future. The analysis of this evidence has also proven to be useful to show that regulation can influence the margin firms have to restrict entry otherwise enjoyed by incumbents.

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[3] These have recently been reviewed by Newham et al. (2019) to set up their own empirical analysis.

For instance, Branstetter et al. (2016) find that limiting this margin can reduce the market revenue of brand firms of up to 90% and drastically curtail overall profits. Jacobo-Rubio et al. (2020) add that the extent to which regulation controls the importance of vested interest in incumbent firms by shareholders of generic manufacturers can impact entry decisions. Newham et al. (2018) find that a regulation allowing a greater degree of ownership overlap, at the firm as well as market level, leads to a decline in the probability of generic entry by as much as 13%. Xie and Gerakos (2020) argue that generic firms in the US are more likely to conclude a settlement agreement with the brand-name companies in which they postpone their market entry, if horizontal shareholdings (i.e. CO) among them are significant.

Some of the empirical evidence has also focused on the effects of CO on prices and it is generally quite coherent across papers. For instance, Dave et al. (2017) find a strong linkage between levels of market concentration and hikes in generic drug prices. Much less research has been conducted on its impact on the financial performance of any of the firms of the sector. A recent exception is Fernandez and Klinge (2020) who find that many firms are able to obtain aggregate returns on equity of 20 to 50%. Profit margins hovering between 10 and 20% are commonplace but a large part of these profits flows to the shareholders rather than being reinvested in the development of new drugs.

While these results are important and useful to think through some of the regulatory issues potentially associated with CO, they are mostly driven by the US context. The US pharma market is home to a relatively unique regulatory environment and this begs for additional assessments in other regulatory regimes. It is particularly interesting in the case of? the European Union (EU) where a combination of national and supranational regulation opens the door for a range of options for the firms of the sector, including in terms of the location of production and the degree of export orientation for instance.[4] We focus on France to contribute to the evidence on the extent to which CO also matters to non-US pharmaceutical markets subject to other competition and regulation rules and a different legal and policy context.

To appreciate the relevance of regulatory specificities, it is useful to keep in mind that under the current EU competition rules (i.e. as of 2020), the concerns associated with CO would be covered by the limitations imposed by Article 101(1) TFEU prohibiting collusion through agreements or concerted practice between competitors and Article 101(3) TFEU defining a number of exceptions. One problem with these rules is that they may not be precise enough in the context of the type of tacit collusion that can arise in the context of CO (i.e. when there is no evidence of direct communication between competitors). In other words, the regulation of the circumstances that characterize CO is, for now, all but straightforward in the context of an industry such as the pharmaceutical industry in Europe and the French case study could contribute to identify some stylized facts that could motivate a more precise diagnostic.

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[4] It is also worth mentioning that regulatory and fiscal accounting rules can be quite different across countries despite significant coordination efforts and this makes cross country comparison of some of the cost, revenue and financial data much harder than across states in the US for instance.

3. Who owns the (French) Pharmaceutical Market

The following description of the French pharmaceutical market focuses on the presence of institutional investors in the sector. The identification of this presence is not to be a simple exercise. It not only requires reliable corporate ownership data but also an ability to account for the fact that many leading companies in France are subsidiaries of American pharma giants. The information collected for this paper comes from three different sources. It is not ideal, but it provides enough hindsight on the (ir-)relevance of CO in the French pharma market. It deserves a somewhat detailed description.

The first source is the Bureau van Dijk's Orbis Europe database. It covers extensive corporate ownership structures, factoring in all types of shareholders. One of its notable shortcomings in our context is that ownership stakes of wholly owned investment funds or other company branches are not consistently united under the name of the parent entity. This can lead to underestimations of the collective might of investment groups and hence distort concentration assessments. Therefore, we manually aggregated shareholdings at the family level. To account for the declining quality of ownership data as one goes back in time, we limited our assessment to the period 2013-2019.

The second source is the Securities and Exchange Commission's (SEC) 13F filings. They are considered to be best practice to gather institutional ownership data in companies from overseas. This dataset discloses all equity holdings in publicly traded companies from the US by institutional investors with at least USD 100 million in assets under management. It was kindly made available to us by Fintel.[5] It was however not as complete as necessary as it does not cover large non-institutional investors. To cover them, we relied on the CNN Money website. As for our first source, it is the best available publicly, but it suffers from comparable drawbacks. We ended up also correcting manually for the missing investors.

The third source is the OpenHealth Company. Its ecosystem of healthcare data centralizes a substantial bandwidth of consumer and patient data for the whole of France.[6]

Table 1 reports the top shareholders of leading pharmaceutical companies in France in 2019. It shows that, with few exceptions, all of the largest stockholders are institutional investors. Moreover, almost all of these owners are invested in more than one competitor at a time. This is particularly striking with regard to BlackRock and Vanguard. They constitute the largest shareholder in two thirds of the companies under review. In addition, Table 1 shows that France is no exception to the important role that institutional investors have in the pharmaceutical industry and that the main global players are present in the market. A couple of national champions and niche players complete the bigger picture.[7]

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[5] https://Fintel.io
[6] www.openhealth.fr
[7] Note that we refer to the names of the parent companies throughout this paper. This reduces the confusion dueto the fact that the names of national subsidiaries oftentimes differ from those of the holding companies.

Table 1. Top 10 shareholders in leading pharmaceutical companies in France (2019)

Novartis	[%]	Mylan	[%]	Pfizer	[%]
JPMorgan Chase	22.83	BlackRock	13.84	BlackRock	8.00
Novartis	7.31	Vanguard	10.04	Vanguard	7.81
Capital Group	5.72	Wellington	9.99	State Street	5.10
Bank of New York Mellon	5.36	State Street	8.68	Capital Group	2.99
UBS	4.20	Invesco	4.95	Wellington	2.60
Nortrust	3.80	Pzena	3.90	Bank of America	1.79
Emasan	3.40	Paulson & Co.	2.33	JPMorgan Chase	1.60
BlackRock	3.35	AQR Capital	2.32	Geode	1.58
Vanguard	2.63	Capital Group	2.09	T. Rowe Price	1.43
Norway	2.16	Geode	1.80	Northern Trust	1.33

Bayer	[%]	Johnson & Johnson	[%]	Merck	[%]
BlackRock	11.59	Vanguard	8.25	Vanguard	7.90
Singapore	3.97	BlackRock	6.90	BlackRock	7.50
Capital Group	3.49	State Street	5.70	Capital Group	4.63
UBS	3.18	Geode	1.40	State Street	4.61
Norges Bank	3.03	State Farm	1.40	Wellington	2.30
Harris Associates	3.03	Northern Trust	1.32	Bank of America	1.73
Norway	3.02	Bank of America	1.31	JPMorgan Chase	1.62
Vanguard	2.95	Bank of New York Mellon	1.22	Geode	1.54
BPCE	2.89	Norges Bank	1.06	Bank of New York Mellon	1.42
Credit Suisse	2.49	Massachusetts Fin. Serv.	1.03	Northern Trust	1.28

