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Market Power and Investment in Advanced Economies: Monopolistic and 'Segmented' Competition

Poder de mercado e inversión empresarial en economías avanzadas: competencia monopolística y competencia 'segmentada'

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Abstract

Recent studies have related market power in advanced economies to stagnating business dynamism and investment. This article addresses this issue at the firm level, using both markups and market shares as measures of market power. While our results show that market shares have a negative effect on investment, markups generally have a positive effect, which only becomes negative for very high markups. The negative effect of high markups on investment should not, however, be attributed to market leaders, but to smaller, niche firms. Thus, the current state of market power in advanced economies is one where "superstar firms" and niche firms or "segmented competition" coexist, and together put downward pressure on investment rates.

Keywords: Market power, markups, investment behaviour, competition, firm-level data.

Resumen

Estudios recientes han relacionado el creciente poder de mercado en las economías avanzadas con el estancamiento de la inversión y el dinamismo. Este artículo analiza esta relación a nivel microeconométrico, empleando la cuota de mercado y el markup como medidas de poder de mercado a nivel empresa. Nuestros resultados muestran que las cuotas de mercado tienen un efecto negativo sobre la tasa de inversión, mientras que el efecto de los markups es ambiguo, siendo positivo inicialmente, y solo negativo para valores elevados del markup. Estos altos markups, sin embargo, se encuentran típicamente en empresas de menor tamaño. En consecuencia, el estado actual del poder de mercado en economías avanzadas se caracteriza por la presencia de empresas 'nicho' o competencia segmentada que, junto con la existencia de empresas pseudo-monopolistas, ejerce también una presión a la baja en la tasa de inversión.

Palabras clave: Poder de mercado, markups, inversión empresarial, competencia, microdatos.

JEL Classification/ Clasificación JEL: L10; L13; E22

1. Introduction

The rise of market power in advanced economies has received much attention in recent years. Different studies have documented strong increases in market concentration rates (Gutierrez and Philippon, 2017; Grullon et al., 2019; Autor et al., 2020), price markups (Diez et al., 2018; De Loecker et al., 2020; Diez et al., 2021) and monopolistic rents (Gutierrez and Philippon, 2016; Brun and Gonzalez, 2017; Stiglitz, 2017; Eggertsson et al., 2021) over the past decades, suggesting that markets have become less competitive and business dynamism more stagnant. The standard narrative in most of these studies is that higher market power increases monopolistic profit rates, reduces investment and damages consumer surplus and labour shares.

One of the main limitations in previous studies is that they look at macro or meso-level relations between market power and investment aggregates (or at best they model firm-level behaviour that is consistent with aggregate trends). Most of them do not empirically study how market power affects investment behaviour at the firm-level, and generally assume the underlying firm-level dynamics that would explain aggregate trends. In fact, to the best of our knowledge, only Diez et al. (2018) estimate the effect of market power on investment behaviour at the firm-level, and find that markups can have a positive effect on investment which only becomes negative for very high markups. While aggregate measures of market power may offer insight on overall trends in advanced economies, a more granular look into sector and firm-level dynamics is required to understand how the rise in market power may affect investment overall.

This article takes a step in this direction. We study the relation between market power and investment behaviour at the firm-level using data for over 13,000 firms in OECD countries, from 2012 to 2020. Our large dataset and geographical coverage allows us to identify a generalised effect of market power on investment in advanced economies, and our recent time window helps characterise the current state of competition and market power (as compared to studies that focus on how market power has changed in the past decades). To do so, we consider two different indicators of market power at the firm level: markups and market shares.

Our study presents an interesting result, which is that markups and market shares are not generally positively related. Very high markups are more often found in smaller firms. These smaller, high-markup firms, furthermore, appear

to play an important role in the overall rise in markups which the literature has taken as evidence of declining competition. Thus, competition in advanced economies today appears to be characterised not only by the presence of large superstar firms, but also by the emergence of some form of 'segmented competition' by which smaller firms manage to exert increasing market power on niche segments of demand where they exhibit higher markups.

Another important result in our study is that markups, on their own, do not seem to be a comprehensive measure of market power. If we were to only consider markups as measures of market power, this concentration of higher markups in smaller firms that would imply, contrary to standard economic intuition, that larger firms tend to have less market power in general. Instead, looking at the relation between markups and market shares reveals an interesting trade-off by which firms with higher market shares tend to charge moderate (not higher) markups. Again, very high markups are typically found in firms with low market shares which seemingly represent niche firms that cannot upscale their activity without lowering markups (Keil, 2017; 2019). In consequence, since markups and market shares each reflect important dimensions of market power, both need to be considered to have a full understanding of market power at the firm level.

In relation to investment, our estimation shows that market power (market shares and markups) does have a negative effect on investment, although in the case of markups, this effect is found for very high markups only, as in Diez et al. (2018). For most firms, with more moderate markups, it seems that markups reflect growth opportunities or 'post-investment rents' (Aghion et al., 2005) that stimulate investment behaviour. Given the negative effect of market shares on investment, these 'post-investment rents' seem to wear off as firms gain market, but also as they manage to target non-generalizable niche markets with lower growth perspectives but a higher degree of market power relative to consumers. The generalisation of this form of 'segmented competition' could therefore contribute to putting downward pressure on aggregate investment levels.

This article is divided into seven sections. The following section reviews the main findings in the literature on the rise of market power and its effects on investment behaviour. Section three presents the data used for our analysis and stylised facts in relation to markups and market shares. Section four presents our empirical model and quantitative method used to estimate the effect of market power on firm-level investment, and section five presents the results of our estimation. In section six we discuss how these findings relate to those of previous studies, and how they modify our interpretation of the rise of market power in advanced economies, and section seven concludes.

