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KU Leuven, Faculty of Economics and Business
Dept. of Management, Strategy and Innovation (MSI)

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Nuria Boot, Jo Seldeslachts and Albert Banal Estañol

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Nuria Boot[*], Jo Seldeslachts[†] and Albert Banal Estañol[‡]

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Abstract

Common ownership - when an investor holds shares in two or more companies - has recently attracted significant attention from policy-makers and researchers, studying mainly US firms. European firms, however, are different as top investors with large stakes, like governments, founding families and foundations are much more prevalent. This paper takes a well-known common ownership with micro-economic foundations, *lambda*, capturing managerial incentives, and compares its implications for S&P Europe 350 firms to those of the S&P 500 for the period 2004-2015 by looking at within, across and global lambda patterns of the European and US S&P companies. We find that US companies have a higher lambda, but European firms' lambda become both faster connected within Europe and across with their US counterpart where the latter is even more pronounced. Both patterns can be traced back to US investment managers' increasing global reach.

[*]KU Leuven. nuria.boot@kuleuven.be

[†]KU Leuven & DIW Berlin. jo.seldeslachts@kuleuven.be

[‡]Universitat Pompeu Fabra & City University London. albert.banalestanol@upf.edu

1 Introduction

Common ownership, when an investor holds shares in two or more firms, has gained significant attention from policy makers and academics in the past couple of years. Institutional investors, such as BlackRock and Vanguard, hold a large and increasing fraction of the publicly traded stock of firms worldwide. They are relatively new types of common owners, driven by the rise of mutual funds and sovereign wealth funds. The links that they cause between firms may, if managers care about the returns to their shareholders, alter strategic objectives of these firms.

Particularly in the US, public companies are typically characterized by having the same group of institutional investors as largest shareholders (Azar et al., 2018). Many European firms, on the other hand, are traditionally characterized by having high levels of ownership by founding families, corporations and governments, who hold a larger number of shares. (Thomson et al., 2006) Recently, however, institutional investors are increasingly present in European firms. For example, documenting the ownership patterns in Germany, Seldeslachts et al. (2017) note indeed the presence of governments and families as non-common investors together with common investors. Banal-Estañol et al. (2021) find similar patterns in the largest European banks. Table 1 illustrates some of the main differences between firms in Europe and the United States. Two major players in the telecommunications industry, Deutsche Telekom and Verizon both have institutional investors such as BlackRock in their top 5 shareholders. However, the European firm, Deutsche Telekom, has a local banking group and the government as its largest shareholders with a significantly higher percentage of shares held than the top shareholders in Verizon.

Deutsche Telekom		**Verizon**	
KfW	17%	Capital Group	7%
German government	14%	BlackRock	6%
BlackRock	8%	Vanguard	6%
Deutsche Bank	2%	State Street	4%
NBIM	1%	Wellington	2%

Table 1: Top 5 shareholders in Deutsche Telekom (S&P Europe 350) and Verizon (S&P 500) in 2015Q4

European policy-makers have also shown receptiveness to the potential impact of common ownership. The European Commission examined the potential effects of common ownership in two recent high-profile merger investigations, Dow/Dupunt and Bayer/Montsanto, in which it stated that the typical market-share based concentration measures would underestimate actual concentration due to the presence of overlapping investors between the firms.[1] Studies commissioned by and roundtables

[1]European Commission, *Case M.7932 DOW/DUPONT* and *Case M.8084 – Bayer/Monsanto*

hosted by policy institutions such as the European Parliament, German Monopolkomision and the OECD called for more research on the prevalence and potential effects of common ownership.[2]

This paper documents the rise in common ownership in Europe by comparing common ownership among S&P Europe 350 firms to the S&P 500, and how connected companies are across. The vast majority of the literature on common ownership has focused on the United States, with Backus et al. (2020) casting light on the sources of variation in common ownership in the S&P 500. This paper uses the same pairwise measure of common ownership, lambda, since it is arguably the measure with the strongest micro-foundations. It has a number of advantages over the Modified Hirschman Herfindahl index, an aggregate measure that requires a Cournot competition assumption and the definition of product markets. Taking the problem one step further, by linking common ownership to market outcomes in the United States, lambda has been applied by Kennedy et al. (2017), Gramlich and Grundl (2017) and Boller and Scott Morton (2019).

Lambda follows from the objective function stated in Rotemberg (1984) and indicates how much a firm values another firms' profits. A lambda of 0 would be the scenario of own profit maximization, in which firms do not care about the effect their actions have on others. An attractive property of lambda is that it can be decomposed into two parts, cosine similarity (or investor overlap) and relative investor concentration, to obtain insights on where the variation comes from. Cosine similarity indicates the angle between investors' holdings in the two firms, or how similar the holdings of the investors holding shares in two firms are. Relative investor concentration relates to the idea that investor concentration affects control, if one firm has large investors (high investor concentration) compared to another firm it will be more expensive to control. Backus et al. (2020) show that relative investor concentration accounts for a substantial part of the variation in lambda. In addition to this decomposition, this paper also decomposes lambda in a way that shows the contribution to lambda of different investor types.

This paper finds that common ownership is on the rise in Europe, and while levels are still lower than those in the US, the rise in recent years has been steeper than in the United States. In the period 2004-2015 the average lambda more than doubled, from below 0.08 to 0.21, whereas it rose from 0.37 to 0.56 in the United

[2]Frazzani, S., Noti, K., Schinkel, M. P., Seldeslachts, J., Banal-Estañol, A., Boot, N., Angelici, C., (2020) "Barriers to Competition through Common Ownership by Institutional Investors", Study for the Committee on Economic and Monetary Affairs, European Parliament, Luxembourg, 2020, Available at `https://www.europarl.europa.eu/RegData/etudes/STUD/2020/652708/IPOL_STU(2020)652708_EN.pdf`. Monopolkomision (2018), "XXII Biennial Report of the Monopolies Commission", Chapter II, Available at `https://www.monopolkommission.de/images/HG22/Main_Report_XXII_Common_Ownership.pdf`. OECD, "Common Ownership by Institutional Investors and its Impact on Competition", OECD Publishing, DAF/COMP(2017)10, 11, Available at `https://www.oecd.org/competition/common-ownership-and-its-impact-on-competition.htm`

States. Furthermore, when looking at patterns of lambda across Europe and US companies, we find that the lambda between European and US companies is higher than within European companies, and rising faster. These patterns can be attributed to (i) local European investors do not have Europe-wide networks and (ii) US investors are becoming more prevalent in Europe, thereby more linking European and US companies.

Going back to the lambdas of Europe and the US, The difference in levels is driven by lower (though equally steeply rising) levels of cosine similarity in Europe. The steep rise in Europe is driven by US investment managers gaining importance. This paper further highlights two directions in which there is potential in two directions for rise in Europe. First, increasing stakes of already present common investors raise average lambda more in the presence of large investors. Second, holding cosine similarity constant, higher dispersion in relative investor concentration leads to higher levels of lambda. With founders and governments often holding large stakes, Europe has higher dispersion in relative investor concentration and therefore potential for higher lambda's. However, this does not fully materialize due to the lower levels of investor overlap. The lower levels of investor overlap are also the reason why incentives for tunneling, transferring profits from one firm to another thereby expropriating undiversified shareholders, are less of a concern in Europe.

This paper also takes a step in extending the alternative control assumptions used in Backus et al. (2020). This is particularly relevant for Europe since different types of investors may have different links between ownership and control. As Backus et al. (2020) show, the average lambda in the S&P 500 appears to converge towards the end of the sample, meaning that common ownership weights become almost insensitive to the link between ownership and control used. In Europe, if anything, lambda seems to become more sensitive to the control assumption used over time.

This paper proceeds as follows. Section 2 reviews the literature. Section 3 introduces the databases used. In section 4 introduces the theoretical foundations behind the common ownership measure, while section 5 shows the patterns over time in Europe, in the United States and globally. Section 6 decomposes the measure and looks at the drives behind those patterns. Section 7 discusses implications and extensions and section 8 concludes.

2 Literature

This paper is tied to several streams of literature. The theoretical literature behind the common ownership hypothesis proposes models formalizing what common ownership incentives would look like. Empirical papers on common ownership investigate patterns in common ownership incentives and study their relation to market outcomes. Two relevant streams in the corporate governance literature look at the effect that investors have on management within firms and at the origin of different

ownership structures around the world.