Sanofi	[%]	GlaxoSmithKline	[%]	Bristol Myers Squibb	[%]
L'Oreal	9.48	BlackRock	7.39	Vanguard	8.06
Dodge & Cox	8.56	Vanguard	3.42	Wellington	7.83
BlackRock	3.63	Dodge & Cox	3.32	BlackRock	7.10
Amundi	2.99	State Street	2.96	State Street	3.41
Franklin Resources	2.98	Standard Life Aberdeen	2.70	FMR LLC	2.40
Vanguard	2.59	Capital Group	2.64	Dodge & Cox	2.14
State Street	2.28	Norway	2.40	JPMorgan Chase	1.43
BNP Paribas	2.05	Legal & General Group	2.18	Renaissance Technologies	1.40
Norges Bank	2.00	Brunner Investment	2.12	Ameriprise	1.32
Norway	2.00	Schroders	1.58	Geode	1.28

Roche	[%]	Amgen	[%]	Gilead Sciences	[%]
Hoffmann Family	45.00	Vanguard	7.83	BlackRock	8.10
Novartis	33.33	BlackRock	7.20	Capital Group	8.07
UBS	3.16	Capital Group	6.70	Vanguard	7.76
Brunner	2.33	FMR LLC	5.20	State Street	4.61
Vanguard	2.29	State Street	4.52	Bank of New York Mellon	2.31
BlackRock	2.04	Primecap	3.18	Invesco	1.54
Sun Life Financial	1.07	Geode	1.67	Geode	1.48
Credit Suisse	1.00	Northern Trust	1.47	Dodge & Cox	1.38
FMR LLC	0.88	Bank of America	1.42	Northern Trust	1.32
Franklin Resources	0.80	Wells Fargo	1.25	Franklin Resources	1.12

Reckitt Benckiser	[%]	Astrazeneca	[%]	Procter & Gamble	[%]
Jab Holdings	6.82	BlackRock	8.63	Vanguard	8.84
Sun Life Financial	5.24	Capital Group	6.42	BlackRock	6.77
Massachusetts Fin. Serv.	5.00	Investor AB	3,93	State Street	4.71
BlackRock	4.56	FMR LLC	3.65	Geode	1.53
Morgan Stanley	4.20	Wellington	3.42	Northern Trust	1.31
Vanguard	2.63	Vanguard	3.41	Bank of America	1.19
Norway	2.41	Dodge & Cox	3.21	FMR LLC	1.19
State Street	2.17	Legal & General Group	2,24	UBS	1.09
Standard Life Aberdeen	2.08	Primecap	2.21	Norges Bank	1.07
Legal & General Group	2.04	State Street	2.17	Bank of New York Mellon	1.01

AbbVie	[%]	Abbott Laboratories	[%]	Teva Pharmaceuticals	[%]
Vanguard	8.01	Capital Group	8.68	Capital Group	15.47
Capital Group	7.83	Vanguard	8.41	Wellington	6.27
BlackRock	6.40	BlackRock	7.11	Franklin Resources	4.29
State Street	3.85	State Street	4.15	Berkshire Hathaway	3.92
FMR LLC	1.66	Wellington	2.40	BlackRock	3.22
Geode	1.29	Massachusetts Fin. Serv.	1.81	Abrams Capital	1.92
Northern Trust	1.13	Northern Trust	1.50	State Street	1.12
Orbis Allan Gray	0.96	FMR LLC	1.41	Norges Bank	0.78
Bank of New York Mellon	0.88	Geode	1.39	Northern Trust	0.67
Norges Bank	0.85	Bank of New York Mellon	1.26	FMR LLC	0.57

Sources: Fintel, Orbis Europe

Table 2 provides an alternative presentation of the key information reported in Table 1 of interest for our analysis. It is designed to increase the visibility of the match of each of the top 8 investors with the firms in which they hold at least a minority share. It shows that institutional investors such as BlackRock, Vanguard or State Street are present in almost all of the main firms of the sectors. The other investors are also present in a fair numbers of firms that should be competing with each other.

Table 2: Who "owns" the French pharmaceutical groups?	
Investors	**Pharmaceutical group**
BlackRock	Abbott, AbbVie, Amgen, Astrazeneca, Bayer, Bristol-Myers Squibb, Gilead, GSK, Johnson & Johnson, Merck, Mylan, Novartis, Pfizer, Procter & Gamble, Reckitt Benckiser, Roche, Sanofi, Teva
Vanguard	Abbott, AbbVie, Amgen, Astrazeneca, Bayer, Bristol-Myers Squibb, Gilead, GSK, Johnson & Johnson, Merck, Mylan, Novartis, Pfizer, Procter & Gamble, Reckitt Benckiser, Roche, Sanofi, Teva
State Street	Abbott, AbbVie, Amgen, Astrazeneca, Bristol-Myers Squibb, Gilead, GSK, Johnson & Johnson, Merck, Mylan, Pfizer, Procter & Gamble, Reckitt Benckiser, Sanofi, Teva
Capital Group	Abbott, Amgen, Astrazeneca, Bayer, Gilead, GSK, Merck, Novartis, Pfizer, Teva
Geode	Abbott, AbbVie, Amgen, Bristol-Myers Squibb, Gilead, Johnson & Johnson, Merck, Mylan, Pfizer, Procter & Gamble
Wellington	Abbott, Astrazeneca, Bristol-Myers Squibb, Merck, Mylan, Pfizer, Teva
Norges Bank	AbbVie, Bayer, Johnson & Johnson, Procter & Gamble, Teva
Norway	Bayer, GSK, Novartis, Reckitt Benckiser, Sanofi
Source: Based on the raw data from Fintel, Orbis Europe	

While Table 1 and 2 are quite insightful already, they take an excessively "macro" view on the sector. In doing so, they do not do justice to the extraordinary diversity and complexity of a sector which is fragmented into multiple niche markets. To address this limitation, we need to investigate market structures and common ownership at a less aggregated level. We do this by focusing on high-turnover product markets, i.e. pain treatment, blood glucose monitoring, digestive health, and respiratory tract infection treatment.[8] To be able to document the relevance of CO for each of these product lines, in addition to its relevance at

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[8] Another weakness of this source of information is that it does not provide details on the extent to which a stakeholder holds the position as an asset manager or as a global custodian (i.e. JP Morgan vs. JP Morgan asset management). Note also, that it does not say anything on the way stakeholders vote. If the stakeholders reported are a private equity, sovereign, pension or hedge fund, they often make the voting decision on their own. Many are quite active in the firms they invest in. They will vote and often try to get a seat at the management board. If the stakeholder is a more classical asset manager, the voting decision will depend on the contractual arrangements made with its clients. Many will not ask for input from their clients and many also will try to be passive investors in order to avoid possible difficulties with possible disagreements among its heterogeneous group of clients. Neutrality is often the preferred strategy for these managers. Global custodians will usually also ask instructions from their clients and this can be quite challenging since split votes are not allowed (1 vote for 1 position). Note also that the name of an investor included in the list does not imply that it holds a position as asset manager or global custodian. Azar (2019) argues that when managers have to deal with multiple views on how to vote, the anti-competitive effects of common ownership are mitigated and end the control it enjoys when it is fully insulated from shareholder dissent. When this protection exists and the firms act in the interest of their shareholders, the equilibrium outcome is equivalent to an economy-wide monopoly. See Anton et al. (2020) for a longer discussion.

the firm level, we rely on the data at the firm level on annual product details, sales value, and unit sales. This information is reported in Table 3 for the top 10 sellers for each of these four products markets for 2019. This is where the data produced by OpenHealth Company proved to be useful.

