Supply Chains, Takeovers, and Market Power*

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Abstract

Rising market power can threaten competition and business dynamism, resulting in lower levels of welfare. To date, while much of the empirical work relies on U.S. data, there is scant evidence about the evolution of markups in Europe and the channels through which markups can change. Considering that the number of takeover activities in Europe has steadily increased over time, this study investigates the role of firms' acquisitions as a driver of change in markups, market shares, productivity and profitability. Interestingly, our results suggest that takeovers aimed at vertical integration strategies result in lower levels of markups of about 2.75%. On the other hand, we do not find significant changes in the case of horizontal integrations after controlling for reverse causality. Thus, in line with the U.S. Vertical Merger Guidelines of 2020, we emphasize the pro-competitive effects deriving from vertical integrations that stem from eliminating frictions on the inputs markets, after reducing double marginalization in the presence of market power.

JEL codes: L22; F23, L11, L23; L25

Keywords: takeovers, market power, markups, multinational firms, vertical integration

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1 Introduction

Recent evidence of rising market power on a global scale is attracting the attention of many among scholars and policymakers. The main concern is that a higher monopoly power by a few firms with a dominant position can endanger consumers' welfare. Yet, despite an intense debate, we argue that further research is needed to understand the whys and wherefores of global market power. Right now, the most accredited argument suggests that firms with higher markups charge higher prices, thus leading to suboptimal levels of market competition and welfare. Yet, rising markups may also be associated with endogenous increases in fixed costs, depending on changing market structures[1]. From the latter perspective, one cannot exclude that higher markups can be eventually associated with cost reductions, representing an incentive for incumbent firms to invest and for new firms to enter the market. In this case, higher markups could bring about a counter-intuitive association with higher levels of competition and a wave of investments in innovation that can actually result in higher welfare.

We contribute to the ongoing debate with an empirical study in which we focus on the manufacturing firms in the European Union to test the causal impact of takeovers on firm-level markups, when one company acquires corporate control over another after purchasing the majority of its equity stakes. Takeovers are one way to increase market power, and they have been on the rise in recent decades, both in Europe and in the United States. According to the Institute for Mergers, Acquisitions and Alliances (IMAA), the number of M&A deals was 10,814 in 1990 and steadily increased over time, reaching 49,327 in 2019. A company can acquire a competitor in the same industry to add together market shares. A company can acquire another company along the supply chain, either downstream among buyers or upstream among suppliers, to obtain the delivery of cheaper or better intermediate inputs, and hence gain an indirect competitive edge over competitors.

At first, when we look at stylized facts, we record a decreasing trend of markups, which is confirmed after we unravel industry and country heterogeneity. Looking at firms' characteristics, we find that targeted firms are significantly bigger, more productive and more efficient than the average manufacturing firms in the European Union. Yet, and most interestingly, when we challenge causality, we find evidence that targeted firms start charging on average lower markups after a new parent company's takeover. Apparently, our findings point to a general albeit counter-intuitive combina-

[1]For a review of seminal works in industrial organization explaining sources of rising markups, please see Berry et al. (2019)

tion of decreasing markups and increasing market shares after the takeover, once we control for reverse causality.

Thus, against previous evidence, we decide to further investigate by separating takeover strategies. We find that lower markups are actually charged after vertical integration on a supply chain, i.e., when a parent company acquires control over a supplier and they can establish intra-firm trade by exchanging cheaper or better intermediate goods or services. On the other hand, when we look at horizontal takeovers, i.e., when parents and companies operate in the same industry, we do not record any significant impact on either average markups, market shares, or profitability.

Eventually, we argue that our findings suggest that vertical integrations along supply chains can contribute to eliminating externalities derived from double marginalization. An integration of a buyer and a supplier under unique headquarters reduces the chain of successive markups along supply chains. After becoming part of the same corporate entity, it is possible for buyers and suppliers together to increase market efficiency and potentially charge lower final prices. From a more general perspective, vertical integration strategies can yield overall efficiency gains, albeit at the expense of a higher market concentration. In the presence of market power on the market for inputs, vertically integrated companies may reduce overall welfare inefficiencies by internalizing part of the upstream production processes. Against this background, one could still have *good concentration* that results from welfare-enhancing operations that bring the most efficient firms to increase their market shares at the expense of more inefficient competitors.

Our identification strategy combines a difference-in-difference specification with a propensity score matching exercise to control for an endogenous selection of targeted firms based on observable financial information. The aim is to consider cherry-picking when parent companies acquire control oever firms after anticipating their market potential. Following most recent developments by Callaway and Sant'Anna (2021), our specification is robust to the presence of staggered treatments (in our case, the takeovers) that can occur in different periods, i.e., when cohorts of acquisitions distribute unevenly on the observed timeline. We finally make our results robust also to the presence of a weaker assumption of parallel trends, when the latter holds potentially only after conditioning on *ex-ante* firms' characteristics.

Eventually, we reconnect with the debate on the health of competition policies in the European Union. Indeed, none of our results shows any systematic increas-

ing trend in European markups after takeovers. They are either lower after vertical integration or not statistically significant after horizontal integration. As takeovers have been largely acknowledged as a fundamental channel through which markets can concentrate, they have always been under the scrutiny of competition authorities. In the European Union, however, cases of mergers and takeovers fall under the European Competition Law to preserve the benefits of the Single Market. Under the European Union Merger Regulation (EUMR), art. 2(3), for a merger to be declared compatible with the Single Market, it must not create or strengthen a dominant position. Therefore, there is a general acknowledgement that the intention of the regulators has been to establish a way first to prevent and then to sanction the emergence of dominant positions. We can comment against previous evidence that the European mechanism apparently works to prevent the negative impact of takeovers as long as we consider markups as a proxy for how dominant a firm can become in a market. On the other hand, our results point to what the U.S. Vertical Merger Guidelines of 2020 already emphasize. Vertical integration strategies can bring about pro-competitive effects in the presence of market power, when they are able to eliminate frictions on the inputs markets, after firms reduce the phenomenon of double marginalization. Finally, we argue, the latter is a phenomenon that deserves more attention by policy-makers and scholars.

The remainder of the paper is organized as follows. The next section 2 relates our contribution to previous scholarly literature. Section 3 describes our data structure and provides preliminary evidence on the evolution of markups and other economic variables of interest. Section 4 describes the identification strategy to derive the impact of takeovers on market power, productivity, and other firms' dimensions. Section 5 controls for the robustness and sensitivity of our findings. Finally, Section 6 concludes.

2 Related literature

Our contribution relates to recent works that signal rising market power and higher industrial concentration. In latest years, empirical studies document a rise in market power (Hall, 2018; De Loecker et al., 2020; Diez et al., 2019; Bighelli et al., 2022) in the U.S. Yet, evidence for the European Union is mixed. Bighelli et al. (2022) show that firm concentration has increased in Europe in the last decade. At the same time, they find a positive and significant correlation between rising sector-level concentration and increases in sector-level productivity. Differently, McAdam et al. (2019) find that concentration ratios in the euro area have remained broadly flat in the last ten years, thus suggesting that competition intensity may have been reasonably stable, while markups

have declined marginally since the late 1990s. Aggregate estimates at the world level (De Loecker and Eeckhout (2018)) report a stable increase in global markups, even though it is reasonable to expect a certain degree of heterogeneity among different countries and markets.