The theoretical foundations behind common ownership date back to Rubinstein & Yaari (1983), Rotemberg (1984), Reynolds & Snapp (1986) and Bresnahan & Salop (1986). These papers study how the internalization of the effect decisions have on other firms, affect a firms' strategic decisions. Common ownership among competing firms can have anti-competitive effects either by unilaterally reduce incentives to compete or make collusion easier to sustain. On the other hand, a recent theoretical paper shows that in settings with technological spillovers common ownership can also be welfare-enhancing through increases incentives to invest. (Lopez & Vives, 2019)

A couple of papers show empirical patterns of what common ownership incentive terms look like in certain industries and economies. The most comprehensive one with a long sample in the US is Backus et al. (2020) who show that the rise in common ownership in the US is driven by diversification and in the cross-section by investor concentration. In Europe, Seldeslachts et al. (2017) show to rise of investment managers & common ownership in Germany. Banal-Estañol et al. (2021) show common ownership patterns in the European banking industry and the effect the global financial crisis has had.

The empirical literature, using a variety of methods and strategic decisions, tests the hypothesis that firms internalize the effect they have on others through their actions. Evidence is inconclusive, with studies finding anti-competitive effects in the US airline and banking industry (Azar et al., 2018, 2019), while using different methods Kennedy et al. (2017) and Gramlich & Grundl (2017) find no evidence for the same airline industry. Backus et al. (2021) use different objective functions in their structural model and find that price-setting in ready-to-eat cereal is most consistent with individual profit-maximization. Using different strategic decisions, two papers in the pharmaceutical industry find evidence that common ownership links between brands and generic manufacturers make the launch of such a cheaper generic drug less likely. (Newham et al., 2020, Xie & Gerakos, 2019) Across a wide range of industries in Europe, Boot et al. (2021) find that a top non-common investor has a negative effect on markups, compared to other commonly held firms, hinting at a conflict between the different types of investors.

There is a stream in the corporate governance literature that - without taking externalities among firms into account - investigates channels through which institutional investors may affect governance and strategic decisions of firms. This is a small but growing literature. (Aghion et al., 2013; Brav et al., 2018) Appel et al. (2016) establishes that passive mutual funds have a significant and positive impact on several aspects of corporate governance (board composition,anti-takover provisions and unequal voting rights). Their evidence suggests that a key mechanism by which these investors exert their influence is through their large voting blocks. Boone and White (2015) find that firms with higher institutional ownership have more public information dissemination,lower information asymmetries and higher liquidity. Similar to Appel et al. (2016), they find that the effects are strongest for indexing investors.

However, what the corporate governance literature lacks is research that discusses how corporate governance exactly works and which types of owners have which influence.

This paper is also related to a stream in the corporate governance literature that studies the origin of different ownership structures around the world and their impact on firm performance. La Porta et al. (1999) systematically document the ownership of the 20 largest companies across the 27 richest economies and compare what explains these differences in ownership patterns. While their observed sample predates to a large extent the rise of mutual and sovereign wealth funds, and the evolution of the asset management industry to more diversified passive investing, the patterns they observe are in some dimensions still very accurate to date. They find that, except in economies with very strong shareholder protection, few firms are widely held as in Berle and Means' picture of the modern corporation, but rather often have families and the state as controlling shareholders. Consistent with their earlier research (La Porta et al., 1997, 1998) they find that on of the main factors behind this relates to the legal protection of minority shareholders. Common law countries (like the US) tend to have better legal protection of minority shareholders, therefore controlling shareholders have less to fear if they lose control and become a minority shareholder, due to for example a takeover, and may be more willing to sell shares to raise funds or to diversify. On the other hand, in countries with less protection of minority shareholders, losing control (and the corresponding private benefits of control) can be very costly and could make shareholders less willing to give up control by selling shares in the market.

Theory suggests that the benefit of becoming a shareholder of a firm depends on other shareholders' presence, with theoretical papers finding ambiguous effects. Winton (1993) and Zwiebel (1995) show that there are negative externalities between shareholders either due to inefficiencies arising from free-rider problems or due to the allocation of private benefits of control. On the other hand, Edmans and Manso (2011) show that multiple blockholders can generate positive externalities, as they they impose a stronger threat of discipline that induces higher managerial effort. A recent empirical study by Hadlock and Schwartz-Ziv (2019) finds that except for small blocks of investment managers, an incumbent blockholder makes it less likely that others establish or maintain a block position in a firm.

3 Data

This paper links ownership data from the Thomson Reuters Global Ownership Database to the set of constituents of the S&P500 and the S&P Europe 350.

3.1 Indices

The S&P Europe 350 and S&P 500 are stock indices operated by S&P Dow Jones and both part of the S&P Global 1200. They measure the stock performance of large

companies listed on stock exchanges in the United States and Europe (comprising the euro zone, Norway, Sweden, Switzerland and the United Kingdom). The index composition is obtained from Datastream, by taking the composition in the closing month of each quarter.

Unlike indices like Russell 1000 that are strictly rule-based, the components of the S&P 500 and S&P Europe 350 are selected by a committee. The committee uses similar criteria for both indices, including market capitalization, liquidity, domicile, public float, representation of industries in the economy, financial viability, length of time publicly traded (minimum 12 months) and stock exchange they are traded on. One of the goals is also to minimize turnover, as being removed from the index can have a negative value on the firm's valuation.[3] To keep our sample comparable to Backus et al. (2020), for the US firms we exclude firms that are primarily traded on a foreign stock exchange and have an American Depository Receipt.

Table 2 shows how the firms across the two indices are similar in size. While the average firm in the European index has higher revenues, the average American firm has a higher market capitalization. The number of observations also shows that we get close to an average of 500 firms per quarter (as 48 quarters of data and 500 and 350 firms respectively would give 24'000 and 16'800 firms respectively).

S&P Europe 350				
	mean	sd	median	obs
revenue	25'020	40'270	11'390	14'213
market cap	25'540	34'330	12'730	16'223
S&P 500				
	mean	sd	median	obs
revenue	17'970	35'930	7'509	21'704
market cap	26'640	45'950	12'180	23'032

Note: numbers are in millions of US dollars.

Table 2: Descriptives S&P Europe 350 and S&P 500

Figure 1 shows the distribution of firms across industries for both indices, where industries are defined at SIC division level. It can be seen that the industry mix is very similar for the two indices, with Europe having a slightly larger financial sector representation and a slightly smaller services sector.

[3]The composition of the indices varies little over time. 60-70% of firms are in one the indices for the entire sample. The main reasons why the composition of the indices changes are exclusion of a firm after mergers or being to small (e.g. after a spin-off or changes in market capitalization) or inclusion of next firms (e.g. newly merged entities or tech firms).

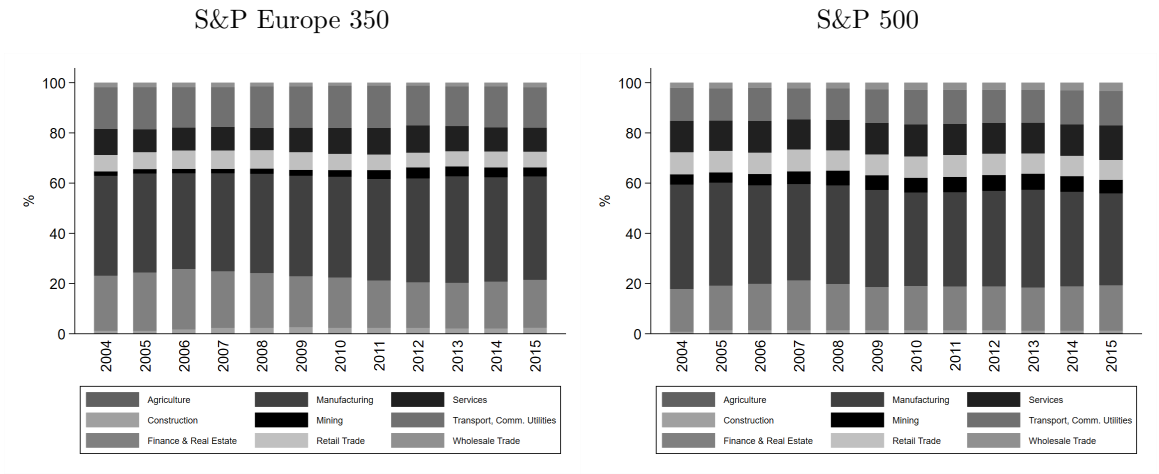


Figure 1: Industry composition of firms in the indices over time

Figure 2 shows the percentage of firms per country for the S&P Europe 350 index. Not surprisingly, the largest number of firms come from the United Kingdom, France and Germany. The most notable change over time is the decline in the share of UK firms, going from almost 40% at the beginning of the sample to slightly above 30% at the end.

