Hacettepe University Graduate School Of Social Sciences

Department of Economics

THE EVOLUTION OF MARKET POWER AND ITS RELATION WITH INFLATION IN TÜRKİYE

Şamil PİŞMAF

Master's Thesis

Ankara, 2023

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ACCEPTANCE AND APPROVAL

The jury finds that Şamil PİŞMAF has on the date of 19.04.2023 successfully passed the defense examination and approves his Master's Thesis titled "The Evolution of Market Power and Its Relation with Inflation in Türkiye"

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ETİK BEYAN

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ABSTRACT

PİŞMAF, Şamil. *The Evolution of Market Power and Its Relation with Inflation in Türkiye*, Master's Thesis, Ankara, 2023.

In this study, I analyzed the evolution of market power in Türkiye between the 2006-2021 period by estimating firm-level and aggregated markups with a data-set covering a vast majority of Turkish industries. I also examined if the inflation in Türkiye was related with the changes in market power. I show that, despite a general decrease in industry concentrations, market power, as measured by markups, in Türkiye has seen a rise since 2014. Weighted average markup for the Turkish economy has risen from 1.15 to 1.22 over the period analyzed. The evidence suggests that, the increase in market power for the Turkish economy has been primarily driven by the rise of markups of the large firms within the industries. The results of the empirical analysis employed on the potential impacts of markups, and thus market power, on inflation, however, do not provide a clear answer whether there is conclusive evidence on such a relationship in the Turkish economy. Nevertheless, the simultaneous surge of markups along with inflation in 2021 in Türkiye and some other economies, together with the findings of several studies in the literature, imply a vicious circle such that market power fuels inflation and increasing inflation strengthens firms' market power. Initially which triggers which remains uncertain and requires further study on this very subject.

Keywords:

Competition, market power, markup, inflation

ÖZET

PİŞMAF, Şamil. *Türkiye'de Pazar Gücünün Seyri ve Enflasyon ile İlişkisi*, Master Tezi, Ankara, 2023.

Bu çalışmada, Türkiye'de 2006-2021 döneminde pazar gücünün gelişimi, Türkiye endüstrilerinin önemli bir bölümünü kapsayan bir veri seti kullanılarak, firma seviyesinde ve toplulaştırılmış markuplar tahmin edilmek suretiyle analiz edilmiştir. Ayrıca Türkiye'de enflasyonun pazar gücündeki değişimlerle ilişkili olup olmadığı da incelenmiştir. Çalışmada, endüstri yoğunlaşmalarındaki genel düşüşe karşın, Türkiye'de markuplar yoluyla ölçülen pazar gücünde 2014 yılından itibaren artış yaşandığı gösterilmiştir. Türkiye ekonomisi için hesaplanan ağırlıklı ortalama markup, incelenen dönem süresince 1,15'ten 1,22'ye yükselmiştir. Bulgular, Türkiye ekonomisinde pazar gücünde meydana gelen artışın, esas olarak endüstrilerde yer alan büyük firmaların markuplarında meydana gelen artış kaynaklı olduğuna işaret etmektedir. Markupların ve böylelikle pazar gücünün enflasyon üzerindeki potansiyel etkilerine dair yapılan ampirik analizde elde edilen bulgular, Türkiye ekonomisi için bu tür bir ilişkinin varlığına dair nihai kanıtlar sunmamıştır. Buna karşın, 2021 yılında Türkiye'de ve diğer çeşitli ekonomilerde markuplar ve enflasyonda yaşanan eşanlı sert yükselişler ile birlikte literatürde yer alan çeşitli çalışmaların bulguları, pazar gücünün enflasyonu beslediği, enflasyonun da firmaların pazar güçlerini desteklediği bir kısır döngüyü ima etmektedir. Bunlardan hangisinin öncelikle diğerini tetiklediği ise belirsizliğini korumakta olup bu alanda daha fazla çalışma yapılmasını gerektirmektedir.

Anahtar Kelimeler:

Rekabet, pazar gücü, markup, enflasyon

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ABBREVIATIONS

BLS: Bureau of Labor Statistics

CBRT: The Central Bank of the Republic of Türkiye

CEA: Council of Economic Advisers

CMA: Competition and Markets Authority

CR: Concentration Ratio

GDP: Gross Domestic Income

ECB: European Central Bank

EIS: Entrepreneur Information System

EU: European Union

HHI: The Herfindahl-Hirschman Index

IMF: International Monetary Fund

KLEMS: BLS - Integrated Industry-level Production Accounts

OECD: Organisation for Economic Co-operation and Development

NACE: Statistical Classification of Economic Activities in the European Community

NAICS: The North American Industry Classification System

SIC: Standard Industrial Classification

TCA: Turkish Competition Authority

TURKSTAT: Turkish Statistical Institute

UK: United Kingdom

US: United States

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INTRODUCTION

Benefits of promoting competition in markets are manifold. Among them, lower prices in general comes topmost (CEA, 2016, p. 1). As microeconomic theory suggests, in a perfectly competitive market, firms do not have market power (Whish & Bailey, 2012, p. 25), setting their prices equal to their marginal costs (Bishop & Walker, 1999, p. 18). However, in real life, due to market imperfections and lack of competition, markups, which defined as *"the ratio of price over marginal cost"* (Hall, 2018, p. 2), are usually greater than one. In this sense, markups claimed to be a prominent proxy to measure market power (Przybyla & Roma, 2005; Hall, 2018), as the markets depart from perfect competition the ability of firms for imposing prices beyond marginal costs strengthens (OECD, 2021, p. 21).

Some recent research reveal that markups have been rising in the modern capitalist economies for several decades (Berry et al., 2019, p. 7), indicating a rise in market power as well. For example, De Loecker et al. (2020) showed that markups in the US economy has experienced a dramatic surge since 1980s. Calligaris et al. (2018) found a comparable trend for OECD countries since 2005. Diez et al. (2018) also confirm those findings using financial statements of publicly traded companies in 74 countries.

As the macroeconomic theory reveals, the cost of high inflation is vast (Driffill et al., 1990), and there is very little, if any, doubt that the inflation is a monetary phenomenon in the very first place which has to be dealt with carefully designed macroeconomic policies (OECD, 2022, p.7-8). However, some recent studies indicate that decreasing competition and rising market power within the economies was related with higher levels of inflation.

Neiss (2001) found that the markup, as an indicator of the competition between firms, played an important role in explaining differences across economies in average inflation within the OECD countries. Cavelaars (2003) analyzed the 1988-2000 period for 23 OECD countries and provided evidence that a greater product market competition led to a permanently smaller rate of inflation. Przybyla

& Roma (2005) studied 1980-1990 and 1991-2002 periods for 15 EU countries and observed a negative relationship between competition and average inflation for prolonged periods. Conducting a similar research on 15 countries and 34 sectors, Janger & Schmidt-Dengler (2010) revealed a significant negative correlation among competition, inflation and variance of price through 1991-2005. For longer intervals, though, explanatory power of competition on inflation rates fades. They also provide evidence that intensified competition has inflation-stabilizing effects. Studying the US economy through 1950 to 2014 with firm-level data, De Locker & Eeckhout (2017) concluded that, inflation had been higher from 1980 onwards than it would have been without the rise in market power, which was a problem to be remedied by the antitrust policy not the monetary policy.

Türkiye has been a country of high inflation ever since the early 1970s. After almost three and a half decades, it was only 2004 when the country finally recorded a single digit inflation rate. Yet, the country's inflation rate to date has remained well over the world and OECD averages. For example, through 2004-2021, Türkiye has recorded an average inflation of 10.11%, while the average rate for the world and the OECD countries were 3.37% and 1.92% respectively for the same period[1]. Inflation in Türkiye has particularly accelerated after 2017.

Thus, for almost five decades, Türkiye has not been successful enough to achieve inflation rates that are close to developed countries or most of the emerging economies, even with years of strict monetary policies after the 2000s. Bearing this fact in mind, I believe it worth delving if some other determinants or structural problems, other than monetary policy, might play significant roles in the level of inflation in Türkiye. There is a chance that lack of vigorous competition within the markets can be among those structural problems.

In this regard, following a similar approach with De Locker & Eeckhout (2017), in this study, I examine the course of markups and thus market power in Turkish economy, and for a number of selected Turkish manufacturing industries in

[1] Source: The World Bank Global Database of Inflation
https://www.worldbank.org/en/research/brief/inflation-database

particular I try to reveal if the structural high inflation problem of Türkiye has some of its roots in potential lack of intense competition within the markets.

There are some studies in the literature, which are related in part to our research topic. However, to my knowledge, there is no comprehensive research of the kind has made to date for the Turkish economy, on the very same context with this thesis.

Günay et. al, (2005) investigated the relationship between profit margins, which were defined as “the ratio of total profits to total costs of wages and intermediate inputs”, and inflation for the period through 1980-1996. They found evidence of a positive effect of price inflation on profit margins. Çörüş (2009) used four-firm concentration ratios as a proxy for competition to investigate the relation with competition and inflation in Turkish manufacturing industries for the 1995-2001 period. He found that, concentration ratios were negatively associated with sectoral inflation. Gürcihan Yüncüler & Oral Çevirmez (2018) observed that inflation was among the factors pulling down the [accounting] profits for the BIST 100 firms between years 1993 and 2018. Taymaz & Yılmaz (2015) estimated markups for Turkish manufacturing industry for 1990-2000 period and showed that the markups had declined after the Customs Union between EU and Türkiye entered into force. Using gross profit margins extracted from firm level data of Turkish manufacturing sector from 1989 to 2016, Gürcihan Yüncüler & Erdoğan Coşar (2019) revealed that real exchange rate movements have significant impact on firm profitability, moreover this effect was higher in sectors that are relatively more concentrated. In a recent study by Yılmaz & Kaplan (2022), using firm level data for the years through 2005-2015, the authors examined how markups have changed in manufacturing sector in Türkiye and found that it is mainly the large firms, which determine the course of markups.

Thus, studies above are not either directly have the same research questions, methodologies, approaches, or do not use the wide data set that used in this thesis. In this regard, my research can fill the gap in the literature in this very subject.

Hence, the aim of this study is twofold: First, I inquire if there has been an upward trend in markups and thus market power for the Turkish economy. Second, in line with the research mentioned above, I look for evidence of a significant relationship between market power and inflation for particular NACE 3-digit industries for the time period that will be analyzed. Should there be evidence found on rising markups that would imply lack of competition economy wide or for particular industries, and/or significant effect of market power on inflation, some policy implications might be inferred for strengthening the antitrust/competition policy and enforcement in Türkiye.

Though markup is a good proxy to measure the extent of market power; however, it is not trivial to measure markups since marginal cost cannot be observed directly (Cavalleri et al., 2019, p. 11). Nevertheless, a number of methods have proposed in the literature to estimate markups. These methods can be divided in to three main approaches; 'the accounting approach', 'the demand approach' and 'the production approach'. The later includes production function approach and the cost approach. In this study, I follow a similar cost approach strategy as in Nishioka & Tanaka (2019) and CMA (2020) to recover markups from individual firms' financial statements.

The data to conduct the research is obtained from Ministry of Industry and Technology's Entrepreneur Information System (EIS)[2]. EIS is the only source a researcher can get detailed and wide enough data such as firm-level balance sheets, income statements and firm size indicators that are necessary for the estimations to make for a study of this kind. Since the EIS data starts with the year 2006, I inquire the period between 2006 and 2021. I also use related industry level and general producers price indexes published by TURKSTAT.

In this context, this study is organized as follows: In chapter 1, I introduce some widely used methodologies to measure the level of competition in markets. Chapter 2 provides a brief discussion on different approaches for markup estimation, with a particular attention to their respective advantages and

[2] https://gbs.sanayi.gov.tr/AnaSayfa.aspx

drawbacks. The strategy followed to recover the markets in this study, the data used and the results found are also presented in this section. In chapter 3, first, I briefly review the literature on macroeconomic implications of competition. Then I introduce the econometric model used to inquire the possible relation between industry-level markups and inflation, and finally I present and discuss the result of estimations. Chapter 4 concludes this thesis.

CHAPTER 1: MAIN INDICATORS OF COMPETITION IN MARKETS AND MARKET POWER

At its simplest, competition can be defined as the process of economic rivalry between firms (Clark, 1925, p. 220; Bishop & Walker, 1999, p. 14; Whish & Bailey, 2012, p. 3). This is a contest among firms to attract and win customers by offering them better alternatives than those offered by their competitors, which benefits customers in many ways (CMA, 2020, p.7).

The most pronounced benefit of competition is lower prices (CEA, 2016, p. 1). In the concept of perfect competition, all firms set their prices equal to their marginal costs (Bishop & Walker, 1999, p. 18). This leads an identical (market-determined) price for all competitors in the market, since, a slightest increase in one firm's price would bring for that firm to lose all of its customers to rivals (White, 2012, p. 4) and also it would be unprofitable for a firm to ask a price below their marginal cost (Wish & Bailey, 2012, p. 5; White, 2012, p. 4).

Competition also pushes firms to achieve greater efficiency and innovation; thus, benefits consumers by better product quality, new and innovative products, higher variety of choice, and at the end improved social welfare and economic growth, which can be interpreted as better living standards (Whish & Bailey, 2012, p. 4-6; Lorenz, 2013, p. 1; CEA, 2016, p. 1-2; TCA, 2022, para. 6).

Market power, on the other hand, refers the extent a firm's or group of firms' might to set prices beyond their marginal costs, which induces higher prices than what would occur under perfect competition (Diez et al., 2018, p. 3; Cavalleri et al., 2019, p. 3; White, 2012, p 4-5). It is a primal concept and concern for competition law and policy (Bishop & Walker, 1999, p. 12; Whish & Bailey, 2012, p. 1-2). This arises from the fact that, market power enables firms to harm consumers not just by higher prices through reducing output, but also by lowering product quality, stifling innovation and lessening freedom of choice (Whish & Bailey, 2012, p. 1-2; CMA, 2020, 14, p. 14). Thus, market power disrupts efficiency, engenders waste of resources and loss of social welfare (Güven & Yeni, 2013, p. 109).

Therefore, correctly measuring the intensity of competition and market power within and across industries, and observing their trends are highly valuable for policymakers (OECD 2018, p.4). Hence, assessing the degree of competition in markets and the gravity of firm market power has long been a common study area for both competition authorities and other public agencies around the world, as well as economists from many branches (Cavalleri & et al., 2019, p. 13). Competition authorities use this sort of analysis when handling antitrust cases, merger investigations and sector inquiries. They may also develop screening tools based on competition indicators to identify possible markets with competition problems and/or deciding which markets to prioritize (OECD, 2021, p. 39). Determining how well competitive process works in the economy and the way they evolve also helps policy makers to better understand the reasons underlying the evolution of competition and market power, and allows them to develop policies to improve competition, which would promote efficiency, innovation and welfare (OECD 2018, p.4; Calvino et al., 2020, p.6).

However, measuring competition is far from being an undemanding task. This is due to the fact that the concept of competition is very complex in nature, which cannot be observed directly. Therefore, a number of methods have been developed and proposed in the literature to identify and quantify the degree of competition (OECD, 2021, p. 44).

These indicators mainly focus on two facets of competition to measure, which are market structure (either static or dynamic state) and market performance. Nevertheless, there are also different metrics aiming to measure other facets of competition (OECD, 2021, p. 11). The choice between the methods and metrics to be used depends on the availability of data and the purpose of the study in hand (p. 33). However, it is generally accepted to be a good practice to use multiple indicators to get clearer insights on the evolution of the competition and market power within markets and the economy (CMA, 2020, p. 11).

In what follows, I will introduce the most common measures of competition and market power, namely concentration measures, business dynamism indicators

and performance indicators, with an emphasis on their respective advantages and shortcomings.

1.1. CONCENTRATION MEASURES

Concentration refers one of the structural characteristics of a particular market, which is based on firms' shares of various metrics within that market. These metrics may vary, such as, from volume of sales (either revenues or quantities) to production capacities or number of employees, depending on the nature of the competition in markets and/or context of study (OECD, 2018, p. 4-5).

Concentration measures are among the most widely used indicators by both competition law enforcers and economists as a proxy to assess the degree of competition in a particular market (Benkard et al. 2021, p. 1). The idea behind this tendency is simple and intuitive since economic theory –in general- suggests a negative relation between concentration and the competitive pressure that firms faced. In this sense, an increase in concentration within a market may indicate a rise in market power, as well (CMA, 2020, p. 14).

The major advantage of these indicators stems from simplicity in application and data requirements. Given a market is defined reasonably; the only needed information to calculate usual concentration measures are firms' revenues (CMA, 2020, p. 15). This simplicity, for instance, allows competition authorities to quickly draw implications on potential effects of a particular merger on the intensity of competition within a relevant market as a result of a prospective merger, thus to decide whether further investigation is needed for clearance of the proposed transaction. The authorities can also use concentration indicators as a screening tool to determine markets which antitrust enforcement might prioritize (OECD, 2018; OECD, 2021).

Researchers also often rely on concentration as an indicator, though imperfect, of the course of market power over time within and across the industries and use these measures to infer about economy-wide developments and cross-country comparisons (Cavalleri et al., 2019, p. 6).

There are several ways to measure market concentration. Among them, the N-Firm Concentration Ratio (*CR*) and The Herfindahl-Hirschman Index (HHI) are the most common ones.

The N-Firm Concentration Ratio measures the sum of market shares of *n* largest firms in a market or industry (Davis & Garces, 2010, p. 288; Cavalleri et al., 2019, p. 11; OECD, 2018, p. 6). A simple mathematical expression of the *CR* is as follows:

$$CR_{n,t} = \sum_{i=1}^{n} S_{i,t} \quad (1)$$

where *n* is a predetermined number of top firms regarding to sales in a particular industry or market and $S_{i,t}$ is the market share of firm *i* in year *t* which is calculated as:

$$S_{i,t} = \frac{sales_{i,t}}{\sum_{i=1}^{N_t} sales_{i,t}} \quad (2)$$

where N_t is the number of all firms within the same industry or market in year *t* (Cavalleri et al., 2019, p. 11).

Depending on the study purposes, *n* could be a variety of numbers that are typically 10 or less. CR3, CR4, CR5, CR8 and CR10 are among the most commonly used concentration ratios, which denote the combined market shares of top 3, 4, 5, 8, or 10 largest firms respectively (OECD, 2018, p. 6). However, there are also studies that use larger number of firms, such as CR20 (see CMA, 2020; Maré & Fabling, 2019) or even CR50 (see CEA, 2016) as concentration metrics. This metric approximates to zero when there is an infinite number of firms with equal market shares, and equals to 100 [percentage points] where the '*n*' firms capture the whole market (OECD, 2021, p. 11).

Calculation of *CR* is an easy task since it only requires information on the number of firms in a market and their respective market shares, which mainly explains its wide use. Yet, interpretation of the *CR* and its use as a comparison metric about the structure of a market over time and among different markets are not that

straightforward. These issues arise from the fact that *CR* inevitably does not provide any information on the distribution of market shares (Menon Economics, 2019, p. 11; Cavalleri et al., 2019, p. 11, Bektemur, 2022, p. 19).

To illustrate this, suppose there are two markets, Market A and Market B, which have the same CR4, that is 85. There are five competitors in Market A, with the fifth largest firm having a market share of 15 percent. In Market B, on the other hand, the remaining 15 percent of market share are distributed among 90 firms, which shows a relatively long tail in the distribution. Since combined market share of top four firms in both of these markets are the same, the CR4 cannot distinguish between the competitive structures of these two markets. A similar situation is also the case, for instance, when market shares of top five firms in Market C are 60 percent for the leader and equal to 5 percent for the other four competitors; while 18 percent each for Market D. CR5 would yield 90 for both Market C and Market D, even though many researcher or antitrust authority would find the structure of the former market more problematic in terms of competition, than the latter.

The Herfindahl-Hirschman index (HHI), which is based on the works of Hirschman (1945) and Herfindahl (1950) comes with a solution to this problem with *CR*, by first calculating the squares of all firms' market shares in the market, and then summing the results (Cavalleri et al., 2019, 6; OECD, 2021, p. 12, Şanta, 2022, p. 1692):

$$HHI_t = \sum_{i=1}^{N_t} S_{i,t}^2 \tag{3}$$

HHI ranges between close to zero to 10,000. A HHI value close to zero, which means a very large number of small firms exist in the market, represents perfect competition, while a value of 10,000 represents a monopoly (CMA, 2020, p.14; OECD, 2021, p. 12)[3]. This metric gives a greater weight to firms with larger

[3] There are some other, less common approaches proposed in the literature to compute HHI, which claimed to have better properties. For instance, see Bekaroğlu (2019).

market shares than to those with smaller ones, hence reflects the importance of difference in relative sizes (OECD, 2021, p. 12)[4].

HHI values greater than 1000 usually associated with concentrated markets, and those with HHIs above than 2000 considered to be highly concentrated (CMA, 2020, p.14). Competition authorities also generally do not consider mergers in a market with HHI values of less than 1000 as problematic, while they usually scrutinize merger reviews when the HHIs are more than 2000[5].