2. Investment and market power

Our work is part of the vast literature that tries to explain the relationship between market competition, investment and corporate growth. This research

agenda can be traced back to Bain (1956) and his "structure- conduct-performance" (SCP) paradigm. The SCP model presents a framework for empirical analysis that examines the effect of market structure on the evolution of a given industry and on the performance of firms in that industry. According to this framework, the structural characteristics of a certain market determine the behavior of firms within that market and, therefore, their performance in terms of innovation, investment, profits and other similar variables. In other words, the SCP model assumes that there is a direct link between market structure, firm behavior and performance. Later on, the New Industrial Organization approach (Tirole, 1988) expanded and revised this theoretical framework, introducing new insights when explaining firm behavior.

Within this literature, a large number of theoretical and empirical studies have been developed analyzing, among other issues, the relationship between market structure and firm strategy (Shubik and Levitan, 1980), the behavior of firms in imperfectly competitive industries (Porter, 1981), the link between industry concentration scenarios with market outcomes (Bresnahan and Schmalensee, 1987) and the impact of market structure on competition (Goolsbee and Syverson, 2008), innovation (Rafique-Hashmi and Van Biesebroeck) or investment strategies (Cohen and Mazzeo, 2010). Specifically, this literature on industrial organization considers that there are structural reasons (economic, strategic and technological) that push firms to grow (Tirole, 1988): developing economies of scale, risk diversification, better access to both capital and external sources of financing, reduced transaction costs or greater market power.

The business strategy literature has also examined the motives that explain corporate investment and growth. In particular, the "Resource-Based View of the firm" is an approach that, building on Penrose's (1959) work, has been used to analyze the strategic resources a firm can exploit to achieve sustainable competitive advantage. This literature has emphasized that corporate growth and investment should be studied in terms of both internal and external determinants, with the understanding that firms grow due to a combination of factors: the efficient use of underutilized internal resources that can be leveraged for growth, the accumulation of knowledge and experience ("economies of learning"), the vision and ambition of the firm's managers, efficient management and external market conditions (increasing demand for the firm's products or services and access to external resources, including finance, technology and strategic partnerships).

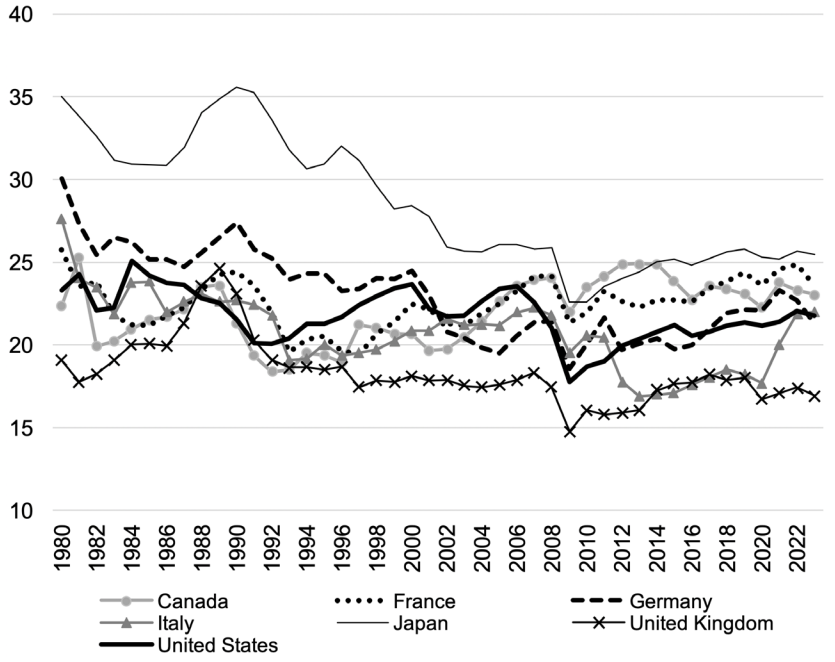
In this literature on industrial organization and corporate growth we find different approaches to the relationship between competition and corporate investment. For example, some authors point out that less competition in markets reduces business investment due to a combination of different factors (Porter, 1980): the lack of competition reduces the need to diversify and expand into other markets and, in addition, companies in less competitive markets tend to have higher returns without the need to reinvest their profits, which reduces the pressure to innovate and the incentives to improve efficiency.

In the opposite direction, other authors (Tirole, 1988) point out that in highly competitive markets, firms may be less willing to invest large sums due to uncertainty about the payback of those investments and lower profit margins. Moreover, firms already established in an industry, and with a dominant position, may use investment as a strategic tool to create barriers and deter the entry of new competitors.

All this literature on industrial organization and corporate growth provides a theoretical and empirical framework of undoubted value for analyzing, from a microeconomic point of view, the determinants that explain the behavior of firms and, particularly, their investment decisions. According to this literature, the relationship between competition and investment is complex and depends on multiple factors, so that competition can either encourage or discourage investment. Nevertheless, this framework must necessarily be complemented by other literature –with a macroeconomic focus– when investigating the link between market power and investment rates in advanced economies.

Investment rates in advanced economies have been slowing down over the past decades (Gordon, 2012; Baldwin and Teulings, 2014; Summers, 2014;

Figure 1. Investment rates in major advanced economies (percentage of GDP)



Source: IMF, World Economic Outlook data.

Gutierrez and Philippon, 2016; Grullon et al., 2019; Eggertsson et al., 2021). In Figure 1, we see that Gross Capital Formation (as a percentage of GDP) has fallen in most of the major advanced economies, typically presenting lower levels in the last decade than those observed in the 1980s and 1990s.

While this is a well-established fact, the causes for this slowdown are less clear. Different suggestions have been made, including structural headwinds (Gordon, 2012), a lack of profitable investment outlets (Summers, 2014), financialization of corporate management (Stockhammer, 2004; Davis, 2018; Tori and Onaran, 2020) or financial sector hypertrophy (Cecchetti and Kharroubi, 2015).

