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Do product market reforms work? Assessing regulatory changes impacting competition

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Abstract

We create a new dataset that characterizes publicly released studies of product market reforms implemented from 1932 to 2011. We then examine the size and origins of differences in estimated impacts based on an OECD classification scheme for potentially competitive restrictions of regulation. The median impact from switching to pro-competitive regulatory settings is a 19 per cent price decline. Competition-restricting regulations that are directed at specific societal objectives, such as health, safety, education, the environment, and financial stability or protection, have lower price increases than the price declines from regulatory changes creating greater competition. Policymakers can consider these estimates when balancing the effects of competition-enhancing regulatory reform against other societal objectives.

Keywords: regulation, competition, regulatory reform
JEL: L51, D47, K20

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1 Introduction

Government policies frequently advocate regulatory reform to increase competition.[1] One reason is the belief that regulations can create unnecessary costs and barriers to entry. Reforms can reduce these, and thus increase competition, but may also impact the social goals that justified certain regulations. Trade-offs between competition and social goals are inherent within the overall regulatory process, yet are difficult for policymakers to assess. Although there have been more than 300 studies on the effects of individual product market reforms affecting competition, there has been surprisingly little systematic effort to compile and analyze these estimated effects.[2] The purpose of this paper is to fill that gap by performing a broad and systematic empirical analysis of previous estimates of the impact of product market reforms affecting competition.

On the one hand, the importance of understanding these effects is particularly high in light of increasing academic evidence raising doubts about the value of pro-competitive market policies to drive product market outcomes (e.g., Juhász et al., 2024). On the other hand, evidence of harm from weak competition is supported by several measures. Estimates of market power impacts range from: losses of 1.7 per cent to 7.7 per cent of GDP (Posner, 1975; Cowling and Mueller, 1978; Akcigit et al., 2021); rising markups from 21 to 61 per cent (De Loecker et al., 2020)[3]; and creating 12 to 21 per cent of wealth of the wealthiest 1 per cent of society by sacrifice of the bottom 90 per cent (Ennis et al., 2019). In light of the different directions of research results, policymakers require more information for judicious balancing of impacts of social product market reforms against pro-competitive regulatory reforms.

This paper systematically consolidates prior studies relevant to this balancing by examining the effects of changing competition-restrictive regulations on prices. To do so, we create and analyze a new data set on impacts

[1]See, for example, Executive Order 14192 of 31 January 2025 and Executive Order 14219 of 19 February, 2025 that direct agencies to "initiate a process to review all regulations" and to identify regulations "that impose undue burdens on small businesses and impede private enterprise and entrepreneurship." See also Executive Order 14036 of July 9, 2021, the White House OIRA's "Guidance on Accounting for Competition Effects when Developing and Analyzing Regulatory Actions" of October 2023, or the European Commission's "Better Regulation Toolbox, Tool No 24, Competition" of 2023.

[2]We are not aware of any broad cross-country effort to collect and calibrate the competitive effects from studies of actual product market reforms except for case study reviews (Estache and Wren-Lewis, 2009; Joskow and Rose, 1989; Kwoka, 2008; Winston, 1993).

[3]Some of the rise in markups may also be due to regulation, with Singla (2023) suggesting that rising regulation could explain 31 - 37 per cent of rising markups.

from 305 reform observations that encompass 39 jurisdictions. The data were assembled from academic, government and third party reports with the support of the OECD. While not all reports found include a quantitative impact estimate, of those that do, about 90 per cent provide price impacts (and few non-price estimates are provided). We consequently limit our focus to measuring the size of these price impacts and the factors that affect them. In many instances, but not all, the regulatory changes can be examined in conjunction with a control that could help identify the impact of the regulatory change.[4]

The reforms affecting competition examined here are motivated not only for economic reasons but also for health, safety, education, the environment, and financial stability or protection. Regulation for non-economic reasons is here characterized as 'social'. Social regulation is often enacted by sector or specialized agencies that have an interest in meeting the primary objectives for their agency and, in so doing, may at times impact competition. However, while there are many rationales for regulation to support pro-competitive or desirable social regulation, Buchanan (1999) has emphasized that politicians and regulators should not be viewed as benevolent and always acting for the public good. They make their policy choices based on a variety of factors, many of which do not reflect the public interest and which can affect the paths chosen.