When it comes to explaining the trends, De Loecker et al. (2020) noticed for the U.S. that it is the upper tail of the distribution that mainly drives the rise in markups. Market shares are reallocated toward *superstar firms* with higher markups and lower labor shares (Van Reenen, 2018; Autor et al., 2020; Alviarez et al., 2020). The latter emerge thanks to new available technologies, declining trade costs and the fall of non-tariff barriers enabled by globalization and deep regional integration agreements. In this sense, the general idea is that markups are a possible threat to competitive markets and business dynamism, resulting in lower levels of social welfare through a misallocation of productive resources (Baqaee and Farhi (2020)), and possibly lower labor shares (Deb et al. (2022)).

Yet, when we discuss our findings, we point to the existence of important streams of literature (Berry et al., 2019) according to which higher markups and market concentration *per se* do not imply lower social welfare. The heterogeneity of market structures across industries can offer differing explanations for rising markups, such as in the case of rising endogenous fixed costs that could be associated with lower marginal costs. It is for example the case of technology intensive industries in which the reliance on R&D efforts is higher than in lower tech industries.

Therefore, our paper also relates to previous works showing how different institutional settings in the and the US, including anti-trust and regulation by competition authorities, may lead to different patterns of market power across countries. While according to Grullon et al. (2019), the U.S. have moved towards a decline in antitrust enforcement in the last decade, Gutiérrez and Philippon (2018) argue that European markets tend to be more competitive today than in the past, since European institutions have become more independent and keen on enforcing the regulation. From this point of view, Covarrubias et al. (2019) discuss how the U.S. markets switched from being a case of *good market concentration*, where there are cost-saving strategies and incentives to entry in profitable markets, to being a case of *bad market concentration*, where higher prices and entry barriers damage the welfare of consumers.

A good or bad concentration might result from strategies pursued by firms engaging in M&A activities. Mergers and takeovers are one important way to increase

market power. On the one hand, M&As can increase market power and prices at the expense of consumers; on the other hand, productivity gains due to knowledge transfer, lower marginal costs due to cheaper intermediate inputs and the reallocation of resources to more efficient uses may benefit consumers in the form of improved products or lower prices. Recent empirical studies have found contrasting results about the final impact of M&A activities on market power, concentration and productivity. Stiebale and Vencappa (2018) find that acquisitions in India are associated with increases in quantities and markups but with lower marginal costs. Blonigen and Pierce (2016) use U.S. Census Bureau data on manufacturing plants to find significant increases in average markups from M&A activity but little evidence for productivity gains. Also, McGuckin and Nguyen (1995), Gugler et al. (2003) and Maksimovic et al. (2011) rely on firm-level data to estimate the impact of firms' acquisition on market power and productivity and find evidence of a positive impact on productivity measures. Notably, in our case, we find robust evidence that markups of targeted firms in the European Union tend to have lower markups after the acquisitions; they increase their market share and decrease their variable costs. In contrast, we do not find significant evidence of an impact on either productivity or profitability.

Yet, firms may engage in different M&A strategies depending on the goal they want to achieve. We find that a decrease in markups after acquisitions is mainly due to operations of vertical integration, i.e., when one company takes over a customer or a supplier and, thus, the gains can be directly related to the access of either tangible or intangible inputs at a lower cost (Atalay et al. (2014)), eventually obtaining productivity gains achieved through more efficient use of, for example, technology and logistics (Hortaçsu and Syverson (2007)). On the other hand, we do not find significant changes in markups after the takeover occurs due to a horizontal integration when a market player absorbs a direct competitor and sums up market shares and profits. After we control for cherry-picking by acquirers, who could be able to get the best cherries in the basket by checking for the targets' market potential, statistical associations with market power fade away.

Our results align with other works (Berto Villas-Boas, 2007; Gil, 2015; Crawford et al., 2018), arguing that vertical integration can lead to efficiency gains by eliminating double profit margins. Previous works show how backward integration between firms vertically integrated along supply chains can facilitate access to upstream inputs at lower prices, leading to lower costs for the downstream firm. On the other side, firms might engage in forward integration to reduce average costs and achieve economies of scale (Antràs (2020)). Nonetheless, we cannot exclude that a vertical integration

strategy might create distortions in the rest of the market through the foreclosure of other competitors or a strategic rise in prices of other goods or services in a portfolio of multiproduct firms (Spengler, 1950; Luco and Marshall, 2020). Eventually, the overall welfare effects from the elimination of double margins are ambiguous, as pointed out by Choné et al. (2021), because they depend on the distribution of bargaining power in upstream and downstream markets, possibly bringing heterogeneous impacts on the ability to source from other independent suppliers.

3 Data and Preliminary Evidence

We source firm-level financial accounts and ownership information from the Orbis database compiled by the Bureau Van Dijk[2]. First, we collect financial information on 362,125 European subsidiaries in the manufacturing industries from 2011 to 2019. Among them, we define a subsidiary as a company that a corporate shareholder controls thanks to an absolute majority of voting rights at the shareholder assembly. Therefore, we can follow acquisition cases when a corporate shareholder reaches more than 50% of equity stakes in our observation period.

For the scope of our study, we estimate firm-level markups as a proxy for market power following the methodology proposed by De Loecker and Warzynski (2012)[3]. In Figure 1, we show the distribution of markups we obtained for all firms in 2011-2019. In line with previous studies, most firms have relatively low markups, while only a few firms on the right tail have disproportionately higher market power. To provide evidence about changing patterns of markups, we aggregate sales-weighted markups as in Figure 2. Even though the time span covered in our analysis is insufficient to provide a long-term trend of market power, we can fairly notice that markups are volatile, albeit generally decreasing from 2011 to 2019. However, aggregate estimates might hinder likely heterogeneity emerging when considering different industries. For this reason, we plot separate trends by 2-digit NACE industries in Figure 3.

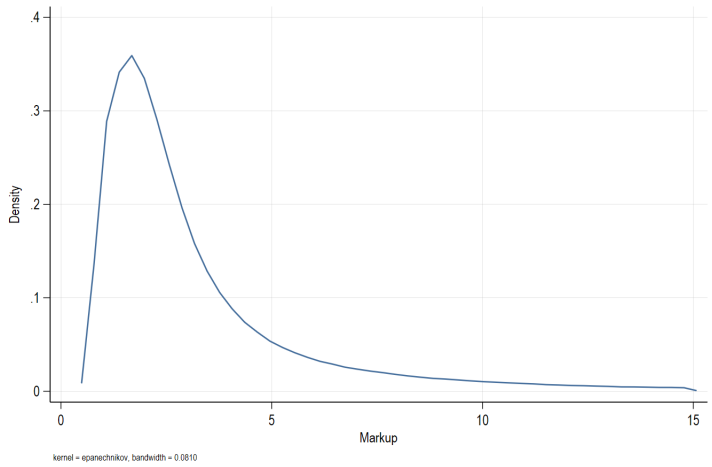
Figure 3 shows the evolution of markups at the 2- digit NACE rev. 2 industry level. Despite the great degree of heterogeneity in average markups across sectors, we can notice a general decreasing trend over time with few exceptions regarding the man-

[2]The Orbis database standardizes firm-level financial accounts and ownership on a global scale. It also includes an ownership module that allows tracking changing shareholding information at the firm level. Orbis data have been increasingly used for firm-level studies on multinational enterprises. See for example Cravino and Levchenko (2016), Del Prete and Rungi (2017), Del Prete and Rungi (2020), Alviarez et al. (2020)

[3]In Appendix A, we describe the details of the procedure and we address potential concerns related to the estimation of the markup ratios following the most recent lines of literature.