Overall pharma market	(%)	Pain treatment market	(%)	Respiratory tract infection treatment market	(%)	Digestive health market	(%)	Blood sugar monitoring market	(%)
Novartis	7.87	Sanofi	51.35	Sanofi	15.19	Teva	10.71	Roche	34.74
Sanofi	6.34	Bristol Myers Squibb	18.81	Boiron	12.46	Mylan	6.66	Lifescan	30.89
Mylan	5.73	Genevrier	3.47	Procter & Gamble	6.82	Mayoly Spindler	6.27	Abbott	13.78
Servier	5.46	Reckitt Benckiser	3.08	Urgo	6.33	Bicodex	5.90	Ascensia	9.92
Pfizer	3.55	Mylan	2.91	Reckitt Benckiser	6.04	Pileje	5.65	Sanofi	5.34
Johnson & Johnson	3.11	Servier	2.84	Therabel Lucien Pharma	5.64	Norgine	5.59	Ypsomed	2.56
Bayer	3.01	Glaxosmithkline	1.99	Pierre Fabre	4.46	Ipsen	5.46	Dinno Sante	1
Bristol Myers Squibb	2.73	Pfizer	1.74	Bristol Myers Squibb	4.35	Reckitt Benckiser	4.97	Menarini	0.97
Merck	2.57	Expanscience	1.57	Grimberg	4.05	Johnson & Johnson	4.63	Evolupharm	0.36
Glaxosmithkline	2.37	Novartis	1.08	Bouchara Recordati	3.52	Ferring	4.21	-	-

Table 3: Market shares of the top 10 producers for the overall pharmaceutical French market and for the main product lines (2019)

Source: OpenHealth Company

The computation of the market shares follows a straightforward pattern. We refer to the annual sales volume per company in the respective market as a percentage of the market's total pharmacy sales. Thereby the consideration of retail prices (hence including revenues flowing to wholesalers, pharmacies, and the state) is perfectly suitable for industry studies that do not go beyond national borders but may turn out to be a stumbling block to making direct comparisons with international peers. In addition, it was again necessary to aggregate company sales at the family level in order to depict a proper picture of market allocation.

Table 3 also highlights the relevance of the details in the assessment of the pharmaceutical market. None of the firms dominates all of the specific markets and in each of these specific markets, some firms who are not in the top 10 for the overall sector enjoy some significant presence. Crossing the information of Table 1 with the information reported in Table 3 provides an indication of the extent to which institutional investors are present in each of the specific markets. This can then be used to compute concentration measures at the relevant market level to assess the extent to which common ownership increases concentration.

4. Assessing the importance of CO for market concentration risks

In order to quantify the extent of market power risks in the French pharmaceutical industry and to highlight the importance of accounting for CO, we rely on three different measures of concentration. The first is the usual Herfindahl-Hirschman Index (HHI). It is a

purely market share-based indicator and is only reported here to show the risks associated with ignoring CO. The second is the Modified HHI (MHHI), which has been used by the recent literature to account explicitly for the effects of CO structures. Finally, we also rely on a third measure, the Amplified HHI (AHHI), suggested by Estache, Katte and Kieffer (2021) seeking to address some of the issues raised by the computation of the MHHI.

Formally, the HHI is expressed as follows:

$$HHI = \sum_j s_j^2 \qquad (1)$$

where s_j is the market share of firm j multiplied by 100. The index ranges from 0 in case of perfect competition to 10000 in case of a pure monopoly. The literature discussing the recent surge in popularity of passive investment vehicles and the accompanying rise in CO argues that this evolution in the market makes the HHI increasingly obsolete as it only considers firms' intra-industry market shares. As a result, it can lead to underestimating the potential levels of market power.

The recent literature on CO suggests relying on the MHHI. By taking into consideration corporate control and financial incentives of investors in addition to the firms' market shares, the MHHI aims at "capturing the extent to which firms' most powerful owners are also owners of natural competitors".[9] It is computed as follows:

$$MHHI = HHI + MHHI\ delta$$

$$\sum_j \sum_k s_j s_k \frac{\sum_i \gamma_{ij}\beta_{ik}}{\sum_i \gamma_{ij}\beta_{ij}} = \sum_j s_j^2 + \sum_j \sum_{k \neq j} s_j s_k \frac{\sum_i \gamma_{ij}\beta_{ik}}{\sum_i \gamma_{ij}\beta_{ij}} \qquad (2)$$

where β_{ij} is the ownership share of firm j accruing to shareholder i, γ_{ij} is the control share of firm j exercised by shareholder i, and k indexes j's competitors.

While in theory control rights are distinct from ownership shares, both variables are oftentimes equalized in practice due to data deficiencies, hence sparking robustness concerns. Ownership stakes inferior to 0.5% are usually omitted.

Despite being a significant improvement over the HHI, the MHHI has two main weaknesses. The first is that the omission of stakes lower than 0.5% makes the MHHI more sensitive to outliers. For instance, when the bulk of shares is spread over a myriad of (undiversified) investors with near-zero stakes while the remaining shares are concentrated in the hands of few common owners, the MHHI returns sky-high levels of market concentration, as Lambert and Sykuta (2019) demonstrate.[10] But even in less extreme cases, ignoring minor shareholders because they are considered to be too small to be relevant can dilute the denominator of the equation and consequently inflate the degree of market power. The second limitation is its inherent endogeneity, as Boller and Morton (2020) point out. Since the index moves in tandem with endogenously determined market shares, variations can be interpreted as both source and outcome of the competitive process.

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[9] Schmalz (2018).

[10] This is due to the fact that the denominator in the MHHI delta equation takes into account ownership shares from all investors rather than only the common ones. When the number of non-common owners gets larger and/or their equity shares get smaller, the MHHI will increase (Backus et al. 2019).