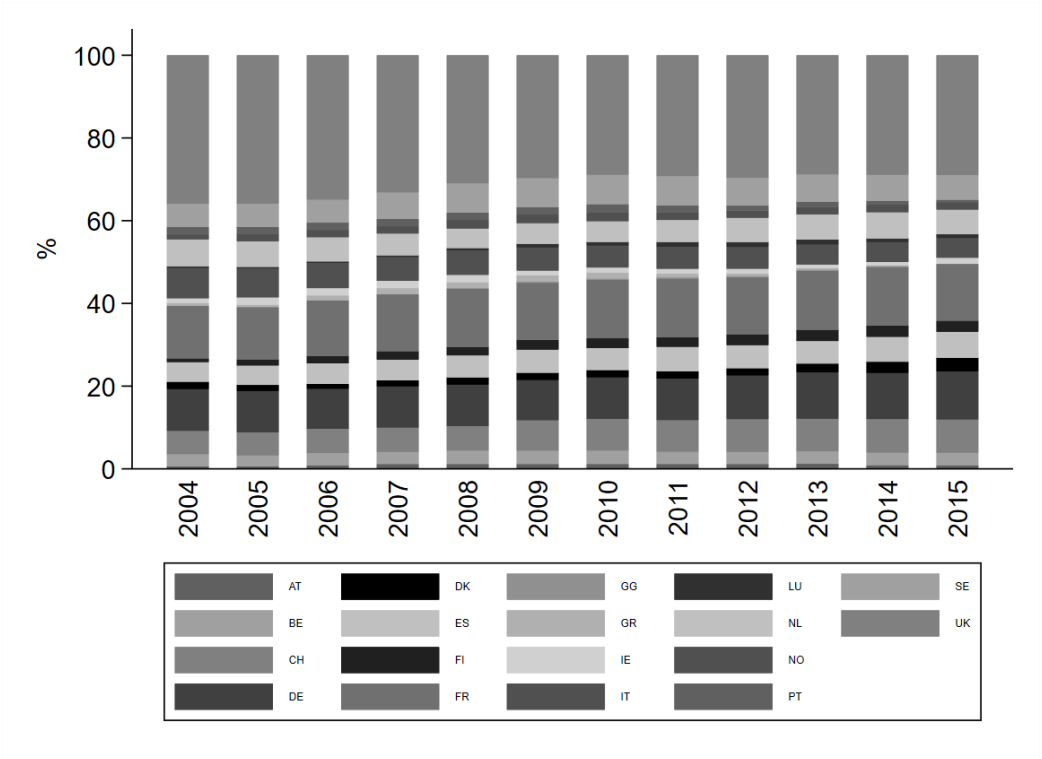


Figure 2: Country composition over time of the S&P Europe 350

3.2 Ownership data

We use the Thomson Reuters Global Ownership Database to obtain ownership information for the constituents of the indices. The Thomson Reuters Global Ownership Database includes holdings by each shareholder in each publicly listed firm for every year-quarter in the period 2004-2015. For firms outside the US, information is sourced from stock exchange filings, trade announcements, company websites, company annual reports and financial newspapers. For the US, Thomson Reuters collects ownership information from 13F, 13D and 13G filings, and forms 3, 4, and 5. This database has also been used by Banal-Banal-Estañol et al. (2019, 2020) and Newham et al. (2020).

This data has a number of advantages compared to the Thomson Spectrum data that most of the recent papers on common ownership rely on. Contrary to the Thomson Reuters CDA/Spectrum database offered by WRDS [4], this data is not limited to 13F filings, which are only filed by large investors in the US.[5] More importantly, the WRDS database shows holdings assigned to the owner that filed the 13F. This is what is commonly referred to as an "as-filed view." This database utilizes a "money-

[4]This data is used among others by Azar et al. (2018), He & Huang (2017), Xie & Gerakos (2018)

[5]Furthermore, as pointed out by Backus et al. (2020), WRDS and Thomson Reuters began to notice data irregularities in that database, but these are mostly addressed in an update in July 2018.

manager view." With this view, the database combines one or more filings to link the holdings to the actual firm that manages the investments. In other instances, it might break apart a single filing in order to accomplish the same thing. The holdings would then be assigned to one or more of the managers listed on the file. In other words, this database attempts to assign the *decision maker* or ultimate owner, which is often not the same as the filer.[6] Furthermore, to fully account for changes in investor name that occurred through the sample as a result of mergers, acquisitions and partial sales, the data provided by Thomson has been modified.

Table 3 shows the top 10 investors in both indices by percentage of shares held. The most striking difference is that top investors in Europe hold much higher stakes than in the United States. The top ten in Europe features several governments. They are for example heritage of a post-war nationalization of the industry (the French government in Electricité de France) or of post-financial crisis bailouts and restructuring of banks (the British and Spanish government in Royal Bank of Scotland and Bankia). There is also a number of (founding) families and individuals holding large stakes in European companies. In the United States on the other hand, governments are absent and families and individuals are present (such as the Walton family or Oracle co-founder Lawrence Ellison) but they are less common and hold smaller stakes.

S&P EU 350			**S&P 500**		
Firm	*Top investor*	*%*	*Firm*	*Top investor*	*%*
Edf	Government of France	85%	Diamond Offshore	Loews Corporation	53%
Man	Volkswagen	75%	Hormel Foods	Hormel Foundation	49%
Royal Bank of Scotland	UK Financial Investments	73%	Walmart	Walton Enterprises	45%
Christian Dior	Arnault Family	72%	Reynolds Amricn	British American Tobacco	42%
Schindler	Schindler and Bonnard families	70%	Republic Servs	Cascade Investment	31%
Equinor	Government of Norway	67%	Kraft Heinz	Berkshire Hathaway	27%
Luxottica	Leonardo del Vecchio	66%	Oracle	Lawrence Ellison	27%
Hermes Intl.	Hermes Family	65%	First Solar	JCL Holdings	26%
Bankia	FROB	64%	Kraft Heinz	3G Capital	24%
Antofagasta	E. Abaroa Foundation	61%	CA	Careal Holding	24%

Table 3: Top 10 holdings by % of shares held by a single investor (2015Q4)

Table 4 shows that the big 3 investors in the United States (Vanguard, BlackRock and State Street) hold (larger) stakes in virtually every S&P 500 company by the end of our sample and in the case of BlackRock and Vanguard often more than 5% in the United States. In Europe they are increasingly present too. BlackRock holds over 5% of shares in more than half of the index by the end of the sample, and Vanguard holds small stakes in nearly every firm in the index, despite not appearing in the top 10 investors at the beginning of the sample. Contrary to the United States, Europe

[6]For a detailed explanation of this data and the dynamic assignment of ultimate owners, see data repository: `https://www.openicpsr.org/openicpsr/project/120781/version/V1/view` attached to the paper Banal-Estañol et al. (2020). See also Backus et al. (2020), for a discussion on the mistakes that databases generate when using as-filed based ownership data, including short positions.

also has a number of UK investors and a Norwegian sovereign wealth fund among its top investors. Except Barclays Global Investors (which was acquired by BlackRock in 2009), all top investors in the US are also American.