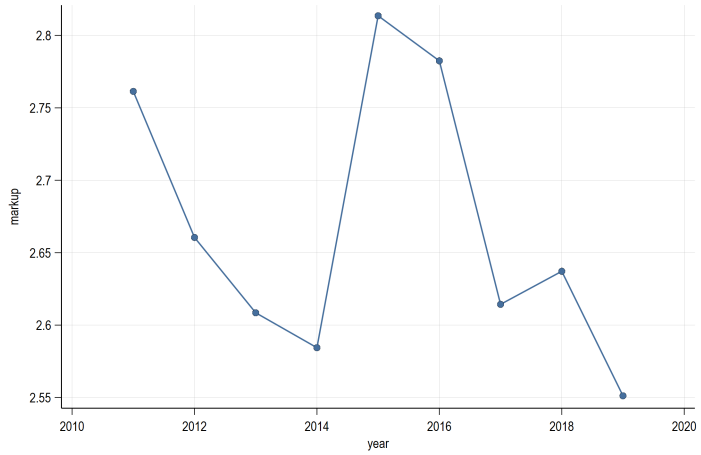
ufacture of textiles, wood, metal products, machinery and equipment, and transport equipment.

Figure 1: Distribution of markups in the European Union



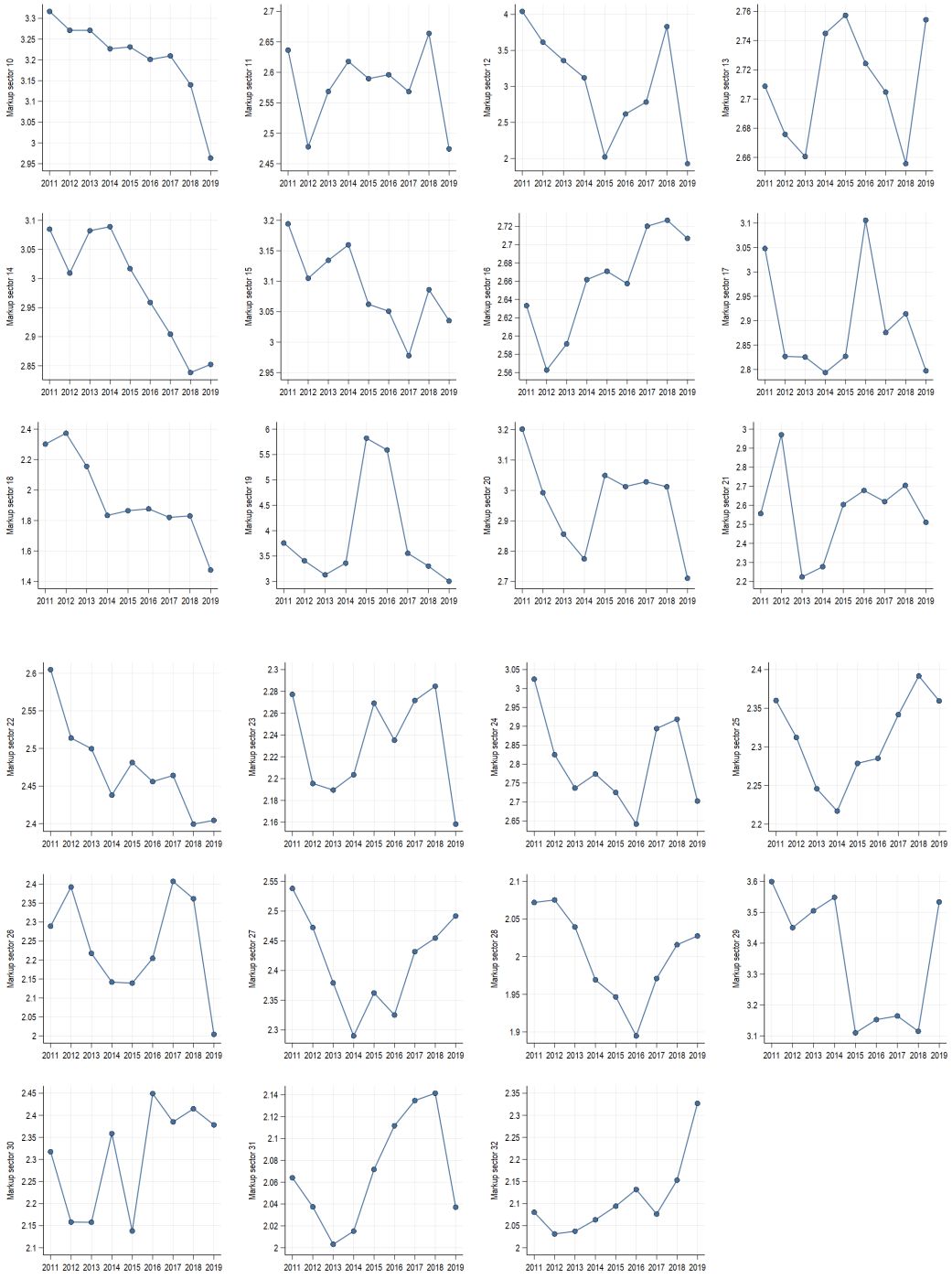
Note. Distribution of markups of European manufacturing firms in 2011-2019. Markups are estimated following De Loecker and Warzynski (2012). The distribution presents a mean value of 2.73 with a median equal to 2.04 and a standard deviation of 3.72.

Figure 2: Evolution of aggregate markups



Note. The figure reports European manufacturing firms' sales-weighted average markup over time in 2011-2019. Markups are estimated following De Loecker and Warzynski (2012).

Figure 3: Sales-weighted average markup in the European Union, 2011-2019.



Note. The figure reports the sales-weighted average markup for 2-digit NACE rev. 2 manufacturing industries. Markups are estimated following De Loecker and Warzynski (2012).

Taken together, descriptive evidence points to a decreasing trend of market power for manufacturing firms in the European Union. In the rest of our paper, we will shed light on the peculiar role of M&A activities in affecting the trends. For our purpose,

we extract from our general sample a total of 5,433 cases of firm-level takeovers distributed over time, whose coverage is reported in Appendix Table A1. Please note that we exclude from the analysis cases of multiple acquisitions of the same subsidiary in our period of analyses, assuming that treatment can occur at most once for each firm. This is consistent with the idea that direct investment has a longer-term perspective and, thus, any shorter-run management of equity in an investor's portfolio is not able to significantly have an impact on the management of economic activities. In Appendix Table A2 we have a look at the sample coverage of takeovers across sectors, revealing that there is a substantial degree of heterogeneity, with the highest number of takeovers in the manufacturing of metal products, machinery and equipment and manufacture of food products.