The third measure considered here, the AHHI, is an alternative to the MHHI to account explicitly for CO. It is computed as follows:

$$AHHI = HHI + AHHI\ delta \qquad (3)$$

with $AHHI\ delta = \sum_i \left(\sum_j \beta_{ij} * s_j^2 + \sum_{k \neq j} \beta_{ik} * s_k^2 \right) \qquad \forall \beta_{ij}, \beta_{ik} \geq 0.005$

where β_{ij} is the ownership share of firm j accruing to shareholder i and β_{ik} is the ownership share of firm k accruing to shareholder i, k being a natural competitor of j in the same industry. The AHHI delta reflects the magnifying effect on concentration of CO in a simpler way than the MHHI delta does. Moreover, it can include cases of cross-ownership as well. Another key difference is that the additive characteristic of the AHHI delta's equation implies that the AHHI will never be more than twice the HHI while the MHHI is built on a fraction and thus has no upper limit. Note that ownership shares of less than 0.5% are omitted as in the case of the MHHI since they are considered insufficient to have a noteworthy influence on firm decisions. But in this case, the effect of the omission is less sensitive to extreme cases because of the additive nature of the AHHI.

The risks of concentration are anchored in the same rules of thumb for thresholds as those adopted for the HHI. Below 1500, the market is considered to be competitive, from 1500 to 2500, the market is seen as moderately concentrated. Above 2500, the market is considered as highly concentrated. Since the AHHI delta is essentially an intensifier of market concentration, these thresholds are exceeded more promptly when ownership overlap in an industry is significant. A condition sine qua non for the AHHI to provide an accurate estimation of concentration, is to only take into consideration investors which hold equity stakes in at least two competing firms. As such, this avoids the potential endogeneity issue of having the structure of non-common owners reflected in our index.

A limitation for both the AHHI and the MHHI is that they do not allow investigating changes across firms as they are designed to measure concentration at the market-level. Another drawback of this peculiarity is that overlapping ownership of potential competitors which are not presently active on the same market is neglected. Nonetheless, common owners could theoretically keep their portfolio firms from even entering new markets if it is against their interests, and accordingly dampen competition. This adds yet another layer of complexity to the issue and might hence risk to overshoot the mark.

Finally, we rely on what boils down to a fourth indicator derived from the AHHI to provide a simple quantification of the impact of CO in proportion to overall market concentration to guide policy discussions. It is a simple transformation of the information provided by the computation of the AHHI and expressed as a basic ratio, i.e. the "Common-Ownership-Ratio" (COR):

$$COR = \frac{delta\ HHI}{AHHI} \qquad (4)$$

These various measures do not provide guidance as to the relevant threshold to consider assessing whether CO is a source of concentration or not. They all simply suggest that additional research is needed at this stage. Many researchers advise against overstating the available empirical work and drawing any premature policy conclusions, which in the end do

more harm than good.[11] At the current level of knowledge, we know that none of the measures are perfect, but they are robust enough to assess whether there is a case to dig deeper or not when the relative importance of passivity starts to have an impact on the available imperfect indicators.

5. Evidence on the degree of concentration

This section analyses and compares the three measures of market concentration, first for the overall French pharmaceutical industry, next for the four selected product markets. We then discuss the insights provided by the most recent value of these measures (2019) as well as their evolution between 2013 and 2019.[12]

a. Market concentration in the overall market

At first glance, the data reported in Tables 1 and 2 may suggest that competition on the French pharmaceutical market may be fierce. Frontrunners Novartis and Sanofi merely account for roughly 8% and 6% respectively, and approximately half of the overall market is spread over the 15 largest pharmaceutical manufacturers in 2019. As Figure 1 shows, this low level of concentration is confirmed by the values in 2019 of the three measures.

Figure 1, however, suggests a small remarkable difference between the HHI and the two other indicators. Indeed, the HHI shows a small downward trend while the MHHI and the AHHI feature a slight upward slope, reflecting the rising levels of CO. These two indicators thus lead to a somewhat different perspective on the impact of CO on concentration than an assessment based on the HHI would have suggested.

A second insight provided by Figure 1 flows from the differences between the MHHI and the HHI. The Modified HHI towers over the HHI by a factor of four, hovering around a value of 1000. Over the 7 years period covered by the sample, it shows an increase of 23%. On the other hand, the Amplified HHI provides a much more conservative estimate of market concentration within the pharmaceutical industry in France and an increase of only about 4%.

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[11] For instance, OECD (2017), Ginsburg and Klovers (2018), Lambert and Sykuta (2019), Patel (2018), Koch et al. (2021), O'Brien and Waehrer (2017), Hemphill and Kahan (2020), Lewellen and Lowry (2020), Gilje et al. (2020), Backus et al. (2020), and Burnside and Kidane (2020).

[12] The proper definition of product markets within the pharmaceutical industry is still an experimental field with no clear-cut rules, as Siotis et al. (2020) point out. Some may argue that the scope of the markets we have examined is too broad and should be restricted to one specific medicine at a time (e.g. Abdela (2018)). This would bring about a multitude of small "niche" markets, many probably with higher levels of concentration.

Figure 1. Indicators of market concentration for the overall pharmaceutical market

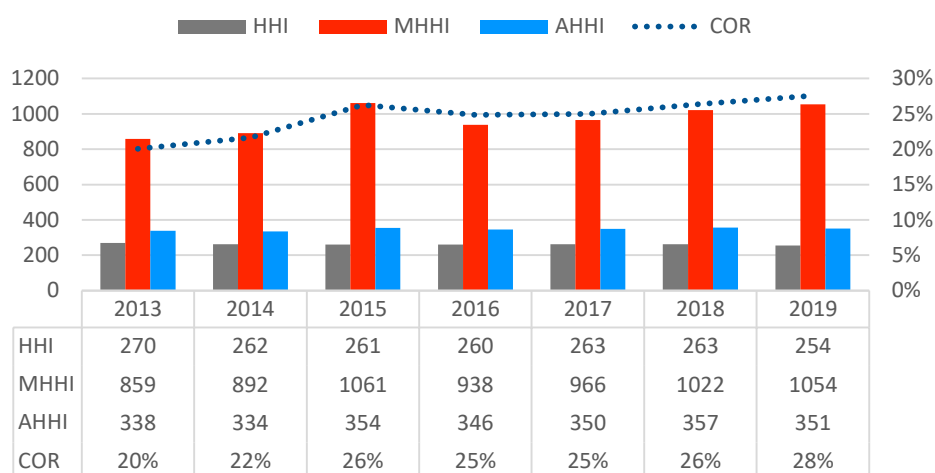|	2013	2014	2015	2016	2017	2018	2019
HHI	270	262	261	260	263	263	254
MHHI	859	892	1061	938	966	1022	1054
AHHI	338	334	354	346	350	357	351
COR	20%	22%	26%	25%	25%	26%	28%

Figure 1 also reports the computation of the COR. It confirms that overlapping ownership has indeed been a growing factor in the sector considered globally. The COR follows a clear uptrend, leaping 8% between 2013 and 2019 to eventually reach a concerning degree today. This is not surprising since the majority of leading firms are publicly traded behemoths, Servier and Pierre Fabre being the only exceptions. Driven by this development, the COR reflects the fact that the amplifying effect of CO outweighs the falling concentration of market shares during the period under investigation.