The downward trend of the investment rate in the main advanced economies has also been understood in the field of post-Keynesian economics as the result of unexpected changes in demand (and thus possibly the result of equally unexpected changes in the structure of the economy). In particular, from the Sraffian supermultiplier approach (Serrano, 1995), it has been argued that a lower investment rate may be the result of a lower growth rate of demand and, particularly, a lower growth rate of the autonomous components of demand (those expenditures that are neither financed by contractual wage income nor can create capacity). Lower growth in autonomous demand would imply less induced (capacity-creating) investment through the accelerator effect.

However, another important change that has taken place during these decades has also been identified by the literature as a key factor: the rise in market power, registered through both the increase in markups and the rise in market concentration rates.

Gutierrez and Philippon (2017) find evidence of decreasing competition and higher average price markups, and argue that rising concentration rates can largely account for the investment gap (low investment despite high Q-ratios) observed in the United States during the past decades. Grullon et al. (2019) also find evidence of increasing market concentration rates among listed firms in the United States since the 1980s and agree that market power has become an important source of value for listed firms. In fact, Eggertsson et al. (2021) argue that only by the combination of high market power and lower natural interest rates can the observed investment slowdown be explained when cost of funding has been historically low and profit rates historically high.

Another set of studies also show evidence of rising market power by looking at the evolution of average price markups (De Loecker and Eeckhout, 2018; Diez et al., 2018; De Loecker et al., 2020; Diez et al., 2021). Following a method for markup estimation developed by De Loecker and Warzynski (2012), these studies find a strong increase in price markups over the past decades in both advanced and emerging economies. Since markups are observed at the firm level, in contrast to market concentration rates, these studies can also look into the distribution of markups across firms to identify where market power is growing. De Loecker et al. (2020) and Diez et al. (2021) find that the rise in average markups has been mainly driven by high-markup firms growing faster

than other firms and by a greater dispersion in the distribution of markups (more firms enjoying increasingly higher markups).

Other studies, however, have called into question the standard narrative found in these studies, arguing that higher market power is not necessarily responsible for lower investment rates, and could even potentially contribute to stimulating investment levels. Autor et al. (2020) argue that the rise in aggregate markups could, in fact, be consistent with the emergence of more efficient, highly innovative 'superstar' firms, which would actually bring investment rates up. Diez et al. (2018) estimate a panel data regression model using firm-level data from listed firms of 74 countries, from 1980 to 2016, and find that higher markups do not have a consistently negative effect on investment. Their study finds a non-monotonic inverted-u shaped relation between markups and investment at the firm level, similar to the relation between competition and innovation found in Aghion et al. (2005). According to their results, increases in market power initially have a positive effect on investment ('post-investment rents'). Only as markups reach higher values does the effect wear off, eventually becoming negative, as most of the literature expects.

Looking at market power more broadly, that is, taking both markups and market concentration into consideration, Davis and Orhangazi (2021) also find an ambiguous relation between market power and investment. Focusing on the industry level relation between market concentration rates, markups, investment behaviour and profitability in the United States, the authors find that more concentrated markets (typically considered to be less competitive) actually tend to have higher investment levels, and do not always present higher markups. In fact, the authors find cases of high market concentration rates with low markups, low profit rates and average investment rates, and yet other cases in which firms enjoy high markups in low concentration markets (indicating some form of market power that is not related to market concentration) with no clear relation to investment.

In summary, the relation between the rise in market power and the observed investment slowdown in advanced economies is not clear, and the empirical evidence is somewhat inconclusive. It should be noted that most of these studies are done at the aggregate (macro or meso) level, without looking directly into underlying firm-level dynamics that explain how firms manage to obtain higher levels of market power, and how that affects their competition-related incentives to invest. We believe that studying these dynamics empirically and at the firm level, can offer important insights for understanding the relation between the rise in market power and the aggregate investment slowdown.

3. Markups and market shares

3.1. Data

To study these relations at the firm level we use annual financial data obtained from the ORBIS database for listed firms of 35 OECD countries

during the years 2012-2020[1]. Financial statements in ORBIS have been standardised and are comparable across jurisdictions and, while the availability of historical data in ORBIS is lower than in other datasets such as Compustat, its geographical coverage is much larger and has been used for this reason in other studies concerned with multi-country firm-level analyses (Gal, 2013; Gopinath et al., 2017; Diez et al., 2021).

For our study, we focus on nonfinancial corporations[2] that present consolidated financial statements. Financial data are deflated using the GDP deflator. Additionally, firm-level data typically require some treatment in order to eliminate anomalous or irrelevant observations. Since we are only considering listed firms, we eliminate any observations for years in which the firm was not yet listed or had already been delisted. We also drop observations that represent a large jump in firm assets or sales[3] since these are typically residual observations representing a firm's starting years or last years. Firms with zero or negative profits, sales or capital stock throughout the entire observation window are also eliminated. Finally, we remove observations in the top and bottom 1 per cent of the distribution for each variable. As a result, we end up with a panel of over 100,000 observations for 13,000 firms from 2012-2020.

Price markups and investment rates can be calculated directly for each firm-year observation in our sample. We estimate markups as profit margin (sales revenue minus costs of goods sold) relative to costs of goods sold. Though many studies have used the method for estimating markups developed by De Loecker and Warzynski (2012), this method has recently been called into question (Bond et al., 2021; Doraszelski and Jaumandreu, 2021). Doraszelski and Jaumandreu (2021) argue that the estimation of output elasticities required to calculate these markups are not robust to differences in demand across firms or time, thus leading to biased estimated of price markups. Additionally, the entire estimation procedure relies on cost minimisation of a representative production function, which requires the strong assumption of common production technologies across firms within the same market.

While our markup is not an exact measure of price relative to marginal cost, similar measures are commonly used in the literature as approximations given the lack of more detailed information (Aghion et al., 2005; Gutierrez and Philippon, 2017; Grullon et al., 2019; Davis and Orhangazi, 2021). More importantly, as we will show later on, our stylised facts obtained using profit margin relative to costs of goods sold are largely in line with those found in previous studies using the De Loecker and Warzynski method (De Loecker et al., 2020; Diez et al., 2021).