2004q1

S&P Europe 350					**S&P 500**				
Investor	*Country*	*1%*	*3%*	*5%*	*Investor*	*Country*	*1%*	*3%*	*5%*
Legal & General	UK	103	67	0	Barclays Global Investors	UK	439	275	48
BlackRock	US	88	57	19	State Street Global	US	439	145	38
Fidelity	US	86	48	22	Vanguard	US	435	15	1
M&G Investments	UK	74	24	5	Northern Trust	US	394	7	3
State Street	US	73	10	3	Fidelity	US	316	184	103
Capital Group	US	72	58	38	Capital Group	US	242	182	122
UBS	CH	68	17	9	BlackRock	US	222	28	6
Standard Life	UK	68	13	3	Ameriprise Financial	US	189	22	5
Aviva	UK	67	14	1	Wellington Mgmt.	US	187	80	37
Lloyds	UK	65	19	4	Alliancebernstein	US	174	78	48

2015q4

S&P Europe 350					**S&P 500**				
Investor	*Country*	*1%*	*3%*	*5%*	*Investor*	*Country*	*1%*	*3%*	*5%*
BlackRock	US	304	213	176	Vanguard Group	US	477	473	446
Vanguard	US	284	3	1	BlackRock	US	476	469	403
NBIM	NO	255	31	10	State Street Global	US	475	454	95
Aberdeen	UK	138	33	11	Northern Trust	US	383	3	3
Capital Group	US	122	73	54	Fidelity	US	341	167	88
Fidelity	US	112	26	15	Capital Group	US	239	156	110
State Street	US	95	12	0	Bank of New York	US	229	24	4
Legal & General	UK	94	24	0	J.P. Morgan Chase	US	206	79	23
UBS	CH	86	12	3	T. Rowe Price	US	205	109	72
Franklin Templeton	US	70	33	17	Invesco	US	192	25	4

Table 4: Largest investors by number of blockholdings

4 Common ownership measure

Given its micro-foundations and in other to compare common ownership in Europe to the United States, this paper uses the measure for common ownership used in Backus et al. (2020).[7] The measure follows directly from a model proposed by Rotemberg (1984) in which the proposed objective function is that firms maximize static shareholder value, as opposed to the firms' own profits. The profits of the shareholder i are assumed to be given by a weighted sum of profits over its portfolio

[7]The measure has also been applied by several other papers studying common ownership including Banal-Estañol et al. (2020), Boller and Scott Morton (2019), Lopez & Vives (2019) and Newham et al. (2020).

of firms:

$$v_i = \sum_{k=1}^{J} \beta_{ik} \pi_k \tag{1}$$

where β_{ik} are the cash flow rights the shareholder has in firm k. Being a common owner means that β_i is larger than zero for more than one firm.

The manager of firm j is assumed to maximize the weighted average of its shareholders' profits:

$$\sum_{i=1}^{I} \gamma_{ij} \sum_{k=1}^{J} \beta_{ik} \pi_k \tag{2}$$

$$\propto \pi_j + \sum_{k \neq j} \lambda_{jk} \pi_k \tag{3}$$

where γ_{ij} are the control rights that shareholder i has in firm j. The idea is that, as these shareholders may have different objectives, the manager solves this as a social choice problem where it weighs each shareholder's interests by the control rights they have in the firm. Rearranging gives an objective function where the manager of firm j maximizes its own profits plus a weighted sum of others' profits, where profit weights are given by:

$$\lambda_{jk} = \frac{\sum_i \gamma_{ij} \beta_{ik}}{\sum_i \gamma_{ij} \beta_{ij}} \tag{4}$$

λ_{jk} is the degree of internalization of firm k's profits by the manager of firm j relative to the own profits of firm j. These weights correspond to Edgeworth's coefficients of "sympathy" between firms (Lopez & Vives, 2019). All $\lambda_{jk} = 0$ corresponds to the scenario where all firms maximize their own profits. $\lambda_{jk} = 1$ corresponds to how mergers (or full collusion) are usually modeled, since post-merger the firms are assumed to fully internalize the effect their strategic decisions have on each other.

While β_{ij} can directly be observed in our database, γ_{ij} depends on an underlying corporate governance model. Most models in the corporate governance only go as far as acknowledging that ownership and control may not be equal. There no consensus of what the relationship between β and γ should be for different types of investors, or what drives it. The vast majority of the literature therefore uses a "proportional control" (or one share, one vote) assumption, where $\gamma_{ij} = \beta_{ij}$. Like Backus et al. (2020), most of this paper uses this assumption as well, but relaxes the assumption in the last section to accommodate $\gamma_{ij} = \beta_{ij}^{\alpha}$.[8] This way, with for example $\alpha > 1$ more power can be given to larger investors. Stylized example 1.1 illustrates how the common ownership incentive terms are computed. Let firms 1 and 2 operate in one economy and firms 3 and 4 in a different one. Besides investors A, B and C, the

[8]This specification has the favorable properties that γ is continuous, monotonically increasing in β and γ and is equal to zero when holdings are zero.

rest of the firms' shares is held by small retail investors who have no influence on the firms' actions.

Example 1.1

	firm 1	firm 2
investor A	5%	5%
investor B	25%	-

Ownership structure 1

	firm 3	firm 4
investor C	5%	5%

Ownership structure 2

The profit weight that firm 1 places on firm 2, λ_{12} is given by:

$$\lambda_{12} = \frac{\sum_i \beta_{i1}\beta_{i2}}{\sum_i \beta_{i1}\beta_{i1}} = \frac{\beta_{A1}\beta_{A2} + \beta_{B1}\beta_{B2}}{\beta_{A1}^2 + \beta_{B1}^2} = \frac{5 * 5 + 25 * 0}{25^2 + 5^2} = \frac{1}{26}$$

Meaning that, relative to it's own profits which have a weight of 1, firm 1 values firm 2's profits by about 0.04. It can also easily be seen that all other lambda's in this example are equal to 1, since the only investor holding shares in firms 2, 3 and 4 is a common investor that holds the same percentage of shares in other firms.

$$\lambda = \begin{bmatrix} 1 & \frac{1}{26} \\ 1 & 1 \end{bmatrix} \qquad \lambda = \begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$$

Now, suppose the common owners, investors A and C increase their stake from 5% to 10%. The ownership structure of the two firms now looks as follows:

Example 1.2

	firm 1	firm 2
investor A	10%	10%
investor B	25%	-

Table 5: Ownership structure 1

	firm 3	firm 4
investor C	10%	10%

Table 6: Ownership structure 2

In this example this only affects the weight that firm 1 places on firm 2, since the other firms still have only one investor, that holds the same percentage of shares in the other firm. The profit weights are now given by:

$$\lambda = \begin{bmatrix} 1 & \frac{4}{29} \\ 1 & 1 \end{bmatrix} \qquad \lambda = \begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$$

With firm 1 now placing a weight of about 0.14 on the profits of firm 2.

This example illustrates how an increasing percentage of shares held by common owners can have larger effects when there are large non-common owners. The average lambda between firms 1 and 2 rose as a consequence of the larger stake held by the common investor, while the lambdas between firms 3 and 4 did not change. The intuition why increasing the number of shares held of already present common investors has a larger impact for the firm with a large non-common owner, is that it makes the portfolios of the two sets of investors holding shares in the firms more similar, while those of the firms without the non-common owners are already more similar.

5 Common ownership patterns

The presence of large (non-common) owners is something that characterizes the ownership structure of European firms. How this can lead to steeper increases in average lambda is also somewhat reflected by the empirical patterns we observe. Figure 3 shows the average common ownership measure over time for the two samples of firms. While average levels of common ownership have been and continue to be higher in the United States, in Europe the rise in the last couple of years has been much steeper. The average lambda in Europe more than doubled, from 0.08 to 0.21, between 2004 and 2015. In the US, lambda rose from 0.37 to 0.56.

S&P Europe 350 S&P 500

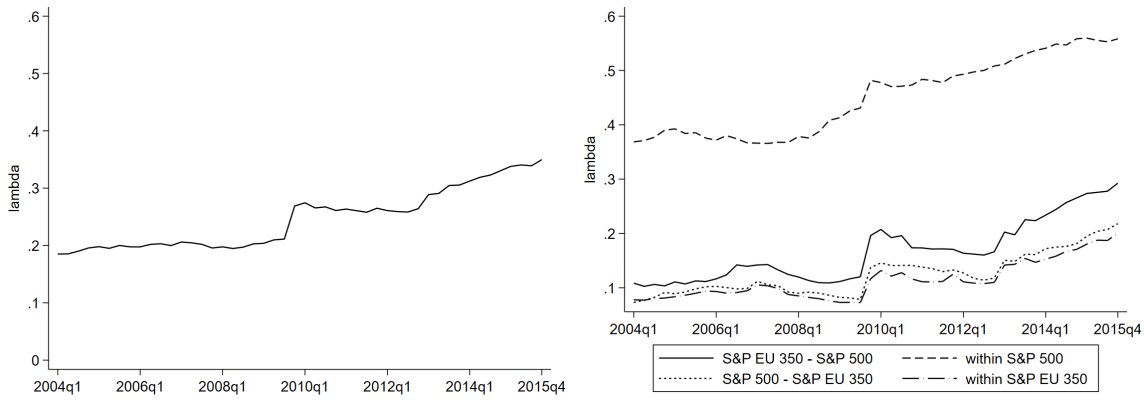
Figure 3: Mean common ownership measure over time

While a decision of a telecommunications provider may barely affect profits of luxury fashion brand, this paper avoids defining a relevant market for two reasons. The first is that it allows to draw a comparison to the economy-wide profits weights of the S&P 500 in Backus et al. (2020). The second is that defining a relevant market in a satisfactory way is not straightforward. Industry codes are generally too broad to define a set of competitors and the firms in these indices operate in many relevant

product markets. Using industry classifications, Appendix A.2 shows the average lambda over time among same-industry firms. The trend in profit weights of same industry firms is similar and the levels are slightly higher than the economy-wide profit weights.