More broadly, the reasons for undue restrictions in product market regulation derived from prior research can range from benign to malicious. For example, regulations can be accidentally inappropriate (Baron and Ferejohn, 1987; Morris and Roger, 1978), initially appropriate but stickily maintained (e.g., when there is a technical change but institutional lock-in (David, 1985; North, 1990), or initially inappropriate. Initial restrictions may unduly restrict competition for a variety of reasons, including lobbying in which the maximum investment in lobbying could equal the gains from lobbying for regulation (Peltzman, 1976; Posner, 1974), regulatory hubris, excessive paternalism, cronyism, corruption (Aidt, 2003; Becker, 1983; Mehlum et al., 2006; Murphy et al., 1993) and regulatory capture (Kalt and Zupan, 1984; Stigler, 1971; Weingast, 1981).

To the extent that competition is unnecessarily or excessively restricted, the consequences can, in principle, increase prices, increase costs, unduly change quality or influence innovation. Previous efforts to associate degrees of regulatory restriction with outcomes have suggested that changes in product market regulation were associated with increased multi-factor produc-

[4]Note that we are not suggesting that regulatory changes themselves can generally be seen as random events.

tivity growth (Nicoletti and Scarpetta, 2003; Égert, 2016). Such studies have not been based on individual assessments of regulatory reforms, but on comparisons of changed performance with changes in regulatory restriction.

Our paper adds to the literature analyzing how product market regulations perform and the impacts of regulatory reforms. Existing microeconomic survey literature does not focus on regulatory reforms but rather is largely focused on competition policy matters such as cartel overcharge (Connor and Bolotova, 2006; Boyer and Kotchoni, 2015; Oxera et al., 2009), the efficiency effect of privatization (e.g., Bel et al., 2010), incentive regulation, or the price effects of mergers Mariuzzo and Ormosi, 2019. The existing papers typically control for study characteristics like the year, type of service, method employed, country, or type of publication. By using further information from the papers in the database, we control for the industry, the regulatory motive, and the nature of competition distortion.

We test the hypothesis that pro-competitive deregulation is associated with lower consumer prices (Winston, 1993). To do so, we estimate a model of price change estimates from our database of ex post studies by measuring the magnitude of the effects of regulatory change affecting competition. We distinguish between economic and social policy and compare price effects between economic "deregulation" and social regulation.

Surprisingly, the best estimate of price impacts association with regulatory change towards more competitive outcomes is about a 19 per cent reduction, and with other estimates within a range of 16.0 to 24.1 per cent in the estimation specifications from quantile regressions. Price reductions from social deregulation are potentially 9 percentage points higher than price increases after social regulation. The difference between effects of social deregulation and social regulation may arise from market-specific effects or increased precision of newer reforms.

Our paper is constructed on top of other research that adopted a variety of methods for multiple industries in different countries. As such, it requires a number of caveats. First, the product markets examined are not uniform and likely experience highly differentiated price dynamics. Consequently, the precision of the findings presented here must be interpreted with due caution. Second, the means and median performance do not necessarily reflect the likely outcomes in a particular observation of regulatory change. Third, control groups may not adequately encompass the role of technological change and product variation over time.[5] Fourth, there may be a bias towards performing studies that find statistically significant effects rather than no effect.[6]

[5]Miller (2025) emphasizes the importance of technical change.

[6]Garg and Fetzer (2024) finds that the number of zero effect claims has fallen in eco-

The research approach we adopt seeks to address the potential problem of observation bias, though more work may be needed in this area. We also would suggest that findings that pro-competitive reform raises prices would be highly publishable, thus suggesting the paucity of observations with such a finding is not due to bias in studies' selection of events to study. Fifth, some of the studies may not have adequately addressed concerns related to endogenous effects. Considering the potential weaknesses, we consider that, even with these caveats, it is worthwhile to assess results from the hundreds of observations identified of competition-affecting regulatory reform.

The paper is organized as follows. Section 2 describes the database and key variables. Section 3 shows descriptive statistics. Section 4 proposes a model and reports empirical results. Section 5 draws implications and conclusions.