A number of studies for the last decade argue that the concentration in many US industries have been on the rise. Peltzman (2014) analyzed the concentration in US manufacturing sector and found that concentration has been increasing ever since the US merger policy changed in 1980s. CEA (2016) reports that, revenue share of top 50 firms in most of the US sectors have raised over the years 1997-2012. Using US Economic Census data covering the years 1982-2012, Autor et al. (2020) observe that CR4, CR20 and HHI that based on sales have shown an explicit upward trend for most of the six broad sectors, and on average. They find similar results when the concentration metrics are computed based on employment. Accordingly, Grullon et al. (2019) show that, the HHI has seen an upward trend in more than three-fourths of US industries, with having mean increases up to 90 percent. Having examined the trends in several concentration metrics, they underline that, the main finding of rising concentration is robust to selection of different indicators.

In contrast with the US, similar studies for European countries provides mixed evidence on concentration trends. Using the data set by Kalemli-Ozcan et al. (2015), Döttling et al. (2017) find that average concentration in the EU in terms of CR4 and HHI have remained stable or even decreased from 1999 to 2012. The trend is similar for both EU-wide calculations and national basis. Based on Euromonitor data, Valetti (2018) examined the CR4 and HHI metrics for the five

[4] If we turn back to our example above, upper bound for HHI of Market D would be 1720, while lower bound for Market C is more than 3700.
[5] See for instance TCA (2022), *Guidelines on the Assessment of Horizontal Mergers and Acquisitions* para. 19.

biggest EU countries[6] (the EU5) and observed that concentration have not increased between 2010 and 2015, except for a small increase for France. Koltay and Szabolcs (2021), however, report a moderate rise in mean concentration for the same countries over the years 1998-2019. They also highlight that there has been a dramatic increase in the ratio of industries with high concentration levels.

Relying on ORBIS and iBACH data set covering the period 2006-2015, Cavalleri et al. (2019) conclude that CR4 and HHI trends have remained fairly flat in EU manufacturing sector and the economy as a whole. Following a novel approach by accounting for ownership structures of firms across industries and economies, however, Bajgar et al. (2023) find evidence that increasing concentration is not limited to US but it is also the case for a large set of European countries from 2000 onwards.[7]

TURKSTAT has published several concentration metrics by NACE 4-digit industries for Turkish economy[8]. First of these data is compiled based on NACE Rev 1.1 classification under 449 industry classes and covers the 2006-2008 period. The second one is based on NACE Rev 2. for the years between 2009-2015, which includes 529 industries. Table 1 below, summarizes the data for selected years. Figure 1 shows the trend for (unweighted) mean CR4, CR8 and HHI at 4-digits level. Unlike the situation for many advanced economies, the figure reveals a clear decline in average concentration in terms of all three metrics, particularly after 2008 –the global recession year.

Table 1: Number of enterprises and concentration measures for NACE 4-digit industries in selected years

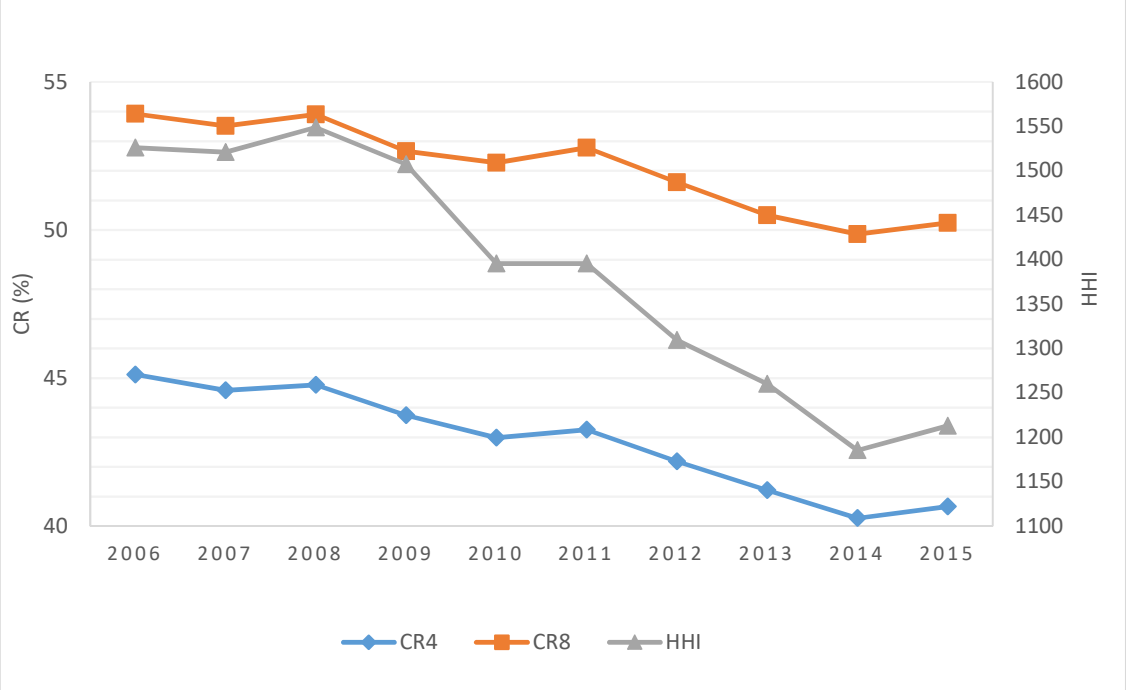
Year	Number of Industries	Number of Enterprises		CR4		CR8		HHI	
		Mean	Median	Mean	Median	Mean	Median	Mean	Median
2006	449	5549.64	409	45.12	37.40	53.92	50.60	1526.1	525
2009	529	4871.42	436	43.74	35.75	52.66	48.70	1507.3	520.4

[6] Germany, France, Spain, Italy and UK.
[7] There is also a vast number of country-specific concentration studies. For instance see Menon Economics (2019) for Norway, Schiff & Singh (2019) for New Zealand and CMA (2020) for UK.
[8] See *"Concentration Ratios by Classes in Sections, 2006 - 2008 (NACE Rev. 1.1)"* and *"Concentration Ratios by Classes in Sections, 2009 - 2015 (NACE Rev. 2)"* by TURKSTAT available at https://data.tuik.gov.tr/Kategori/GetKategori?p=sanayi-114&dil=2

2015	529	5137.88	635	40.66	33.14	50.24	45.16	1213.0	463.5

Source: TURKSAT. See footnote 5.

Figure 1: Concentration evolution based on NACE 4-digit industries in Türkiye (2006-2015)



Source: TURKSAT. See footnote 5.

Akçiğit et al. (2020), use the firm-level EIS employment data covering 2006-2016 to compute CR4, CR20 and HHI based on employment shares of manufacturing firms at NACE 4-digit level. They also show that weighted average concentration had fallen between 2009 and 2012, but started to increase by 2014.

In a recent study, Bektemur (2022) calculated HHI for 567 NACE 4-digit industries in Türkiye based on EIS firm-level sales data for 2006-2020 period. He observed that concentrations have increased in 226 of those industries; while there have been decreases in concentrations in the remaining 341.

Using the EIS data, this study finds a downward trend in concentration between 2006 and 2021, in terms of sales-weighted mean HHI. I will provide concentration figures based on my calculations and discuss the findings in Chapter 2.4 below.

Before moving on the next indicator, it should be noted that, concentration as an indicator of market power is not without limitations. To begin with, concentration indicators are not direct measures of market power, since concentration itself is mainly an outcome of market, which is shaped by the competitive interactions of firms in the same market (CMA, 2020, p. 15). In this sense, concentration may rise as a consequence of intense competition such that small competitors expand their market share through realizing economies of scale, cost efficiency, lower prices or innovation (Bektemur, 2022, 22; CEA, 2016, p. 3; OECD, 2019, p. 3). Decreasing number of rivals and a subsequent rise in concentration could well be the case in which inefficient firms eliminated through the competitive process and exit the market, rather than a consequence of dominant firms' exclusionary conducts (CMA, 2020, p. 15).

A second draw back arises from the data that is used to calculate concentration indicators. Most studies on concentration rely on administrative data collected and recorded through some sort of industrial classification such as "*Standard Industrial Classification (SIC)"* for the UK, *"The North American Industry Classification System (NAICS)"* for the US or *"Statistical Classification of Economic Activities in the European Community (NACE)"* for Türkiye and countries within the European Statistical System. This sort of data typically defines industries at up to six digits.

Nonetheless, these standard classifications do not necessarily based on demand side substitutability of products[9] or stages of supply chain (OECD, 2019, p. 3; Affeldt et al., 2021, p. 6), but usually define those products that have similar physical traits and production processes (Benkard et al. 2021, p. 1). Therefore, even the most disaggregated classifications, such as six digit NACE codes, are probably broader than many *relevant product markets* that would have been defined in competition law enforcement (CMA, 2020, p. 15; OECD, 2021, 35)[10].

[9] Products refers to both goods and services.

[10] Standard method to define relevant markets in competition law is the so-called SSNIP test. This test relies on demand elasticities, and focuses on the profitability of a hypothetical monopolist when there is a "*small but significant and non-transitory increase in p*rice" (SSNIP) (Bishop & Walker, 1999, p. 53-54). The relevant product market is the narrowest group of products that allow

For instance, NACE 20.42.04 includes “shampoos, hair conditioners, hair sprays, hair gels, hair lotions, permanent wave products, hair dye” etc. All of the listed captured by this particular NACE code are hair care products for sure; however, it is far from being clear that hair dye cannot be a substitute for shampoo or conditioner. In a competition law case, even sub segments of these products could be regarded as separate relevant product markets.

A similar problem also arises with the geographic scope of the data. For many countries, a wide set of firm-level data on sales is only available at national level (OECD, 2021, p. 10). However, a geographic market could be either local, national or even international (Affeldt et al., 2021, p. 7)[11]. Cement industry, for instance, is characterized with narrow geographic markets. Hence, a nation-wide industry sales data can tell little about the actual level of concentration in well-defined geographic markets for cement products. This is also often the case for retailers. When a national retail chain opens new stores in areas that was not operating before, this could increase concentration nationally, but at the same time may cause a decrease in concentration in local markets since a new competitor enters (CMA, 2020, p. 16).

Thus, there is an essential difference between what could be defined as *industry concentration* and *market concentration*. The studies rely on administrative data that based on industrial classifications actually calculates the former, which is an aggregation of the later. While industry concentration is on the rise, concentration of possibly many markets within the same industry could either be rising, falling or remaining the same (OECD, 2021).

In a recent study by Werden and Froeb (2018), the authors compare relative sizes of relevant markets defined in US antitrust enforcement over 2013-2015 period and corresponding NAICS 6-digit industries. The “Commerce Quotients” which they find by dividing the volume of commerce in those cases by the value of industry commerce reveal that, even the most granular US Census data can be

a hypothetical monopolist to impose such an increase profitably (Bishop & Walker, 1999, p. 49; White, 2012, p. 31; TCA, 2008, para. 8-10).

[11] The problem also occurs when the data does not involve volume of imports.

100 times greater than an antitrust relevant market (Werden & Froeb, 2018, p. 1-5). Benkard et al. (2021) use consumer survey data to build concentration measures for narrowly defined product markets for a wide range of goods and services. Two main results emerge from their study: First, they find that most of those markets were much more concentrated than reported by previous studies based on US Census production data. Second, however, the median concentration had been decreasing since 1994 (See Benkard et al., 2021, p. 1-5). Affeldt et al. (2021) follow a different approach and focus on more than 20,000 relevant markets defined in EU Commission's merger cases between the years 1990-2014. They find that average post-merger HHIs in those markets were close to 3,000, which, they underline, is roughly ten times larger than what the literature usually report.

Another point that has to be mentioned about the data that have been used in studies to estimate concentration is that, these data usually do not account for ownership structure of firms, which also is the case for the EIS dataset. Undertakings may operate in the same market with multiple subsidiary firms. When this is the case, concentration measures based on firm-level data would induce a downward bias for calculations. On the other hand, large firms usually operate across many industries. In this case, however, attributing these firms' revenues to a particular industry may overestimate concentration measures (Bajgar et al., 2023, p. 2). Analyses of this kind also do not usually take into account partial owner ship –be it cross ownership among rivals or common ownership, which refers "ownership of shares in competing firms by institutional investors" (OECD, 2017, p. 2). There is an increasing debate in competition policy and industrial organization that, partial ownership may reduce rigorous competition among firms[12]. Hence, there is the risk that treating all firms as independent could result a potential underestimation of concentration while overestimation of competition intensity within a market (OECD, 2021, p. 12).

[12] For a detailed review of the novel empirical research on common ownership, see Schmalz (2021).

For these reasons, it should be kept in mind when interpreting results of the studies of this kind that, first, industry concentration does not necessarily reflect market concentration (OECD, 2021, p. 13). Nonetheless, delineation of relevant markets is already a difficult task in individual competition law proceedings that, it is impossible to consistently perform such an exercise on an economy-wide basis, let alone to obtain high quality data needed for a study of this kind (Shapiro, 2018, p. 722). Since there is no practical way to correctly define thousands of relevant markets in the economy and to track changes in demand and/or supply side for the products, or changes in ownership structures of firms within those markets; concentration-based metrics calculated with data that compiled through industrial classifications still keeps their importance and relative value as a proxy for market concentration and market power. When other measures of competition and market power also indicates similar findings, in particular.

1.2. BUSINESS DYNAMISM INDICATORS

Concentration as a structural indicator of competition is a static metric in nature, thus it only partly reflects the actual situation in a given industry (CMA, 2020, p.30). When combined with some dynamic indicators, however, interpretation of these measures can provide a much clearer picture about how well the competition works in industries (OECD, 2021, p. 16; CMA, 2020, p.30).

Resources are continuously reallocated across firms and sectors in market economies (Mondolo, 2021, p. 12). This process allows new firms to born, incentivizes resources to flow to firms that are more productive and gives the opportunity to these firms to expand their businesses (Cavalleri et al., 2021, p.11). Hence, in well-functioning markets, new entrants and incumbents contest the positions of other competitors, possibly resulting displacement of older less efficient ones (OECD, 2021, p. 16). From a Schumpeterian point of view, this means *creative destruction* process is working in the economy, which is essential for innovative and competitive markets (Akçiğit et al., 2021, p. 16; OECD, 2021, p. 16). For this reason, even a market that is highly concentrated may be competitive if the business environment is dynamic (CMA, 2020, p.30).

There are several indicators of business dynamism proposed and used in the literature. The most common ones are entry and exit rates, which can be expressed as the ratio of the number of new firms to the number of active firms in market j and year t for the former, and the same ratio of the number of exiting firms for the later (OECD, 2021, p. 16; Bektemur, 2022, p. 29). Researchers also often use the *'churn' rate*, which refers the sum of these two rates:

$$Entry\ Rate = \frac{New\ (Entering)\ Firms_{jt}}{Active\ Firms_{jt}} \times 100 \quad (4)$$

$$Exit\ Rate = \frac{Exiting\ Firms_{jt}}{Active\ Firms_{jt}} \times 100 \quad (5)$$

$$Churn\ Rate = Entry\ Rate + Exit\ Rate \quad (6)$$

The focus of these measures is what could be defined as *"the selection effect of competition"* (OECD, 2021, p. 16). That is, competition can draw new rivals to enter the market, while pushing the most inefficient ones to exit. In this sense, these measures may provide information on how much the selection effect of competitive forces are in work to keep markets dynamic, i.e. in general the higher the entry and exit rates the more dynamic are the markets.

However, there may be cases where high firm entry and exit rates alone do not correctly reflect the competitive structure of a particular industry. For instance, churn rates may be high but this could actually be the result of new firms' failure on challenging the incumbents and thus exiting the market, while older incumbent firms keep holding their positions (CMA, 2020, p. 31; OECD, 2021, p. 16). Likewise, for those markets which are dominated by large firms, these rates may not provide enough information regarding business dynamism, since a major proportion of these rates would probably account for entry and exit statistics of

small firms (CMA, 2020, p. 31; OECD, 2021, p. 16). High exit rates that are not accompanied by similar levels of firm entry may also not be a good sign for the competitive structure of markets, since this could cause a dramatic decrease in the number of firms, resulting a weakening of competition between the remaining rivals. This could be the case, for instance, in times of financial crisis.

Depending on the data availability, a variety of different metrics can also be used as proxies for business dynamism. *Rank persistence* is among these measures. This indicator focuses on a number of top firms within an industry and analyzes if there have been changes in identities of industry leaders for a predefined period of time (OECD, 2021, p. 19). If this metric reveals that top firms in terms of market share in an industry remain unchanged, i.e. ranks have been persistent; this can be interpreted as a sign of low business dynamism. CMA (2020), for instance, used this metric to check if top ten firms in each sector that analyzed had been amongst the same list for the past three years. They report an overall increase in rank persistence for the UK economy (CMA, 2020, p. 33).

Another metric to measure business dynamism is the *average age of firms*. This metric also focuses on large firms but this time not their ranks but mean ages (CMA, 2020, p. 32; Bektemur, 2022, p.30). The aim is to capture whether the population of large firms changes in time by calculating and tracking the average ages each year. If the average age of large firms increases by one each year, this suggests that same firms remain large, which would be a sign of absence of dynamism (CMA, 2020, p. 32). A rate of increase smaller than one, on the other hand, indicates either new firms' stepping into the club of large firms, exiting of older incumbents, or a mixture of these outcomes (CMA, 2020, p. 32; OECD, 2021, p.18).

Job reallocation is also a commonly used metric for measuring business dynamism. There are several approaches to measure job reallocation; but in its simplest form, this metric is the sum of newly created and destructed jobs in a market or industry within a given period of time (Weingarden, 2017). The relevance of this measure with business dynamism is intuitive by the fact that, creation and destruction of jobs within an economy is associated with new firms'

entry, changes in incumbents' market positions, and finally firms' exit from the market.

Recent studies highlight a downward trend in business dynamism for advanced economies (Calvino et al., 2020, p.8-10). Using US Census Bureau's Longitudinal Business Database and Business Dynamics Statistics that cover 1976-2011 period, Decker et al. (2014) report that business dynamism in the US has seen a secular decline in terms of several metrics including entry rates; though the exit rates has remained relatively stable. The study reveals that the decline in the dynamism across sectors is particularly evident after 2000 (Decker et al., 2014, p. 18, 29). CEA (2016) confirms these findings and underlines that labor market dynamism, which expresses the frequency of changes in employer identities of employees, has also seen a similar trend since 1970s.

Macdonald (2014) analyzed Canadian business-sector for the 1983-2012 period and found that both entry and exit rates were fallen, with a drop in entry rates over two times the drop in exit rates. Bakhtiari (2017) uses Business Longitudinal Analysis Data Environment for Australia covering the years 2002-2015 and finds that Australian industries have seen a much steeper fall in entry rates than both US and Canada.

Cavalleri et al. (2019) compare the business dynamism trends onwards 2000s through examining firm entry and job reallocation in euro area and the US. They conclude that, although start-up rates fall in some countries, unlike the situation in the US, however, there was no secular decline in business dynamism metrics in euro area.

Calvino et al. (2019) also focus on entry and job reallocation rates as indicators of business dynamism across 18 countries and 22 industries, and they find evidence of a prevalent decline for many countries over the 2000-2015 period. They particularly highlight a greater decline for several countries, including Türkiye, than in most European economies.

Akçiğit et al. (2020) use a firm level data set covering the years from 2006 to 2016 to study the Turkish manufacturing sector. Examining a wide range of metrics, including entry rates, rank persistence, job reallocation, distribution of growth rates and young firms' share in business, they find that Türkiye has seen an eminent decline in business dynamism after 2012.

Using the firm level Orbis data set covering 28 economies between years 2000 and 2015, Akçiğit et al. (2021) show that both new firms' entry rates, growth rate dispersion, and young firms' contribution to total output have declined. They report that this decline is significantly associated with rising concentrations.

Hence, business dynamism measures are useful indicators, which are widely used by researchers and antitrust authorities to understand the changes in market competition. Nonetheless, these metrics alone cannot provide conclusive answers for many markets, as it is the case for most indicators (CMA, 2020, p. 34). However, since empirical research indicates a close relation of these metrics with other measures of competition such as concentration (Akçiğit et al., 2021, p. 16), interpretation of these metrics accompanied by other indicators can present a deeper insight abought the way competition and market power evolve.

1.3. PERFORMANCE INDICATORS

Performance indicators are non-structural metrics used to quantify competition in markets. These were developed by the literature as a response to shortcomings of static and dynamic structural indicators, such as concentrations and churn rates (OECD, 2021, p. 20). A major advantage of performance indicators is their less sensitive nature to market definition. In addition, these measures take into account that intensity of competition could be high even in markets that are highly concentrated (Weche & Wambach, 2018, p. 5). The most widely used measures of this kind are markups and profits, which are introduced below.