1 Given the relatively short observation window available in ORBIS at the time we extracted our data, we include year 2020 in our sample, despite the pandemic, to use all the available historical observations.

2 Firms in Financial Services (NAICS code 52) and Real Estate (NAICS code 53) are not considered.

3 Following Bloom et al. (2004) and Tori and Onaran (2020).

Estimations of market shares present a different set of complications since direct calculation of market shares using firm-level data are typically unreliable in markets where listed firms only represent a small portion of the market (Diez et al., 2018; Grullon et al., 2019; Davis and Orhangazi, 2021). To mitigate this effect we calculate market shares of listed firms by considering sales of both listed and non-listed firms available in ORBIS. However, even after including non-listed firms, many markets still present unreasonably high concentration rates which is probably due to incomplete data collection rather than reflecting true underlying market structures (see Table 2 in the Appendix). To further avoid possible biases introduced by these firms, we calculate pseudo market shares for a given year considering only the largest 20 firms in markets with at least 20 firms[4]. In consequence, the number of market-share observations is reduced to roughly one third of our initial sample (see Table 3 in the Appendix for summary statistics).

3.2. Markups

As we show in Figure 2, both the median markup and the sales-weighted average markup in our sample appear to have risen steadily during in the past decade. The sales-weighted average markup can be affected by composition effects such as high-markup firms becoming larger or large firms increasing their markups (De Loecker et al., 2020). In our case, we are more interested in a generalised rise in markups that could have a significant effect on firm-level investment behaviour overall, and not just for a specific subsample of firms. For this reason, the rise in the median markup is a more significant trend for us, since it shows that market power has increased for most firms in advanced economies.

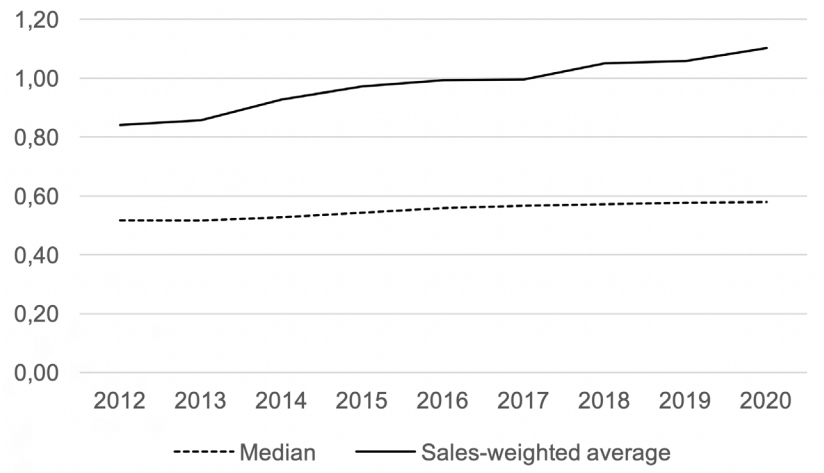
Previous studies have typically associated these rising markups to the predominance of pseudo-monopolists, large multinationals or 'superstar' firms (Gutierrez and Philippon, 2017; Autor et al., 2020; De Loecker et al., 2020) since they find rising markups to be related to greater market concentration or weaker competition. The standard reasoning is that higher markups can only be enjoyed if firms manage to beat competition and gain higher market shares. In fact, we typically expect firms to turn any competitive advantage they may have into higher market shares first, in order to ease off their survival constraint, and only later would they be able to start raising prices without fear of losing their dominant position.

Figure 3 shows the evolution of concentration rates[5] and median markups for major advanced economies. Since our estimation sample contains more than 30 countries, we chose to present these trends only for the most relevant

4 The United States Census Bureau calculates industry-wide HHIs using the top 50 firms in each industry. This criterion, however, would have significantly reduced the number of markets in our sample.

5 Concentration rates are calculated as the Herfindahl-Hirschmann Index, using our approximate measure of market shares.

Figure 2. Evolution of average markups



Source: Own elaboration using data from ORBIS.

economies. We can see that markups show a growing trend in most cases, but contrary to what is typically expected, we do not find a clear relation between markups and concentration rates. This is better accounted for in the next section where we look at the firm-level relation between markups and market shares.