Table 1: Targeted firms vs. non-targeted firms

Variable	Average non-target firm	Average target firm	t-test $\Delta < 0$
Markup	2.31	2.66	-0.35***
Sales	13,987,977	62,205,898	-48.217.921***
Profitability	8.65	7.21	1.44
Capital intensity	65,632	105,655	-40.022***
(log of) TFP	9.69	10.64	-0,95***
Fixed assets	6,500,321	28,973,367	-22.473.046***
Added value	3,472,404	11,468,822	-7.996.418***
N. of employees	52	152	-100***
Market share	0.001	0.006	-0.005***
Variable costs	9,942,897	46,415,548	-36,472,651***

The table reports average values of variables of interest with a t-test for significance. Markups are estimated following De Loecker and Warzynski (2012). *** stands for $p < 0.001$.

A preliminary analyses on how firms that have been taken over compare with other firms in the sample is reported in Table 1. We perform t-tests for a set of variable of interest to check whether there is any systematic difference across the two subset. Indeed, we acknowledge that the average values of markups, sales, capital intensity, total factor productivities (TFP), fixed assets, value added, employees, market shares, and variable costs are higher in the case of firms that have been acquired (i.e, our treatment group) vs. the ones that never changed ownership majorities. From another perspective, we can say that it is very likely that bigger, more profitable and more efficient firms are more attractive targets for acquisitions. Interestingly, we do not find

any statistically significant difference in profitability. Obviously, differences in firms' performances can be endogenously related to events of acquisitions. Therefore, the following analyses will take care of randomization to challenge reverse causality and establish the causal contribution of takeovers to firm-level outcomes, with a special focus on market power, which we proxy with firm-level markups.

4 Empirical Strategy

In this section, our aim is to test the impact of takeovers on firm-level outcomes. For our purpose, we implement an empirical strategy in two steps. First, we combine a propensity score matching with a difference-in-difference model with a panel data setting, when staggering treatments can occur in multiple periods. For our exercise we rely on the procedure recently proposed by Callaway and Sant'Anna (2021). We consider as treated those firms that were taken over compared to a control group obtained after a propensity score matching. In this case, Callaway and Sant'Anna (2021) propose a match procedure that exploits all available information on untreated companies with the adoption of inverse probability of treatment weights. The scope is to eliminate the endogenous selection bias of targeted firms into the treatment, since we assume that firms with the best economic potential were screened by acquirers before a bid. On the other hand, the methodology by Callaway and Sant'Anna (2021) improves on a classical difference-in-difference approach because it considers the bias of heterogeneity in treatment timing, i.e., when takeovers can occur endogenously and asymmetrically over the timeline we can observe.

At a second step, we separate events of vertical integration from the rest of the takeovers, as the first indicate an organization of supply chains within or across national borders. The intuition is that the vertical integration of supply chains under the coordinated management of a parent company implies a different organization of production processes whose impact on market power has been neglected by previous literature.

4.1 Market power and takeovers

To estimate the causal impact of firms' acquisitions, we follow the difference-in-difference strategy proposed by Callaway and Sant'Anna (2021) in a panel setting, since: i) takeovers can occur in multiple time periods; ii) we have variation in treatment timing, as we observe an increasing trend in takeovers; iii) we can assume that the assumption on parallel trends holds only after conditioning on observed firm-level characteristics.

Briefly, our doubly robust estimator identifies multiple $ATE(g,t)$ for each cohort

of treated firms. Each cohort represents a group g of firms that have been taken over in the same year. t. It is therefore possible to estimate a set of coefficients, one for each cohort, to track down the impact of the takeover over time. Thus, one can aggregate and obtain a unique coefficient that aggregates the impact of takeovers over the entire timeline. The estimator is obtained as follows:

$$ATE(g,t) = E\left[\left(\frac{G_g}{E[G_g]} - \frac{\frac{p_g(X)C}{1-p_g(X)}}{E\left[\frac{p_g(X)C}{1-p_g(X)}\right]}\right)(Y_t - Y_{g-1} - m_{g,t}(X))\right] \tag{1}$$

where G_g is a binary variable that is equal to 1 if a unit is first treated in period g and C is a binary variable equal to 1 for firms never object of an acquisition; $p_g(X) = P(G_g = 1|X, G_g + C = 1)$ is the probability of being acquired for the first time in the period g conditional on observed financial information and either being a member of group g or not being acquired in any time period; $m_{g,t}(X) = E[Y_t - Y_{g-1}|X, C = 1]$ is the population outcome regression for the control group of firms that have never been acquired. We refer to Callaway and Sant'Anna (2021) for a more complete discussion on the methodology. We choose to use the doubly robust alternative as it provides for a combination of inverse probability weights with an outcome regression approach. That is, the counterfactual group is obtained by using information about all units that are untreated, assigning to each unit an inverse probability weight of being similar to one that is actually being treated.

By estimating separate $ATE(g,t)$ we can therefore identify differences in the causal effect of the treatment for each cohort and we are therefore able to determine the degree of heterogeneity of the treatment across groups over time. To estimate the aggregate effect of firms' takeovers on markups we can finally compute a weighted average of previously defined $ATE(g,t)$ in the following way:

$$\theta_s^O = \sum_{g=2}^{T} \theta_s(g) P(G = g) \tag{2}$$

where,

$$\theta_s(g) = \frac{1}{T - g + 1} \sum_{g=2}^{T} \mathbf{1}\{g \leq t\} ATE(g,t) \tag{3}$$

and T denotes the number of years. $\theta_s(g)$ allows to highlight treatment effect heterogeneity with respect to the year in which the firm has been acquired. We can aggregate the latter parameter at a higher level and get θ_s^O that is the overall estimate of the impact of takeovers on firms' outcomes. In other words, the aggregate coefficient is computed as a weighted average of the time-specific parameters $\theta_s(g)$ using group-specific weights, $P(G = g)$'s, that are obtained considering the relevance of each

group over the total sample.

Table 2 shows baseline results. We find consistent evidence of lower levels of markups after the takeovers occur. In particular, as from column (1), we find that on average a takeover implies a decrease of markups (1.42%) after the acquisition, and at the same time an increase of market shares (2.3%), as shown in column (2). Notably, we do not find evidence of significant changes in other firm-level outcomes (TFP, sales, variable costs).

Table 2: Average treatment effect (ATE) of takeovers on firm-level outcomes

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES	Markup	Market share	ROI	TFP	Sales	Variable costs	Profits
Post Treatment	-0.0142***	0.0230**	-0.0341**	-0.0078	0.0048	0.0116	-0.0166
	(0.0060)	(0.0120)	(0.015)	(0.0100)	(0.0080)	(0.0086)	(0.0108)
Observations	1,187,432	1,187,432	1,187,432	1,187,432	1,187,432	1,187,432	1,187,432
Controls	YES	YES	YES	YES	YES	YES	YES

The table reports results following the difference-in-difference approach by Callaway and Sant'Anna (2021). ATE coefficients are obtained as a weighted average that considers the importance of each cohort of firms. The estimator is doubly robust, and we control for firms' characteristics. The control group includes firms that are never treated and firms that are not treated yet. Standard errors clustered at the firm level are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

4.2 Vertical vs. horizontal integration strategies

To identify whether heterogeneous changes in markups stem from different integration strategies, our next step is to separate cases of vertical and horizontal integration. The rationale for separating strategies is that there are different mechanisms at play. Firms engaging in horizontal takeovers absorb a direct competitor, possibly achieving economies of scale. Vertical integration strategies aim at absorbing a buyer or a supplier, therefore possibly pursuing cost-saving strategies along a supply chain, when intermediate inputs are delivered intra-firm, after the acquisition. On the other hand, one cannot exclude that there are indirect anti-competitive effects when a dominant position in the markets for inputs allows a competitive advantage over direct competitors.