1.3.1. Markup

Markup refers to the ratio of the price of a product to its marginal cost (De Loecker et al. 2020, p. 568; CMA, 2020, p. 37). It manifests capability of a firm to impose prices exceeding incremental costs of production (OECD, 2021, p. 21). In this sense, this is a direct indicator of market power (Akçiğit et al. 2021, 9; Monopolkommission, 2018, para. 390; CMA, 2020, p. 38). We can define markup, *μ,* as:

$$\mu = \frac{P}{C} \tag{7}$$

where P is the price of the output and C is the marginal cost of increasing output. A markup of one, which means equality of price to cost, represents perfect competition. If markup is greater than one, for instance 1.25, this means the price is 25% more than marginal cost, i.e. the firm enjoys some degree of market power (Monopolkommission, 2018, para. 392).

The above expression is also closely related with the well-known Lerner Index (L), which measures market power:

$$L = \frac{P-C}{P} = 1 - \frac{1}{\mu} \tag{8}$$

This metric lies between zero and one. As the index depart from zero, this indicates an increase in market power, i.e. markups higher than one (OECD, 2021, p. 46)

A major issue with markups is that, however, it is not possible to observe markups directly. First, prices are not usually readily available for a large range of products. Second, even if a researcher had prices, marginal costs remain unobservable. Therefore, a variety of approaches has proposed in the literature to overcome these drawbacks (Cavalleri et el., 2019, p. 6; OECD, 2021, p. 21), which I will discuss in the next chapter.

The use of markups as an indicator of market power has attracted a great deal of attention in industrial organization literature for the last decade. Most of those studies build on Hall's (1988) methodology to recover markups from aggregate data, and De Loecker & Warzynski (2012) who further developed the approach for firm-level data (OECD, 2021, p. 21), focusing firms' cost-minimization problem.

Arguably, the most prominent one among those studies is the study by De Loecker & Eeckhout (2017). This working paper triggered heated debates and some hundreds of new studies on markups and market power around the globe, including this thesis.[13] In the study, the authors used Compustat micro-data of publicly listed firms in the US economy for years between 1950 and 2014, and provide evidence that average markups have increased from 1.18 in 1980 to 1.67 in 2014, while being fairly stable over the 1960-1980 period. One particular finding is that the main drivers of the rise were the firms which already have highest markup levels.

Based on aggregated KLEMS[14] data covering the years 1988-2015, Hall (2018) mainly confirmed the findings of De Loecker & Eeckhout (2017), however he reported a lower increase (from 1.2 to 1.38) for the period covered.

Calligaris et al. (2018) found a comparable trend for OECD countries since 2005. They examined the course of firm-level markups in 26 countries, including Türkiye, relying on ORBIS data for 2001-2014 period. They found that markups have grown around 6% over the considered time horizon. The authors also noted that, most of the increase could be attributed to the top decile of distribution of markups, i.e. firms with highest markups. Results in (IMF, 2019) are in line with this study, where an average increase of 6% reported for 27 sample economies during 2000-2015: 1.8% for 11 emerging market economies and 7.7% for 16 advanced countries in the sample.

[13] According to repec.org, to date, this paper has had 495 citations. A Google search reveals that, actual number of citations might be well over 1,800.
[14] Integrated Industry-level Production Accounts

Diez et al. (2018) also confirm those findings using financial statements of publicly traded companies in 74 countries. They report an average[15] increase in markups by 39% for 33 advanced economies over 1980-2016. The average markups, however, have remained relatively flat for 41 emerging economies in the data set.

Weche & Wambach (2018) also used the large ORBIS database capturing over 3.6 million firm-year observations to uncover the trends in markups in EU members between 2007-2015. They estimated considerably higher markup figures than those reported in the literature; reaching as high as 3.61 in 2007 and 2014 for sales-weighted averages, with an unweighted mean of 2.31 and median of 1.84 for the whole sample. They observed that markups have fallen until 2012, followed by a surge to former levels onwards.

Akçiğit et al. (2021) used firm-level data across 82 countries to observe trends in market power. They revealed a secular rise in markups over 30% globally between 1980 and 2016. They also show that much of the rise is associated with advanced countries, with a rise of over 35%.

De Loecker & Eeckhout (2022), present a sharper increase for the same period above. They observe that mean markup was 1.6 in 2016 globally, which is almost 45% greater than what had been in 1980, 1.1. They confirm the general finding that the increase is more evident for advanced countries. They also show that average markups in Türkiye has seen a 0.32 point decrease between the years 1980-2016. Their markup estimate of 1.16 is, by the way, the same with what is estimated in this study, which I will show in the next chapter.

There are also myriad other studies examined the markups either for group of countries or country-specific. For instance, Monopolkomission (2018) for Germany, De Loecker et. al. (2018) for Belgium, Nishioka & Tanaka (2019) for Japan, Bauer & Boussard (2019) for France, Menon Economics (2019) for Norway, CMA (2020) for UK and Mondolo (2021) for Italy.

[15] GDP-weighted averages.

Studies focusing on performance indicators of firms and industries in Turkish economy mainly relies on several profit metrics rather than markups. However, there are some exceptions. Taymaz & Yılmaz (2015) estimated markups for Turkish manufacturing industry for 1990-2000 period and showed that the markups had increased until 1994, but declined after the Customs Union between EU and Türkiye entered into force, the year 1995. Their estimates using plant-level data for 23 3-digit SIC industries yield markups higher than 2.

Ünveren & Sunal (2015) examined the drivers of the low labor share in Türkiye for the time horizon between 1983-2010. They concluded that the main reason was the high level of markups, which they estimated an average of 1.7 using aggregated PWT[16] data set.

Akçiğit et al. (2020) computed markups by first subtracting the sum of material input and labor costs from sales, than dividing profits to this value. This calculation has done using firm-level balance sheets for Turkish manufacturing industry, covering 2006-2016. They found that markups have increased after 2012, which was mainly driven by large firms.

Yılmaz & Kaplan (2022), using firm level data for the years through 2005-2015, examined how markups have changed in manufacturing sector in Türkiye and found that it is mainly the large firms, which determine the course of markups, confirming the result in Akçiğit et al. (2020).

As I explained above, main advantage of markup arises from the fact that it is a direct metric for market power. It has well established theoretical grounds so that it may provide good insights on the intensity of and changes in competition (CMA, 2020, p. 38). In addition, since it can be computed on firm-level, it allows a wide range of comparisons, such as within and across markets, industries or countries, without the need to define a relevant market (Monopolkommission, 2018, para. 390).

[16] Penn World Table

However, a researcher has to consider that, conditions of perfect competition is rather exceptional, such that in real industries firms usually enjoy market power of some degree (Davies and Garces, 2010, 48), stemming from, for instance, market imperfections or product differentiation (Monopolkommission, 2018, para. 390). Therefore, attention should be given to observed trends rather than absolute levels (CMA, 2020, p. 45). In addition, it should de be noted that, in the long run firms have to recoup their short run fixed costs too, to remain in business (IMF, 2019, p. 58). In this sense, a rise in markups could be the result of increasing fixed costs, rather than strengthening of market power. Hence, the literature also relies on different metrics, such as profits, to check if they present consistent results (CMA, 2020, p. 38, 39).

1.3.2. Profits

In competitive markets, firms are expected to operate on "*normal*" level of profits. This usually refers the profit levels, which firms need to validate preserving the employed capital. Thus, profits constantly higher than these levels enjoyed by a large number of firms could be an indication of competitive issues within markets (CMA, 2020, p. 39; OECD, 2021, p. 22). Accordingly, increasing profits could be a sign of lessening competitive intensity, while decreasing for the opposite (CMA, 2020, p. 40).

Various metrics of profitability proposed and used in the literature, most of which rely on accounting data. A prominent one is the return on capital employed (ROCE). ROCE associates profits a firm makes with the capital it uses. It is defined as follows (OECD, 2021, p. 22):

$$ROCE = \frac{Earnings\ Before\ Interest\ and\ Taxes\ (EBIT)}{Total\ Assets - Curre \quad Liabilities} \tag{9}$$

Several measures based on return on sales (ROS) are also in use. These are ratios that express selected return figures of a firm divided by its sales. For instance, EBIT margin, which is also widely used, is the fraction of EBIT in the total revenue. This is a standard metric to quantify operating profits. Likewise, net profit margin is the ratio of net profits to total revenue (OECD, 2021, p. 22).

There is also a long list of other ratios used to measure firms' performance in terms of profits, which are taken as indicators of market power. For instance, CEA (2016) rely on Return on Invested Capital (ROIC) to show that, this measure of profit has increasingly been captured by firms in the top 90th percentile.

Gutiérrez & Philippon (2018) compared the trends of profitability in the US and EU by using gross and net operating surplus margins. They show that these margins for US firms have increased significantly starting with 2000s, while remaining relatively flat for EU.

De Loecker et. al. (2020) used dividends and market value as proxies of profits. They show that both indicators have followed a close path with that of markups in the US economy between 1950 to 2014.

Diez et al. (2019) also report that dividends to sales ratio is strongly and positively associated with markups, in their comprehensive study covering 74 economies. Their results indicate that a 1.3% increase in the sad ratio is related with a 1% increase in markups.

CMA (2020) calculated ROCE and EBIT margins of large firms as metrics of profitability for the UK economy. The study shows an increase in EBIT for the firms at 90th percentile, between 2008 and 2018. The analysis of ROCE figures, however, yields a moderate downward trend for the same period.

Mennon Economics (2019) used operating margin and EBITDA[17] margin to analyze the trends in profitability in Norway, with a firm level data set covering 1992-2018. Their analysis revealed that, profitability indicators for the Norwegian

[17] EBITDA is calculated by simply adding depreciation and amortization to EBIT.

economy have remained quite stable through 2000s, even if markups has seen a 8 percentage point increase in the same time span.

Güven and Yeni (2013) computed price-cost margins[18] using aggregated data for 72 NACE 4-digit Turkish manufacturing industries, covering the 1985-2001 period. They provide evidence of a positive relation with concentration and profitability in Türkiye.

Akçiğit et al. (2020) rely on profit share to assess the development of profits in Turkish manufacturing industry. This metric, as they define, refers the ratio of profit to sales and change in stocks. Using this indicator, they find that the profit rates have increased over the years 2012-2015, along with an increase in concentration and markups.

Bektemur (2022) defines profitability as the ratio of the remainder of net sales after subtracting Cost of Goods Sold (COGS) divided by net sales. He used a firm level data for 567 4-digit industries covering the years between 2006-2020, and found that average profits have increased in 297 of those industries, while they have fallen for the remaining 270. He reports that most of the industries operate with an average profit between 0,18 – 0.25, i.e. 18% and 25%. He also observed that profitability is over 60% in some 2% of all 4–digit industries.

As can be seen from the literature summarized above, there is a wide range of different profitability measures, which may yield different results. In addition, observed profitability, for instance relatively low profits might be the consequence of inefficiencies, rather than stiff competition (OECD, 2021, p. 22). Therefore, as with the markups, priority should be given to observe the trends not just the levels. As Shapiro (2018) suggests:

> *"some caution is appropriate when looking at economy-wide data on profits. However, the disconnect between accounting profits and economic profits may matter less when looking at changes in profits over time than when looking at the level of profits, and when looking at a large number of firms"*. (p. 732)

[18] They defined this measure as the ratio of gross margins divided by total revenue.

This way, profit measures could be valuable indicators for changes in the intensity of competition and market power (Shapiro, 2018, p. 732; OECD, 2021, p. 23-24; CMA, 2020; p. 40).

1.4. OTHER INDICATORS

There are myriad other indicators proposed and used by competition authorities around the world and industrial organization researchers. Below I provide a non-restrictive list of those indicators, each of which focus different aspects of competition:

- Entry (and exit) barriers, such as sunk costs, economies of scale and regulatory barriers,
- Price,
- Panzar-Rosse model (the H-statistic),
- The Boone indicator,
- Metrics on productivity, such as labor productivity or total factor productivity
- Innovation

Introducing all of these measures above in detail is, however, well beyond the scope of this study. I refer the reader to OECD (2021) for a detailed overview of these indicators.

CHAPTER 2: EVOLUTION OF MARKUPS IN TÜRKİYE

2.1. EMPIRICAL FRAMEWORK AND DATA

2.1.1. Empirical Framework

As the vast literature suggests, markup is a good proxy to measure the extent of market power. However, it is not trivial to measure markups, since researcher cannot observe markups directly. This arises from two facts, as we have discussed earlier. First, prices are not usually readily available for a large range of products; and second, even if a researcher had prices, marginal costs remain unobservable. (Cavalleri et al., 2019, p. 6). Nevertheless, a number of methods have proposed in the literature to estimate markups. (OECD, 2021, p. 21) These methods can be divided in to three main approaches; the accounting approach, the demand approach and the production approach. The later includes production function approach and the cost approach.

The accounting approach mainly relies on profit margins, which are directly observable such as from firms' financial statements (De Loecker et al. 2020, p. 568). Recall that we defined markup as, $\mu = P/C$ in the Equation (7). If we multiply both numerator and denominator by total output (Q) we get;

$$\mu = \frac{P}{C} = \frac{PQ}{CQ} \tag{10}$$

where the upper part of the fraction is the revenue, or sales in income statements, and the lower part refers the incremental costs of production, which assumed to be directly observable in the data (De Loecker et al. 2020, p. 569).

This appears to be a simple way to recover the markups. However, there are several issues with the approach. For once, this method implicitly assumes that average and marginal costs of production are equal. This could only hold if there are no fixed costs. Another implicit assumption of the approach is the existence

of perfect substitution between production factors. Both of these assumptions are quite strong and not realistic (De Loecker et al. 2020, p. 568-569).

The demand-side approach rests on deriving markups from demand data. This is a well-established approach, such as the works of Berry et al. (1995), (2004), known for producing reliable markup estimates, (Cavalleri et el., 2019, p. 6; De Loecker et al. 2020, p. 568). The main idea relies on estimation of price elasticities of demand, then recovering markups through the first-order-conditions of profit maximization. However, this methodology is also not without drawbacks, especially for studies aiming to observe economy-wide trends and perform comparisons (CMA, 2020, p. 43).

First, implementation of this approach requires imposing a particular demand system to capture the nature of competition, which might not be the best fit for a wide range of products and industries. The other major shortcoming arises from data requirements. It is highly unlikely, if not impossible, to find product-level information on prices and quantities across a wide range of industries for long time spans (De Loecker et al. 2020, p. 568).[19] Therefore, demand approach is only suitable for shorter time periods and for limited industries which can provide the data required (Cavalleri et el., 2019, p. 6).

This brings us to the third approach, the production approach, which is also chosen for this thesis. This method -which build on Hall's (1988) methodology to recover markups from aggregate data, and De Loecker & Warzynski (2012) who further developed the approach for firm-level data- relies on the assumption that firms choose the optimal bundle of variable inputs to minimize their costs (De Loecker et al. 2020, p. 568).

Main advantages of this approach than the demand approach are it requires considerably less data and assumptions, such as assumptions of a specific demand system and how firms compete. In addition, it is flexible enough to

[19] Finding valid instruments for a large range of products is another major concern when performing demand estimation. For an overview of demand estimation methodologies, see Berry & Haile (2021).

estimate markups for a broad variety of firms and industries, for longer time horizons (Cavalleri et el., 2019, p. 6). Accounting data, which is based on firms' financial statements and which, generally available for many industries and economies, provides most of the information needed. These are mainly firm-level revenue figures and input expenditures (De Loecker et al. 2020, p. 564, 568).

Thanks to these properties, the production approach have become most widely used methodology to measure markups in the literature, lately. Following De Loecker et al. (2020, p. 570-572), foundations of this approach can be shown as follows:

We have N firms, $i = 1, ..., N$, in the economy, which are heterogeneous with regards to productivity ρ_{it} and production technology Q_{it}. The firm i minimizes the cost of production in each year t, given the production function:

$$Q_{it} = Q_{it}(\rho_{it}, V_{it}, K_{it}) \tag{11}$$

where V_{it} is a bundle of variable inputs (such as labor, materials and energy) and K_{it} is the capital. The Lagrangian function for the respective firm's cost minimization problem is:

$$\mathcal{L}(V_{it}, K_{it}, \lambda_{it}) = P_{it}^{V} V_{it} + r_{it} K_{it} + F_{it} - \lambda_{it}(Q(.) - \bar{Q}_{it}) \tag{12}$$

where λ is the Lagrange multiplier, P^{V} is the price of the variable input, r is the user cost of capital, F_{it} is the fixed cost, $Q(.)$ is the specified technology in (11) and $\bar{Q}$ is a scalar (De Loecker et al., 2020, p. 570).

Assuming input prices are given to firm, the FOC with respect to the variable input V is:

$$\frac{\partial \mathcal{L}_{it}}{\partial V_{it}} = P_{it}^{V} - \lambda_{it} \frac{\partial Q(.)}{\partial V_{it}} = 0 \tag{13}$$

In the above equation, the Lagrange multiplier λ directly corresponds to the marginal cost. If we multiply all terms by $\frac{V_{it}}{Q_{it}}$ and rearrange the equation, we obtain the expression below for the output elasticity of input V:

$$\theta_{it}^{V} \equiv \frac{\partial Q(.)}{\partial V_{it}} \frac{V_{it}}{Q_{it}} = \frac{1}{\lambda_{it}} \frac{P_{it}^{V} V_{it}}{Q_{it}} \tag{14}$$

Since $\mu = \frac{P}{\lambda}$, where P is the output price, De Loecker et al. (2020, p. 571) provides a simple expression for the markup:

$$\mu_{it} = \theta_{it}^{V} \frac{P_{it} Q_{it}}{P_{it}^{V} V_{it}} \tag{15}$$

In the equation, $P_{it}Q_{it}$ is the revenue, $P_{it}^{V}V_{it}$ is the cost of a selected bundle of variable inputs, and thus $\frac{P_{it}Q_{it}}{P_{it}^{V}V_{it}}$ is the inverse of revenue share of this bundle.

Note that, this expression does not depend on any specific conduct or demand system (De Loecker et al., 2020, p. 571). In addition, revenue is readily available in accounting data and the same mostly applies to cost of variable inputs, which could be a combination of any variable input[20] of production.

However, we still need the output elasticity of input θ_{it}^{V} , i.e. the variation in output resulting from a change in the quantity of selected input (CMA, 2020, p. 44) , to estimate markups. There are two different approaches to obtain output elasticities; the production function approach and the cost [share] approach.

The production approach involves econometric estimation of output elasticities build on a particular production function, such as Cobb-Douglas production function (Nishioka & Tanaka, 2019, p. 1; CMA, 2020, Appendix C., p. 47). De

[20] In theory, any choice of variable inputs should bring same estimates for markups (CMA, 2020, p. 44).

Loecker et al. (2020) and many studies that reviewed in the previous chapter mainly rely on this approach to obtain output elasticities.

Nevertheless, there are some criticism in the literature on the use of production function approach. Bond et al. (2020), in particular, suggest that in the absence of data on output quantities, what estimated and used in this approach is the *revenue* elasticity rather than the elasticity of output. They argue that when the output prices are correlated with input choice, than the elasticity estimates would be downwardly biased, or worse, may even not contain any useful information for markup. They also question the validity of instruments used in the literature when estimating production functions, which would result in inconsistent output elasticity estimates. Raval (2023) provides evidence that, markup estimates using different variable inputs through production function approach substantially differ.

An alternative for the production function approach is the cost approach, which uses cost share of a variable input in total variable costs as an approximation of output elasticity. The two approaches are, in theory, consistent. However, they differ in empirical strategy to obtain output elasticities (Nishioka & Tanaka, 2019, p. 1). The main advantage of cost approach is that, it does not require estimation of production functions. In addition, the only information needed is costs, not the quantities. Hence, critiques mentioned above do not apply (CMA, 2020, Appendix C., p. 48-49). It relies on calculation of the firm's total variable cost and computing the selected input or bundle of inputs' share in this cost.

Consider a firm, which uses capital and a combination of variable inputs, such as labor and materials, for production. Under the assumptions of constant returns to scale, and that firms minimize their costs through optimizing the use of flexible inputs of production each year, the output elasticity θ_{it}^{V} can be expressed as follows (Nishioka & Tanaka, 2019, p. 5; CMA, 2020, Appendix C., p. 48-49):

$$\theta_{it}^{V} = \propto_{it}^{V} = \frac{P_{it}^{V} V_{it}}{P_{it}^{V} V_{it} + r_t K_{it}} \tag{16}$$

where $\propto_{it}^{V}$ is the cost share of variable input for firm i in year t, and r_t is the user cost of capital:

$$\mathrm{r_t} = (I_t - \pi_t) + \Delta \tag{17}$$

where I_t is a proxy for average borrowing costs for the economy (such as central bank policy interest rate), π_t is an indicator of increase in general price level (such as inflation indexes or GDP deflator) and Δ is the depreciaton rate.

This approach implicitly assume that first order conditions of cost minimization hold for all firms. However, this assumption might not met for all firms due to adjustment frictions in variable costs. Nevertheless, it should hold on average. In this aspect, the literature propose using mean (such as CMA (2020) and Meier & Reinelt (2020)) or median (such as De Loecker et al. (2020)[21]) of the distribution of cost shares for broad sectors for each year, such as 2-digit industry-year pairs.[22] In addition, Nishioka & Tanaka (2019) suggest that this methodology might be a better fit for medium to long run, rather than shorter time horizons.