The main limitation of Figure 1 is that it ignores key pharmaceutical sectors' inherent characteristics. Fragmented into myriad sub-markets covering an ample gamut of drugs and medicines, overall market concentration might be misleading as pharmaceutical manufacturers usually generate the bulk of their income from a handful of top-notch products. On these grounds, the low levels of market concentration in the French pharmaceutical industry may not deliver what they promise. On the contrary, a particularly high extent of institutional ownership overlaps and presumably significant degrees of market power within niche markets put the case for going through individual product markets with a fine-tooth comb.
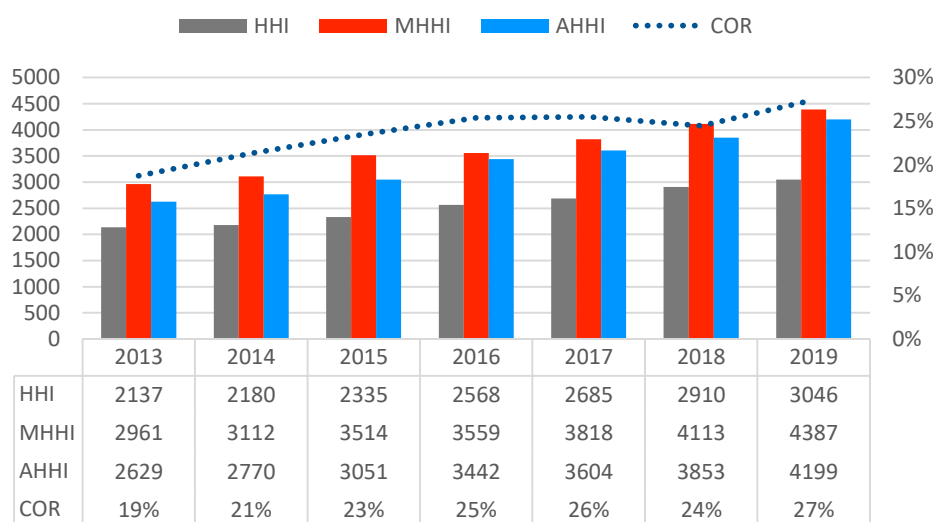
b. Zooming In on Individual Product Markets

In the following sections, we perform an in-depth analysis of market concentration inside four high-volume product markets in order to weigh up the virtues and pitfalls of each indicator.

i. Market concentration for the pain treatment market

With EUR 1.47 billion in pharmacy sales in 2019, the French market for pain treatment medicines is home to a total of 104 companies which supply more than 600 products. Nonetheless, market leader Sanofi was able to extend its dominance and top the list with a market share upwards of 50% while the flagging runner-up Bristol Myers Squibb secured slightly less than a fifth of the market in 2019. A handful of multinational players and local

champions complete the bigger picture. Against this background, the traditional HHI naturally spiralled up between 2013 and 2019, even surpassing the threshold for a highly concentrated marketplace in 2016 as Figure 2 illustrates.

Figure 2. Indicators of market concentration for the pain treatment market

	2013	2014	2015	2016	2017	2018	2019
HHI	2137	2180	2335	2568	2685	2910	3046
MHHI	2961	3112	3514	3559	3818	4113	4387
AHHI	2629	2770	3051	3442	3604	3853	4199
COR	19%	21%	23%	25%	26%	24%	27%

The inclusion of CO further exacerbates this trajectory. Shaped by considerable fluctuations along the way, the MHHI soared by nearly 1400 to attain a market concentration of 4387 in 2019. In comparison to the HHI, this translates into a relative difference of 1341 for the final year. The AHHI paints a slightly more moderate image, albeit its increase over the time span under examination is in the same order of magnitude. Pursuing a more consistent growth pattern than its counterpart, our alternative measure peaks at a value of 4199 in 2019. Furthermore, a widening gap between the baseline and both indicators can be observed, suggesting that overlapping ownership levels have risen since 2013.
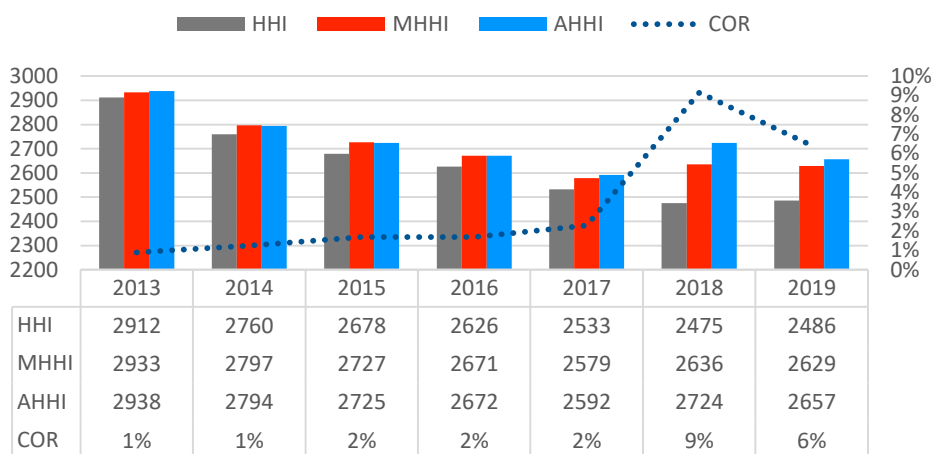
A closer look at Figure 2 corroborates this hypothesis. The COR's slope is marked by a strong upward tendency heading towards the 30% mark, only slowed down by a short dip in 2018. Especially in a market that is already highly concentrated even when the potentially anticompetitive effects of horizontal shareholdings are neglected, bringing the antitrust authorities to the scene should be contemplated to prevent excessive market power and the resulting harm to competition.

ii. Market concentration for the blood glucose monitoring market

Indispensable for diabetes patients, the market for blood glucose monitoring devices is our second product market of interest. Here, annual pharmacy sales amounting to approximately EUR 500 million in 2019 are highly concentrated in the hands of few pharmaceutical manufacturers. Even though their combined market share has been on the descending branch, Roche and Lifescan account more or less equally for two thirds of the total market today. In terms of ownership structure, the Hoffmann-La Roche family holds a

majority stake in the Swiss multinational while another third is owned by Novartis.[13] As a result, institutional investors solely play a minor role. Lifescan is a comparatively small niche player which is not traded publicly. Correspondingly, the amplifying effect of CO on market power is rather trivial, as Figure 3 depicts.

