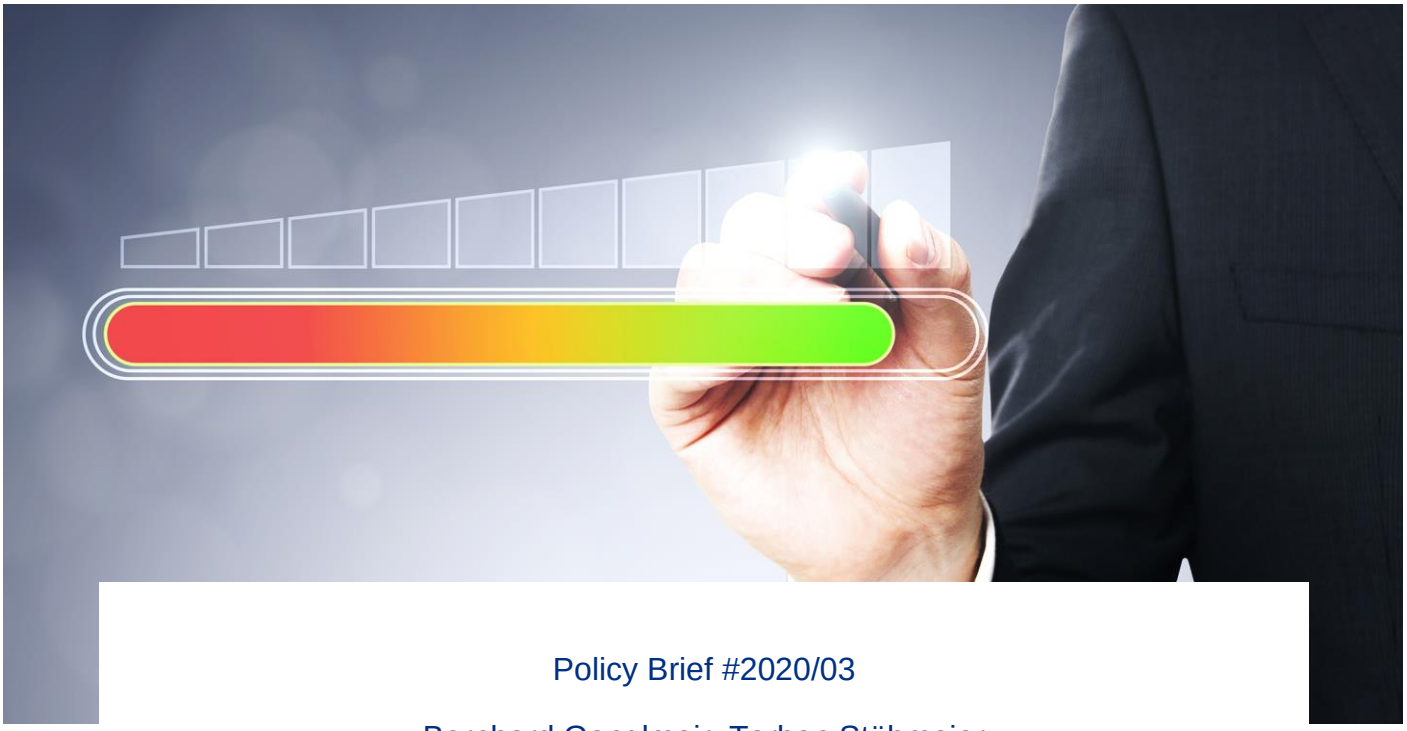

Policy Brief #2020/03

Bernhard Ganglmair, Torben Stühmeier

We must protect competition

The coronavirus is hitting the economies hard. There is a threat of an increase in market concentration with consequences for competitiveness. How has competition recently developed in Germany? What role does it play for productivity and innovation?

Germany's economic output slumped by 2.2 percent in the first quarter of this year, amounting to the sharpest drop since the financial crisis of 2008/2009. For the year as a whole, the federal government even expects the largest decline in gross domestic product since the post-war period.