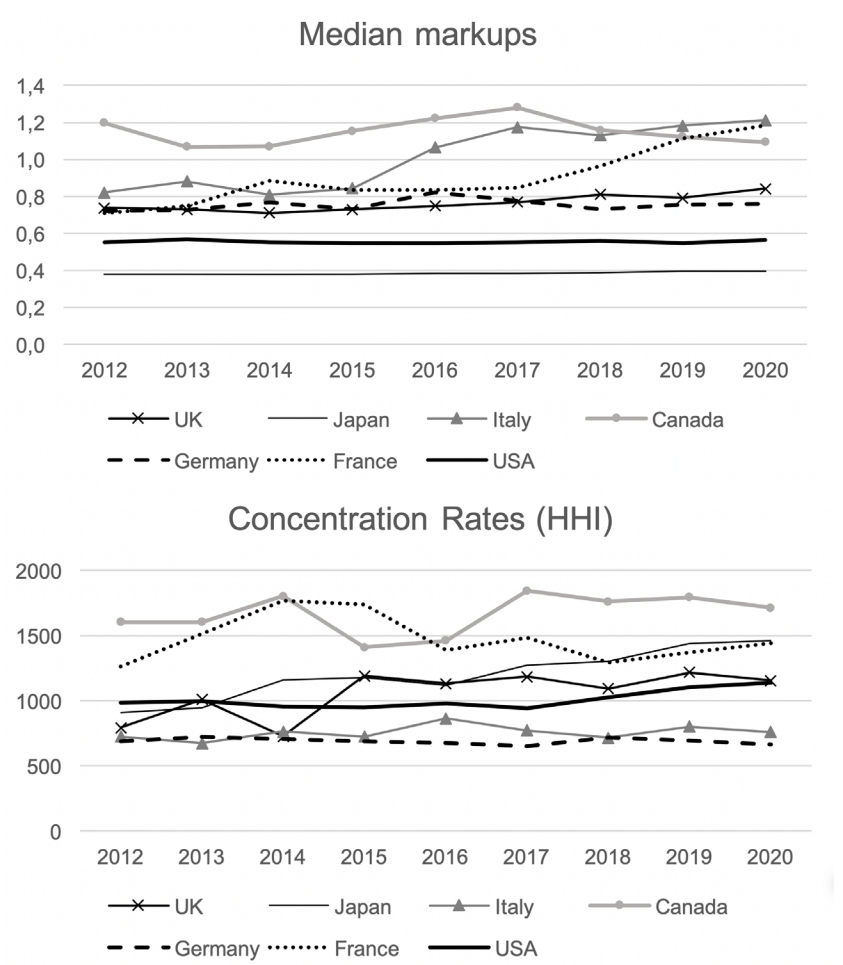
3.3. Market shares

As explained above, to obtain more reliable estimates of market shares we calculate the share of total sales among the top 20 firms in each market[6]. Figure 4 shows the relation between markups and market shares at the firm level for all firms in our sample over the period 2012-2020. This figure reveals an interesting pattern. First of all, we typically find higher markups in firms with low market shares. Only in a few exceptional cases do firms with high market shares manage to enjoy very high markups (these seem to be cases of pseudo-monopolists or 'superstar' firms).

However, the relation between market share and markups is not directly negative. Instead, what we find is that, as firms gain market shares, their markups tend to gravitate towards more moderate values. In other words, there appears to be a certain trade-off by which firms that intend to reach high market shares either need to keep prices in line with competition (Shaikh,

6 Even considering this restricted sample, many firms have a small (or very small) market share after applying this threshold, as shown in Figure 4.

Figure 3. Evolution of market power in major advanced economies

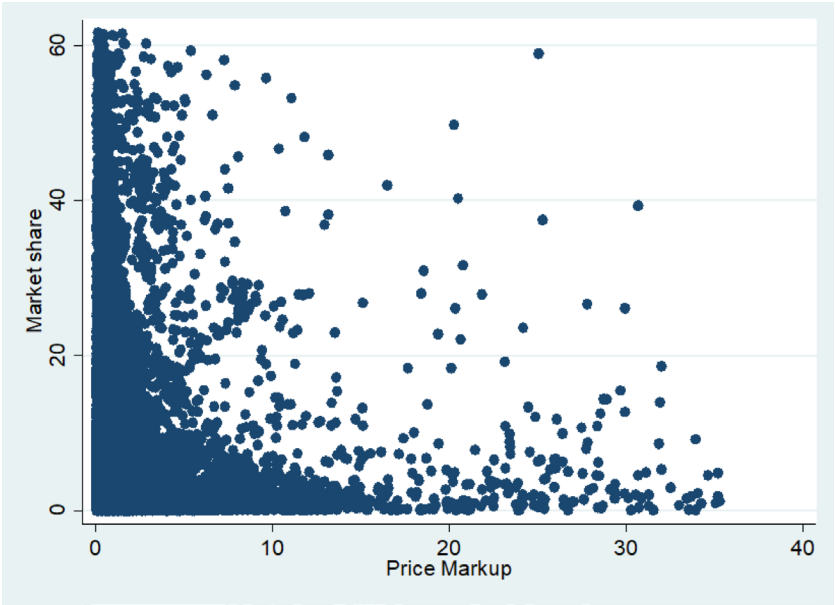


Source: Authors' own elaboration using data from ORBIS

2016; Kiel, 2017; 2019) or face diminishing returns to scale, and where very high markups can only be enjoyed by smaller 'niche' firms that find it difficult to upscale their activity and at the same time enjoy a high degree of market power on consumers (Diez et al., 2021).

In any case, this nonlinear relation implies that market shares and markups are not necessarily interchangeable measures of market power. Davis and Orhangazi (2021) argue that market concentration rates can be insufficient

Figure 4. Market shares and markups (observations for the period 2012-2020)



Source: Own elaboration using data from ORBIS.

measures of market power if there are high-markup firms in low-concentration markets. Similarly, if market shares or market dominating positions are also an expression of some form of market power (as most of the literature seems to accept), then market power cannot be fully accounted for by only considering markups. To analyse the effect of market power on investment behaviour at the firm level we should, therefore, take both dimensions into account.

4. Empirical model and estimation method

In order to see how each of these dimensions of market power affects investment behaviour, we estimate a firm-level investment function. The determinants of firm-level investment have been the subject of extensive debate in economic literature (Jorgenson, 1971; Abel and Blanchard, 1986; Blundell et al., 1992; Chirinko, 1993; Fazzari and Petersen, 1993; Carruth et al., 2000; Brauman and Kopcke, 2001), and there is a general consensus that profitability, demand and cost of funding are important determinants of investment behaviour. In consequence we estimate the following regression model:

$$\left(\frac{I}{K}\right)_{it} = \beta_0 + \beta_1 \left(\frac{I}{K}\right)_{i,t-1} + \beta_2 Q_{i,t-1} + \beta_3 \left(\frac{S}{K}\right)_{i,t-1} + \beta_4 \left(\frac{D}{K}\right)_{i,t-1} + \beta_5 markup_{i,t-1} + \beta_6 market\ share_{i,t-1} + \tau_t + \eta_i + \epsilon_{it} \quad (1)$$

Where *I/K* represents firm *i*'s investment expenditure relative to capital stock (property plant and equipment) at time *t*, *Q* represents the Q-ratio (calculated as stock market capitalisation relative to total assets) as a measure of firm profitability, *S/K* represents sales volume relative to capital stock as a measure of demand pull and *D/K* represents the debt to capital ratio as a measure of financial fragility and cost of external funding. To this equation we add two measures of firm-level market power: *markup* represents price markups, defined as profit margin relative to costs of goods sold and *market share* represents share of total sales volume among the largest 20 firms in a given sector and country.