Figure 3. Indicators of market concentration for the blood glucose monitoring market

	2013	2014	2015	2016	2017	2018	2019
HHI	2912	2760	2678	2626	2533	2475	2486
MHHI	2933	2797	2727	2671	2579	2636	2629
AHHI	2938	2794	2725	2672	2592	2724	2657
COR	1%	1%	2%	2%	2%	9%	6%

In addition, Figure 3 foregrounds the anticipated elevated market concentration which, however, has steadily decreased throughout the period of observation. If we consider the HHI, the value even tumbled below the threshold for a highly concentrated marketplace in 2018. Nearly on par, both the MHHI and the AHHI run in parallel to the traditional index before scattering in 2018. The source of this dispersion can be traced back to a jump in CO levels, as Figure 3 points out. Nevertheless, the COR indicates a very modest degree of ownership overlap in the French blood glucose monitoring market.
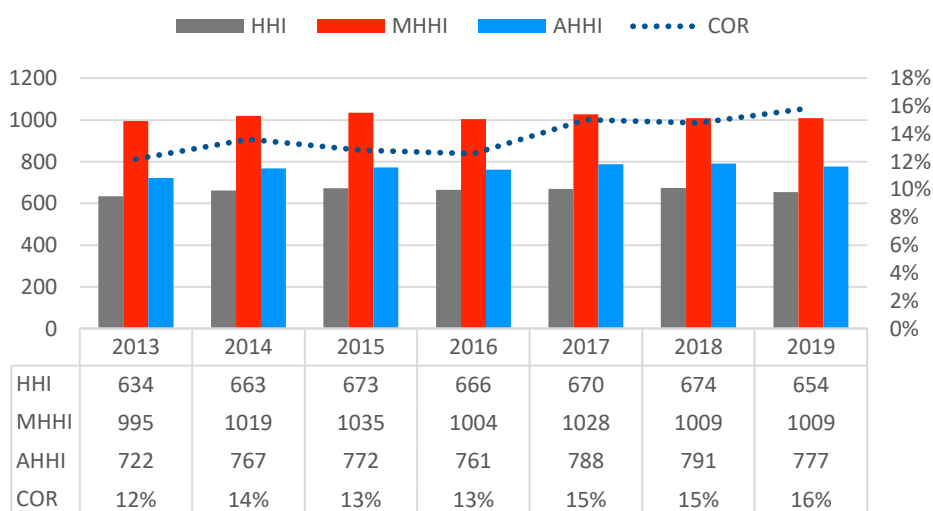
iii. Markets for respiratory tract infection treatment

In 2019, the medicine markets for respiratory tract infection treatment aggregated EUR 623 million in annual pharmacy sales, the sales being spread over a large group of companies. Furthermore, the market leader accounts for a modest 15% so that we can assume that competition prevails in this market. This conclusion is mirrored by the indicators of market concentration, as Figure 4 showcases.

The HHI oscillates between 634 and 674, thus referring to an utterly competitive marketplace. Even by taking CO into the equation, the bottom line remains unaltered, despite the MHHI escalating considerably in comparison to the baseline to transcend the 1000 marker. Its novel counterpart, the Amplified HHI, incorporates the conceivably disruptive repercussions of overlapping ownership in a more moderate manner, never increasing by more than 19% relative to the HHI during the period under review.

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[13] Since Novartis is not active on the French blood glucose monitoring market, this significant case of cross-ownership falls outside the scope of both the MHHI and the AHHI. Nevertheless, it should be kept in mind that harm to competition could result from this ownership composition according to cross-ownership theory. Novartis could, for instance, refrain from entering the market in question as this would impair its holding's dominant position and consequently its portfolio value.

**Figure 4. Indicators of market concentration
for the respiratory tract infection treatment market**

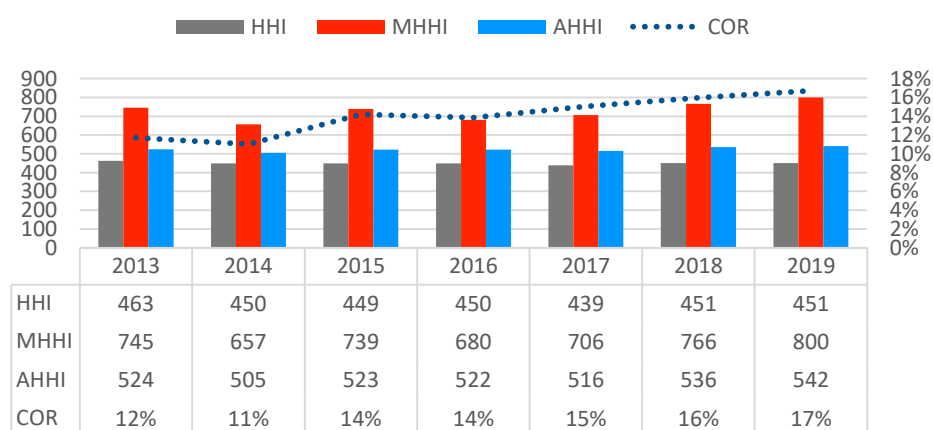|	2013	2014	2015	2016	2017	2018	2019
HHI	634	663	673	666	670	674	654
MHHI	995	1019	1035	1004	1028	1009	1009
AHHI	722	767	772	761	788	791	777
COR	12%	14%	13%	13%	15%	15%	16%

Overall, this market is thus quite competitive and institutional investors do not play a prevalent role in this segment, as more than half of the top 15 firms are privately held in 2019. In this context, the COR indicates a tolerable extent of CO, but should nonetheless be kept track of in view of a steady upward motion, having increased gradually from 12% in 2013 to 16% in 2019.

iv. Market concentration for the digestive health market

The situation in the French digestive health market is quite similar to the one in the respiratory tract infection treatment market as seen in Figure 5. In 2019, it represented EUR 956 million in annual pharmacy sales and a large group of companies shared this revenue. Its market leader accounts for only 10%. This competitive environment is confirmed by the various measures of concentration.

Figure 5. Indicators of market concentration for the digestive health market

	2013	2014	2015	2016	2017	2018	2019
HHI	463	450	449	450	439	451	451
MHHI	745	657	739	680	706	766	800
AHHI	524	505	523	522	516	536	542
COR	12%	11%	14%	14%	15%	16%	17%

The HHI hovers around 450 while the MHHI also moves in bearable spheres, albeit being marked by hardly traceable volatilities, and eventually peaks at 800 in 2019. The AHHI

once again provides a more conservative estimate of market concentration than the MHHI as it ends with a value of 542. This is while following a smooth trajectory that points slightly upwards throughout the time span under consideration. In terms of CO concentration, the COR has seen a rise from 12% in 2013 to 17% in 2019 and should hence be further monitored.

6. Impact of CO on Profitability and Financing Strategy

In this section, we analyse the possible impact of CO on a number of financial indicators. We do so by assessing the correlation between the three indexes computed earlier for each product line and a number of financial performance or strategy indicators computed from the data at the firm level for the sample of the top 15 firms in each of the product markets.[14] We start with a basic test of Pearson and Spearman correlations and move on to a simple econometric setting, recognizing that the analysis is very preliminary since the dataset available is limited.