In its efforts to counteract the stark economic impact of the Corona pandemic, the federal government is putting in place aid programmes worth billions. Various packages are designed to secure the liquidity of companies with a functioning business model before the crisis. But the corporate landscape will inevitably change. Many sectors such as tourism and the hospitality industry are massively affected by the lockdown and related measures. Industries that are strongly integrated into international supply chains, such as the metal, electrical, and automotive industries, are also struggling with disruptions and losses.

Despite the aid packages, there is a considerable risk of market upheaval. And on top, the packages themselves can come with negative effects for competition, experts warn. Especially in heavily crisis-ridden sectors, there is a threat of reduced competition. Some companies will disappear from the market - ailing companies are good takeover candidates. All in all, an increase in market concentration is feared.

And these developments have consequences for the competitiveness of the economy as a whole, as we show in our current study "Price Markups, Innovation, and Productivity: Evidence from Germany." We examine how competition between companies in Germany has developed in recent years and show that effective competition is an important driver of productivity and innovation. We summarize the key findings of the study in this policy brief.

FIGURE 1: **Average Price Markups**

Source: Authors' own calculations.

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cent and thus correspond to the average estimates for Europe (e.g., Wambach and Weche, 2018). We observe a slight increase in markups with a somewhat stronger increase towards the end. During the financial crisis 2008/2009, markups decreased only slightly on average.

Competition in Germany

What is the situation regarding competition in the German economy? To address this question, we estimate firm-level price-cost margins (markups). The idea behind this is as follows. If competition in the respective sectors is intense, companies will be limited in how much they mark up prices above cost. If competition is weak, however, we expect higher markups. We therefore interpret an increase in markups as a decrease in the intensity of competition. There are other factors that can contribute to an increase in markups – such as a greater significance of fixed costs – but the literature suggests that these are of secondary importance (De Loecker et al., 2020).

Our results are based on data from almost 12,000 German companies in the manufacturing, trade, and service sectors from the Orbis database for the period 2007-2016. Further details on the data and empirical methods can be found in the study.

Figure 1 shows the development of markups across sectors. On average, over our sample period, the markups in Germany are around 30-45 per-

Figure 2 breaks down the development by economic sector. We observe from these graphs that the services sector was the driving force behind the decline of the markups in the aggregate during the financial crisis. Markups in this sector dropped by about 20 percentage points and started to show signs of recovery only toward the end of our observation period. In the manufacturing and trade sectors, on the other hand, there were virtually no crisis effects.

Small companies less crisis resilient

Overall, in Germany it is rather the small and medium-sized companies that can set high markups, while large companies set the lowest markups in our sample. Many small and medium-sized companies are often active in narrow markets where competition is comparatively low. Large companies, on the other hand, often operate internationally and are therefore exposed to greater competitive pressure.

FIGURE 2: **Average Price Markups by Sector (Nace Section)**

Source: Authors' own calculations.

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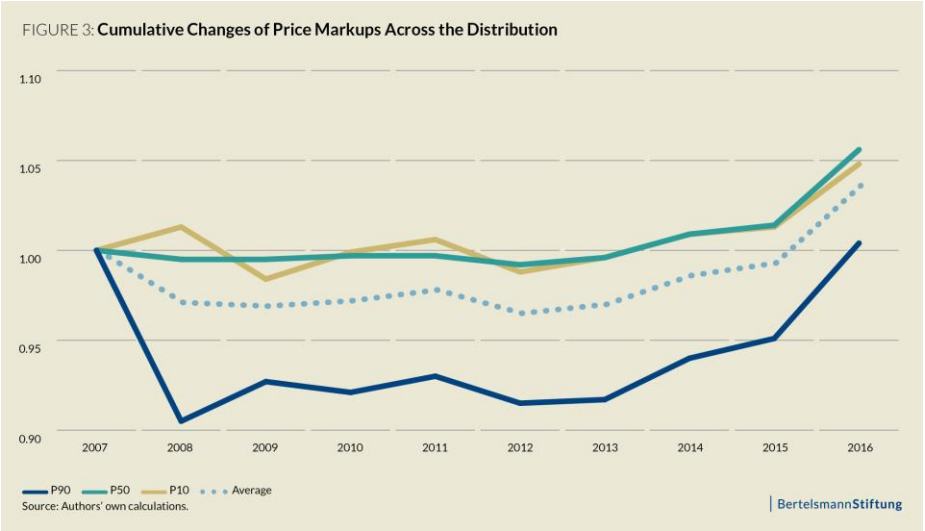