Considering both approaches, and advantages of cost share approach particularly in terms of simplicity in implementation and results of studies such as Nishioka & Tanaka (2019) and Raval (2022) providing evidence that this approach produces consistent results, I choose the cost approach for obtaining output elasticities in this study. I follow De Loecker et al. (2020, p. 613) and use the median of the distribution for each year within a NACE 2-digit industry as the measure for the output elasticity. To compute the user cost of capital, r_t, I rely on yearly average nominal interest rates of banks for commercial loans for the I_t and producers price indexes (PPI) for the π_t. I set the depreciation rate, Δ, to 0.10.

[21] The authors used cost share approach as a robustness check for their markup estimations based on production function estimations.
[22] This means assuming that, firms operating in the same 2-digit industry-year have a common elasticity of output (Meier & Reinelt, 2020, p. 9).

2.1.2. Data

The main data to conduct this research is obtained from Ministry of Industry and Technology's Entrepreneur Information System (EIS). The EIS combines comprehensive firm-level datasets that collected and provided by several public agencies such as Revenue Administration, TURKSTAT, Social Security Institution and Small and Medium Sized Enterprises Development Organization of Türkiye.

The data within the EIS includes but not limited to firm registries, firm scale classifications, industry classifications (up to NACE 4-digit), detailed balance sheets and income statements, employee numbers and etc.. It allows a researcher to match data on different types of economic activities by firms across datasets. Leaving the finance sector aside, EIS covers all remaining industries and population of firms in the Turkish economy. This is the only source a researcher can get detailed and wide enough data that are necessary for the estimations to make for a study of this kind.

The raw EIS micro data covers over 17 million observations for the years between 2006 and 2021. After some data cleaning[23], such as dropping all firms that reported a net sales value less than the yearly minimum wage; the final data set still consist of some 11.2 million observations corresponding a yearly average of over 700 thousand firms a year, operating under more than 570 NACE 4-digit industries. I also use relevant industry level and general producers price indexes published by TURKSTAT, and nominal interest rates and exchange rates published by CBRT.

In this study, I use 'Net Sales' data for the revenue and 'Cost of Sales' (COS) for the cost of variable input bundle in firms' financial statements, to calculate firm-year specific revenue shares as in the Equation (15). To compute output elasticities in Equation (16), I follow CMA (2020) and use 'Fixed Assets' for capital in balance sheets. To calculate profit margins, I rely on the ratio of EBIT (which

[23] See Appendix 1. for data cleaning strategy employed.

corresponds to ‘Operational Profits’) to ‘Net Sales’ in income statements. EBIT in income statements. I also utilized information on industry classifications that firms operate and firm scale classifications. HHIs are also based on firms’ share of ‘Net Sales’ within each NACE 4-digit industries. Table 2 below provides a summary of the main data utilized:

Table 2: Summary of dataset and key variables

Number of Observations (2006-2021)			**Key Variables**
Year	**Raw dataset**	**After cleaning**	
2006	693,813	456,772	• Net sales • Cost of sales • Fixed assets • Markups • Profit [Operational Profit (EBIT)] Margins • HHI • NACE 2-4 digit industry classifications • Firm scale classifications
2007	786,849	517,973	
2008	834,280	545,375	
2009	861,446	553,831	
2010	888,565	566,737	
2011	927,946	596,703	
2012	966,660	636,893	
2013	1,029,644	663,373	
2014	1,087,341	703,971	
2015	1,147,855	748,703	
2016	1,195,613	779,512	
2017	1,263,006	812,545	
2018	1,342,783	872,291	
2019	1,370,968	891,586	
2020	1,503,365	915,216	
2021	1,477,778	974,706	
Total	17,377,912	11,236,187	

2.2. MARKUPS IN TÜRKİYE

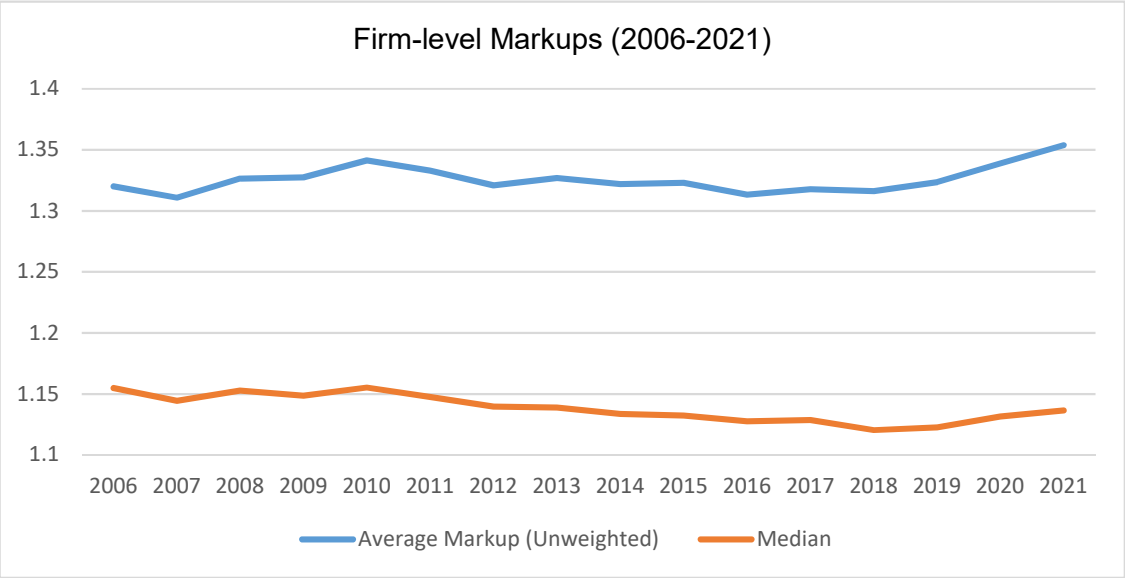
This section presents the main findings on the trends in markups, which this study relies on as the central indicator of market power in the Turkish economy. Since the markups are estimated on a firm-year basis, I will first show the evolution of firm-level markups. I will then compare and discuss the course of aggregated markups for the economy and different levels of industry classifications. I also provide average markups for different firm sizes.

Table 3 shows the summary statistics of markups. We see that, average firm-level markup has remained fairly stable around long term average of 1.32 between 2006-2018, which followed by a slight increase to 1.35 for the next three years. Median markup has even seen a small decrease of 0.02 points over the same period. Figure 2 plots these trends in mean and median firm-level markups.

Table 3: Summary statistics of firm-level markups (2006-2021)

Year	N	Mean	Median	Sd
2006	456,772	1.3202	1.1547	0.6645
2007	517,973	1.3108	1.1443	0.6793
2008	545,375	1.3265	1.1529	0.7073
2009	553,831	1.3274	1.1485	0.7275
2010	566,737	1.3414	1.1553	0.7556
2011	596,703	1.3330	1.1474	0.7548
2012	636,893	1.3207	1.1396	0.7437
2013	663,373	1.3268	1.1389	0.7734
2014	703,971	1.3218	1.1335	0.7770
2015	748,703	1.3230	1.1324	0.7895
2016	779,512	1.3132	1.1276	0.7690
2017	812,545	1.3178	1.1285	0.7839
2018	872,291	1.3161	1.1204	0.8202
2019	891,586	1.3235	1.1226	0.8461
2020	915,216	1.3388	1.1315	0.8650
2021	974,706	1.3538	1.1365	0.9024
Total	11,236,187	1.3266	1.1369	0.7879

Figure 2: Evolution of firm-level markups (2006-2021)



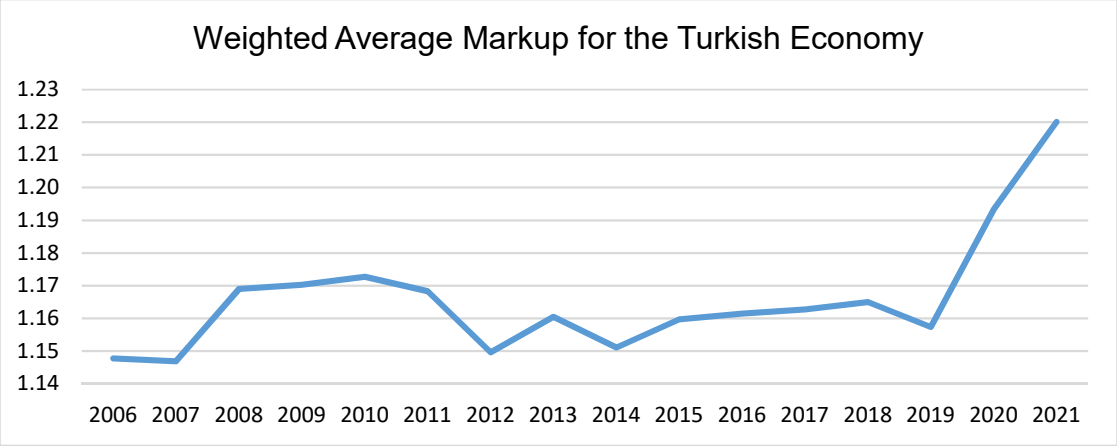
When it comes to aggregate markups, which are the weighted averages of markups for sectors and across the economy calculated as below, however, the main picture substantially changes:

$$\mu_t = \sum_i S_{it}\mu_{it} \tag{18}$$

where S_{it} is the share of sales of firm i in either the industry or economy in year t, which is used as weight[24].

Figure 3 shows the evolution of weighted average markups for the Turkish economy for the time period covered by this study. Markups were slightly under 1.15 in 2006 and 2007. This was followed by a small increase starting with 2008, the year of global financial crisis, i.e. The Great Recession. The markups have fallen back to 2006 levels in 2012, and remained somewhat stable until 2019. However, there have been a sharp rise in 2020 and 2021, the years the world has hit with the global Covid-19 pandemic. By 2021, the markups increased to 1.22, meaning of an average markup of 22% over marginal cost.

Figure 3: Evolution of aggregated markups for the Turkish economy (2006-2021)



[24] Edmond et al.(2018) argues that when measuring aggregate markups, cost-weighted averages should be used rather than sales-weighted. They claim *"revenue-weighted average of firm-level markups, as used in the existing literature, overstates the rise in the overall level of market power"*. Nevertheless, I preferred sales-weighted averages as it is more common in the literature.

Figure 4: Evolution of aggregated markups by NACE classification levels[25] (2006-2021)

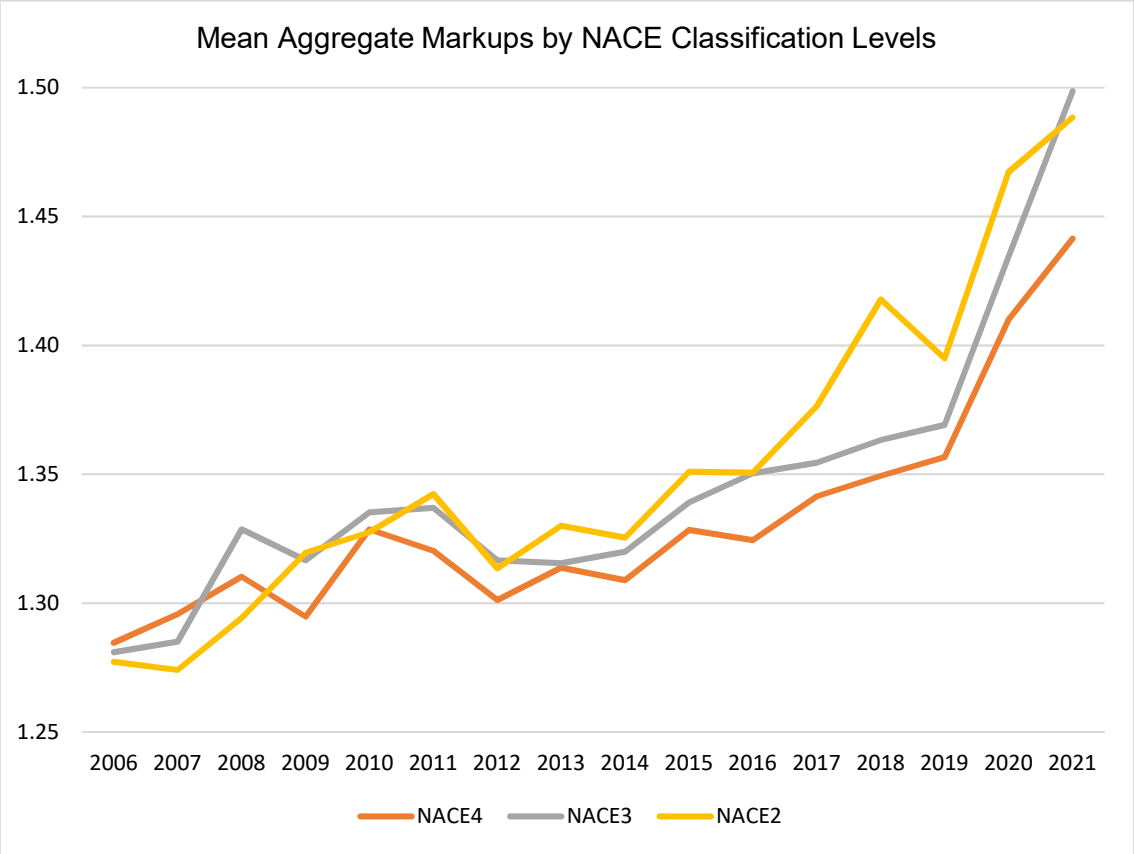


Figure 4 presents a much more striking picture. For an average NACE 4-digit industry, aggregate markups have increased from 1.28 in 2006 to 1.44 in 2021. This means a 44% markup over incremental costs. When we aggregate markups for 3 and 2-digit level, the increases are more pronounced, from 1.28 to 1.50 and 1.49 respectively, between 2006-2021. While the weighted average markup growth for the economy over the 2006-2021 period is 6.3%, it is 12,2% for the average NACE 4-digit industry, 17% for 3-digits and 16.5% for 2-digit level. The rise in sectoral markups are particularly evident after 2014. Figure 5 reports the growth of markups by different aggregation levels and Table 4 provides a comparison of the average aggregated markups calculated for each year. A more detailed presentation of summary statistics of aggregate markups can be found in Appendix 2.

[25] NACE2, NACE3 and NACE4 represent NACE 2, 3 and 4-digit industries respectively.

Figure 5: Growth in average markups by aggregation levels (2006-2021)

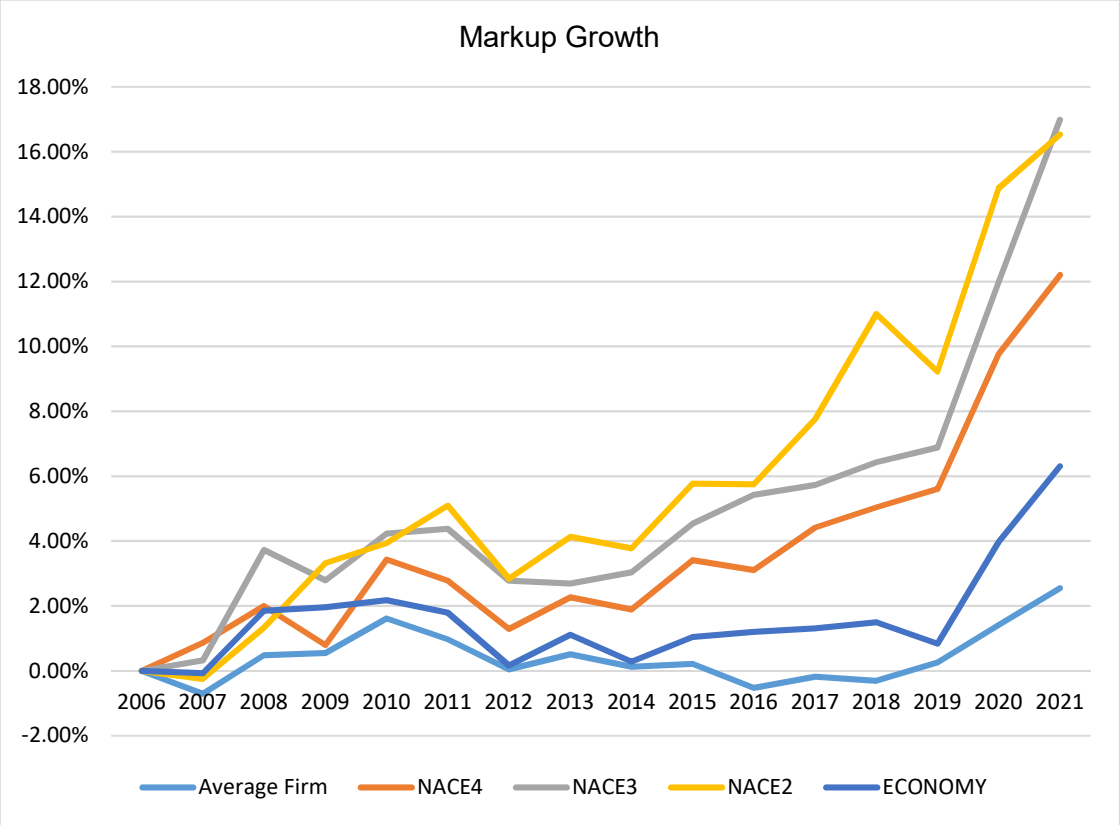


Table 4: Summary of average markups by aggregation levels (2006-2021)

Year	NACE4	NACE3	NACE2	ECONOMY
2006	1.28	1.28	1.28	1.15
2007	1.30	1.29	1.27	1.15
2008	1.31	1.33	1.29	1.17
2009	1.29	1.32	1.32	1.17
2010	1.33	1.34	1.33	1.17
2011	1.32	1.34	1.34	1.17
2012	1.30	1.32	1.31	1.15
2013	1.31	1.32	1.33	1.16
2014	1.31	1.32	1.33	1.15
2015	1.33	1.34	1.35	1.16
2016	1.32	1.35	1.35	1.16
2017	1.34	1.35	1.38	1.16
2018	1.35	1.36	1.42	1.16
2019	1.36	1.37	1.40	1.16
2020	1.41	1.43	1.47	1.19
2021	1.44	1.50	1.49	1.22

To better understand the underlying trends in the evolution of market power, we now turn our focus to distribution of markups by firms scale. There are four types of firms in terms of scale: ‘micro’, ‘small’, ‘medium’ and ‘large’. This classification of firms by scale is based on official definitions, of which depends on employee numbers and revenue. Leaving the revenue part aside, micro firms are those with less than 9 employees in a year. Firms with yearly employees between 10-49 defined as small, 50-249 as medium, and those with more than 250 yearly employees are defined as large. The information on scale classifications of each firm is directly extracted from the EIS dataset. Figure 6 reports the trends in average markups (unweighted) by firm size. Detailed summary statistics of average markups by firm scale classifications is presented in Appendix 2.

Figure 6: Evolution of average markups by firm scale classifications (2006-2021)

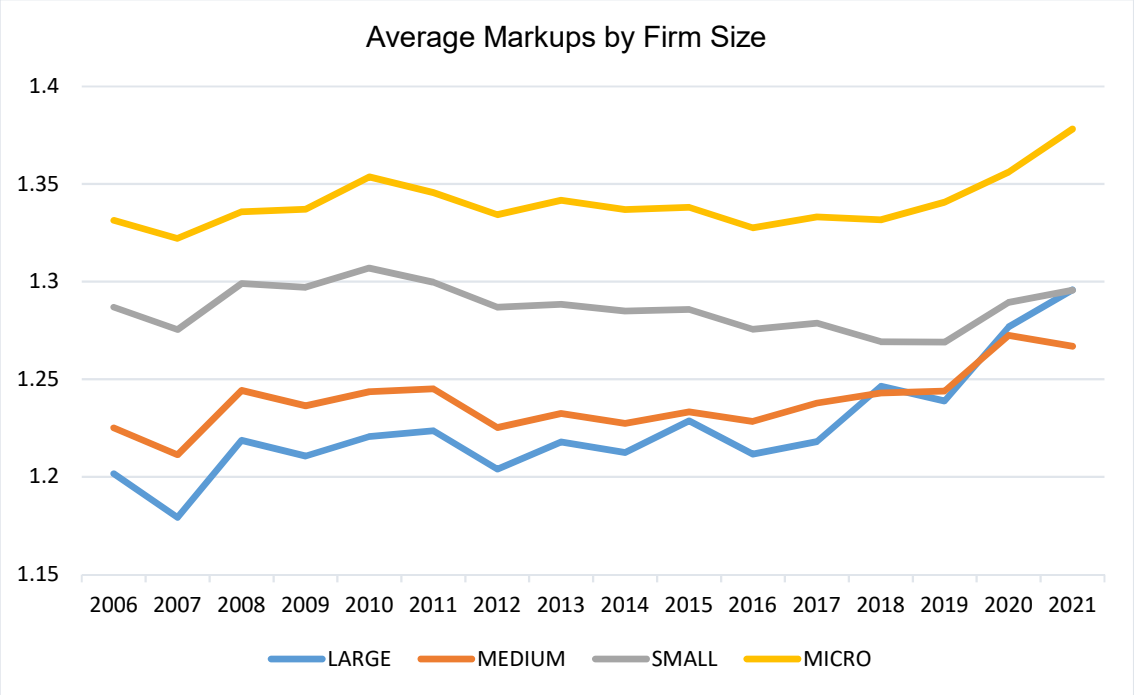


Figure 6 reveals that, interestingly, markups are on average greater for micro and small firms than medium and large ones. This is in conformity with De Loecker & Eeckhout (2017), who also reported a tendency of larger markups in smaller firms, though this is not the case when markups decomposed at industry level. IMF (2019) also found in their study covering 27 countries that, most of high-markup firms are small.