To identify horizontal mergers, we check whether the corporate shareholder and its subsidiary belong to the same industry at the 2 digit level of the NAICS 2002 classification. To identify vertical integration we follow Fan and Lang (2000), Acemoglu et al. (2009), Alfaro et al. (2016), and Del Prete and Rungi (2017) by using Input-

Output coefficients derived from the Bureau of Economic Analysis (BEA). We compare technical coefficients of the industry in which the subsidiary operates with the median coefficient of inputs required by the industry in which the parent company operates. We assume that a subsidiary is in a vertical relationship with the parent company if the I-O technical coefficient between the subsidiary industry and the parent industry is above the median. Out of the 5,433 cases of acquisition in our sample, we can distinguish 1,039 events of horizontal acquisitions and 3,243 of vertical acquisitions. Table 3 reports results for vertical and horizontal acquisitions as shown in panels (a) and (b), respectively.

Table 3: Average treatment effect (ATE) of takeovers: vertical vs. horizontal integration strategies

(a) Vertical integrations

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES	Markup	Market share	ROI	TFP	Sales	Variable costs	Profits
Post Treatment	-0.0275***	0.0019	-0.0436***	-0.011	-0.0032	-0,0008	-0.0147
	(0.0076)	(0.0151)	(0.0168)	(0.0126)	(0.0086)	(0.0098)	(0.0117)
Observations	1,176,673	1,176,673	1,176,673	1,176,673	1,176,673	1,176,673	1,176,673
Controls	YES	YES	YES	YES	YES	YES	YES

(b) Horizontal integrations

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES	Markup	Market share	ROI	TFP	Sales	Variable costs	Profits
Post Treatment	0.0054	0.0487	-0.0037	0.0385	0.0264*	0.0353**	0.0068
	(0.0174)	(0.0306)	(0.032)	(0.0237)	(0.0146)	(0.0175)	(0.024)
Observations	1,165,674	1,165,674	1,165,674	1,165,674	1,165,674	1,165,674	1,165,674
Controls	YES	YES	YES	YES	YES	YES	YES

Table shows results of the doubly robust Callaway and Sant'Anna (2021) estimator, using both never treated and not-yet-treated units in the control group. Variables are in logs. Standard errors clustered at the firm level are reported in parentheses and significance levels are *** p<0.01 ** p<0.05 * p<0.1

At this stage, we find a significant impact of the takeover on markups only in the case of vertical integration strategies. In particular, we observe in Table 3 panel (a) that a targeted firm shows on average a 2.75% decrease in markups, as in column (1). In panel (b), when we look at horizontal acquisitions, we do not find significant changes in any of the firm-level outcomes we test.

Eventually, we argue, lower markups by acquired firms can be the consequence of efficiency gains obtained after the elimination of double margins. Double marginal-

ization is an externality that occurs when two firms that have market power, being involved in a supply chain relationship, both apply an optimal markup to their prices beyond marginal costs, while facing a steep demand curve. From a welfare point of view, double marginalization along supply chains has a negative impact. It induces deadweight losses because the final consumer price is higher than the price in a context of vertical integration. Therefore, the elimination of double margins can be considered an efficiency gain although in presence of a market power by a vertically integrated production unit. In this event, the upstream firm can decrease its margin selling its products at the downstream company at a lower price, decreasing therefore the total markup on consumers. It is beyond the scope of our analyses whether there is indeed an overall welfare effect in Europe from takeovers' activities. Yet, we refer to the theoretical work of Choné et al. (2021), who discuss how the elimination of double margins can have an ambiguous effect on total welfare. Depending on the distribution of the bargaining power among the parts involved in the acquisition, a vertical integration strategy can threaten the market position of the other independent suppliers, therefore leading to foreclosure effects. When the buyer has full bargaining power over prices and quantities, the vertical acquisition always benefits final consumers, while in cases of reduced bargaining power after the buyer has committed to deal exclusively with a more limited set of suppliers, exclusion of efficient suppliers potentially harms final consumers.

The issue of double margins attracted renewed interest by policy-makers especially after the publication of the U.S. Vertical Merger Guidelines in 2020, according to which pro-competitive effects deriving from vertical integration are almost entirely to be attributed to the elimination of double margins.

On the other hand, when we look at panel (b) of Table 3, we find that horizontal acquisitions do not have any significant impact either on markups or market shares in our sample of European takeovers. This is also an important result, as it could indicate that the European competition policy is successful in limiting market abuses in the case of mergers and takeovers. Nonetheless, we find evidence that both sales and variable costs are higher after a horizontal integration, pointing to an overall impact on firm size.

5 Robustness and sensitivity analysis

In this section, we perform a battery of robustness and sensitivity checks on our previous analyses.

The first concern is that, up to now, we focused exclusively on the impact on subsidiary firms. We can check now the consistency of our results looking at changes in the outcomes of the parent companies, after considering as treated those that have acquired a majority equity stake in at least one subsidiary in our period of analysis. Table 4 shows the results obtained after our baseline methodology. Notably, we do not find any significant change in the level of markups of parent companies. We argue that our findings are compatible with an elimination of double margins. In line with expectations, the reduction would be mainly on the side of integrated suppliers, who deliver cheaper intermediate inputs to the downstream parent company after an intra-firm coordination of economic activities. On the contrary, we find statistical evidence that parent companies decrease their level of profitability, as measured by ROI, and thus parties might incur in the fixed costs associated to a complex operation of acquisition. Indeed, vertical acquisitions might be diluitive to earnings in the short term for the acquirors as also reported by Christensen et al. (2011), because the latter focus on a longer-term break-even.

Table 4: Average treatment effect (ATE) of takeovers on parent companies

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES	Markup	Market share	ROI	TFP	Sales	Variable costs	Profits
Post Treatment	0.0369	-0.0577	-0.2773***	-0.2401*	0.0075	0.0169	-0.0144
	(0.0324)	(0.0449)	(0.0569)	(0.1372)	(0.0235)	(0.0255)	(0.0261)
Observations	15,103	15,103	15,103	15,103	15,103	15,103	15,103
Controls	YES	YES	YES	YES	YES	YES	YES

The table reports aggregate results obtained following the methodological approach proposed by Callaway and Sant'Anna (2021) to account for heterogeneity in treatment timing. Single coefficients of the ATE are obtained with a weighted average that considers the importance of each cohort of firms subject to takeover in different times. Estimations are obtained through a doubly robust estimator and include firms' characteristics as control variables. The control group is composed by never treated units and not-yet-treated units. Variables are in logs. Standard errors clustered at the firm level are reported in parentheses and significance levels are *** p<0.01 ** p<0.05 * p<0.1

Table 5: Average treatment effect (ATE) of vertical takeovers on parent companies