In Figure 3 we plot cumulative markup changes for the 10th, 50th, and 90th percentiles of the firm level price markup distribution. The figure allows us to explore the different time paths of different parts of that distribution. We can see that firms at the top of the distribution with high markups (90th percentile - P90) are also those that experienced a sharper drop during the financial crisis. Their markups level did not return to pre-crisis levels (2007) until 2016. Unlike firms with high markups, firms with lower markups returned to pre-crisis levels around the year 2013.

Smaller companies were thus less resilient to the financial crisis than larger companies. This also seems to be the case in the current corona crisis. One reason for this is certainly the weaker financial position. Another is that many small companies are often active in the service sector, which has been badly hit both during the financial and the current crisis.

No concentration-tendencies in Germany

Across sectors, we do not find conclusive evidence for an intensification of market power trends. The development of markups is relatively even across the entire company distribution. Unlike in the USA (De Loecker et al., 2020), for Germany we do not find that some companies (e.g., large ones) are outperforming their competitors. Companies across the entire distribution have been able to increase their markups since the financial crisis.

Competition and productivity: A brief theory

In many industrialized countries, as in Germany, a declining productivity growth has been recorded for years. Possible explanations range from statistical measurement errors, declining investment in research and development to structural shifts towards more services. In our study, we examine the role of the competitive environment for productivity development at the firm and sector level.

Economic theory views competition is an important driver of productivity growth (see, for example, Syverson, 2004). First, competition leads to companies using their resources as efficiently as possible, for fear of being overtaken by their competitors. Second, competition induces resources in the market as a whole to move from unproductive to productive firms. A third channel works indirectly through innovation. Although competition has been viewed as having an ambiguous effect on innovation activities (Aghion et al., 2005), it is now mainly seen as an important driver of innovation (Haucap et al., 2019; Igami and Uetake, forthcoming). And innovation, in turn, is an important driver for the productivity development of companies in Germany (Peters et al., 2017).

Recently, arguments that see a positive correlation between market power and productivity have also gained traction with the advent of the “superstars hypothesis.” It argues that the increase in market concentration is precisely the result of high productivity (Autor et al., 2020), as the most productive and innovative companies (i.e., the “superstars”) prevail in competition and increasingly gain market share.

Competition drives productivity

In our study, we shed light on the interdependencies of competition, innovation, and productivity.

TABLE 1: **Relationship Markup and Productivity**

Dependent variable: $\ln(\text{Productivity}_{it})$	Labor Productivity (1)	TFP (2)	Labor Productivity (3)	TFP (4)
Panel (a): Total Economy (Observations: 45,428 / 36,489)				
$\ln(\text{Average markup}_{i,t-1})$	−1.320*** (0.0500)	−1.468*** (0.0518)		
$\ln(\text{Average markup}_{i,t-2})$			−1.341*** (0.0542)	−1.493*** (0.0564)
Adj. R^2	0.361	0.597	0.359	0.590
Adj. R^2 (markups only)	0.097	0.151	0.094	0.148
Panel (b): Manufacturing (Observations: 21,340 / 17,229)				
$\ln(\text{Average markup}_{i,t-1})$	−2.148*** (0.0679)	−2.186*** (0.0663)		
$\ln(\text{Average markup}_{i,t-2})$			−2.100*** (0.0734)	−2.140*** (0.0718)
Adj. R^2	0.321	0.325	0.308	0.312
Adj. R^2 (markups only)	0.178	0.188	0.167	0.178
Panel (c): Trade (Observations: 14,031 / 11,297)				
$\ln(\text{Average markup}_{i,t-1})$	−3.933*** (0.108)	−4.217*** (0.129)		
$\ln(\text{Average markup}_{i,t-2})$			−3.903*** (0.116)	−4.198*** (0.138)
Adj. R^2	0.485	0.450	0.472	0.453
Adj. R^2 (markups only)	0.405	0.385	0.389	0.371
Panel (d): Services (Observations: 9,921 / 7,833)				
$\ln(\text{Average markup}_{i,t-1})$	0.1210*** (0.0438)	−0.0747* (0.0442)		
$\ln(\text{Average markup}_{i,t-2})$			0.1120** (0.0473)	−0.0884* (0.0478)
Adj. R^2	0.255	0.816	0.256	0.816
Adj. R^2 (markups only)	0.073	0.068	0.074	0.070
Year FE	Yes	Yes	Yes	Yes
2-digit Industry FE	Yes	Yes	Yes	Yes