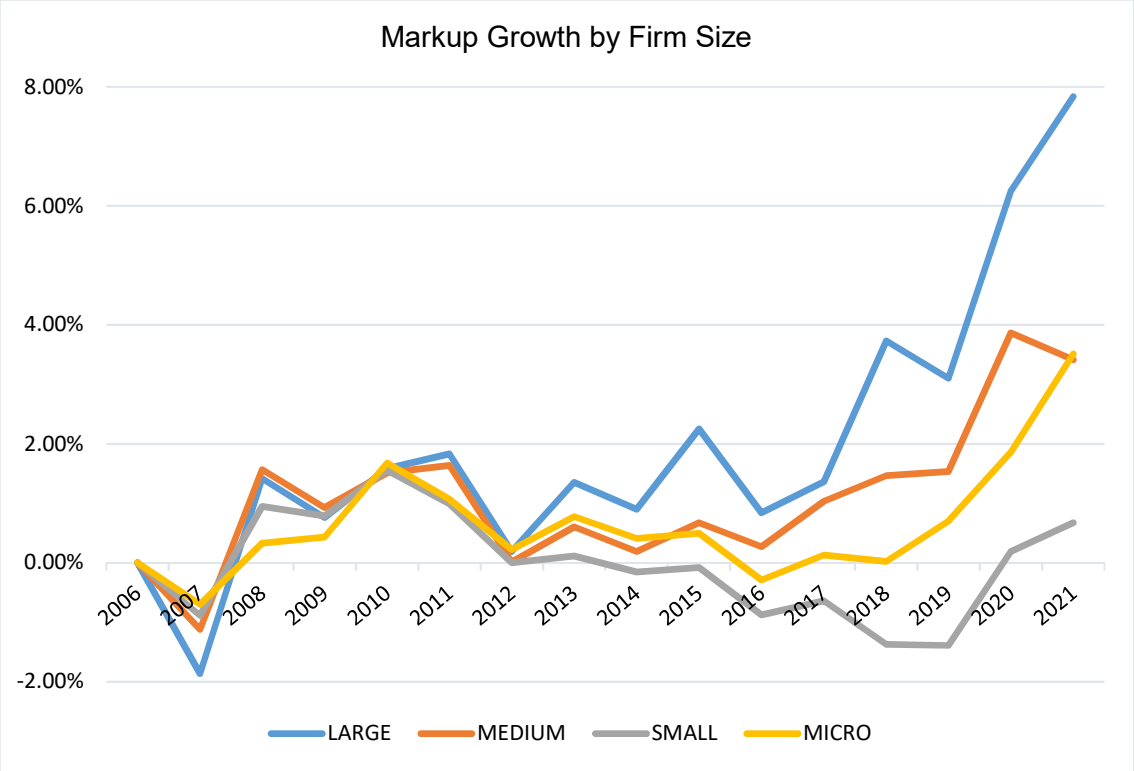
There may be several explanations for this observation. First, the smaller firms might be simply performing better as suggested by IMF (2019). Another possible explanation could be the informal economy, for instance informal/unregistered employment, which in turn might reflect those firms' official cost figures lower than actual costs of production, such as labor costs.[26] In addition, concerns on "replacement costs" stemming from expectations on higher levels of inflation in the future could be another reason. It is likely that smaller firms, in particular, might not set their prices based on just current inventory costs but also considering the possible costs they would face with, when they will have to renew their stocks. One would expect such an effect to be greater, the higher the inflationary expectations. However, this effect should not be significant for longer time periods. Nevertheless, underlying reasons for small firms to have larger markups could be an interesting topic for a future study.

Turning back to the Figure 6, we see that, although markups of larger firms are lower than the smaller firms in levels, they have been on rise since 2012. This finding is consistent with Akçiğit et al. (2020), who also report an increase in markups and profits for large firms beginning with 2012[27]. While there have been approximately 0.04 point rise in both micro and medium sized firms, and almost no change for small sized firms, the markups of large firms have increased from 1.20 in 2006 to 1.29 in 2021, revealing a 7.8% growth. The increase in the markups of this group is particularly evident after 2017. This is a clear evidence that the overall rise in aggregate markups across the Turkish economy has mainly driven by the rise in markups of large firms. This conclusion is also in line with the results of Akçiğit et al. (2020) and Yılmaz & Kaplan (2022). Figure 7 presents the growth in average markups by firm scales.

[26] According to TURKSTAT, the ratio of informal employment for 2021 Q4 is 28,7% for Türkiye. "https://data.tuik.gov.tr/Bulten/Index?p=Isgucu-Istatistikleri-IV.-Ceyrek:-Ekim---Aralik,-2021-45643&dil=1#:~:text=Sosyal%20g%C3%BCvenlik%20kurulu%C5%9Funa%20ba%C4%9Fl%C4%B1%20olmadan,%28%2C7%20olarak%20ger%C3%A7ekle%C5%9Fti."

[27] Their definition of 'large firms' covers both 'large' and 'medium' size firms in Figure 6, however results seem to hold despite the difference in definition of large firms in two studies.

Figure 7: Growth of average markups by firm scale classifications (2006-2021)



To summarize this section, I find evidence of a rise in overall markups in the Turkish economy. This rise is more prominent when the markups are aggregated for different levels of NACE classifications, and for the time period between 2012 and 2021. This implies an increase in market power for the Turkish economy, which seems to be driven by the rise of markups and market power of the large firms within the industries.

One possible source of concern with these results is that, the observed increase in markups might not be a reflection of strengthening of market power if, for instance, it is the consequence of firms' needs to compensate their fixed costs and investments which in turn may enhance efficiencies. When this is the case, prices charged over incremental costs of production might not result in an increase in overall profits (Diez et al., 2018, p. 10). Keeping this possible concern in mind, I further evaluate the trends in profitability in the Turkish economy in the following section.

2.3. MARKUPS AND PROFITABILITY

As it is previously discussed, there may be cases that markups fall short to reflect the complete picture on the market power. Rising or high fixed costs could be one particular reason. Therefore, I examine firms' profits to find out if there are similarities with markups in terms of trends and try to reveal if there is evidence of a significant relationship between these two indicators.

The metric I chose to measure profits is the EBIT margin, which is a common metric to quantify operating profits. In Turkish accounting system, EBIT corresponds to 'Operational Profits' in income statements which is the remainder of 'Net Sales' after subtracting 'Cost of Sales' and 'Operational Expenses' such as research and development, marketing and general expenditures.

I present the summary statistics of firm-level profits in Table 5. The table shows that mean profitability for Turkish firms are fairly low and have been decreasing between 2006 and 2019. After a slight increase for the next two years, average profits are still only 1% in 2021. Median firm-level profits are larger than the mean; however, a downward trend also applies for the median for the period analyzed.

Table 5: Summary statistics of firm-level profits (2006-2021)

Year	N	Mean	Median	Sd
2006	456,772	0.0228	0.0388	0.2853
2007	517,973	0.0222	0.0400	0.8665
2008	545,375	0.0189	0.0369	0.2785
2009	553,831	0.0125	0.0350	0.2896
2010	566,737	0.0143	0.0343	0.2882
2011	596,703	0.0123	0.0325	0.3683
2012	636,893	0.0093	0.0308	0.2788
2013	663,373	0.0078	0.0297	0.2989
2014	703,971	0.0073	0.0292	0.3154
2015	748,703	0.0060	0.0287	0.4195
2016	779,512	0.0010	0.0264	0.3576
2017	812,545	0.0079	0.0265	0.2897
2018	872,291	0.0026	0.0236	0.3117
2019	891,586	-0.0025	0.0216	0.2954
2020	915,216	0.0007	0.0208	0.2914
2021	974,706	0.0113	0.0213	0.2897
Total	11,236,187	0.0084	0.0284	0.3585

Nevertheless, as with the markups, aggregate profits[28] tell a whole different story. Figure 8 reports a comparison of the trends in aggregate markups and profits across the economy. The resemblance between two time-series is evident. Weighted average EBIT margin in 2006 was 4.18% in 2006. Following first an increase until 2009 and then a decrease until 2012, profits have started to rise after 2014 and largely kept the upward trend over the studied time span and have reached 6,81% in 2021.

Figure 8: Comparison of trends in aggregated markups and profits for the Turkish economy (2006-2021)

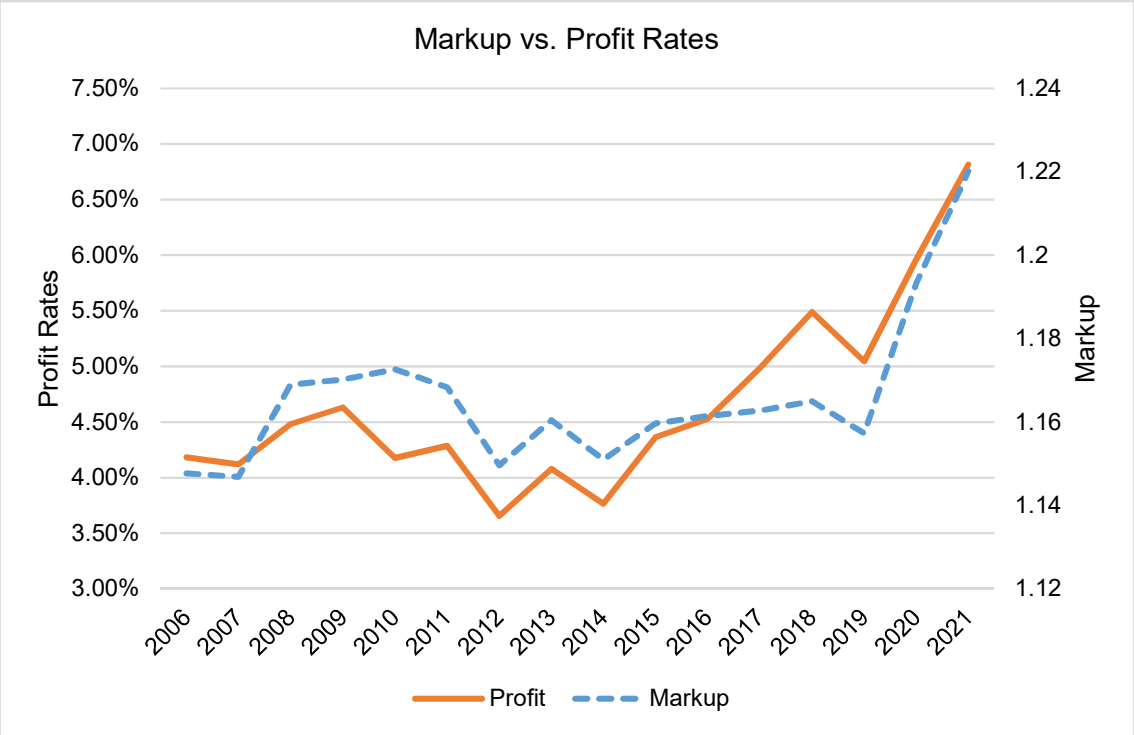


Figure 9 below reports that, profits aggregated in 4-digit NACE industries had an average of 5% in 2006. This average has increased to 8.5% in the year 2021. Aggregated profits for different levels of NACE classification also show a similar pattern. Growth in aggregated profits for the examined period are shown in Figure 10. Table 6 summarizes yearly averages of aggregated EBIT margins. I also provide summary statistics of aggregate profits in detail in Appendix 3.

[28] Aggregate profits are computed in the same fashion with the Equation (18), i.e. using share of sales as weights.

Figure 9: Evolution of aggregated profits by NACE classification levels (2006-2021)

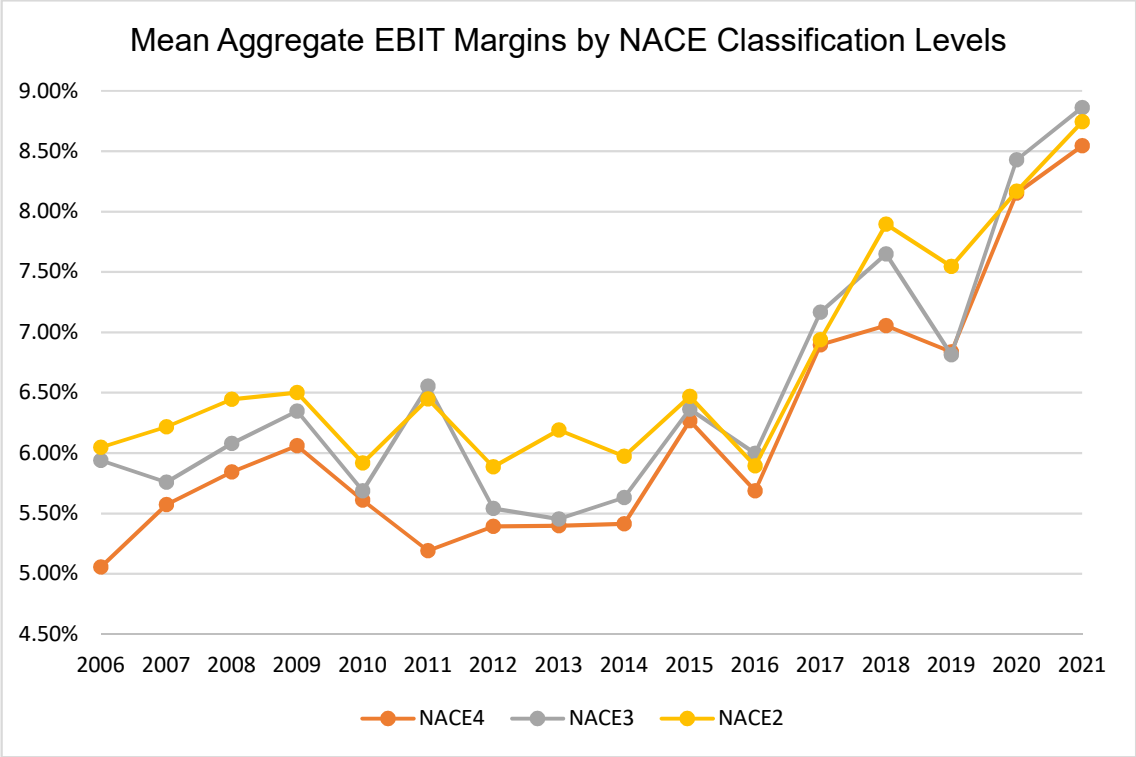


Figure 10: Growth in average profits by aggregation levels (2006-2021)

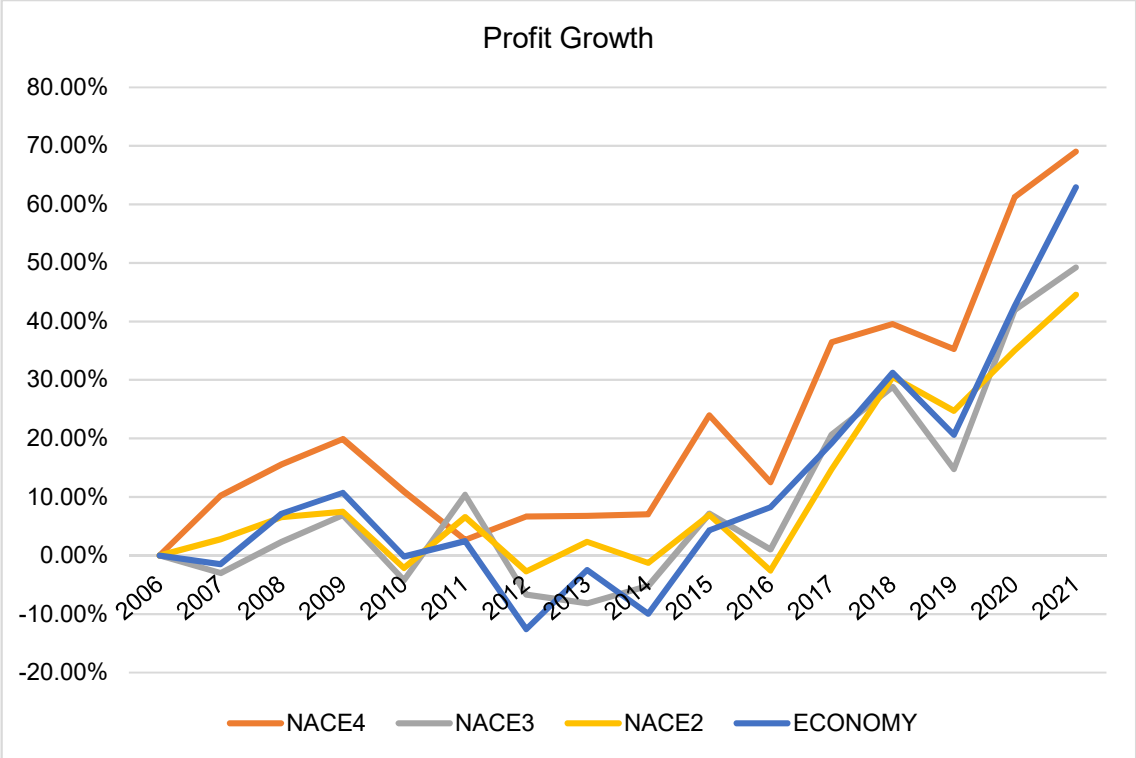


Table 6: Summary of average profits by aggregation levels (2006-2021)

Year	NACE4	NACE3	NACE2	ECONOMY
2006	5.06%	5.94%	6.05%	4.18%
2007	5.57%	5.76%	6.22%	4.12%
2008	5.84%	6.08%	6.45%	4.48%
2009	6.06%	6.35%	6.50%	4.63%
2010	5.61%	5.69%	5.92%	4.18%
2011	5.19%	6.55%	6.45%	4.28%
2012	5.39%	5.54%	5.88%	3.66%
2013	5.40%	5.45%	6.19%	4.08%
2014	5.41%	5.63%	5.97%	3.77%
2015	6.27%	6.36%	6.47%	4.36%
2016	5.69%	6.00%	5.89%	4.53%
2017	6.90%	7.17%	6.94%	4.99%
2018	7.05%	7.65%	7.90%	5.49%
2019	6.84%	6.81%	7.54%	5.04%
2020	8.15%	8.43%	8.17%	5.96%
2021	8.54%	8.86%	8.74%	6.81%

The figures and tables above provide evidence of a positive correlation between markups and profitability. Nevertheless, I further investigate the relation among these two indicators of market power through regression analysis. I run both firm-level and 4-digit industry-level panel fixed-effect regressions and show that there is a strong positive relation between profits and markups. Firm-level panel regressions based on a total of 11.2 million observations for approximately 2 million firms for the period between 2006-2021. Industry level regressions captures 9.2 thousand observations for 598 NACE 4-digit industries for the same period.

The regression results indicates that, on average, a 1% increase in firm-level markups are associated with around a 0.31 percentage point rise in profits. Likewise, industry-level regressions show evidence that, a %1 increase in aggregate industry markups are related with a corresponding 0.23 percentage points increase in industry profits. The results of the regressions are presented in Table 7.