VARIABLES	(1) Markup	(2) Market share	(3) ROI	(4) TFP	(5) Sales	(6) Variable costs	(7) Profits
Post Treatment	0.0364	-0.1089	-0.375***	-0.2888*	0.0293	0.0529	-0.0165
	(0.0496)	(0.0697)	(0.0892)	(0.175)	(0.0361)	(0.0384)	(0.0423)
Observations	12,963	12,963	12,963	12,963	12,963	12,963	12,963
Controls	YES	YES	YES	YES	YES	YES	YES

The table reports aggregate results obtained following the methodological approach proposed by Callaway and Sant'Anna (2021) to account for heterogeneity in treatment timing. Single coefficients of the ATE are obtained with a weighted average that considers the importance of each cohort of firms subject to takeover in different times. Estimations are obtained through a doubly robust estimator and include firms' characteristics as control variables. The control group is composed by never treated units and not-yet-treated units. Variables are in logs. Standard errors clustered at the firm level are reported in parentheses and significance levels are *** p<0.01 ** p<0.05 * p<0.1

A second concern relates to the methodology we adopt to estimate markups. We rely on the production function approach following De Loecker and Warzynski (2012), who adapt the cost-based approach initially developed by Hall (1988). In particular, exploiting firm-level data, markups are computed as an estimate of price over marginal cost, as proxied by the output elasticity of an input over the expenditure share on that input. The advantage of this method with respect to the demand approach is that it requires minimal data and relatively weak assumptions. Nevertheless, important pitfalls have been discussed by Basu (2019), Syverson (2019) and Traina (2018). Recent work by Bond et al. (2021) highlights identification and estimation issues, when firm-level output prices are not directly observed. To address a potential omitted price bias, we convert revenues to quantities using industry-wide price deflators and we estimate the output elasticity of labor across sectors, holding fixed the time dimension. We assume that labor is a flexible input and that there are no adjustment costs. In this way, as already pointed out by De Loecker et al. (2021), the change in the ratio of revenue to the labor's expenditure is a direct estimate of the change in the markup. In the main analysis we estimate firm level markups using the output elasticity derived with the methodology proposed by Ackerberg et al. (2015). We compare it with the output elasticity obtained with an OLS estimation of the revenue production function with labor and materials as intermediate inputs. Column (1) of Table 6 shows the results of the baseline Callaway and Sant'Anna (2021) with markups derived from the OLS estimator. We get consistent results as subsidiary firms subject to takeovers reduce their level of markups of about 1.57%, and the magnitude is very much similar to the one obtained in previous estimates.

Another methodological concern is about the adoption of a panel setting. Our preferred approach á la Callaway and Sant'Anna (2021) is able to catch variation in treatment timing, as we explained in Section 4. Yet, we may want to compare with a more classical combination of propensity score matching with a two-periods difference-in-difference approach, to check the sensitivity of our results to the empirical strategy. For our purpose, we first derive a control group made of firms with similar characteristics, which we use as a counterfactual for the absence of treatment. Our aim is to control for potential self-selection of firms into a treatment status, as in the case of cherry-picking by parent companies that screen for companies with the best economic potential. We implement our propensity score matching using a 4-nearest neighbor matching scheme with the assumption of a common support. The match is obtained after a logit regression that predicts the probability of receiving the treatment based on firms' size, capital intensity, productivity and age. Balancing properties are reported in the Appendix, to show that we can reduce the original bias. Having a suitable control group, we proceed by estimating the usual difference-in-difference specification on our matched sample:

$$y_{i,t} = \beta_0 + \beta_1 T_i + \beta_2 Post_{i,t} + \beta_3 T_i * Post_{i,t} + \beta_4 X_{i,t} + \gamma_t + \delta_k + \omega_l + \epsilon_{i,t} \qquad (4)$$

where $y_{i,t}$ represents the logarithm of the outcome variables considered (markups, TFP, market shares, profitability, sales, variable costs, and profits), T_i is a dummy to identify treated firms, $Post_{i,t}$ is a dummy variable equal to 1 if the firm has been the target of a takeover at time t. In the above specification γ_t, δ_k and ω_l represent fixed effects for years, countries and 2-digit NACE rev. 2 sectors, respectively, while $X_{i,t}$ is a set of control variables including capital intensity, age, TFP and firm size. β_3 is our coefficient of interest, indicating the effect of the takeover on the outcome variable capturing the average difference on treated firms before and after the treatment. Column (2) of table 6 finally shows the impact on markups, and we record once again a decreasing markup (3.87%) with a higher albeit less statistically significant magnitude than previous results. However, when we separately test the case of vertical integration strategies, in column (4) of Table 6, we do not find a significant impact.

Table 6: Average treatment effect (ATE) on markups: sensitivity to methodologies

	Baseline		Vertical	
	(1)	(2)	(3)	(4)
VARIABLES	Markup (OLS)	DID Markup	Markup (OLS)	DID Markup
Post Treatment	-0.0157***	-0.0387*	-0.0247***	0.0029
	(0.006)	(0.018)	(0.008)	(0.024)
Observations	1,187,432	76,643	1,176,673	47,021
Controls	YES	YES	YES	YES

The table shows results on markups changing estimates of the production function (column 1), and adopting a two-period difference-in-difference after a propensity score matching (column 2). Standard errors clustered at the firm level are reported in parentheses and significance levels are *** p<0.01 ** p<0.05 * p<0.1

A third concern relates sample composition, as the takeovers can have a different industrial or geographical coverage. In the first case, we want to check whether a different impacts of takeovers can arise from an implicit changing level of technology intensity of the production processes. We know from previous industrial organization literature (Berry et al., 2019), that technology does have an impact on market structures. Based on industrial affiliations, we perform an exercise to classify subsidiary firms following Eurostat that separates Low, Medium-Low, Medium-High, and High technological intensity. The classification is based on the sector-level amount of Research and Development expenses and on the propensity to generate intellectual property rights. Appendix Table A5 reports sample coverage along this dimension, showing that almost half of the firms are active in Low Tech industries, while High Tech represents just 3% of the sample. Eventually, we estimate the impact of acquisition on each subsample using our baseline methodologies. As shown in Table 7, the negative impact on markups after vertical strategies on supply chains is mainly explained by the integration of suppliers active in Low-Tech industries. Other categories by technology intensity do not show any statistical significance on *ex-post* markups. We argue that the latter evidence is consistent with the intuition that in Low-Tech industries there is more room to reduce margins for an intra-firm delivery of intermediate inputs, thus reducing frictions from double marginalization. On the other hand, at increasing levels of technology intensity, the elimination of double margins can become more difficult, because endogenous sunk costs in R&D are more relevant. In Appendix Table A6, we also show results on the sample that includes horizontal integrations, eventually confirming results from previous analyses.