In order to draw a comparison to Backus et al (2020), most of this paper focuses on the differences in common ownership within either the S&P Europe 350 or the S&P 500. However, investors may diversify their portfolios globally and firms operating in the US may thereby impose externalities on firms in Europe. Therefore, the left chart in Figure 4 shows the average global lambda over time. The way lambda is computed here is by taking the full sample of firms in both the S&P 500 and the S&P Europe 350 and by calculating also the weight that each firm in the S&P EU 350 places on each firm in the S&P 500 and vice versa. This leads to a matrix of roughly 850 times 850 lambda's of which then the average is computed.

The right chart in figure 4 decomposes the global lambda into four parts. Each of those 850 times 850 lambda's falls in one category. "Within S&P Europe 350" contains the average of the 350 times 350 lambda's, the average weight that a European firm places on other European firms' profits. This is the same line as the left panel of Figure 3. Similarly "within S&P 500" is the average weight that US firms place on other US firms' profits. "S&P 500 - S&P EU 350" is the average of the 500 times 350 lambda's between S&P 500 and S&P 350 firms, meaning this line shows the average weight that a US firm places on a European firms' profits. Similarly, "S&P EU 350 - S&P 500" is the average weight a European firm places on the profits of a US firm. Figure 4 shows that the average weight that firms in the US place on each others' profits is highest, while the average weight that European firms place on each others' profits is lowest.



Global lambda

Global lambda split

Figure 4: Global lambda

The fact that the average weight that European firms place on each others' weight is lowest, appears to be driven by two factors: a strong presence of local investors in

some European countries and smaller stakes held by large US investment managers. Evidence for the former is for example also shown by Banal-Estañol et al. (2021), who show that Swedish investors tend to be the top investors in Swedish banks. These investors are (almost) not present in firms outside of that country, meaning that firms within Sweden may place a larger weight on each others' profits than they would place on firms outside of Sweden. Figure 5 shows the average weight European firms place on other firms of their own country and the average weight they place on firms in the US. The dashed line is the average lambda over all European firm pairs for which firm j and firm k are located in the same country. This is a subset of the 350 times 350 lambda's of the "within S&P Europe 350" in figure 4, as it would exclude for example the weight that Vodafone (a British telecommunications company) would place on Orange (a French firm). The solid line is the average lambda computed over all firm pairs where firm j is a European firm and firm k is a US firm (meaning a set of roughly 350 times 500 lambda's - the same set as the solid line in the right panel of figure 4). Figure 5 shows that the weight that European firms place on other same-country firms' profits has remained fairly constant over the sample, at around 0.3. The weight they place on US firms used to be much lower, but is on a steep rise and has almost reached the same level towards the end of the sample.

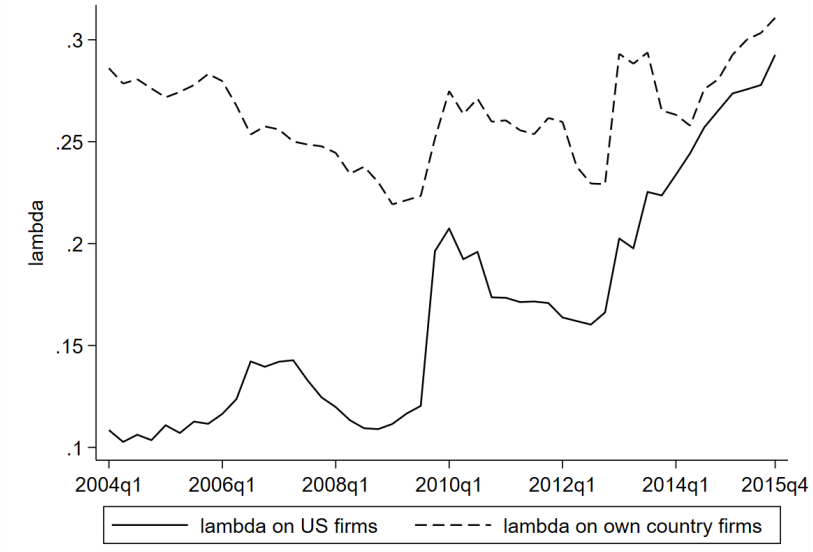


Figure 5: Average lambda of European firms with US firms vs own country firms

US investors like BlackRock and Vanguard are present globally, but have the strongest presence (both in number appearances and in terms of percentage of shares held) in the US. They are present in almost every S&P 500 firm, generally holding at least 5% of shares. They are on the rise in Europe, but holding smaller stakes and appearing less often. Because of that, towards the end of the sample, European

firms have on average more common investors with US firms and therefore place a larger weight on their profits. With the presence of local investors and US investors appearing less frequently, the weight they place on profits of European firms outside their own country lower.

6 Common ownership decomposed

6.1 Investor type decomposition

Banal-Estañol et al. (2020) show that lambda can be decomposed into a weighted average of investor type-specific lambda's. This way, one can look at the contribution of different types of investors to the overall lambda. This decomposition is particularly of interest for European firms, as they exhibit more heterogeneity in terms of types of investors and investor nationality. Assuming for simplicity of notation that there are two types of investors, type 1 and type 2, lambda can be written as a linear combination of investor type-specific lambda's:

$$\lambda_{jk} = w\lambda^1_{jk} + (1-w)\lambda^2_{jk}$$

where λ^1_{jk} captures the relative weight that firm j puts on firm k's profits because of investors of type 1:

$$\lambda^1_{jk} = \frac{\sum_{i\in 1} \gamma_{ij}\beta_{ik}}{\sum_{i\in 1} \gamma_{ij}\beta_{ij}}$$

Weight w represents the weight that firm j places on the lambda's of investors of type 1. This weight depends on how important investors of type 1 are within firm j:

$$w = \frac{\sum_{i\in 1} \gamma_{ij}\beta_{ik}}{\sum_{i\in 1\cup 2} \gamma_{ij}\beta_{ij}}$$

Applying this decomposition of lambda to investor nationality allows to see which nationalities of investors contribute most to the rise of common ownership over time. Nationalities here are split into US investors, European investors and a category containing other nationalities (mainly Asian and Australian investors). The top two panels in figure 6 show that the rise in lambda in the S&P Europe 350 is primarily driven by an increase in lambda's of US investors, while the contribution of non-US investors to lambda remains fairly constant. In the S&P 500 lambda is driven almost entirely by US investment managers (with the exception of the pre-2010 period, before Barclays Global Investors, a major UK investor, got taken over by BlackRock). US investors' increasing importance is also shown in the bottom two graphs, where it can be seen that in the US, after 2009, the weights of non-US investors are almost zero. In Europe the weight of US investors is increasing at the expense of European investors and that by the end of the sample they are almost at the same level.