Table 7: Regressions: Effect of markups on profit margins

	Dependent variable: Profit Margin			
	Firm-Level		Industry-Level	
Variable	(I)	(II)	(III)	(IV)
Markup (log)	0.2787***	0.3129***	0.2217***	0.2296***
Year Fixed Effects	X	X	X	X
Firm Fixed Effects		X		
Industry Fixed Effects				X
Constant	-0.0396***	-0.0257***	-0.0008	-0.0021
N	11,236,187	11,236,187	9,240	9,240
R2	0.0525	0.0525	0.1466	0.1465
Number of Groups	1,989,861	1,989,861	598	598

Table Notes:
- *Profit Margin* is the firm level or yearly weighted average EBIT margins for relevant NACE 4-digit industries in percentage points (2006-2021).
- *Markup* is the firm level or yearly weighted average markups for relevant NACE 4-digit industries in logarithmic form (2006-2021).
- SE's are clustered in NACE 4-digit industries
- Legend: * p<.1; ** p<.05; *** p<.01

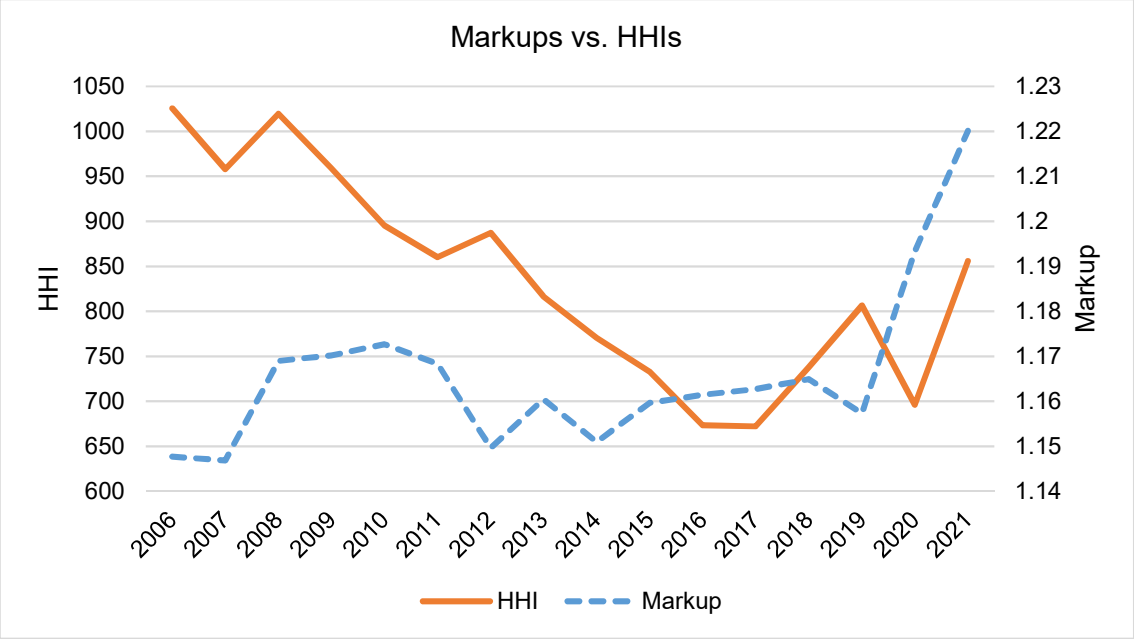
Hence, the analyses in this section provides further evidence that the rise in the markups have not been the result of increasing fixed costs but associated with rising market power.

2.4. MARKUPS AND MARKET CONCENTRATION

We have seen so far that markups, along with profits, have had an upward trend in Türkiye after 2014, indicating an increase in aggregate market power as well. I further examine if the concentration has also followed a similar path, and if it has a relation with markups in the Turkish economy. I first calculated HHIs as the measure of concentration for NACE 4-digit industries. Then I computed the aggregate HHIs for upper levels of NACE classifications and the economy. Weights used for the aggregation is the share of sum of 4-digit industry sales to total sales in the sector or economy in each year.

Figure 11 presents a comparison of trends in aggregate concentration and markups across the economy. A first look does not seem to imply a clear relationship, either positive or negative, between these two measures. It is seen that, the weighted average HHI was slightly over 1000 in 2006 and unlike the markups, there has been a downward trend between 2006 and 2016. After 2017, however, HHI has started to rise from 672 and ended up at 856 in 2021. This is still around 17% lower than what was the HHI in 2006.

Figure 11: Comparison of trends in aggregated markups and HHIs for the Turkish economy (2006-2021)



The HHIs calculated for different NACE classification levels also have decreased over the 2006-2021 period. For instance, mean HHI of NACE 4-digit industries were around 1700 in 2006. After an almost steady decrease for the following years, the HHI has fallen to 1338 in 2021. Figure 12 shows the trends in HHIs for different aggregation levels. Table 8 presents a summary of average HHIs for each year analyzed. Detailed descriptive statistics of HHIs are provided in Appendix 4.

Figure 12: Evolution of concentration in the Turkish economy (2006-2021)

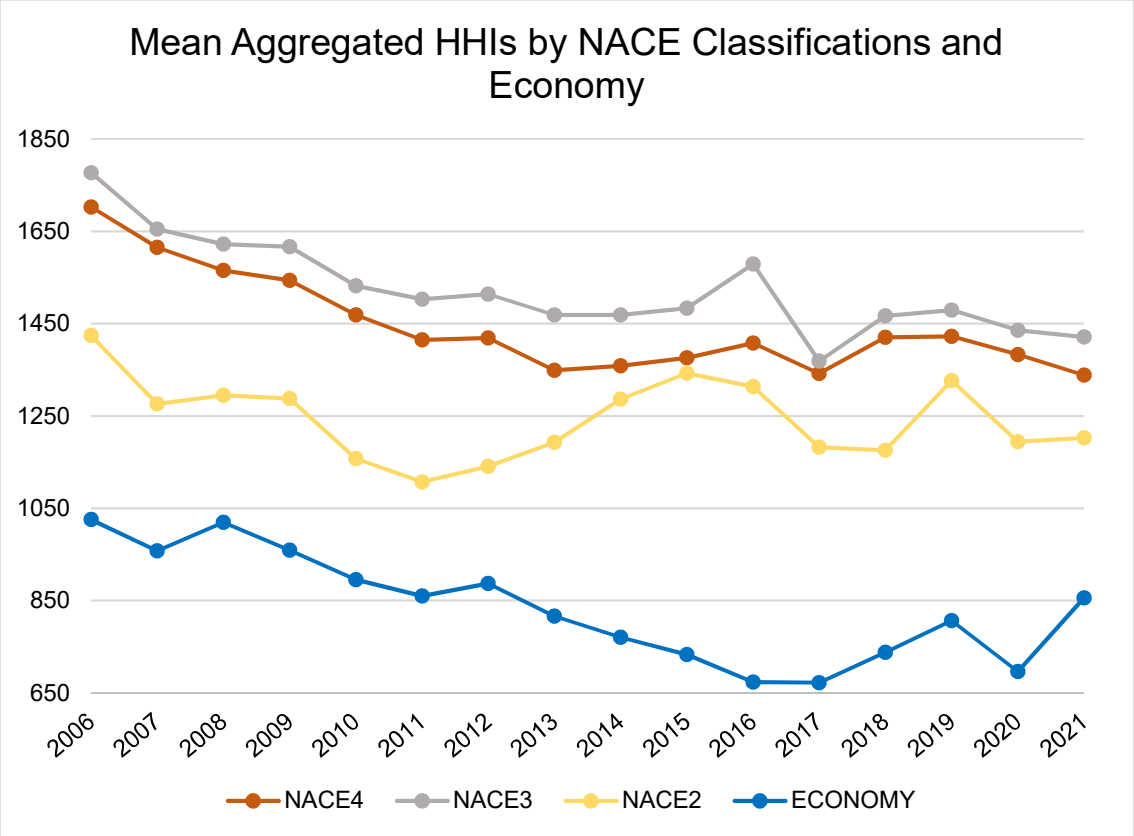


Table 8: Summary of average HHIs by aggregation levels (2006-2021)

Year	NACE4	NACE3	NACE2	ECONOMY
2006	1703	1777	1425	1025
2007	1616	1655	1276	958
2008	1565	1623	1295	1020
2009	1544	1617	1288	959
2010	1469	1532	1158	895
2011	1415	1503	1107	860
2012	1419	1514	1141	887
2013	1349	1469	1193	816
2014	1359	1469	1287	771
2015	1376	1484	1342	733
2016	1408	1579	1314	673
2017	1342	1369	1182	672
2018	1420	1467	1176	738
2019	1422	1479	1327	807
2020	1383	1436	1194	696
2021	1339	1421	1203	856

I further extract top and bottom five 4-digit industries in terms of markups for the whole period of 16 years (on average) and for 2021, to observe if there is a common pattern on the relationship between markups and HHIs for these selected industries. Based on the statistics presented in Table 9, highest markup industries seem to be associated with higher HHIs, on average. Nevertheless, this table is also far from being shown an obvious relation between these two metrics as, for instance, the industry with highest markup in 2021 has a HHI close to two of the bottom five industries, and even lower than one of them.

Table 9: Top and bottom five 4-digit industries by markups

	2006-2021 Average				
	NACE	**Markup**	**HHI**	**EBIT Margin**	**Avr. Num. of Firms**
High	8412	3.09	4106	-0.1%	19
High	9200	2.84	2136	15.6%	688
High	6312	2.71	1588	13.9%	99
High	6100	2.62	4750	29.4%	8
High	2400	2.57	7435	4.0%	252
	Average	**2.77**	**4003**	**12.6%**	**213.16**
Low	6612	0.97	580	-0.1%	816
Low	1270	0.96	3509	-1.4%	13
Low	3522	0.96	1498	3.4%	71
Low	3514	0.90	3887	2.0%	114
Low	3523	0.75	2288	1.3%	12
	Average	**0.91**	**2352**	**1.1%**	**205.20**
	2021				
	NACE	**Markup**	**HHI**	**EBIT Margin**	**Num. Of Firms**
High	6619	6.19	1364	46.4%	142
High	7220	5.39	5718	12.9%	17
High	1820	4.67	2305	28.8%	11
High	2400	4.31	7945	32.1%	522
High	9200	4.31	1608	6.3%	859
	Average	**4.97**	**3788**	**25.3%**	**310.20**
Low	4635	1.03	1152	0.3%	391
Low	3523	1.03	2513	3.3%	12
Low	4648	1.01	1025	0.5%	1198
Low	6612	1.00	785	0.3%	749
Low	3514	0.94	448	-2.5%	154
	Average	**1.00**	**1185**	**0.4%**	**500.80**

As a final exercise, I conduct a regression analysis to uncover a possible relationship between HHIs and markups; namely to see if industry HHIs are among the determinants of markups in Turkish economy. I run panel fixed-effect regressions at 4-digit industry-level, with the markups (in logarithmic form) as the dependent variable. The results of regressions presented in Table 10 show that, coefficients estimated for HHI (log) are not statistically significant. These results suggest that variations in markups in 4-digit Turkish industries are not associated with the variations in HHIs. This supports the findings of graphical analysis and provides further evidence that; markups have risen in Turkish economy notwithstanding an overall decrease in HHIs.

However, the regression results below should be taken with caution, since -as explained in section 1.1 above- NACE 4-digit industries are in general far more broader than actual relevant markets. Thus, a researcher should bear in mind that, a similar analysis for more narrowly defined markets might provide different results.

Table 10: Regressions: Effect of concentration on markups

	Dependent variable: Markup (log)	
Variable	(I)	(II)
HHI (log)	-0.0045	-0.0063
Year Fixed Effects	X	X
Industry Fixed Effects		X
Constant	0.2131***	0.2503***
N	9240	9240
R2	0.0310	0.0316
Number of Groups	598	598

Table Notes:

- *Markup* is the yearly weighted average markups for relevant NACE 4-digit industries in logarithmic form (2006-2021).
- *HHI* is the yearly HHI for relevant NACE 4-digit industries in logarithmic form (2006-2021).
- SE's are clustered in NACE 4-digit industries
- Legend: * p<.1; ** p<.05; *** p<.01

CHAPTER 3: MARKUPS AS A POSSIBLE DRIVER OF INFLATION IN TÜRKIYE

Previous chapter reveals evidence that, despite a general decrease in industry concentrations, market power -as measured by markups (and profits) - in Türkiye has seen a rise since 2014. In this chapter, I investigate if the evolution of market power has had an impact on high inflation rates in the Turkish economy. I first start with reviewing the discussions and findings in the literature on the potential macroeconomic impacts of competition and market power. Then I document results of some recent studies on the effects of competition on inflation, and, on the contrary, the effects of inflation on competition. Finally, I present the empirical strategy followed to investigate the effects of market power on inflation, the data used and the results found. This chapter ends with a brief discussion in the light of the relevant literature and the results obtained in the study.

3.1. MACROECONOMIC IMPLICATIONS OF COMPETITION

3.1.1. Relationship between Market Competition and Macroeconomic Outcomes

First and the most general discussion of macroeconomic implications of competition is, actually, ‘what the relationship between market competition and macroeconomic outcomes is’. As we have discussed in the first chapter, the theory suggests that, the economy in general would benefit from perfect competition where the rival firms compete with each other for customers to choose them (their product).

Considering macroeconomic indicators, competition between firms increases productivity (such as total factor productivity) and contributes to economic growth (OECD, 2014, p. 1) as the rivalry between firms forces them to be more efficient also the less efficient ones leave the market while more efficient ones entering (i.e. allocative efficiency). Moreover, competition leads firms for better management and this also adds to total productivity (productive efficiency). The

effect of competition on innovation is another discussion that centers around its impact on economic growth.

Other than economic growth, some other macroeconomic consequences of competition are also discussed in the literature. These discussions center around the scenarios where the competition is hampered in a way and the effects of impaired competition are seen on some macroeconomic indicators such as employment and inequality. When there is less competition in the economy, the prices would be higher, choices would be less and quality is degraded, all of which affect the poorest (OECD, 2014, p. 3) most and this adds to the inequality in society. Other than that, less competition means less output, which could mean less employment.

There are studies, which are worth to mention, that show the increase in market power and concentration of firms in the economy results in changes in macroeconomic outcomes. For instance, Aghion et al. (2005) investigates how the level of product market competition affects innovation. Since the economic literature is not precise about the association of competition with innovation, the authors contribute to this discussion by finding an inverted-U shape pattern between these two indicators. They use Lerner Index as the main indicator of competition and average number of patents taken in an industry weighed by their citation numbers as the measurement of innovation. By using a flexible nonlinear estimator, they conclude that competition and innovation have an inverted-U shape relation and the extent of this relation changes with the level of competition in an industry.

Díez et al. (2018) confirm the findings of Aghion et al. They examine the changes in markups in 74 economies and find that firms' incentives to invest decreases as their market position rises. When the markups are low, investment increases with the increase in market power, yet as the markups become even higher, investment is lower especially in industries where the markups are already high. It is also claimed that declining labor share is also associated with higher markups.

Autor et al. (2020) begin their article with the observation that the labor share of income has been falling in the US and in many countries for the last decades. To explain the underlying reason behind this fall, they use the term *"superstar firm"*. In recent years, markets reward firms providing higher quality, lower costs and higher innovation by higher market power. By using firm level US Census data covering 6 sectors since 1982, it is showed in the article that as these superstar firms have more market share in more and more industries, the aggregate share of labor decreases because *"superstar firms have higher markups and a lower share of labor in sales and value-added"* (p. 37).

De Loecker et al. (2020) suggest that the observed trend in markups in the US economy since 1980 not only result in reallocation of economic activity towards the larger higher markup firms in an industry but also the reduction of the aggregate labor share. Hence, the authors claim that their findings about the rise in level and distribution of markups in the US economy explain the labor share decline for the six decades.

Syverson (2019) analyzes the (above-mentioned) literature on macroeconomic implications of market power that associate the increase in market power to decreasing investment and share of labor. He argues that although market power could be a potential candidate for explaining the trends in macroeconomic indicators, there is still a need for more evidence to conclude that market power is "the" factor for explaining fall in labor share, lower investment rates, slower growth and dynamism etc.

It is understood that the effect of market power/concentration/competition on macroeconomic indicators is yet to be discussed further and the debate is carried to another level by adding the policy implications of these general outcomes. Accordingly, the second discussion on the issue is about the effects of competition on macroeconomic policies.

3.1.2. The Effects of Competition on Macroeconomic Policies

There are recent studies on the potential impacts of competition on macroeconomic policies. Aquilante et al. (2019), for instance, discusses the matter by exploring the relationship between market power and monetary policy. The authors use the changes in market power for the level of competition in the markets and argue that shifts in market power may have affected the macroeconomic indicators such as price and supply of goods and services (Phillips curve) and the amount of investment and innovation (aggregated demand curve).Then the authors discuss the effect of such shifts on designing the monetary policy.

Ferrando et al. (2021) focuses on “how monetary policy changes transmits to the real economy through changes in firms’ credit constraints and borrowing costs” and examines whether market structure has an effect on the level of this transmission. As the theory suggests, more expansionary monetary policy makes it easier for firms to find credit and reduces borrowing costs; eventually passing this through the whole economy by affecting total output. The study investigates if market power has an effect on pass through of monetary policy first to lending conditions and second to the real economy.

The data of change in borrowing costs of firms are driven from the European Central Bank’s (ECB) “Outright Monetary Transactions (OMT)” program, which aims to lessen the financial fragmentation across the Euro area. The survey results and balance sheet information are also analyzed. It is found that firms with lower market share and higher credit constraints in sectors with lower concentration face larger decline in credit constraints compared to the firms in more concentrated sectors. Moreover, more market power gives firms room for monetary policy shocks and they respond less. Therefore, it is concluded that market concentration affects the transmission of monetary policy and hence has an effect on the effectiveness of the policy.

Aghion et al. (2019) also analyze OMT program’s outputs to understand how product market competition affects monetary policy. They find that relaxing of

monetary policy with OMT induced sectoral growth more in sectors (countries) with higher market competition.

Duval et al. (2021) use US's and 14 advanced countries' firm-level data to examine whether monetary policy transmission is affected by firms' markup levels. They come to the conclusion that firms with lower markup are affected more by monetary policy shocks since they are more responsive to change in interest rates and their real sales and fixed assets are affected more. Furthermore they find that role of markup is even larger when firms are smaller and younger, which is associated with them facing tighter financial constraints. Finally, it is found that these firm-level effects of monetary policy shocks affect monetary policy's transmission to the economy.

Baqaee et al.(2021) show that the effects of easing monetary policy not only on aggregate output but also on productivity. They divide the monetary policy shocks' effects in output into two: demand-side and supply-side effects. They find that when there is a monetary expansion, higher markup firms have more room for cutting their markups than low markup firms can do. Therefore easing monetary policy "reallocates resources to high-markup firms and alleviates misallocation".

How monetary policy is affected by competition in markets and market power emphasizes the importance of competition policy and brings one to the third general discussion about the macroeconomic implications of competition: the effects of "competition policy" on macroeconomic indicators.

3.1.3. The Effects of Competition Policy on Macroeconomic Indicators

The general theory suggests that as markets become more competitive, this leads to higher productivity levels both at the industry and country level. Since competition policy aims at making markets more competitive, effective enforcement of this policy might lead to more growth.

Buccirossi et al. (2013) examine the effectiveness of competition policy in enhancing efficiency and productivity. Relying a sample of 12 OECD economies and 22 industries between 1995-2005, they define a set of variables called “the competition policy indicators (CPIs)” that would be considered as indicators that measure competition policy effectiveness. They isolate the effects of some other related determinants of productivity growth such as product market regulation, trade liberalization etc. and find that the “aggregate CPI has a positive and highly significant effect on total factor productivity growth”.

Petersen (2013) analyzes the effect of competition policy on macroeconomic outcomes by focusing on the countries that had just introduced competition law in their jurisdictions. By using the data of 154 countries during the period from 1960 to 2005, he examines whether introduction of competition law has made a significant impact on their democracy scores and level of economic development/growth in ten years. Petersen finds that introducing a competition law regime in a country has significant positive effects on economic growth and development yet this impact occurs with a time-lag, which means competition regimes need some time to become effective in an economy.

The finding of Ma (2011) that introducing competition law in less developed countries has weaker effect on macroeconomic outcomes than in more developed countries show not only that the introduction of a competition law regime but also increasing institutional capability of competition authorities and internalizing competition culture in a country has a positive effect on growth.

In addition to studies that focus on effect of competition law and policy, some other studies examine how different antitrust interventions affect economic growth. Petit et al. (2015) examine how forming cartels affect growth in productivity by using the data of 27 industries in the Dutch economy between 1982 and 1998. Cartel formation was not strictly forbidden on this period and they had to be registered. Hence, the authors use this cartel register data to show the relationship between cartel formation/termination/presence on total productivity growth. They find that cartel presence significantly lowers productivity growth.

Panon and Moreau (2022) analyze the data of cartels that were detected by the French Competition Authority between the period 1994 and 2007. They find that cartels reduced total productivity growth by 2%. Analyzing the data, it is found that member of cartels are the largest firms of their industries and therefore breaking them up with infringement decisions lowers the markups and prices of members, relocating the demand. The aggregate productivity, efficiency and total welfare improve by eliminating cartels.

European Commission (2022), analyzes the impact of antitrust interventions of the Commission on GDP, employment, prices and productivity. With a simulation analysis using QUEST-III, competition policy interventions of the Commission such as merger decisions, cartel and abuse of dominance prohibitions, are converted as a markup shock and it is found that in the baseline scenario *"0.77 percentage point reduction in markup resulting from the European Commission's competition policy interventions triggers an increase of real GDP equal to 0.37% and a 0.21% reduction in inflation"* between 2012-2019 after five years (p. 18).

It is seen that besides the macroeconomic implications of competition, competition might also affect another macroeconomic concept: inflation. Therefore the literature on the relationship between competition and inflation is discussed in the next section.

3.1.4. Competition and Inflation

In the literature about the link(s) between competition and inflation, the discussions seem to be in two directions: whether level of competition has inflationary/disinflationary effects and whether inflation/disinflation affects the level of competition.

Since both distorted competition and rising inflation have effects of higher prices, one might think that these two concepts have similar results in the economy. However, competition is generally a microeconomic concept while inflation is a macroeconomic concept. The level of competition affects the price levels in specific sectors/industries and makes them above or below competitive levels

while inflation is the percentage change rate of general prices in an economy. Hence, even if prices are very high compared to competitive levels in all sectors (i.e. competition is ineffective) yet stable in an economy, the inflation would be low. The association of competition and inflation, therefore, is not a simple one[29].