We include a lag of the dependent variable, since investment is better specified as a dynamic process containing an autoregressive component and a set of exogenous variables (Bond and Meghir, 1994; Brauman and Kopcke, 2001; Tori and Onaran, 2020). All other regressors are also lagged since a firm's investment decisions at time t is expected to be made in the previous period or on the basis of information available to the firm at the start of the current period (Abel and Blanchard, 1986; Orhangazi, 2008). Additionally, since we are working with panel data, we include time dummies (τ_t) to control for time fixed effects.

To avoid any potential individual fixed effects (η_i) from biasing our estimated coefficients, we estimate the coefficients in our model using the system-GMM estimator with instrumental variables as in Arellano and Bover (1995) and Blundell and Bond (1998). Sector and country dummies are not included since they are dropped from the first-difference equation and are collinear to individual fixed effects in the level equation. Instead, we use country-sector cluster-robust standard errors[7] to control for cross-sectional correlation and heteroscedasticity in the error term. Finally, observations are also weighted by country-sector so that coefficient estimates do not mainly reflect empirical relations observed in countries or sectors with more observations (Love, 2003; Cameron and Trivedi, 2010).

In line with previous studies on investment behaviour we expect the Q-ratio to be positively related to investment, since profitability will lead to high returns on investment and facilitate external funding (Blundell et al., 1992; Bond and Meghir, 1994). We also expect the sales-to-capital ratio to be positively related to investment, since sales largely represents the strength of demand for a firm's goods or services and this will typically lead to greater investment through a sales-accelerator mechanism (Brauman and Kopcke, 2001; Orhangazi, 2008; Tori and Onaran, 2020). The debt-to-capital ratio is expected to have a negative effect on investment, since higher indebtedness will signal financial fragility and increase external funding costs (Fazzari and Petersen, 1993; Nikolaidi, 2014; Tori and Onaran, 2020). However, indebtedness could also

7 The use of both countries and 2-digit NAICS codes was necessary to ensure a sufficiently large number of clusters following Roodman (2009).

have a positive effect on investment if firms mainly rely on external funds to finance investment, and the final effect could be ambiguous.

As for our measure of market power (market shares and markups), we expect them both to have a negative effect on investment. Generally speaking, a higher degree of market power (higher market shares) is expected to reduce incentives to invest since firms face lower competitive pressures. Additionally, in line with most of the literature (Gutierrez and Philippon, 2017; Grullon et al., 2019; De Loecker et al., 2020) we expect higher markups to also reflect lower competition, and therefore, have a negative effect on investment, even if the effect may initially be positive (Diez et al., 2018). Importantly, since market shares and markups are not directly related (as we saw in section 3), we expect each variable to reflect the effect of different forms of market power on investment behaviour (high market shares indicating market dominant positions, and high markups mainly reflecting niche firms in forms of 'segmented competition').

5. Estimation results

Table 1 presents the results of our estimation. In addition to the base model containing both markups and market shares (column I), we estimate the model again including only markups (column II) or market shares (column III). Furthermore, since using market shares greatly reduces our estimation sample by restricting the sample to the largest 20 firms in each market, we also explore the effect of markups on the full, unrestricted sample to take advantage of the whole set of observations. In this case, we estimate two models: one using only markups and another using markups and squared markups to test for any nonlinear effects such as those found in Diez et al. (2018). Non-linear effects of both market shares and markups are also explored on the restricted sample and results are presented in Appendix Table 4.

The p-values of the Hansen test in all three models show no sign of overidentification[8] and the autocorrelation tests also show no sign of autoregressive behaviour in the error term. Beginning with the traditional determinants of firm-level investment, we find the lagged term of investment rate to be positive and significant, as expected, in all models. However, while the Q-ratio, the sales-to-capital ratio and the debt-to-capital ratio present the expected signs in most cases, only the coefficient for the Q-ratio seems to be statistically significant. Considering that our sample consists of firms from many different sectors and countries where demand elasticities of investment may vary and where financial fragilities related to costs of funding may appear at different levels of indebtedness, this is not entirely surprising.

8 Instruments were limited to two lags for the first-difference equation to avoid instrument proliferation.

Table 1. Estimation results

Variables	I	II	III	IV	V
	Markups and shares	Market shares	Markups	Markups (full sample)	Markups squared (full sample)
$(I/K)_{-1}$	0.2032***	0.1961***	0.2448***	0.2289***	0.2262***
	(0.0585)	(0.0584)	(0.0553)	(0.0391)	(0.0380)
Q_{-1}	3.8690*	2.5221**	6.2210***	5.5805***	5.2002***
	(2.1093)	(1.1136)	(1.6075)	(1.4103)	(1.3303)
$(S/K)_{-1}$	0.0127	0.0378	0.0599	0.0878	0.0872
	(0.0803)	(0.0421)	(0.0748)	(0.0927)	(0.0979)
$(D/K)_{-1}$	0.1472	0.0714	0.1018	-0.0006	-0.0062
	(0.1202)	(0.0769)	(0.1137)	(0.0698)	(0.0839)
Market $share_{-1}$	-0.7321**	-0.6442			
	(0.3057)	(0.3998)			
$Markup_{-1}$	1.1977*		0.7197	0.1298	1.5905***
	(0.6482)		(0.6772)	(0.2384)	(0.5786)
Square $Markup_{-1}$					-0.0524***
					(0.0182)
Constant	16.2583***	19.3911***	7.7158***	10.1694***	8.9831***
	(3.6214)	(4.0311)	(2.0531)	(2.1905)	(2.1595)
Observations	18,111	19,021	18,111	65,940	65,940
Number of id	3,300	3,419	3,300	10,496	10,496
Cluster variable	country-sector	country-sector	country-sector	country-sector	country-sector
Num. Clusters	147	149	147	423	423
Year FE	YES	YES	YES	YES	YES
Num. Instruments	127	107	107	107	127
Hansen test	0.380	0.223	0.101	0.197	0.310
AR1	0.000	1.55e-08	4.55e-10	0.000	0.000
AR2	0.725	0.830	0.710	0.200	0.247
Wald Chi-square	1082	1248	1845	2864	2856