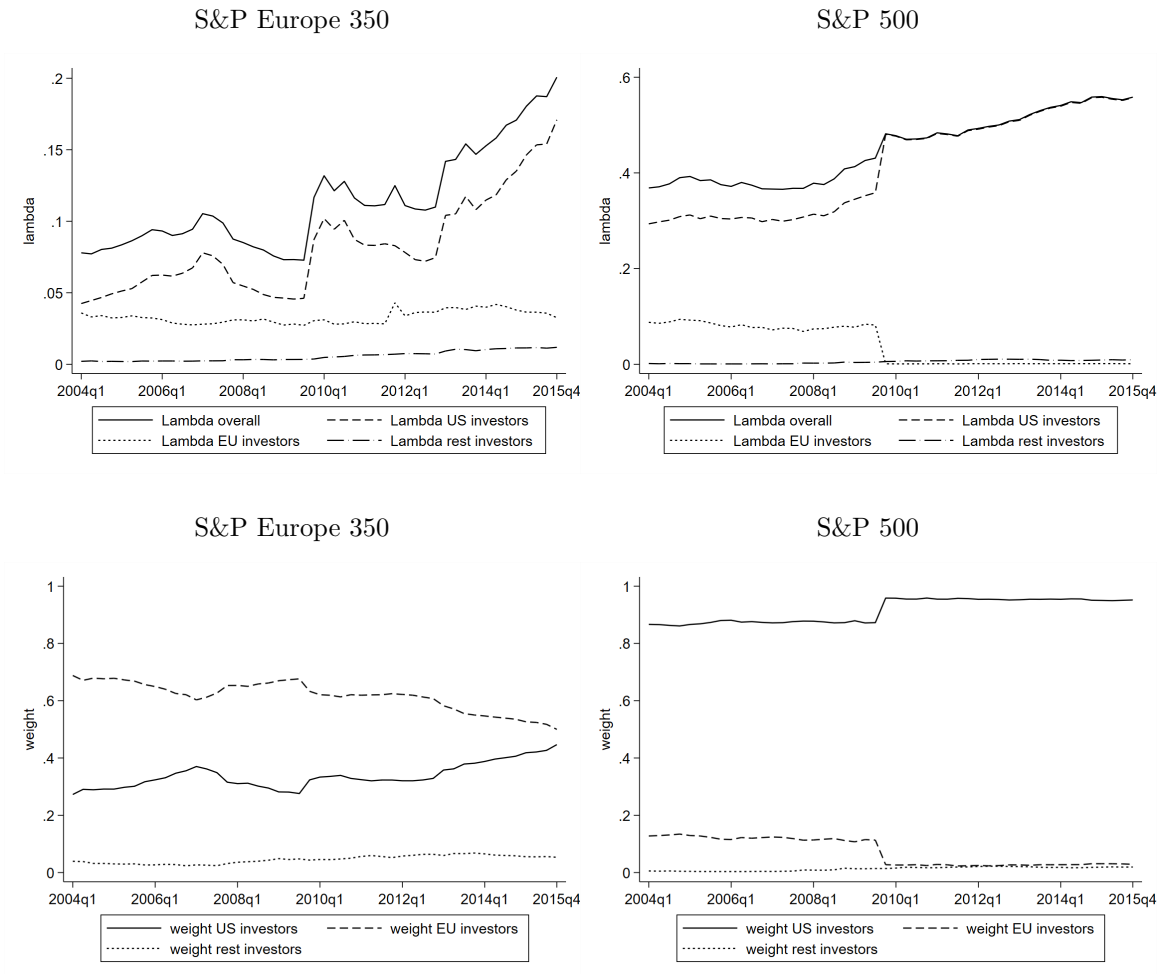


Figure 6: Investor nationality lambda and weights by index

Notes: The top figures show lambda over time by nationality of investor, the bottom two figures show the average weight by nationality of investor over time.

One could also decompose lambda to see the contribution by type of investor (i.e. investment managers, individuals & corporations and government agencies). This decomposition is not included in the paper because investment managers are behind the entire rise in lambda in the US and almost entirely in Europe. This is not because individuals & corporations or government agencies are never common owners, but because when they are common owners, they only appear in a very limited number of firms, meaning their average contribution over the entire set of pair-wise lambda's is very small.

6.2 Cosine similarity & relative investor concentration

Besides decomposing by type of investor, as Backus et al. (2020) show this common ownership measure also has meaningful mathematical decomposition properties that allow to study the underlying sources of changes in common ownership. In particular, λ_{jk} can be written as the ratio of two inner products, which using the geometric definition of an inner product can in turn be rewritten as the angle between the two vectors multiplied by the Euclidean norm of the vectors. As a result λ_{jk} can we written as a product of two elements, the cosine similarity and relative investor concentration:

$$\lambda_{jk} = \frac{\sum_i \beta_{ij}\beta_{ik}}{\sum_i \beta_{ij}\beta_{ij}} = \frac{\langle \beta_j, \beta_k \rangle}{\langle \beta_j, \beta_j \rangle} = \frac{cos(\beta_j, \beta_k)\|\beta_j\|\|\beta_j\|}{cos(\beta_j, \beta_j)\|\beta_j\|\|\beta_j\|} \tag{5}$$

$$= \underbrace{cos(\beta_j, \beta_k)}_{\text{cosine similarity}} \cdot \underbrace{\frac{\sqrt{IHHI_k}}{\sqrt{IHHI_j}}}_{\text{relative IHHI}} \tag{6}$$

where $IHHI_k = \sqrt{\sum_i \beta_{ik}^2}$, the investor Herfindahl-Hirschman index, is the Euclidean norm of the vector containing all investor holdings in firm k, β_k.

The cosine similarity part indicates how similar the portfolios of investors holdings shares in firms j and k are. It is bounded between 0 and 1, and is larger when the portfolios are more similar. It is equal to:

$$cos(\beta_j, \beta_k) = \frac{\sum_i \beta_{ij}\beta_{ik}}{\sqrt{\sum_i \beta_{ij}^2}\sqrt{\sum_i \beta_{ik}^2}} \tag{7}$$

It means that for the cosine similarity to be high it's not only the overlapping investors' holdings in the two that firms count (i.e. the investors that would be called "common owners"). Also the holdings of investors that only hold shares in one firm matter, as they would appear in the denominator. In our context, for example a government holdings a large percentage of shares can make the angle between the two firms large.

The second part, the relative IHHI part is the relative investor concentration. A general rise in investor concentration alone, like the one from the example in the previous section, may not have effects on lambda, since the higher investor concentration would appear in both the numerator and denominator. Relative investor concentration relates to the ability of common owners to exert control. The idea is that if firm j is very concentrated in terms of ownership compared to firm k (for example because it has investors that hold larger percentages of shares), firm j would be harder to influence for common owners than firm k. Or in terms of the effect on λ_{jk}, firm j (k) would place a larger (smaller) weight on its own profits relative to firm k's (j's) profits because of the larger (smaller) $IHHI_j$ ($IHHI_k$) appearing in its denominator. In fact, this relative IHHI part accounts for all heterogeneity in λ's within pairs of firms,

as the cosine part is symmetric.

Taking logs, the sources of variation of the parts of lambda are additively separable, so variance can be attributed to each component.

$$Var(\log \lambda_{jk}) = Var(\log cos(\beta_j, \beta_k)) + Var\left(\log \sqrt{\frac{IHHI_k}{IHHI_j}}\right) + 2 \cdot Cov\left(cos(\beta_j, \beta_k), \log \sqrt{\frac{IHHI_k}{IHHI_j}}\right) \quad (8)$$

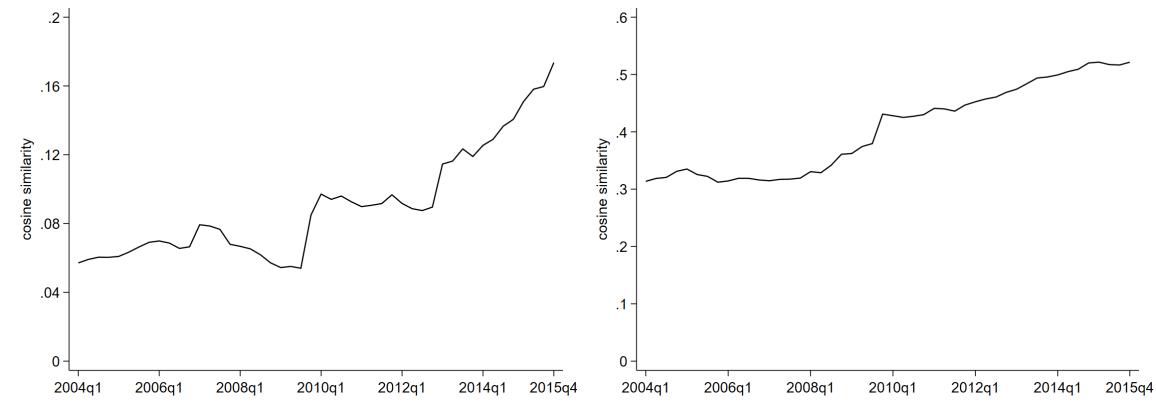
Table 6.2 shows the fraction of variation explained by the components of lambda. For the cross-section, the sample is residualized on quarter fixed effects, the time series on ordered pair fixed effects and the panel on both. The fact that the fraction of variation explained by relative investor concentration is highest in the cross-section is not surprising, given that large investors causing dispersion in relative investor concentration, such as founding families, tend to stay over longer periods of time.