2 The database

2.1 General description

The data set is taken from a collection of 488 papers first assembled by staff at the OECD, under oversight from one of this paper's authors. These papers were assembled based on desk research using key terms in the OECD list of potentially competition-restricting categories of regulation. The desk researchers were instructed to look for all research studies that would be relevant to the search criteria and to record them no matter what outcome was found. Studies were included to determine whether the qualitative or quantitative findings were of small or unexpected directions of impact in order to minimize bias in the collection found. The list of papers was shared with OECD Competition Committee governments with a request for them to supplement it with any additional papers of relevance for ex post examinations of reforms that affect competitive conditions. The set of desk studies was expanded to include the studies provided by governments.

The papers were read to see whether they provided a usable 'observation' analyzing a regulatory change in a product market. Where quantitative estimates of impact were included, the regulation or deregulation was categorized and the industry, price, cost, output, or quality impact estimate were recorded. To limit the extent to which individual personal judgments drive categorizations, all data entered by an analyst has been reviewed by a second analyst and any disagreement raised to the attention of an author. These ob-

nomics papers from 9 per cent before 2000 to 4 per cent since 2000. Ioannidis et al. (2017) finds that the selection effect for randomly significant results may be large.

servations were further divided to lay out regulatory purpose and ensure that results are not driven by the broad categorizations. We tested robustness by dropping categorizations that were judged borderline from some regressions with no substantial change in results.

Some papers contribute more than one observation, while others provide no quantitative information and thus contribute no observation for the purpose of this study. The sample includes academic journals, government reports, OECD reports, book chapters, and unpublished working papers. The earliest reform observed is in 1932 while the latest is from 2011.

The studies collected cover a wide range of sectors, mainly network industries, professional services, distribution, the pharmaceutical industry, and the food industry. The network industries comprise airlines, railroads, telecommunications, electricity, and gas. Occupational licenses cover activities such as health practice (doctors, nurses, dentists), law, architects and engineers, and funeral services.

For our purposes, only those observations that report a price effect are used, since these account for 90 per cent observations. They are selected as the focus to ensure that substantial variance is present among observations. Focusing on papers that include price estimates reduces the usable dataset to 305 observations.

It is important to note that the sample includes both markets where regulation was introduced and others where regulation was removed or reduced (denoted deregulated/liberalized[7]); so these involve comparisons over time before-after (de)regulation. There is also a smaller number that are cross sections in that they use international comparisons or comparisons across states in the US; we count these as deregulation if historically regulation had preceded deregulation in some countries (states). Our key variable PRICE is always the per cent difference between the market when it was unregulated and when it was regulated. In more than 80 per cent of the observations (251/305) this is before-after, as most of the studies captured by the OECD reform database focus on liberalization.

The estimates in most papers of the database are obtained from econometric modeling, based on before-after or a cross-sectional comparison consisting of benchmarking the price of a regulated state or country with the price of an unregulated counterpart for a given industry. The cross sections sometimes employ firm-level data. Some of the econometric studies employ structural models of demand/supply and conduct models, but most use a reduced form.

[7]Note that we recognize pro-competitive regulatory changes as liberalizations.

2.2 Regulation: typology

The key variables in our analysis are explained below.

2.2.1 Impact of policy change

The dependent variable, PRICE defined above as the percentage difference between the market when it was unregulated and when it was regulated (note that this before-after in regulation observations but after-before in deregulation).

2.2.2 Types of policy change

Following the previous literature, we distinguish two broad types of regulation: economic and social (Breyer and MacAvoy, 2016).