3.1.4.1. The Effects of Competition on Inflation

Discussions on how the level of competition might affect the inflation rate generally focus on dynamic inconsistency theory that high market power firms are less responsive to changes in monetary policy and therefore policy makers' actions create an inflationary bias when they aim to increase aggregate output. Accordingly, when the economy is more competitive, experiencing lower long-term inflation rates would be more possible because competition makes the economy more flexible in terms of price changes and input substitution so that *"more flexible prices are likely to render the monetary commitment to low inflation more credible"* (Przybla & Roma, 2005, p. 9).

How the level of competition affects inflation rates is a question that should be answered based on short-term and long-term effects. As it was mentioned earlier, ineffective/distorted competition increases the prices and even if this distortion were across all sectors of an economy, the effect of rise of prices would be seen in next period's inflation. Nonetheless, if prices stay on that (high) level, one would not see the effects of them on inflation in the other period, i.e. the inflation is not sustained. For impaired competition to increase inflation, its effects should be seen in a longer period and this would be possible if the economy faces demand or supply shocks that would continue to change the level of competition.

Although the effect of competition on inflation in shorter periods seems to be temporary, there are studies showing that the overall competition level affects

[29] Both the measurements of competition and inflation rate are debatable. We have covered the former in the first chapter and the second is beyond the context of this study. In this regard, the association of these concepts are studied in this section based on various types of measurements/proxies in the literature.

inflation. Bräuning et al. (2022) examine this relationship by asking whether market concentration affects the pass-through of cost shocks into the prices. They analyze the US firm-level and industry-level data of 2005-2018 by using the granular instrumental variables method. They find that cost shocks cause increase in prices (pass-through effect) and this increase is higher in economies that are more concentrated: 0.02 points increase in HHI rises the effect of pass-through by 25 % (p.4). This means that the higher the industry concentration levels, the more amplifying effect it has on rising inflation in an economy. Hence having markets that are more competitive might have a decelerating effect when the economy faces inflationary pressures.

Relatedly, Przybyla & Roma (2005) analyze the relationship between product markets' competition intensity and inflation by exploring the panel aggregate and sectoral data of 14 sectors from 15 EU economies. They use long-term averages of inflation rates between 1980-2001 for inflation and level of markup, profits (margin and rate) and an "intensity of competition" variable derived from a survey as the proxies of product market competition. The authors find that level of product market competition, particularly the markups, is a significant explanation for longer-term inflation. They conclude that the stiffer the market competition, the lower the average inflation for longer time spans. This negative relationship between competition and inflation is also significant when they take into account the "country size, monetary policy developments, country openness and the level of country development" (p.31).

This is in conformity with results of Neiss (2001), who found that the markup, as an indicator of the competition between firms, played an important role in explaining differences across countries in average inflation within the OECD countries. Cavelaars (2003), as well, analyzed the 1988-2000 period for 23 OECD countries and provided evidence that a greater product market competition led to a permanently smaller rate of inflation.

In their study, Janger & Schmidt-Dengler (2010) analyze the effects of market power inflation (due to distorted competition/market power) and intensity of competition on price levels, variance and yearly and average inflation rates. They

report a significant negative relation between competition intensity and inflation for 1991-2005 period, and conclude that *"intensified competition has a stabilizing effect on inflation and a reduction in markups has a significantly negative impact on price variance"* (p.63).

Stiglitz & Regmi (2022) focus on the causes of rising inflation around the world, especially in the US. They argue that increasing aggregate demand is not the reason for hiking inflation in recent years and therefore monetary policy changes cannot cure it. Instead, they claim that shortages, cost shocks and supply chain distortions are associated with today's inflation rates. Rising market concentration levels accelerate this since firms with market power not only pass cost changes to customers but also more easily use that power to increase their profits. As the evidence, authors show the surge in markups in 2021 especially in the sectors which are crucial for consumer inflation. Furthermore, they argue that rising market concentration also *"made the economy less resilient and has worsened the impact of underlying supply side interruptions"* (p. 43).

Similarly, in a recent paper by Weber & Wasner (2023), the authors focus on the inflation that Covid-19 caused in the US and claim that it is *"predominantly a sellers' inflation that derives from microeconomic origins"* (p.183). Their reasoning lays on the argument that firms with market power hike prices in and post-Covid period. Yet the U.S firms' increasing market power is not a new phenomenon and continues for a long time. Hence, they ask the question that why these firms have not increased prices with increasing market power in the previous decades but do so during and after the pandemic. They argue that firms raise their prices *"only if they expect other firms to do the same"* (p.186) and sector-wide cost shocks and supply bottlenecks that are caused by the pandemic give them the ability to make implicit agreements, which enables coordinating the price increases. Furthermore, consumers lose keeping the track of prices, making demand more inelastic and easier for them to accept higher prices.

Based on the literature review, firm-level data and surveying earnings calls, the authors develop a three-stage inflation dynamic to explain the process:

1. *Impulse*: With the pandemic, the economy faces upstream market price shocks.
2. *Propagation and Amplification:* This propagates to downstream markets as cost shocks and firms respond them by increasing prices to keep their profit margins. Markets in which there are supply bottlenecks, firms even raise their profits and this amplifies the effect of cost shocks.
3. *Conflict*: Labor market tries to keep their real wages yet this does not create a wage-price spiral because labor unions in the US are not strong.

Based on this dynamic, seller's inflation that the US economy faces in the context of Covid-19 pandemic would likely to fade away unless there exists new supply shocks. Nonetheless, authors argue that this 'transitory' nature of inflation might turn to a 'persistent' one because we live in a world where there are potential and occurring shocks such as climate change, the pandemics and tensions between countries.

3.1.4.2. The Effects of Inflation on Competition

The relationship between competition and inflation is also discussed in the opposite direction such that the rate of inflation might affect firms' market power and market competition levels.

Chrinko & Fazzari (2000) analyze 11 US industries to understand the effect of inflation on market power. Since inflation raises price variance in an industry, consumers need to search more because of less information about future prices and this allows firms to raise their markups. They claim that inflation positively affects market power yet this effect is not homogenous across different sectors, being significant in industries with little market power. They add that the relationship is sensitive to the structure of markets and therefore requires further research.

Gwin & Taylor (2004) focus on magnitude of search and information costs to understand the extent of which inflation rate affects market power. They find that

higher search costs lower the demand elasticity since it would be more costly to switch between suppliers and hence in such a setting firms can increase their markups i.e. market power. Contrary, lower the search costs and more elastic the demand, market power of firms decrease because consumers will no longer choose firms that substantially increase their prices.

Taylor (2000) examined the U.S economy's low inflationary period in which he observed a significant decline in firms' pass-through changes in costs to prices. Lower pass-through is interpreted as lower market power of firms since it would mean that pricing power decreases. He sets a microeconomic model indicating that pricing power of firms is affected by expectations about whether the price and cost changes will persist or not: Whether a firm expects that price and cost increases will or will not persist will alter its reaction to competitor's price changes. He then uses a staggered price setting macroeconomic model and analyze whether firm-level changes in market/pricing power has an effect on total output and inflation in an economy.

Taylor compares quarterly inflation rates in the US in two different periods: 1960-1979 (including high inflation times) and 1982-1999 (including disinflation times) and finds that persistence of aggregate inflation is lower in the US between 1982 and 1999; evidence of lower pass-through in disinflationary period. Then he uses macroeconomic simulation models to see *"how expectations of low inflation and the resulting small pass-through and low measured pricing power affect the price-output correlations"* (Taylor, 2000, p.1403). It is found that *"effects of expectations on pass through can have a quantitatively significant effect on the relationship between aggregate output and the price level"* (p.1406). Taylor concludes that this significant effect is temporary since the expectations would quickly change if low inflation period ends. Therefore, if inflation increases as a result of increase in aggregate demand, lower pass-through effect and the effect of inflation on market power of firms are eliminated.

3.1.4.3. Competition Policy as a Tool to Fight Inflation

OECD's recent paper titled "Competition and Inflation OECD Competition Policy Roundtable Background Note" (OECD, 2022) explains extensively how competition policy can be used as a tool to fight inflation and what competition authorities can do in inflationary periods.

Main points considered are as follows:

- Competition policy deals mainly with increasing competition in markets and increased competition generally lowers prices. Yet this would not mean it directly reduces inflation in an economy because the effect of competition policy is limited to the sectors intervened.
- There are studies arguing that competition problems might cause inflationary effects but this does not mean it is regarded as one of the main causes. In this regard, seeing competition policy as one of the main tools to fight inflation does not seem realistic.
- The effects of competition policy and interventions of competition authorities take long time to be seen in the markets and in the economy. This is mainly because competition investigations, decisions and effect of these decisions would require time. Furthermore, they will usually be related just to one market or a few markets.
- Baring these in mind, this does not mean competition policy is not relevant at all while dealing with high inflation. After all, increasing competition in the markets is expected to benefit consumers through reduced prices. Hence, in high inflationary periods, competition policy can have an assistive role, especially in the long-term.

In the study, the recommendation of the OECD dated 14 December 1971 is mentioned[30]. 1971 Recommendation emphasize the need for applying competition rules more vigorously in inflation times, especially against the

[30] This recommendation then became obsolete after the high inflationary times ended and followed by a disinflationary period.

conducts such as price-fixing, market allocation and monopolistic acts that create excessive prices. Moreover, it is advised to monitor the pricing in the key sectors that might have a significant effect on inflation. For these to be realized, the recommendation emphasize the need for competition authorities to have sufficient resources.

OECD (2022) argues that *"the wording of the 1971 OECD recommendation appears equally valid today"* (p.32). Other than that, it draws a frame for what Competition authorities can do in high inflation times. It is emphasized that they should keep doing their usual work as good as possible while giving more attention to the business practices that might have faster pricing and spill-over effects and/or occur in the markets that might have larger effects on inflation in the economy. Nonetheless, the authorities should be careful about over-enforcement, their longer-term effectiveness and pursuing their main goals. Advocacy efforts can also be used against the risks of government interventions that negatively affect competition in the markets, to monitor risky markets and to increase awareness about the benefits of effective competition policy in the economy.

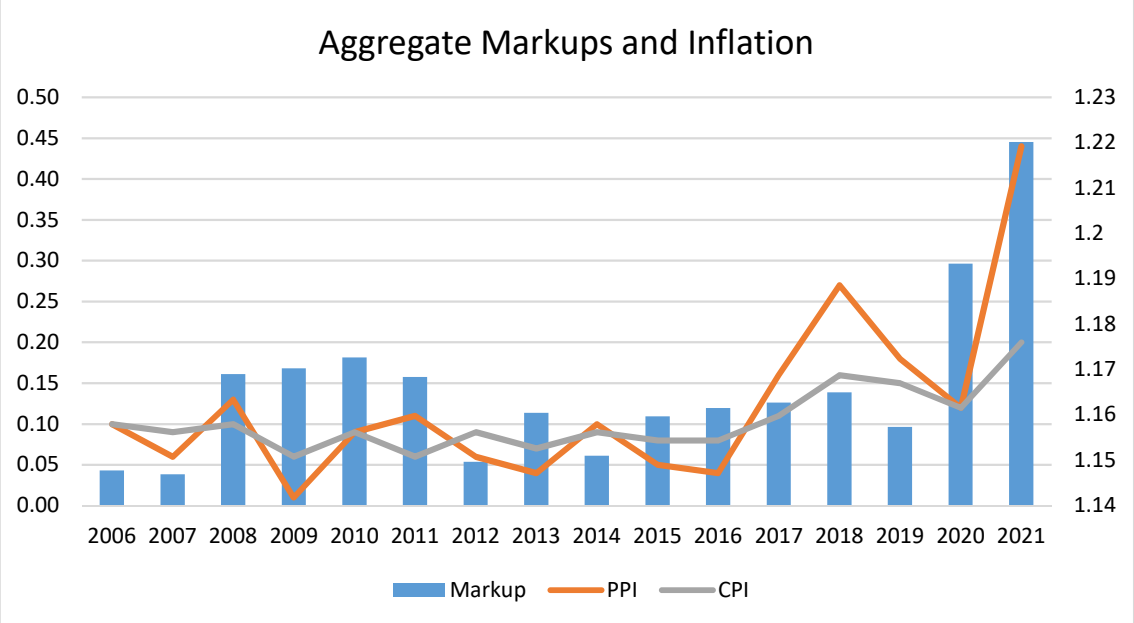
Böheim (2008) is one of the few authors who draws attention to the benefits of "effective" competition policy to fight against inflation. In his study, he emphasizes that positive economic effects of effective competition policy on inflation might only be felt in the medium-long term. Yet he argues that short-term anti-inflationary effect of increasing competition may be possible for some specific sectors. Böheim analyzes Austrian markets of network-bound energy and for over-the-counter drugs. He concludes that increasing competition in energy markets through more rigorous implementation of competition rules and clarifying the roles of the Federal Government and the Provinces to prevent anti-competitive acts could create short-term anti-inflationary effects. It is also argued that over-the-counter drugs in Austria are highly-priced because of the excessive regulation in the market and therefore careful deregulation to increase competition on prices could also be affective to reduce inflationary effects.

In their paper that examines the effects of intensity of competition on inflation rates and price variance, Janger & Schmidt-Dengler (2010) claim that there might be a link between temporary inflation and intensified competition. Therefore this implies that *"it is certainly possible to correct rising inflation by employing competition policy measures"* (p.62). Nonetheless, the cause of rising inflation is more permanent, increasing competition through competition rules would not be that effective.

3.2. EMPRICAL STRATEGY, DATA AND RESULTS

In this section, I investigate the relationship between market power and inflation through empirical analysis. As a starting point, in Figure 13 I report the trends in aggregated markups and yearly changes in consumer (CPI) and producer price indexes (PPI) together for comparison. A quick look, however, reveals that this figure is not quite informative. In some years inflation rates seem to follow the trends in markups, such as from 2007 to 2008; yet for the others, such as 2012-2013 period, the directions of markups and inflation rates are opposite. Nevertheless, sharp surges in markups along with inflation rates, particularly the PPI, in 2021 deserves mentioning.

Figure 13: Trends in aggregate markups and inflation rates in the Turkish economy (2006-2021)



Since the visual analysis of trends in aggregate markups and inflation rates does not seem to be fruitful enough, I continue with regression analysis. In doing so, rather than limiting the analysis with economy wide aggregates, I focus to sectoral markups and producer price inflation to exploit the benefits of panel data. In this regard, I specify the following dynamic equation:

$$ppi_{jt} = \alpha + \beta_1 \mu_{jt} + \beta_2 ppi_{jt-1} + \beta_3 exchangerate_t + \varepsilon_{jt} \quad (19)$$

where lower cases denote logs; ppi_{jt} is the producer price index of industry j in year t, μ_{jt} is the industry-specific weighted average markup in each year used as the proxy for market power, $exchangerate_t$ is the yearly average of '0.5 US Dollars + 0.5 Euro' bundle in liras and ε_{jt} is the error term.

I first estimate the above equation using panel fixed-effects estimator by introducing time and year fixed-effects to control for economy-wide unobserved shocks and heterogeneity across industries. Considering potential endogeneity issues with dynamic models, I also estimate the Equation (19) via two-step system generalized methods of moments (GMM) as a robustness check. Standard errors are clustered at NACE 3-digit level to account for potential serial correlation in residuals.

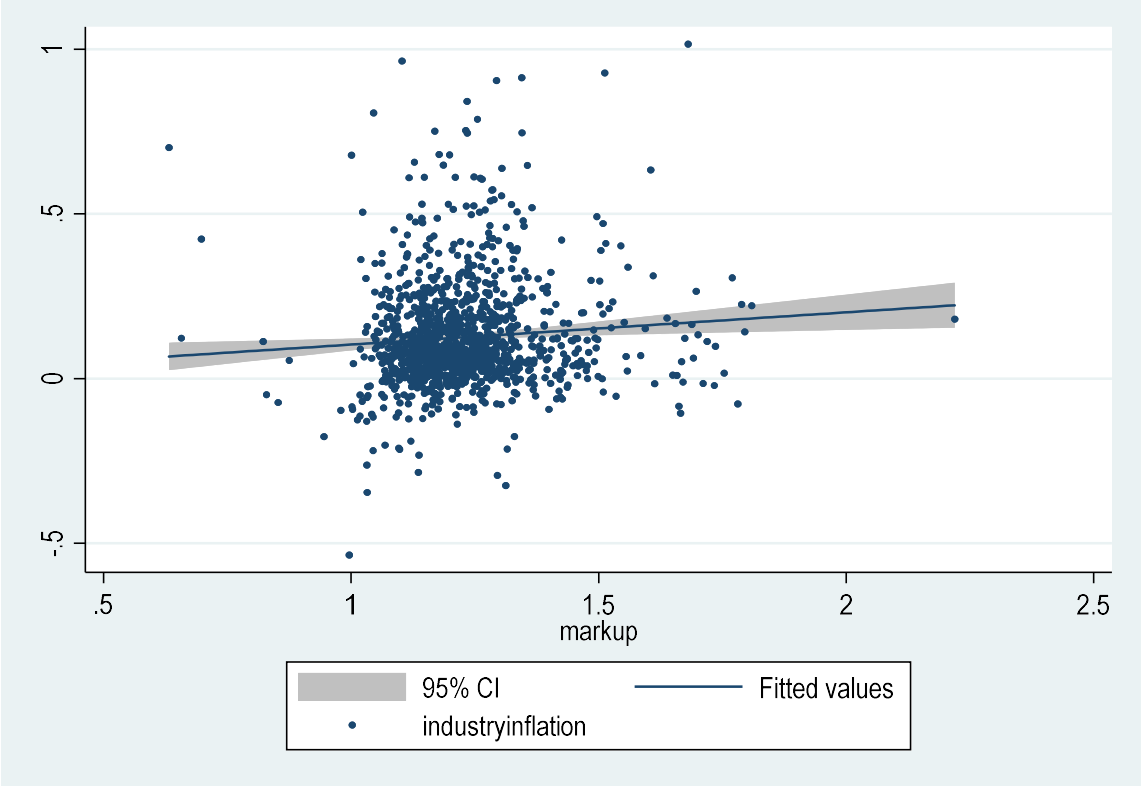
To perform the econometric analysis, I rely on sectoral PPIs, which are published by the TURKSTAT for a number of NACE 3-digit industries within manufacturing sector. Hence, the extent of the analysis is inevitably limited with those industries due to data availability. Nevertheless, the data covers a great majority of Turkish manufacturing industries, thus I believe it is sufficiently representative.

Markups data used in regressions are weighted averages of firm-level markups estimated in this study and aggregated for each NACE 3-digit industry-year pairs. Yearly foreign exchange rates are based on CBRT's selling rates, which are extracted from CBRT Electronic Data Delivery System. Table 11 provides descriptive statistics of the variables used in regressions. Figure 14 shows the scatter plot of industry inflation and corresponding markups.

Table 11: Summary statistics of variables used in regressions

Variable	N	Mean	Std. Dev.	Min	Max
PPI (log)	1,264	5.3742	0.6388	3.6289	7.9572
Markup (log)	1,192	0.1987	0.1060	-0.4587	0.7973
Exchange Rate (log)	1,264	1.0466	0.5809	0.4137	2.2716

Figure 14: Scatter plot of inflation vs. markups with the line of best fit (2006-2021)



I estimate the Equation (19) for a total of 80 NACE 3-digit industries over the 2006-2021 period. Table 12 reports the results of regressions, which are telling two different stories. First, panel fixed-effect regressions, when both time and industry fixed-effects are introduced, provides evidence of a positive relation with inflation in markups, significant at 1% level, i.e. the higher the markups the higher the inflation rate of producer prices.

Second, however, when the equation is estimated with the system GMM estimator, both the sign of the coefficients of markups flip and the significance

disappear, i.e. the yearly variations in PPIs are not associated with variations in markups. This result does not change whether the markups are treated as endogenous, predetermined or strictly exogenous. Thus, the results of the econometric analysis are mixed, and at best, inconclusive.