	S&P 500		**S&P EU 350**	
	cos similarity	rel. IHHI	cos similarity	rel. IHHI
Raw	60.7%	39.3%	77.4%	22.6%
Cross-section	57.6%	42.4%	77.1%	22.9%
Time series	66.6%	33.4%	81.9%	18.1%
Panel	60.4%	39.6%	81.6%	18.4%

Table 7: Fraction of variation in λ explained by its components

Relative investor concentration explains a similar fraction of variation for S&P 500 firms in our 2004-2015 sample as Backus et al. (2020) find for a longer sample. Most notably, relative investor concentration explains less of the variation in lambda over time and in the cross-section in Europe - only about 20%. Cosine similarity on the other hand appears to play a large role in Europe.

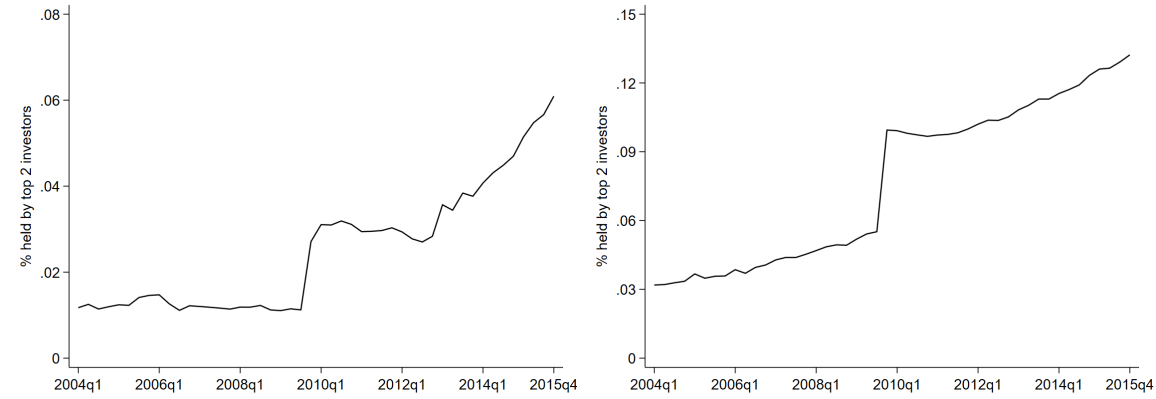
The steeper rise of lambda in Europe is indeed driven by a steeper drive in cosine similarity in Europe. As figure 7 shows, lambda and investor overlap follow each other closely, with investor overlap also steeply rising towards the end of the sample.



S&P Europe 350 S&P 500

Figure 7: Cosine similarity over time

Behind this rise in cosine similarity, are for example the increasingly present largest 2 investors (BlackRock and Vanguard) in Europe. Figure 8 shows how the top 2 investors together used to hold an average of less than 2% of shares in S&P Europe 350 firms, with a rise starting in 2010 to over 6% towards the end of the sample. In 2004, the same investors together held an average of less than 4% of shares in S&P 500 firms, which has increased to almost 14% of shares towards the end of the sample.[9]



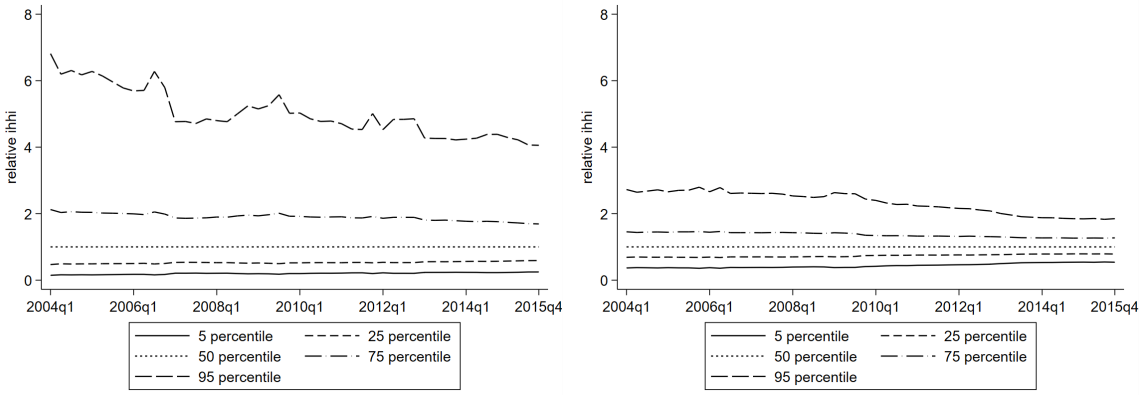
S&P Europe 350 S&P 500

Figure 8: Average percentage held by the top 2 investors (BlackRock and Vanguard)

The other component of lambda, the relative investor concentration, looks very different for Europe compared to the United States. Figure 9 shows the percentiles

[9]The spike after 2009 is driven by BlackRock's takeover of Barclays Global Investors, which was particularly present in the United States.

of relative investor concentration. By construction the median is around 1 as the investor concentration of one firm will appear in the numerator for one lambda and in the denominator for the other. A relative investor concentration of 2 means that investor concentration in that firm is twice as concentrated as in the other firm. Figure 9 shows that relative investor concentration is much more dispersed in Europe, where throughout the sample the 95th percentile of relative investor concentration exceeds 4. In fact, firms like those shown in 3 are the ones that drive the upper percentiles of relative investor concentration.[10]



S&P Europe 350 S&P 500

Figure 9: Relative investor concentration percentiles

The following example illustrates how more dispersion in the relative investor concentration component can lead to higher lambda's. Suppose again that there are two economies, each with two firms operating in them. Investor B holds about 10% of firm 1's shares, or to be more precise: $3\sqrt{11}\%$ of shares. Percentages of shares in this example are chosen such that the cosine similarity part of lambda is equal across the two economies, while investor concentration differs.

Example 2

	firm 1	firm 2
investor A	1%	1%
investor B	$\sim 10\%$	-
cos	1/10	1/10
IHHI	100	1

Ownership structure 1

[10]Investor concentration of the top 5% is not declining. Appendix A.1 shows that the slight decline in relative investor concentration of the top 5 percent firms is driven by an incline in investor concentration of other firms

	firm 3	firm 4
investor C	1%	1%
investor D	3%	-
investor E	-	3%
cos	1/10	1/10
IHHI	10	10

Ownership structure 2

The weight that firm 1 places on the profits of firm 2 is given by:

$$\lambda_{12} = cos * \sqrt{\frac{IHHI_k}{IHHI_j}} = \frac{1}{10}$$

The resulting lambda's are given by:

$$\lambda = \begin{bmatrix} 1 & \frac{1}{10} \\ 1 & 1 \end{bmatrix} \qquad \lambda = \begin{bmatrix} 1 & \frac{1}{10} \\ \frac{1}{10} & 1 \end{bmatrix}$$

Keeping the cosine similarity component constant, asymmetries in investor concentration lead to higher average lambda (0.55 among firms 1 and 2 vs 0.1 among 3 and 4). This is because profits of firms with concentrated ownership will be given large weight by others which is on average not outweighed by the smaller weight they place on firms with less concentrated ownership. This also highlights a second direction in which there is potential for rise in Europe, since investor concentration among European firms is more dispersed.

7 Concluding remarks

This paper compares the rise of common ownership in Europe to the United States. Despite European policy-makers receptiveness to the potential implications of common ownership, there is very little evidence on what common ownership in Europe looks like. This paper compares the rise in common ownership profit weights among S&P 500 and S&P Europe 350 firms.

This paper shows that common ownership in Europe is on a steeper rise than in the United States, but that in terms of levels it is smaller. Average lambda in Europe more than doubled, with European firms placing on average a weight of 0.08 on other firms' profits in the beginning of the sample, to 0.21 by 2015. In the US during our sample the average lambda rose from 0.37 to 0.56. The smaller levels in lambda in Europe are due to lower levels of investor overlap (cosine similarity), which is also behind the steeper rise in lambda over time. The rise of lambda in Europe is driven by US investment managers gaining importance.

We highlight two directions in which there is room for lambda in Europe to increase. First, an increase in common owners' stakes has a larger effect on the average lambda in the presence of large, non-common investors, as many European firms have. This is driven by the fact that increasing a common owner's stake has a large effect in terms of making the ownership structure of two firms more similar compared to the scenario where there is no large non-common investor and firms already have similar ownership structures. Our descriptives indeed indicate that large investors are taking and increasing shares in firms, but that they are not yet at US levels where the largest institutional investor owns more than 5% of shares in 90% of the firms in the index. Second, holding investor overlap constant, dispersion in relative investor concentration increase the average lambda. This is because profits of firms with concentrated ownership will be given large weight by others which is on average not outweighed by the smaller weight they themselves place on firms with less concentrated ownership.