Souce: Authors' own calculations.

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We first document the proportion of the productivity (and changes thereof) in our sectors of interest that can be directly attributed to the markups (as our proxy for competition and the lack thereof). In a next step, we examine the influence of markups on the innovation activities of companies to establish an indirect effect on productivity. Last, we consider direct and indirect effects in a joint estimation exercise.

As productivity indicators we use labour productivity and total factor productivity (TFP). The latter we obtain from estimating production functions; it is usually interpreted as the technological efficiency of production.

The regression results are presented in Table 1. The reported coefficients capture the percentage change of a firm's productivity in the subsequent one or two periods in response to a one percent increase of that firm's markups. Further control variables include firms' assets, firm and year fixed effects.

We find a significant negative effect of price markups on the productivity of a company for the economy as a whole. This implies that competition is indeed an important driver of productivity. An increase in markups by one percent leads to a reduction in labour productivity by about 1.3 percent and a reduction in TFP by about 1.5 percent. The negative correlation is even more pronounced in the manufacturing and trade sectors. In the latter, TFP falls by about 4.2 percent.

The situation is different in the service sector. Here our estimates point to a weakly positive (and significant) effect of markups on firm

productivity. These results might be an indication of the superstar tendencies in the service sector. We would like to express a word of caution, however, as the explanatory power of our model is lowest in the service sector where markups explain only a small proportion of the variation in productivity (6-7 percent, compared to 20-40 percent in the other sectors).

The role of innovation

In Table 1, we document a direct effect of competition on firm-level productivity. In this next step, we examine the direction and magnitude of an indirect effect of competition by way of a firm's innovation activities. For this analysis, we use a sub-sample of about 1900 companies from the Mannheim Innovation Panel (MIP). The MIP is an annual representative survey on the innovation activities of companies in Germany.

In a first step, we ask if markups have any effect on innovation. As dependent variables, we use two innovation indicators obtained from the MIP. *R&D expenditures* include a firm's expenditures to increase the knowledge base. *Innovation expenditures* are a somewhat broader concept and also include expenditures for the acquisition of external knowledge and training for the entire workforce.

Competition leads to more innovation activities

We report the results of our regression analyses in Table 2. We find that price markups do indeed have a negative effect on both innovation variables. To put this differently: the weaker the competitive pressure, the less firms will spend on R&D and innovation. For the economy as a whole, an increase in markups by one percent leads to a decrease in innovation expenditure by 1.7 percent. The effect is strongest in the manufacturing sector, where innovation expenditure falls by 3.7 percent. In the service sector, the negative effect is about half as large. In trade we do not find any significant effects of markups on innovation activities. We suspect that, in our sample period, innovation plays a less important role here than in other sectors of the economy.

Innovation is an important driver of productivity in Germany

In the next step, we examine the effect of innovation on firm-level productivity. Table 3 summarizes our results for TFP.

The estimated elasticities are between 0.05 and 0.08. For example, an increase in innovation expenditure by one percent leads to an overall increase in TFP of about 0.06 percent. This is in line with what other studies find for Germany and other countries (see Peters et al., 2018).