Table 12: Regressions: Effect of markups on inflation

	Dependent Variable: PPI (log)					
	2006-2021					
	Panel Fixed Effects			System GMM		
	(FE1)	(FE2)	(FE3)	(GMM1)	(GMM2)	(GMM3)
Markup (log)	-0.056*	0.254**	0.254**	-0.032	-0.035	-0.117
	(-0.032)	(-0.097)	(-0.113)	(-0.042)	(-0.039)	(-0.188)
L.PPI (log)	1.037***	0.836***	0.836***	1.057***	1.044***	1.011***
	(-0.013)	(-0.041)	(-0.041)	(-0.016)	(-0.016)	(-0.033)
Exchange Rate (log)			0.346***	0.096***	0.105***	0.134***
			(-0.040)	(-0.017)	(-0.015)	(-0.028)
Year Fixed Effects	X	X	X			
Industry Fixed Effects		X	X			
Constant	-0.050	0.842***	0.675***	-0.293***	-0.243***	-0.107
	(-0.064)	(-0.197)	(-0.178)	(-0.08)	(-0.081)	(-0.155)
R-squared	0.966	0.968	0.968			
Number of Observations	1182	1182	1182	1182	1182	1182
Probability	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Groups/Instruments	80	80	80	80/60	80/78	80/63
AR(2)				0.947	0.949	0.920
Sargan Test				0.392	0.589	0.160

Table Notes:

- *PPI* is the natural logarithm of end-of-the-year PPI of up to 80 NACE 3-digit industries (2005-2021)
- *Markup* is the natural logarithm of yearly weighted average markups for relevant NACE 3-digit industries (2006-2021).
- *Exchange Rate* is the natural logarithm of yearly average of '0.5 US Dollars + 0.5 Euro' bundle (2005-2021)
- SE's (in parenthesis) are clustered in NACE 3-digit industries
- Legend: * p<.1; ** p<.05; *** p<.01

In summary, the results of the empirical analysis employed in this study on the potential impacts of markups, and thus market power, on inflation seem to be sensitive to model and estimator selection. Therefore, these results do not provide a clear answer whether there is conclusive evidence on such a relationship in the Turkish economy.

3.3. DISCUSSION

As I have pointed above, the empirical analysis in the previous section left us without a clear-cut answer on how, and if, market power and inflation are associated. In fact there are not many economists who believe, and studies which present definitive evidence, on a relationship (either positive or negative) between these two variables. For instance, a recent survey by University of Chicago Booth School's "The Initiative on Global Markets (IGM)" across 41 leading economists in the US reveals that only 10%[31] of the panelists either agree or strongly agree that market power might have played a significant role behind the high inflation seen in the US lately, while 79% either disagree or strongly disagree.[32]

Recalling Figure 13, however, the simultaneous jump in both markups and inflation levels in 2021 are non-negligible, implying the likelihood of such a relationship, in times of unusually high levels of inflation in particular. Considering the decline in the labor share in the GDP (as with many economies globally) and the year-on-year increase in net operating surpluses of firms, it is likely that we will see a similar, if not more severe picture for 2022 in the Turkish economy, nevertheless we do not have the data to confirm yet.[33] Moreover, Türkiye seems not to be alone on this phenomenon particularly observed for the last years. Remember that Stiglitz & Regmi (2022) also highlight the sharp rise in markups in 2021 in the US economy, along with high inflation.

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[31] The results are weighted on confidence of experts.
[32] https://www.igmchicago.org/surveys/inflation-market-power-and-price-controls/
[33] See TURKSTAT's press release on 2022 Q4 GDP, dated 28.02.2023, available at https://data.tuik.gov.tr/Bulten/Index?p=Quarterly-Gross-Domestic-Product-Quarter-IV:-October-December,-2022-49664&dil=2

Then, what could be the reason(s) behind this co-movement of markups and inflation rates, which have been more pronounced lately? Weber & Wasner (2023)'s explanation could be an answer, such that, supply-side shocks and bottlenecks allow firms with market power to implicitly coordinate increases in their prices, which further amplified by the fact that, when this occurs consumers lose keeping the track of prices, making demand more inelastic and easier for them to accept higher prices. This last part coincides with the findings of Chrinko & Fazzari (2000) and Gwin & Taylor (2004) suggesting the impacts of inflation on increasing search-costs, possibly creating an opacity -or a concern for even higher- future prices and decreasing elasticity of demand, which, in the end allowing firms to increase their markups, and thus market power.

These explanations imply a vicious circle such that market power fuels inflation and increasing inflation strengthens firms' market power; initially which triggers which, yet, remain uncertain. Leaving the matter of the direction of the causality aside, which clearly remains an interesting and fruitful topic for further study, this leaves us with an another question: 'What should or could competition authorities do to support the fight against inflation?'

In this point, we turn back to the IGM survey mentioned above. When it comes to the suitability of antitrust/competition law interventions to reduce inflation for the next 12 months, a vast majority of 84% of experts surveyed disagree that such interventions could lower inflation rates, while only 4% believes that it is likely. OECD (2022) also possesses a similar view, particularly drawing attention to duration of competition investigations to be completed, the time needed to show their impacts, and extents of their market coverage.

Nevertheless, as also pointed out in OECD (2022), this is far from being meant that competition policy is entirely irrelevant in overcoming the impacts of high inflation. At the end, intensifying the competition in the markets at the least benefits consumers by lower prices, considering the major problem with high inflation is the exact opposite. Thus, echoing the OECD, in high inflationary periods, competition policy can have an assistive role. Therefore, competition authorities should keep doing their best to protect the competition in the markets

with a particular attention to the business practices that might have faster pricing and spill-over effects and/or occur in the markets that might have larger effects on inflation in the economy.

As a final remark, and as the findings and discussions above imply, it should be also noted that, apart from well known grounds and reasons of the fight against high inflation, this effort also seems to have a particular importance in hampering the increase in level and persistence of market power.

CHAPTER 4: CONCLUSION

Competition benefits consumers and the society in general, in many ways. These benefits include such as lower prices, greater efficiency and innovation, better product quality, new and innovative products, higher variety of choice, and at the end improved social welfare and economic growth. Market power, on the other hand, enables firms to harm consumers by higher prices through reducing output, lowering product quality, stifling innovation, lessening freedom of choice, and as a result, waste of resources and loss of social welfare.

Therefore, correctly measuring the intensity of competition and market power within and across industries, and observing their trends are highly valuable for policymakers. To perform such an exercise, a number of methods have been proposed in the literature to identify and quantify the degree of competition. Among them, markup, which refers the ratio of the price of a product to its marginal cost, has attracted a great deal of attention in industrial organization literature for the last decade as a direct indicator of market power.

Recent research reveal that markups have been rising in the modern capitalist economies for several decades, indicating a rise in market power as well. In addition, there are also some studies implying that decreasing competition and rising market power within the economies was related with higher levels of inflation.

Inspired by these research, in this study I first analyzed the evolution of market power in Türkiye between the 2006-2021 period by estimating firm-level and aggregate markups with a data-set covering a vast majority of Turkish industries. I also investigated the trends in profitability and concentration in the Turkish economy. Then, I further examined if the inflation in Türkiye was related with the changes in market power.

I show that, despite a general decrease in industry concentrations, market power, as measured by markups, in Türkiye has seen a rise since 2014. Weighted average markup for the Turkish economy has risen from 1.15 in 2006 (and 2014)

to 1.22 in 2021. Since the study reveals that profit rates have also increased in the same period, the rise in the markups have not been the result of increasing fixed costs but associated with rising market power. The evidence also suggests that, the increase in market power for the Turkish economy has been primarily driven by the rise of markups of the large firms within the industries.

The results of the empirical analysis employed in this study on the potential impacts of markups, and thus market power, on inflation, however, do not provide a clear answer whether there is conclusive evidence on such a relationship in the Turkish economy. Nevertheless, the simultaneous surge of markups along with inflation in 2021 in Türkiye and some other economies, together with the findings of several studies in the literature, imply a vicious circle such that market power fuels inflation and increasing inflation strengthens firms' market power. Initially which triggers which remains uncertain and requires further study.

As final remarks, I believe the best course of action for competition authorities and policy in times of high inflation to assist anti-inflationary policies would be focusing to firms' conducts that might have faster pricing and spill-over effects and/or occur in the markets that might have larger effects on inflation in the economy. I also believe that the fight against high inflation with usual anti-inflationary policies may also assist competition policy in terms of restraining market power and its persistence.

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APPENDIX 1.

The raw EIS data that used in this study had 17,377,912 observations over the 2006-2021 period, with an average of over 1 million observations per year. I first dropped all observations which had at least one of the key variables used for the estimations either negative or missing, such as net sales, cost of sales and fixed assets. I further dropped all firms, which reported a net sales value of equal, or less than yearly minimum wage in each year. I believe this is a reasonable approach since a firm should be expected to generate a sales value of more than yearly total of minimum wage at the least. Similarly, I also left the firms aside with a calculated total cost of less than yearly minimum wages.

As a final strategy to deal with potential outliers, I dropped observations in top and bottom 1% of distributions of computed revenue shares and cost shares of the bundle of variable inputs. This final step left us with a total number of observations of 11,236,187.

APPENDIX 2.

SUMMARY STATISTICS OF MARKUPS BASED ON INDUSTRY AND FIRM SCALE CLASSIFICATIONS

Table A2.1: Weighted average markups by different levels of industry classification

	NACE 4				NACE 3				NACE 2			
Year	**N**	**Mean**	**Median**	**Sd**	**N**	**Mean**	**Median**	**Sd**	**N**	**Mean**	**Median**	**Sd**
2006	579	1.2847	1.2049	0.2889	278	1.2810	1.2129	0.2535	81	1.2773	1.2376	0.2118
2007	579	1.2958	1.2005	0.4996	278	1.2851	1.2072	0.2898	80	1.2741	1.2305	0.1990
2008	577	1.3103	1.2232	0.4443	278	1.3287	1.2364	0.5499	80	1.2943	1.2537	0.1928
2009	576	1.2948	1.2224	0.2582	278	1.3167	1.2387	0.2899	80	1.3197	1.2513	0.2701
2010	576	1.3287	1.2288	0.4028	278	1.3353	1.2422	0.4251	80	1.3275	1.2759	0.2252
2011	576	1.3204	1.2393	0.2995	278	1.3371	1.2544	0.3201	80	1.3423	1.2678	0.2519
2012	579	1.3012	1.2158	0.3781	279	1.3166	1.2203	0.4646	80	1.3135	1.2270	0.2375
2013	578	1.3138	1.2241	0.3516	278	1.3155	1.2279	0.3009	81	1.3300	1.2539	0.2394
2014	577	1.3089	1.2270	0.3144	275	1.3200	1.2296	0.3304	80	1.3255	1.2382	0.2850
2015	577	1.3285	1.2271	0.3976	276	1.3391	1.2432	0.3960	80	1.3510	1.2541	0.2954
2016	578	1.3245	1.2254	0.4172	277	1.3505	1.2266	0.4976	80	1.3507	1.2466	0.3622
2017	576	1.3415	1.2384	0.4112	275	1.3545	1.2461	0.4779	80	1.3765	1.2782	0.5516
2018	580	1.3494	1.2475	0.4590	277	1.3634	1.2490	0.4951	79	1.4178	1.2615	0.6645
2019	579	1.3566	1.2339	0.4757	276	1.3692	1.2346	0.4820	80	1.3950	1.2603	0.4971
2020	579	1.4101	1.2687	0.5874	277	1.4345	1.2859	0.6379	79	1.4673	1.3007	0.5335
2021	574	1.4415	1.2856	0.7022	275	1.4986	1.3046	0.8777	79	1.4885	1.3292	0.4618
Average		1.3319	1.2306	0.4339		1.3465	1.2424	0.4709		1.3529	1.2598	0.3738

Table A2.2: Average markups by firm scale classifications

Panel A: Micro and Small Scale Firms									
	Micro					Small			
Year	**N**	**Mean**	**Median**	**Sd**	**Year**	**N**	**Mean**	**Median**	**Sd**
2006	78,673	1.2869	1.1409	0.6049	2006	363,263	1.3314	1.1597	0.6824
2007	86,225	1.2755	1.1292	0.6073	2007	415,906	1.3221	1.1496	0.6987
2008	93,373	1.2991	1.1410	0.6580	2008	434,841	1.3358	1.1568	0.7227
2009	89,655	1.2970	1.1352	0.6807	2009	446,812	1.3372	1.1526	0.7424
2010	100,394	1.3069	1.1417	0.6927	2010	446,516	1.3537	1.1608	0.7763
2011	112,593	1.2997	1.1359	0.6824	2011	461,552	1.3456	1.1519	0.7797
2012	123,572	1.2870	1.1279	0.6783	2012	488,451	1.3343	1.1445	0.7679
2013	129,460	1.2884	1.1272	0.6826	2013	507,055	1.3418	1.1433	0.8039
2014	140,348	1.2850	1.1218	0.6997	2014	534,287	1.3368	1.1383	0.8064
2015	150,369	1.2859	1.1206	0.7133	2015	566,007	1.3380	1.1371	0.8184
2016	151,752	1.2757	1.1135	0.7056	2016	595,014	1.3275	1.1327	0.7932
2017	164,428	1.2787	1.1129	0.7193	2017	612,185	1.3331	1.1345	0.8090
2018	167,441	1.2692	1.1033	0.7481	2018	668,875	1.3317	1.1258	0.8451
2019	166,949	1.2690	1.1032	0.7587	2019	689,659	1.3407	1.1289	0.8736
2020	188,498	1.2894	1.1103	0.8093	2020	686,561	1.3562	1.1391	0.8870
2021	221,627	1.2956	1.1107	0.8625	2021	701,203	1.3782	1.1481	0.9257
Average		1.2858	1.1201	0.7271			1.3413	1.1425	0.8104

Panel B: Medium and Large Scale Firms									
	Medium					Large			
Year	N	Mean	Median	Sd	Year	N	Mean	Median	Sd
2006	12,237	1.2251	1.1207	0.4958	2006	2,599	1.2017	1.1142	0.4019
2007	13,010	1.2114	1.1047	0.5195	2007	2,832	1.1793	1.0927	0.3394
2008	14,175	1.2443	1.1268	0.5604	2008	2,986	1.2187	1.1211	0.4366
2009	14,326	1.2365	1.1195	0.5568	2009	3,038	1.2108	1.1150	0.4458
2010	16,322	1.2437	1.1232	0.5587	2010	3,505	1.2207	1.1156	0.4774
2011	18,597	1.2452	1.1246	0.5637	2011	3,961	1.2237	1.1273	0.4042
2012	20,516	1.2252	1.1128	0.5401	2012	4,354	1.2040	1.1042	0.4534
2013	22,076	1.2325	1.1184	0.5630	2013	4,782	1.2179	1.1133	0.5000
2014	24,291	1.2275	1.1148	0.5445	2014	5,045	1.2125	1.1127	0.4490
2015	26,736	1.2334	1.1190	0.5758	2015	5,591	1.2287	1.1157	0.5337
2016	26,920	1.2284	1.1116	0.5832	2016	5,826	1.2118	1.1121	0.4617
2017	29,602	1.2378	1.1142	0.6183	2017	6,330	1.2180	1.1185	0.5069
2018	29,519	1.2431	1.1132	0.6547	2018	6,456	1.2465	1.1405	0.5546
2019	28,601	1.2439	1.1096	0.6715	2019	6,377	1.2389	1.1262	0.5532
2020	32,766	1.2725	1.1183	0.7422	2020	7,391	1.2768	1.1591	0.5499
2021	41,603	1.2669	1.1126	0.7395	2021	10,273	1.2958	1.1657	0.5922
Average	371297	1.2418	1.1159	0.6192		81346	1.2345	1.1263	0.5055

APPENDIX 3.

SUMMARY STATISTICS OF EBIT MARGINS BASED ON INDUSTRY CLASSIFICATIONS

Table A3.1: Weighted average EBIT margins by different levels of industry classification

	NACE 4				NACE 3				NACE 2			
Year	**N**	**Mean**	**Median**	**Sd**	**N**	**Mean**	**Median**	**Sd**	**N**	**Mean**	**Median**	**Sd**
2006	579	0.0506	0.0507	0.1650	278	0.0594	0.0552	0.0663	81	0.0605	0.0542	0.0594
2007	579	0.0557	0.0480	0.0884	278	0.0576	0.0505	0.0745	80	0.0622	0.0514	0.0510
2008	577	0.0584	0.0518	0.0737	278	0.0608	0.0575	0.0757	80	0.0645	0.0596	0.0461
2009	576	0.0606	0.0528	0.0717	278	0.0635	0.0600	0.0749	80	0.0650	0.0608	0.0527
2010	576	0.0561	0.0477	0.0812	278	0.0569	0.0499	0.0835	80	0.0592	0.0516	0.0507
2011	576	0.0519	0.0531	0.1830	278	0.0655	0.0575	0.0768	80	0.0645	0.0577	0.0637
2012	579	0.0539	0.0485	0.0686	279	0.0554	0.0515	0.0766	80	0.0588	0.0491	0.0598
2013	578	0.0540	0.0521	0.0899	278	0.0545	0.0526	0.1047	81	0.0619	0.0568	0.0533
2014	577	0.0541	0.0491	0.0785	275	0.0563	0.0512	0.0824	80	0.0597	0.0522	0.0511
2015	577	0.0627	0.0568	0.0780	276	0.0636	0.0587	0.0811	80	0.0647	0.0578	0.0518
2016	578	0.0569	0.0529	0.0830	277	0.0600	0.0572	0.0828	80	0.0589	0.0560	0.0626
2017	576	0.0690	0.0592	0.0761	275	0.0717	0.0638	0.0791	80	0.0694	0.0635	0.0601
2018	580	0.0705	0.0608	0.1145	277	0.0765	0.0686	0.0988	79	0.0790	0.0702	0.0716
2019	579	0.0684	0.0600	0.0943	276	0.0681	0.0615	0.1053	80	0.0754	0.0640	0.0661
2020	579	0.0815	0.0698	0.1000	277	0.0843	0.0749	0.0976	79	0.0817	0.0718	0.0667
2021	574	0.0854	0.0722	0.0987	275	0.0886	0.0797	0.1023	79	0.0874	0.0734	0.0734
Average		0.0619	0.0541	0.1020		0.0651	0.0580	0.0864		0.0670	0.0591	0.0595

APPENDIX 4.

SUMMARY STATISTICS OF HHIs BASED ON INDUSTRY CLASSIFICATIONS

Table A4.1: Average / weighted average HHIs by different levels of industry classification

	NACE 4				NACE 3				NACE 2			
Year	**N**	**Mean**	**Median**	**Sd**	**N**	**Mean**	**Median**	**Sd**	**N**	**Mean**	**Median**	**Sd**
2006	579	1703.1	680.1	2405.6	278	1777.3	748.2	2390.5	81	1424.6	784.5	1791.6
2007	579	1615.6	590.1	2347.7	278	1655.1	711.4	2252.7	80	1276.5	715.2	1478.8
2008	577	1565.5	599.4	2285.9	278	1622.6	716.0	2240.7	80	1294.8	733.7	1520.0
2009	576	1544.2	593.7	2235.3	278	1616.7	735.8	2217.7	80	1288.1	777.3	1505.3
2010	576	1468.8	537.5	2173.5	278	1531.9	619.5	2155.0	80	1157.5	606.3	1480.2
2011	576	1414.6	548.0	2111.7	278	1503.3	653.0	2139.1	80	1107.0	569.3	1359.1
2012	579	1419.2	544.7	2136.1	279	1513.9	631.6	2207.3	80	1141.2	527.2	1455.7
2013	578	1349.3	486.4	2089.5	278	1468.9	566.4	2214.6	81	1193.1	637.7	1699.3
2014	577	1358.8	464.4	2160.2	275	1468.9	526.2	2219.3	80	1286.6	517.2	1724.8
2015	577	1375.9	459.9	2171.2	276	1483.8	528.3	2272.9	80	1342.5	566.7	2039.8
2016	578	1407.6	478.2	2187.9	277	1579.2	614.4	2354.8	80	1313.6	568.5	1987.4
2017	576	1341.9	500.9	2071.0	275	1368.9	539.6	2052.8	80	1182.3	552.0	1659.7
2018	580	1420.2	516.4	2157.3	277	1466.8	571.3	2169.2	79	1175.7	629.5	1620.2
2019	579	1422.4	511.7	2176.7	276	1479.2	653.2	2162.0	80	1327.0	683.8	1803.4
2020	579	1383.1	532.1	2038.3	277	1435.8	662.5	1997.4	79	1194.3	686.9	1361.5
2021	574	1338.6	482.7	2077.7	275	1420.8	584.6	2121.5	79	1202.9	564.1	1611.9
Average		1445.5	527.1	2179.5		1524.8	630.2	2198.7		1244.5	648.3	1635.8

APPENDIX 5: ORIGINALITY REPORT

HACETTEPE UNIVERSITY
GRADUATE SCHOOL OF SOCIAL SCIENCES
MASTER'S THESIS ORIGINALITY REPORT

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APPENDIX 6: ETHICS COMMISSION FORM

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GRADUATE SCHOOL OF SOCIAL SCIENCES
ETHICS COMMISSION FORM FOR THESIS

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ECONOMICS DEPARTMENT

Date: 05/05/2023

Thesis Title: The Evolution of Market Power and Its Relation with Inflation in Türkiye

My thesis work related to the title above:

1. Does not perform experimentation on animals or people.
2. Does not necessitate the use of biological material (blood, urine, biological fluids and samples, etc.).
3. Does not involve any interference of the body's integrity.
4. Is not based on observational and descriptive research (survey, interview, measures/scales, data scanning, system-model development).

I declare, I have carefully read Hacettepe University's Ethics Regulations and the Commission's Guidelines, and in order to proceed with my thesis according to these regulations I do not have to get permission from the Ethics Board/Commission for anything; in any infringement of the regulations I accept all legal responsibility and I declare that all the information I have provided is true.

I respectfully submit this for approval.

05/05/2023
Date and Signature

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