Furthermore, when looking at patterns of lambda across Europe and US companies, we find that the lambda between European and US companies is higher than within European companies, and rising faster. These patterns can be attributed to (i) local European investors do not have Europe-wide networks and (ii) US investors are becoming more prevalent in Europe, thereby more linking European and US companies.

It is outside the scope of this paper to investigate which primitives drive the differences in common ownership patterns between Europe and the United States. La Porta et al. (1997, 1999) look at the ownership structure of firms around the world and which factors explain the differences. One of the main factors they put forward relates to the legal system. In legal systems with lower investor protection, large investors are less inclined to sell shares and give up private benefits. Typically, common law countries have higher levels of protection for small investors compared to civil law countries. Except the United Kingdom and Ireland, which are common law countries like the United States, all firms in the S&P Europe 350 are civil law countries.[11] However, the factors explaining the differences in common ownership patterns in Europe and the United States could be different ones, such as the functioning of financial markets, frictions and incomplete market integration.

Besides the origin of ownership structures, another potential avenue for further research would be about the corporate governance model underlying common ownership. This paper takes the most widely used micro-founded theory, but it remains the question whether the assumptions are justified and in which situations these incentives actually manifest itself. We also know little about how ownership translates into control. Most models only go as far as pointing out that there may be a wedge between cash flow and control rights. There is some literature suggesting that control rights exceed cash flow rights only for certain types of investors, for example large

[11] Appendix A.3 shows that while patterns over time are similar, levels of common ownership incentives in the common law countries of the S&P Europe 350 index are higher than those of the civil law countries.

and government investors. However, there are limited theories to test and limited guidance for what this should look like in an empirical implementation. This paper's findings suggest that the need for a better understanding of the link between ownership and control could be even more pressing for Europe, since results are more sensitive and there is more heterogeneity in terms of types of investors and stakes held.

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A Appendix

A.1 Investor concentration percentiles

Figure A.1 shows investor concentration percentiles for firms in the two indices. For the 95th percentile in Europe, the most concentrated firms, the IHHI of about 3000 would correspond to a scenario where 3 equally sized investors hold all shares.

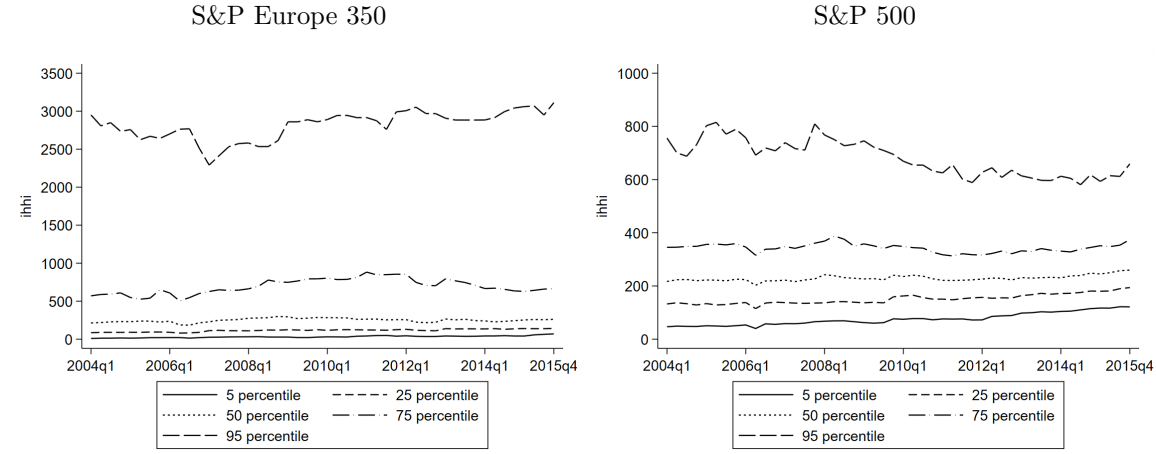

Figure A.1: Industry composition over time

Notes: The plots show the % of firms in each industry (by SIC division) over time for each of the indices.

A.2 Average lambda among same industry firms

Figure A.2 shows that the average lambda among same industry (SIC division) firms follows a very similar pattern to lambda computed over the entire index. Average common ownership incentives among same industry firms are slightly higher.

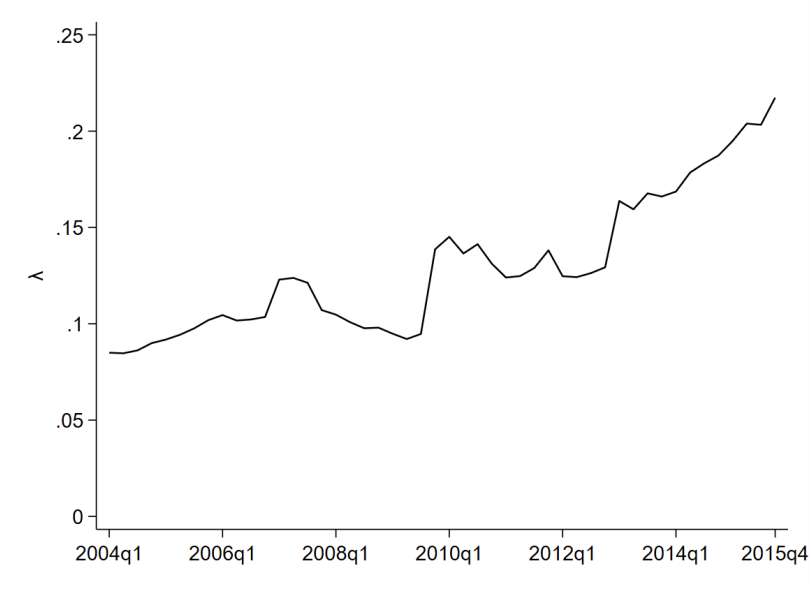

Figure A.2: Average lambda for S&P Europe 350 computed by sic industry

A.3 S&P Europe 350 common ownership incentives and legal systems

Figure A.3 shows the average lambda for the S&P Europe 350, as well as the civil law fraction of the S&P Europe 350 (i.e. excluding roughly 40% of the firms, those from the United Kingdom and Ireland). Indeed, lambdas are higher for the United Kingdom and Ireland compared to the entire index, especially in the earlier years. In the earlier years average lambda decreases by more than 50%, from about 0.08 to less than 0.04, when the common law countries are excluded. However, the steep rise in lambda seems not to be specific to the (historical) legal systems of the countries.

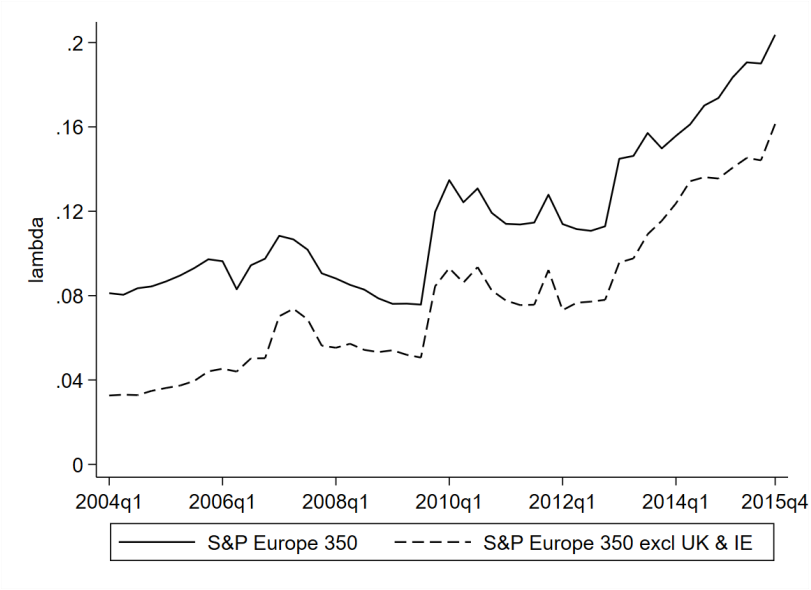

Figure A.3: Average lambda for S&P Europe 350 and for civil law part of S&P Europe 350

KU LEUVEN
Faculty of Economics and Business
Management, Strategy and Innovation (MSI)
Naamsestraat 69 bus 3535
3000 LEUVEN, Belgium
tel. + 32 16 32 67 00
msi@econ.kuleuven.be
https://feb.kuleuven.be/research/MSI/