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

If we look at column I, where we estimate the full model using model market shares and markups, we find that both these variables also have a significant effect, indicating that market power plays an important role in firm-level investment. Interestingly, however, only the effect of market share is negative (reducing investment by 0.73 percentage points for every one-point increase in market share). In contrast, markups are estimated to have a positive effect on investment (increasing investment by 0.12 point per each 10-percentage-point increase in markups), even after controlling for demand pressure (S/K) and profitability (Q). These effects are also found in columns II and III, where we estimate the model using each measure of market power separately. However,

while market shares continue to have a negative effect (column II) and markups a positive effect (column III), these effects are only statistically significant when we control for both measures of market power.

These results highlight the different aspects or dimensions of market power captured by each variable. When firms are able to charge higher markups, this leads to stronger investment levels, possibly because they wish to upscale their activity in order to obtain a stronger position within their market or because their higher markups are the result of efficiency gains related to innovation. However, and as we saw in the second section, when firms reach dominant positions in their market (represented by higher market shares), their level of investment weakens since additional gains from upscaling activity or innovating are likely to become smaller, and the lack of competition reduces the pressure to innovate, the incentives to improve firm' efficiency and the need to diversify and expand into other markets (Porter, 1980; Gutiérrez and Philippon, 2016 and 2017; Grullon et al., 2019).

Furthermore, the opposite effect of markups and market shares, together with their lack of significance in columns II and III, is not surprising if we consider the relation between these two variables found in section 3. While markups and market shares are inversely related in the extremes, firms with low markups can have high or low market shares and firms with low market shares can have high or low markups, leading to an ambiguous relation between market power and investment if we do not control for both measures of market power. In terms of the overall effect of market power on investment behavior that we find in the results shown in column I, we can consider different situations. Firms with high market shares tend to have moderate markups, such that the negative effect of market shares on investment is likely to dominate. Similarly, firms with high markups tend to have lower market shares, such that the positive effect of markups on investment is likely to dominate. In the case of firms with low (high) markups and low (high) market shares the dominating effect is ambiguous, but, in any case, higher markups will generally have a positive effect for similar levels of market shares (indicating higher profitability of investment), and market shares will generally have a negative effect for similar levels of markups (indicating lower growth opportunities).

Since the results in column I are limited to a subsample of larger markets (given that we cannot measure market shares for firms in markets with few observations), we also explore the relation between markups and investment behavior considering the entire observation sample (columns IV and V). As in Diez et al. (2018), the relation between markups and investment appears to be non-monotonous and inverse-u shaped. When the squared markup term is omitted (column IV), markups again have a positive but not significant effect on investment. However, once the squared term is included (column V), we find that markups have a positive and significant effect on investment that becomes negative at high markup levels as a result of the negative effect found in the squared markup term.

As we mentioned earlier, Diez et al. (2018) explain these results by comparing them to the inverse-u shape relation between competition and innovation found in Aghion et al. (2005). Initially, firms in more competitive markets (lower markups) have strong incentives to invest (innovate) in order to escape competition. By investing/innovating firms become more efficient, leading to higher markups and creating a positive feedback mechanism between investment and markups. Only as firms reach higher levels of market power do these returns from investment/innovation begin to wear off, eventually leading to lower levels of investment.

The problem with this explanation is that it, again, identifies higher markups with higher market shares. However, this is not consistent with our evidence on the relation between markups and market shares in large markets (as we saw in section 3), where market leaders do not typically have very high markups. If high markups represent firms escaping competition, our data seem to suggest that this is done by successful market segmentation rather than by gaining market share. In fact, beating competition to greater market shares apparently involves a trade-off by which firms lower markups to keep in line with competition rather than charging increasingly higher markups.

Table 4 in the Appendix shows the estimation of non-linear effects on the restricted sample (used in columns I-III of Table 1), where we find the squared terms of market shares and markups to not be significant. Thus, when we remove smaller (niche) firms from large markets we find that the non-linearity of markups is no longer significant. In consequence, we believe the negative effect found in column V for very high markups (the squared markup term) is more likely to be related to the fact that niche firms do not expect high returns from growing their activity and therefore keep investment levels low. If 'post-investment rents' represented by markups wear off as firms gain market share, as suggested by Aghion et al. (2005), this would more generally appear to involve a movement towards the left-hand side of the inverted-u shape, as a result of the apparent trade-off between market shares and markups.

For example, if a small firm with high markups is an innovator, it is likely to gain market share but lower its markup in the process. The negative effect of a higher market share (which we see in column I), together with a decreasing markup, will eventually bring investment levels down. If a small firm with high markups is instead a niche firm, it is likely to continue targeting specific market segments and attempt to raise markups while lowering investment (resulting in the negative effect on the squared markup term found in column V).

6. Discussion

Our estimation results largely describe two main scenarios where rising market power can lead to lower investment levels. The first scenario is related to rising concentration rates. Higher market shares are found to have a negative effect on investment behaviour and, therefore, greater concentration rates will likely lead to lower investment levels. However, contrary to the standard

narrative, we find that these high market shares do not typically lead to very high markups, but entail a trade-off between markups and market shares that seems more in line with dynamics described in Shaikh (2016)'s theory of real competition than with the notion of pseudo-monopolists or 'superstar' firms (Autor et al., 2020; Diez et al., 2021).

The second scenario can thus be characterised as one where a larger number of niche firms manages to charge very high markups on well-defined market segments while not aspiring to become industry leaders. Very high markups are also found to have a negative effect on investment behaviour and, therefore, in a scenario like this, the rise in high-markup firms would also lower aggregate investment rates.