Table 7: Average treatment effect (ATE): classification by technology intensity after vertical integration

(a) Low Tech

	(1) Markup	(2) Market share	(3) ROI	(4) TFP	(5) Sales	(6) Variable costs	(7) Profits
Post Treatment	-0.0252*	0.0428*	-0.0504	-0.0153	-0.0136	0.0006	-0.0441*
	(0.0134)	(0.0231)	(0.0328)	(0.0137)	(0.0181)	(0.018)	(0.0251)
Observations	448,025	448,025	448,025	448,025	448,025	448,025	448,025

(b) Medium-low Tech

	(1) Markup	(2) Market share	(3) ROI	(4) TFP	(5) Sales	(6) Variable costs	(7) Profits
Post Treatment	0.0063	0.0449***	-0.0255	-0.0069	-0.0065	0.000	-0.0226
	(0.0095)	(0.0184)	(0.0237)	(0.0082)	(0.0125)	(0.0145)	(0.0147)
Observations	502,208	502,208	502,208	502,208	502,208	502,208	502,208

(c) Medium-high Tech

	(1) Markup	(2) Market share	(3) ROI	(4) TFP	(5) Sales	(6) Variable costs	(7) Profits
Post Treatment	-0.02	-0.0107	-0.0973***	-0.0025	-0.0238	-0.0163	-0.0448**
	(0.0135)	(0.0229)	(0.0302)	(0.0293)	(0.0155)	(0.017)	(0.0204)
Observations	231,104	231,104	231,104	231,104	231,104	231,104	231,104

(d) High Tech

	(1) Markup	(2) Market share	(3) ROI	(4) TFP	(5) Sales	(6) Variable costs	(7) Profits
Post Treatment	0.0233	-0.0191	0.0166	0.0039	0.037	0.0449	0.0032
	(0.022)	(0.0684)	(0.0768)	(0.0258)	(0.0329)	(0.0432)	(0.0435)
Observations	36,407	36,407	36,407	36,407	36,407	36,407	36,407
Controls	YES	YES	YES	YES	YES	YES	YES

The table shows results after the doubly robust estimator proposed by Callaway and Sant'Anna (2021), using never-treated and not-yet-treated units in the control group. Variables are in logs. Standard errors clustered at the firm level are reported in parentheses and significance levels are *** p<0.01 ** p<0.05 * p<0.1

Finally, we test whether the impact of takeovers is heterogeneous depending on the location of the subsidiaries. We separate target firms located in so-called New Members

of the European Union from the ones that locate in former EU members[4]. Our prior is that New EU Member countries have a relatively younger industrial structure, mainly built in the recent decades after the transition from a planned economic system, where there has been less room for brownfield investment operations in recent years, and where frictions from double marginalization could be less relevant. Indeed, when we check for sample coverage, we find that we have a strong prevalence of acquisitions in former EU Member countries. Appendix Tables A7 and A8 show the impact on the main outcomes of interest. We find consistent evidence that takeovers have an impact on markups mainly thanks to operations occurring in the former EU members.

6 Conclusion

Rising market power at a global level is an essential concern of policymakers, who interpret it as a sign of *bad market concentration* and declining consumers' welfare. While most of the empirical studies of the literature are focused on what is happening in the United States, there still needs to be more evidence about Europe. Our paper focuses on the effects of takeovers on market power, as proxied by markups and market shares, as M&A activities are rising in the European Union. Notably, we propose to differentiate between horizontal integration strategies, when parent companies integrate subsidiaries that operate in the same industry, and vertical integration strategies, when parent companies integrate subsidiaries on the same supply chain. Interestingly, we find evidence that target firms lower their markups and that such a decrease is due to vertical integration strategies implemented by takeovers in Europe. Therefore, we argue that our results signal the possible presence of welfare gains achieved through eliminating double margins. A vertically integrated company can reduce the chain of markups along a supply chain, thus enhancing consumer welfare when there is high market power in the inputs markets. On the other hand, we do not find significant markup changes after horizontal integration cases. Further investigations are needed to understand whether global vertical integration waves are finally beneficial to consumers from a general equilibrium perspective after also considering possible foreclosure effects along supply chains. Yet, we argue that efficiency gains brought about by vertically integrated supply chains deserve more attention by policymakers and scholars to understand the whys and wherefores of global market power.

[4]Former EU members include: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxemburg, Netherlands, Portugal, Spain, Sweden and UK. New EU members include: Bulgaria, Croatia, Czech Republic, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia.

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Appendix: Markup Estimation

Firm level markup estimation relies on the method proposed by De Loecker and Warzynski (2012), which recovers the markup as the ratio of price over marginal cost. Indeed, the crucial assumption is that output elasticity of a variable factor of production is only equal to its expenditure share in total revenue when prices equals marginal cost of production. Hence, the presence of markups drives a wedge between input's revenue share and its output elasticity. The empirical approach used to recover firm level markups relies on standard cost minimization conditions for variable inputs free of adjustment costs and on the estimation of output elasticity.

In particular, given a production technology $Q_{it} = Q_{it}(X_{it}^1, ..., X_{it}^V, K_{it}, \omega_{it})$ with V variable inputs such as labor or intermediate inputs and assuming that producers are cost minimizers, the FOCs for any variable inputs associated with the Lagrangian function are such that:

$$\frac{\partial L_{it}}{\partial X_{it}^v} = P_{it}^{X^v} - \lambda_{it} \frac{\partial Q_{it}(\cdot)}{\partial X_{it}^v} = 0$$

where λ_{it} is the marginal cost of production at a given level of output. Rearranging terms, multiplying both sides by $\frac{X_{it}}{Q_{it}}$ and definying $\mu_{it} \equiv \frac{P_{it}}{\lambda_{it}}$ the following expression for markups can be derived:

$$\mu_{it} = \theta_{it}^X (\alpha_{it}^X)^{-1}$$

where θ_{it}^X is the output elasticity on an in input X and α_{it}^X is the share of expenditures on input X_{it} in total sales $(P_{it}Q_{it})$. We estimate the output elasticity associated to a Cobb-Douglas production function with an OLS regression in which we use labor as a proxy for variable costs. To get estimates of the output elasticity, consider a production function with Hicks-neutral productivity term and common technology parameters across the set of producers:

$$Q_{it} = F(X_{it}^1, ..., X_{it}^V, K_{it}; \beta) exp(\omega_{it})$$

This form allows to rely on proxy method suggested by Ackerberg et al. (2015) to obtain consistent estimates of the technology parameters β. The estimation procedure rely on the use of materials to proxy for productivity to solve the simultaneity problem deriving from unobserved productivity shocks potentially correlated with input choices. In particular, in the first stage we run the following regression to obtain estimates of expected output $(\hat{\phi}_{it})$ and an estimate for ϵ_{it}: $y_{it} = \phi_t(\ell_{it}, k_{it}, m_{it}, \mathbf{z}_{it}) + \epsilon_{it}$, while in the second stage we rely on the law of motion of productivity $\omega_{it} = g_t(\omega_{it-1}) + \xi_{it}$ to get estimates for all production function coefficients.