The Pearson and Spearman correlation coefficients allow us to first scrutinize any potential basic linear and non-linear relationships between the different measures of market concentration and the standard indicators for both a firm's profitability (i.e. Return on Equity (ROE) and Return on Assets (ROA)) and its financing strategy (i.e. Debt-to-equity (D/E) and Debt-to-assets (D/A)). The basic econometric model estimated from the panel of data discussed earlier allows us to somewhat refine the correlation analysis by controlling for time and product fixed effects and address some concerns resulting from the possibility that we may have omitted some explanatory variables. Note that we do not claim to try to establish a causal relationship.

Our data at the firm level from Orbis Europe contains financial information on both parent companies registered in Europe and any national subsidiaries which enables the drawing of a dividing line and restrict the analysis to (subsidiary) companies generating sales on the French market only as we did for the computation of the concentration indexes.

Table 4 reports an average of the financial data for the sector as a whole and for each of the product markets as well as levels of market concentration for the period of analysis (2013-2019).[15] It suggests quite a comparable ROE and D/A across producet markets. The same is true for ROA, except for the products targeted to monitor blood sugar. In contrast, there is a significant heterogeneity for the D/E. The rest of the section should provide some information on the extent to which the concentration resulting from CO can help explain these differences.

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[14] In this respect, we calculate a yearly weighted average of the financial performance and strategy indicators, thereby using firm market shares as weights, in order to obtain an accurate reflection of the situation in the respective product market. Since the overall pharmaceutical market could distort our assessment for the aforementioned reasons, it is excluded.

[15] The financial data for 2019 is somewhat of an outlier that further inflates all the rations. Relying on the period years average was a way to focus on a lower bound.

Table 4: Concentration) and average of financial indicators per market (2013-2019)							
	HHI	MHHI	AHHI	ROE	ROA	D/E	D/A
Pharma total	262	970	347	0.23	0.07	2.27	0.69
Pain treatment	2551	3638	3364	0.19	0.06	2.38	0.66
Respiratory treatment	662	1014	768	0.20	0.06	1.67	0.62
Digestive Health	450	728	524	0.18	0.08	1.79	0.64
Blood sugar monitoring	2639	2710	2710	0.19	0.04	2.49	0.70
Source: Orbis Europe							

To provide some perspective on what these indicators characterizing these markets in France represent in relative terms, it would be useful to have comparable data for other countries. Since this is not available, we report the sector specific averages recorded by Damodaran on his website (consulted on March 2, 2021).[16]

The comparison suggests that except for the ROA, the financial indicators for the French Pharma subsectors are all quite high. For the full sample of non-financial firms covered by Damodaran in the same period, the market average was 3.2% for the ROE in Europe and 7.8% in the US. For the D/A ratio, it was respectively 29.9% and 20.1%. For Damodaran's sample of 122 European pharmaceutical firms producing drugs, the ROE and D/A are respectively 14.9% and 16.1%. For the US, the sample size is 287 firms and the two ratios are respectively 19% and 15.4%. These are clearly only indicative benchmarks but they contribute to further fuel the concerns for the possibility that some of the risks conceptually feared from the presence of CO may be quite concrete. The following more precise statistical assessment should help refine the assessment.

Before discussing the results of the formal correlation analysis, it is useful to clarify one of the key limitations of the exercise imposed by the lack of data availability on relevant details. The financial data used here is at the firm-level rather than at the product type level. This introduces a significant limitation in the analysis. Indeed, large pharmaceutical manufacturers usually generate their income from the sale of more than just one product. Our focus on the firm level data could thus hide handsome profits derived from monopolized markets or otherwise artificially embellish results from less lucrative ones in the overall financial statement. A second limitation of our dataset is that we exclude smaller pharmaceutical companies. Even if this may be partially mitigated by the use of market shares as weights, it does introduce an upward bias in the weighted averages of the financial indicators. As a general rule in the pharmaceutical industry, smaller firms are less mature than the well-established ones, with lower maturity often translating into lower profitability and turnover as well as relatively higher expenditures for the development of marketable products. As a consequence, the omission of all but the top 15 firms may push the average financial indicators for each market upwards, at least to some extent that is hard to determine

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[16] http://pages.stern.nyu.edu/~adamodar/

without access to a much more precise dataset. Both limitations should thus be kept in mind when interpreting the following data analysis.

a. The basic correlations

The computations of the Pearson and Spearman correlations between each of the financial variables of interest and the three measures of market concentration as well as with the COR coefficient are reported in Table 5. The degree of statistical significance is reported for each correlation. The fact that none of the Spearman coefficients is significant reduces the likelihood of a simple non-linear correlation. The fact that only one of the financial variables shows a statistically significant Pearson correlation suggests that if there is any pattern to be found, it is probably necessary to identify other variables beside the degree of concentration of the markets, however it is measured.

	Table 5. Correlation matrices								
	Pearson					*Spearman*			
	HHI	*MHHI*	*AHHI*	*COR*		*HHI*	*MHHI*	*AHHI*	*COR*
ROE	*0.105*	*0.140*	*0.144*	*0.121*		*0.184*	*0.113*	*0.182*	*.203*
ROA	*-0.214*	*-0.135*	*-0.160*	*0.208*		*-0.299*	*-0.215*	*-0.231*	*0.331*
D/E	*0.401**	*0.402**	*0.403**	*-0.001*		*0.333*	*0.202*	*0.273*	*-0.273*
D/A	*0.367*	*0.331*	*0.348*	*-0.107*		*0.342*	*0.224*	*0.298*	*-0.232*
	p<0.05								

The fact that the only Pearson correlation to be statistically significant for the three measures of concentration is the debt-equity ratio (D/E) is in line with findings by Fernandez and Klinge (2020) who document a sharp increase in indebtedness of the world's largest pharmaceutical manufacturers since the turn of the millennium. This conclusion deserves better validation however, in particular since the COR is not significantly correlated. This further fuels the case to argue that the increase in concentration linked to CO may not have been strong enough to explain the change in the D/E on its own.

The econometric treatment could provide additional insights as it can consider additional control variables, as well as product or time fixed effects to account for the possible relevance of omitted variables. These additional options could, for instance, account for the fact that a variable such as the rate of interest paid on the debt has been declining during the period of interest. The high return on equity could thus be somehow hidden by a significant growth in the share of debt in total assets in an environment in which equity stakes have continued to be small, including by the institutional investors.

b. Insights from a basic econometric modelling

The dataset covers our full sample (2013-2019) for our 4 pharma sub-markets (i.e. 28 observations). It is not large but sufficiently so to run simple (i) time and (ii) product fixed effects regressions using ROE, ROA, and D/A as the dependent variables and assets (to get a sense of the relevance of size) as the main independent variable as well as each of the measures of concentration.[17] We did this in 3 separate regressions, one per concentration measure.