Interestingly, if the rise in aggregate markups over the past decades has mainly been driven by high-markup segments, as shown in Diez et al. (2021), it would seem that the nature of market power in advanced economies is better described both by a proliferation of niche firms that act as monopolists in their specific market segments together with a growing accumulation of market power and surplus extraction in the hands of large corporate behemoths. We would thus be witnessing the development of a kind of 'segmented competition' with growing market power for firms in more narrowly defined product markets or niches.

Given the developments in information technologies, big-data, advertising techniques and core-competencies-oriented corporate strategy (which would greatly favour market segmentation strategies), together with the fact that globalisation has increased the degree of competition faced by large market dominant firms, this outcome is not entirely surprising. In fact, it is possible that both of these scenarios are actually interdependent. Market segmentation can be a valid survival strategy for market laggards in more concentrated markets where competing for higher market shares via price undercuts is more complicated, or where only market dominant firms have the financial capacity to carry out efficiency-improving innovations and will carry out pre-emptive mergers to defend their market shares (Bryce and Dyer, 2007).

While both scenarios would entail an overall negative effect on investment behaviour, correctly identifying how market power is being exerted is relevant in terms of its effects on other aspects of economic performance (such as productivity growth, innovation, consumer surplus or income distribution) and to accurately design pro-competition policy measures. More importantly, by only looking at the evolution of markups, it is not possible to determine how firms are reacting to changes in market structure and competitive pressures and how these may be driving rises in markups.

7. Conclusions

In this article we look at market power and investment at the firm level. Our study offers two main results. First, we find that high markups are generally found in smaller and not larger firms. While this does not rule out the existence

of 'superstar' firms or pseudo-monopolists that may enjoy a strong market dominant position, our data show that higher markups are more common in firms with lower market shares which could either be emergent innovators or niche firms that cannot upscale their activity and at the same time retain these high markups. Market leaders, in contrast, tend to gravitate towards moderate markups, and thus, in order to accurately measure market power (at the micro and macro level) both dimensions –markups and market share– should be taken into consideration.

Secondly, while higher market shares are estimated to negatively affect investment behaviour, we only find a negative effect on investment for markups in the case of firms with very high markup values, as in Diez et al. (2018). However, given the observed trade-off between markups and market shares, the negative effect of very high markups on investment we believe can better be explained by niche firms that have high market power (markups) in specific market segments and low incentives for investment given their less generalizable business models, rather than by market leaders whose post-investment rents have worn off (Aghion et al., 2005; Diez et al., 2018).

Interestingly, if the aggregate rise in market power observed in other studies has been driven mainly by these higher markup segments of the population (De Loecker et al., 2020), then the current state of market power in advanced economies is perhaps more accurately described as one where firms are becoming increasingly successful in targeting specific segments of the market on which they charge higher markups, a sort of 'segmented competition', in addition to the existence of 'superstar' or pseudo-monopolist firms. This distinction is relevant in terms of its potential effects on consumer surplus, income distribution, innovation or productivity growth and particularly in terms of the effectiveness of pro-competition policy measures developed by governments.

We should note, however, that our study presents some limitations due to data availability, specifically regarding estimations of market shares across the entire sample of firms. Future studies could help determine if the trade-off between market shares and markups we find in our data is also observed in a broader set of markets or industries, or if, perhaps, there are different competition regimes, as suggested by Davis and Orhangazi (2021), that give rise to other interrelations between markups, market shares and investment. While our study shows a general relation between market power and investment at the firm level, the existence of different competitive regimes could entail more specific patterns, which could prove to be important in determining how micro-level relations in terms of market power translate into aggregate investment levels. Additionally, future studies could also consider the relation between market power and investment behavior in different moments of the business cycle or under different demand regimes, such as the pandemic or the Global Financial Crisis.

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Appendix

Table 2. Number of market observations by firm count

Market size	Markets	Market-year observations
Full sample	*1,683*	*14,649*
At least 20 firms	*219*	*1,614*
At least 50 firms	*79*	*568*

Table 3. Summary statistics

Variable	Mean	Std. Dev.	Observations	
I/K	22.065	overall	22.998	N = 95087
		between	20.935	n = 12910
		within	15.296	T-bar = 7.365
Q	1.144	overall	1.333	N = 90850
		between	1.299	n = 12053
		within	0.697	T-bar = 7.538
S/K	16.266	overall	36.693	N = 100295
		between	37.082	n = 13449
		within	18.953	T-bar = 7.457
D/K	8.299	overall	21.827	N = 101758
		between	21.765	n = 13504
		within	12.748	T-bar = 7.535
Markup	1.418	overall	3.014	N = 93841
		between	3.249	n = 12787
		within	1.446	T-bar = 7.339
Market share	5.749	overall	8.797	N = 27876
		between	8.559	n = 4249
		within	1.958	T-bar = 6.561

Table 4. Non-linear effects on restricted sample

Variables	I	II
	Market share	Markups
$(I/K)_{-1}$	0.1911***	0.2590***
	(0.0616)	(0.0575)
Q_{-1}	2.9028***	6.5030***
	(1.0251)	(1.7632)
$(S/K)_{-1}$	0.0393	0.0590
	(0.0466)	(0.0753)
$(D/K)_{-1}$	0.0670	0.1137
	(0.0823)	(0.1275)
Market $share_{-1}$	-0.0236	
	(0.3143)	
Square Market $share_{-1}$	-0.0046	
	(0.0067)	
$Markup_{-1}$		-0.2639
		(1.0541)
Square $Markup_{-1}$		0.0394
		(0.0578)
Constant	14.9373***	8.2360***
	(2.5952)	(1.7904)
Observations	19,021	18,111
Number of id	3,419	3,300
Cluster variable	country-sector	country-sector
Num. Clusters	149	147
Year FE	YES	YES
Num. Instruments	127	127
Hansen test	0.189	0.179
AR1	2.63e-08	1.72e-09
AR2	0.846	0.744
Wald Chi-square	1082	2160

Standard errors in parentheses
*** $p<0.01$, ** $p<0.05$, * $p<0.1$