Appendix: Tables and Graphs

Table A1: Time coverage of takeovers

Year of acquisition	N. of acquisitions
2011	554
2013	867
2015	1,060
2017	1,092
2019	1,860
Total	5,433

Table A2: Industry coverage of firms' acquisitions

NACE	Industry description	N. of acquisitions
10	Manufacture of food products	626
11	Manufacture of beverages	147
12	Manufacture of tobacco products	8
13	Manufacture of textiles	158
14	Manufacture of wearing apparel	113
15	Manufacture of leather and related products	79
16	Manufacture of wood and of products of wood and cork	154
17	Manufacture of paper and paper products	141
18	Printing and reproduction of recorded media	114
19	Manufacture of coke and refined petroleum products	12
20	Manufacture of chemicals and chemical products	396
21	Manufacture of basic pharmaceutical products	100
22	Manufacture of rubber and plastic products	360
23	Manufacture of other non-metallic mineral products	259
24	Manufacture of basic metals	169
25	Manufacture of fabricated metal products	846
26	Manufacture of computer, electronic and optical products	225
27	Manufacture of electrical equipment	263
28	Manufacture of machineryand equipment n.e.c.	718
29	Manufacture of motor vehicles, trailers and semi-trailers	205
30	Manufacture of other transport equipment	69
31	Manufacture of furniture	141
32	Other manufacturing	130

Table A3: Variables' description

Variables	**Description**	**Mean**	**St. Deviation**
Markup	following De Loecker and Warzynski (2012)	2.73	3.71
Market Share	firm's revenues over total by country-sector-year	0.001	0.02
ROI	return on investment: profits on fixed assets	4.01	8.53
TFP	following Ackerberg et al. (2015)	2.32	3.06
Sales	as from original financial information	5,519,585	1.54e+07
Variable costs	cost of materials plus cost of employees	4,051,385	1.14e+07
Profits	revenues minus variable costs	1,670,267	4,562,032

Table A4: Correlation matrix

	Markup	Market share	Profitability	TFP	Sales	Variable costs	Profits
Markup	1						
Market share	0.0002	1					
Profitability	0.0064	-0.0012	1				
TFP	0.2977	-0.0001	0.0000	1			
Sales	0.0001	0.2488	-0.0003	-0.0000	1		
Variable costs	0.0001	0.2302	-0.0003	-0.0000	0.9934	1	
Profits	0.0000	0.2996	-0.0004	-0.0000	0.9071	0.8545	1

The table shows pairwise correlations of variables for treated and untreated firms included in the sample.

Table A5: Sample coverage by technology intensity

Technological Intensity	Frequency	%
Low tech	165,676	47%
Medium-low tech	119,379	34%
Medium-high tech	58,053	16%
High tech	10,892	3%

The table represents sample coverage by technology intensity based on firms' industrial affiliations, as from Eurostat classification.

Table A6: Average treatment effect (ATE) after takeovers

(a) Low Tech

	(1) Markup	(2) Market share	(3) ROI	(4) TFP	(5) Sales	(6) Variable costs	(7) Profits
Post Treatment	-0.0166	0.0549***	-0.053*	-0.0035	-0.0051	0.0052	-0.0318
	(0.0131)	(0.0206)	(0.0294)	(0.0127)	(0.0164)	(0.0164)	(0.0243)
Observations	449,385	449,385	449,385	449,385	449,385	449,385	449,385

(b) Medium-low Tech

	(1) Markup	(2) Market share	(3) ROI	(4) TFP	(5) Sales	(6) Variable costs	(7) Profits
Post Treatment	0.0066	0.0264	-0.0333	-0.0049	-0.004	0.0015	-0.0284**
	(0.0085)	(0.0167)	(0.0213)	(0.0072)	(0.0117)	(0.013)	(0.0137)
Observations	504,645	504,645	504,645	504,645	504,645	504,645	504,645

(c) Medium-high Tech

	(1) Markup	(2) Market share	(3) ROI	(4) TFP	(5) Sales	(6) Variable costs	(7) Profits
Post Treatment	-0.0089	0.0191	-0.0788***	0.0171	-0.0123	-0.0021	-0.0387**
	(0.0117)	(0.0191)	(0.0272)	(0.0243)	(0.0127)	(0.0143)	(0.0177)
Observations	233,576	233,576	233,576	233,576	233,576	233,576	233,576

(d) High Tech

	(1) Markup	(2) Market share	(3) ROI	(4) TFP	(5) Sales	(6) Variable costs	(7) Profits
Post Treatment	-0,0004	-0.0266	0.1098	-0.014	0.0572**	0.0504	0.0993
	(0.0195)	(0.054)	(0.0754)	(0.0354)	(0.0279)	(0.0369)	(0.0653)
Observations	36,826	36,826	36,826	36,826	36,826	36,826	36,826
Controls	YES	YES	YES	YES	YES	YES	YES

The table shows results after the doubly robust estimator proposed by Callaway and Sant'Anna (2021), using never treated and not-yet-treated units in the control group. Variables are in logs. Standard errors clustered at the firm level are reported in parentheses and significance levels are *** p<0.01 ** p<0.05 * p<0.1

Table A7: Average treatment effect (ATE) on takeovers: Former vs. New EU Member States

(a) Old EU Member States

VARIABLES	(1) Markup	(2) Market share	(3) ROI	(4) TFP	(5) Sales	(6) Variable costs	(7) Profits
Post Treatment	-0.0126**	0.0409***	-0.0378***	-0.007	-0.0012	0.0065	-0.0245***
	(0.0062)	(0.0109)	(0.0146)	(0.0111)	(0.0072)	(0.0081)	(0.0098)
Observations	1,080,366	1,080,366	1,080,366	1,080,366	1,080,366	1,080,366	1,080,366
Controls	YES	YES	YES	YES	YES	YES	YES

(b) New EU Member States

VARIABLES	(1) Markup	(2) Market share	(3) ROI	(4) TFP	(5) Sales	(6) Variable costs	(7) Profits
Post Treatment	0.0227	-0.1293***	-0.0306	-0.0123	0.0502*	0.0656**	0.0225
	(0.0221)	(0.0366)	(0.0453)	(0.0359)	(0.0274)	(0.0285)	(0.0355)
Observations	172,187	172,187	172,187	172,187	172,187	172,187	172,187
Controls	YES	YES	YES	YES	YES	YES	YES

The table shows results after the doubly robust estimator proposed by Callaway and Sant'Anna (2021), using never-treated and not-yet-treated units in the control group. Variables are in logs. Standard errors clustered at the firm level are reported in parentheses and significance levels are *** p<0.01 ** p<0.05 * p<0.1

Table A8: Average treatment effect (ATE) after vertical integrations: Former vs. New EU Member States

(a) Old EU Members

	(1) Markup	(2) Market share	(3) ROI	(4) TFP	(5) Sales	(6) Variable costs	(7) Profits
Post Treatment	-0.017***	0.0375***	-0.0491***	-0.0207*	-0.0131	-0.0062	-0.0349***
	(0.0065)	(0.0129)	(0.0166)	(0.012)	(0.0083)	(0.0088)	(0.0114)
Observations	1,074,288	1,074,288	1,074,288	1,074,288	1,074,288	1,074,288	1,074,288

(b) New EU Members

	(1) Markup	(2) Market share	(3) ROI	(4) TFP	(5) Sales	(6) Variable costs	(7) Profits
Post Treatment	0.0215	-0.1349***	-0.0263	0.0058	0.0497	0.0744***	0.0249
	(0.0232)	(0.0359)	(0.0534)	(0.0397)	(0.0304)	(0.0299)	(0.0398)
Observations	171,316	171,316	171,316	171,316	171,316	171,316	171,316
Controls	YES	YES	YES	YES	YES	YES	YES

The table shows results after the doubly robust estimator proposed by Callaway and Sant'Anna (2021), using never-treated and not-yet-treated units in the control group. Variables are in logs. Standard errors clustered at the firm level are reported in parentheses and significance levels are *** p<0.01 ** p<0.05 * p<0.1