The estimations on ROE and ROA, controlling through the fixed effect estimation, yield no results, suggesting that it is unlikely that the impact of the evolution of CO over time on these financial indicators was strong enough to be significant. Adding other financial control variables (for instance the D/E ratio), did not alter the main conclusion. In contrast, Table 7 shows that the product fixed effects regression highlights the importance of the measure of concentration selected to assess the impact of CO on financial indicators. While none of the concentration measures seem to be related to the ROA, the regressions for the ROE suggest that omitting to account for CO as would be the case if the usual HHI were the concentration indicator adopted, would underestimate the role of institutional investors in the sector. Indeed both the MHHI and the AHHI are found to be significant determinants of the ROE when product market specificities are accounted for.

Table 6: Product fixed effects regression results for ROE and ROA						
	ROE			ROA		
Constant	0.0022	-0.084	-0.032	0.061	0.070	0.098
Assets	-0.0000002	-0.0000001	-0.0000001	-0.00000001	0.00000001	0.00000001
DE	0.005	0.001	0.009	0.005	0.001	0.004
HHI	0.0002			0.0006		
MHHI		0.0002 *			0.00001	
AHHI			0.0002*			0.00001
R^2	0.462	0.462	0,435	0.250	0.247	0.240
Nber of Obs	28	28	28	28	28	28
* Corresponds to a p vaue<0.05						

In this basic model, both the MHHI and the AHHI show a statistically significant (at the 95% confidence interval) positive association with the ROE. It also shows a leap in the coefficient of determination (to 0.46 and 0.44 respectively). The classic HHI (i.e. ignoring CO) does not identify any link between the ROE, moreover it reports a comparatively lower R^2 (equalling 0.40). Both the MHHI and the AHHI confirm that CO may have something to do with the high ROE noted, in particular considering the fact that these ROEs are significantly higher than those identified for the sector by Damodaran.

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[17] We also assume that unobservable factors that might simultaneously affect the explained variable and the explanatory variables of the regression are time-invariant. Across-group variation is not used to estimate the regression coefficients, because this variation might reflect omitted variable bias.

In contrast, neither of the indicators draws an auspicious picture with regard to the ROA. Even though the application of product fixed effects propels the explanatory power of the regression, elevated p-values suggest that the variables at hand have no meaningful linkage with the return on assets. Part of the reason for this lack of relevance may be linked to the fact the firms with a strong CO characteristic are also more leveraged and this "smoothes" the effect of their higher ROE, since the ROA is simply a weighted average of the ROE and the return on debt in an environment in which the interest rates are extremely low.

The relevance of CO for the leverage indicators is illustrated by Table 7 but the results show that the effect of CO and concentration are not as simple as suggested by the basic correlation analysis reported in Table 5. The comparison of the time and the product fixed effects model suggests that while concentration and CO both matter when the time dimension is accounted for, it does not make a statistically significant difference to the leverage choice made at the product level. In other words, it is more the evolution over time of concentration and of CO that matters than the product market specificities, at least at the existing level of concentration and for its short term evolution over the 7 years period of analysis. The time fixed effect results thus suggest that it is useful to track the evolution over time of the leverage of these firms as already hinted at by the comparison with the Damodaran data and implied by the discussion of the results comparing the determinant of ROA and ROE.

The time fixed effects model for D/A results also show that the relevance of concentration and CO has been increasing somewhat during the period of analysis. All three concentration indicators are positively associated with D/A and R^2 values are close to 0.5, although somewhat unsurprising since one of the key control variables is the size of firm approximated by its assets value.

Finally, it is noteworthy that the three concentration measures produce comparable results for D/A in contrast to what was observed for ROE. This suggests that for these markets, the degree of concentration matters to D/A independently of the importance of CO as well. This is not surprising in such an R&D intensive industry. This ability to leverage to finance R&D probably explains why the R^2 values for the product fixed effect model and the statistical significance of the Assets as a control variable are much higher than for the time fixed effect model, confirming that product market specificities are indeed important determinant of the financing strategies of firms in the sector even if they are not necessarily obviously correlated with CO and concentration.

Table 7: Time and Product fixed effects results for D/A					
	Time fixed effects			Product fixed effects		
Constant	0.682***	0.692***	0.693***	1.017***	0.963***	1.004***
Assets	-0.0000001*	-0.0000001**	-0.0000001**	-0.0000003***	-0.0000003***	-0.0000003***
HHI	0.00003**			-0.00006		
MHHI		0.00003 **			-0.00002	
AHHI			0.00003**			-0.00004
R^2	0.444	0.497	0.482	0.641	0.628	0.639
Nber of Obs	28	28	28	28	28	28
* Corresponds to a p vaue<0.05; ** corresponds to a p value <0.01; ***corresponds to a p value <0.01						

7. Conclusions

The contrast between the picture emerging from the overall market assessment and the one emerging from the various product specific assessments is significant. It argues for a granular view on individual product markets in making policy decisions associated with the presence of CO. This granular approach reveals notable disparities between the four markets under scrutiny, regarding both the levels of market power and the relevance of CO.

At a more technical level, we show that the failure to account for CO leads to an underestimation of market concentration by the time-honoured HHI. This is seen in the comparison with both the MHHI and the AHHI. The two measures converge when market concentration increases but the AHHI is less prone to volatilities in the assessment of the impact of CO on concentration than the MHHI.

At the policy level, the positive and statistically significant relationship between market concentration and ROE and D/A suggests that leading pharmaceutical manufacturers (in particular those operating in highly concentrated markets) have been shifting overtime towards a more leveraged business model aimed at creating shareholder value. But more importantly, the results also suggest that CO has been a factor to account for in this process.

Clearly the analysis has its limitations since it based on a relatively small dataset (2013-2019). But it provides enough evidence to support a call to improve the regulatory monitoring of the financial performance of a sector in which access to relevant data is much more limited than in other public service activities such as electricity or water.

To deliver a more precise diagnostic, some key variables should be included in the agenda for data collection for regulators. For instance, data on the share of exports at the firm level or data on the relative evolution of tangible and intangible assets would both be needed. The effect of the trade data on returns is an empirical matter. But it is likely that increasing trade with countries with deregulated prices would increase the scope for local concentration combined with higher profit margins. The relevance of the composition of assets would be just as uncertain and demand a much more dynamic assessment of the effects of these choices on the production capacity in an environment in which demand for pharma products is likely to continue growing.

Ultimately, a fuller diagnostic is certainly needed to be able to compare the benefits of financing diversification combined with sound firm governance against the costs of dampened competition out of fear that the necessary governance rules cannot be enforced systematically. In view of the many different viewpoints revealed by recent surveys of the conceptual debate and the modest volume of diversified evidence available, it looks like the trade-offs should top the agenda of future research in this field for the foreseeable future.

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