Possible reasons for the relatively low influence of R&D spending on productivity are discussed in the literature. Explanations range from declining returns from research and development and a largely exhausted technological potential (Gordon, 2012; Bloom et al., 2017) and decreasing technology diffusion (Andrews et al., 2016) to delayed effects and a not yet fully developed

TABLE 2: **Effect of Competition on Future Innovation**

	Total (a)	Manufacturing (b)	Trade (c)	Services (d)
Model (1): Dep. Var.: ln(InnoExp$_{it}$) (Observations: 3,149; Firms: 1,278)				
ln(Markup$_{i,t-1}$)	−1.706*** (0.629)	−3.723** (1.261)	−1.010 (2.360)	−1.935*** (0.749)
Adj. R^2	0.307	0.318	0.045	0.318
Model (2): Dep. Var.: ln(R&DExp$_{it}$) (Observations: 3,045; Firms: 1,258)				
ln(Markupi$_{,t-1}$)	−1.596*** (0.561)	−4.140*** (1.394)	0.343 (2.175)	−1.694*** (0.613)
Adj. R^2	0.351	0.351	0.011	0.397
Year FE	Yes	Yes	Yes	Yes
2-digit Industry FE	Yes	Yes	Yes	Yes

Souce: Authors' own calculations.

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TABLE 3: **Effect of Competition and Innovation on Future Total Factor Productivity**

Dependent variable: $\ln(TFP_{it})$	Total (a)	Manufacturing (b)	Trade (c)	Services (d)
Model (1): Innovation Expenditure (Observations: 2,460; Firms: 918)				
$\ln(Markup_{i,t-1})$	−0.801*** (0.134)	−2.090*** (0.179)	−3.372*** (0.630)	0.114 (0.148)
$\ln(InnoExp_{i,t-1})$	0.059*** (0.011)	0.061*** (0.011)	−0.021 (0.069)	0.084*** (0.024)
Adj. R^2	0.658	0.406	0.390	0.823
Model (2): R&D Expenditure (Observations: 2,335; Firms: 895)				
$\ln(Markup_{i,t-1})$	−0.845*** (0.143)	−2.030*** (0.183)	−3.562*** (0.630)	0.029 (0.172)
$\ln(R\&DExp_{i,t-1})$	0.052*** (0.012)	0.052*** (0.011)	−0.011 (0.100)	0.053 (0.038)
Adj. R^2	0.650	0.394	0.417	0.805
Year FE	Yes	Yes	Yes	Yes
2-digit Industry FE	Yes	Yes	Yes	Yes

Souce: Authors' own calculations.

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potential of new technologies (Brynjoflsson and McAfee, 2016).

Thus, in our study we can separate the direct and indirect effects of competition on productivity development on companies. This allows us to make more precise statements on how and through which channels competition affects the productivity of companies. We summarize this in Table 3.

Regardless of whether we consider R&D or innovation expenditure, competition has a positive overall effect on overall economic productivity, on the productivity of firms in manufacturing and trade. In the service sector, as well as in other sectors, there is a weakly negative correlation between competition and productivity.

It is particularly striking that in all economic sectors - except trade - competition is an important indirect driver of innovation activities. This means that weaker competition leads to companies investing less in innovation activities, which in turn has a negative impact on productivity development. This indirect effect is particularly strong in the manufacturing and service sectors. In the latter, this effect almost cancels out the positive direct effect.

Conclusion

Effective competition is a driving force for productivity and innovation in Germany and thus an important element for our future competitiveness. Our study shows this.

We must protect competition. This is especially true now, when many small and medium-sized enterprises are having difficulties staying in the market at all as a result of the corona pandemic. Those companies that had a well-functioning business model before the crisis should now be helped through the crisis. They are important competitors on the markets and ensure a vibrant industry dynamic.

In the service sector we find ambiguous effects of competition on productivity development. Much is in motion here and even more empirical research is needed to develop guidelines for a wise competition policy for this sector.

Study

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