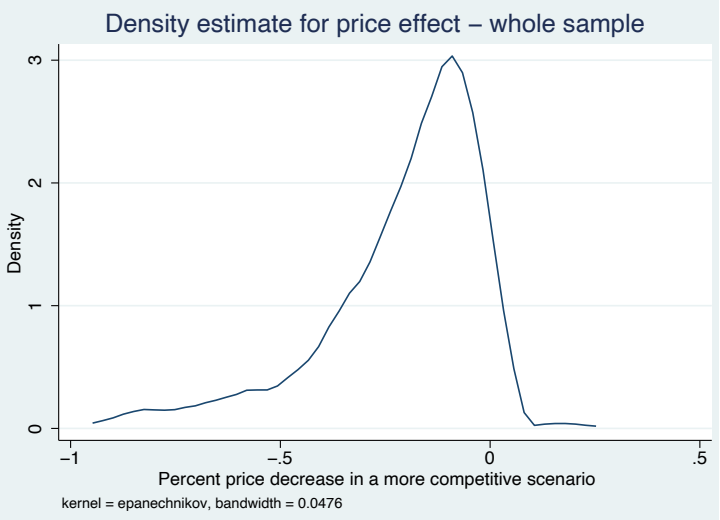
[Insert Table 1 about here]

Table 1: Price reduction descriptive statistics - full sample

Change in PRICE	N	mean	median
Total	305	-0.207	-0.16
By policy change			
Economic deregulation	182	-0.236	-0.200
Social deregulation	69	-0.202	-0.167
Social regulation*	54	-0.117	-0.088
By type of competition distortion			
Abuse	202	-0.198	-0.149
Collusion	83	-0.214	-0.166
Consumer protection	20	-0.268	-0.19

Note: In 'social regulation' observations, PRICE measures the difference between post- and pre-regulation prices, scaled to 1. In economic and social deregulation, PRICE measures the difference between prices with an anti-competitive- and pro-competitive interventions scaled to 1. The purpose of this approach is to see whether there is a difference between adding social regulation and taking away social regulation. These means and medians suggest that new social regulation, which raises prices, has a smaller effect compared to eliminating old social regulation (social 'deregulation').

Figure 1: Density estimate for price effect - whole sample



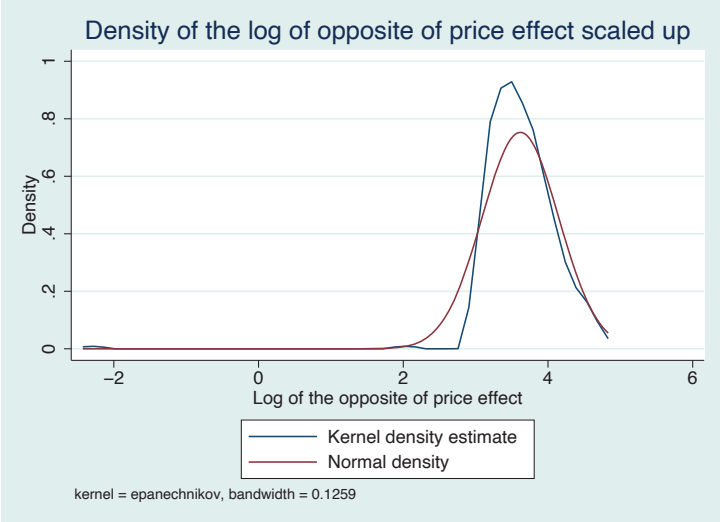
The density of the price effect on the entire sample is shown in Figure 1. It is slightly skewed left, as most values are negative after deregulation. The peak of the distribution is reached at a price effect of -20 per cent. The distribution shows that deregulation appears to reduce firms' market power by eliminating competition restrictions. Indeed, the log-normal distribution of the price effect shown in Figure 2 shows that most of the mass occurs between 3 and 4. That is, most of the price reduction magnitudes range between 20.1 per cent and 54.6 per cent in absolute terms. The positive tail of the distribution is due to the kernel parameters chosen combined with one notably positive price effect.[8]

The category of social regulation captures regulations designed to combat market failures other than market power, such as environmental, congestion, health, and safety regulations. For example, observations identifying the intertemporal effects of occupational licenses, carbon emissions, traffic regulation, exclusive territory regulation of alcohol sales are classified as social regulation. Social regulation also includes zoning regulations and import-restricting regulation to protect local industries (such as construction regulation of schools and advertising private healthcare services).

The line between economic and social regulation can be blurred. Adver-

[8]This price effect occurred after the economic deregulation of bus services in the UK. While this particular effect may reflect a loss of subsidies, we do not consider subsidies within our data, as these are not generally reported across the studies in our sample. Subsidies may both reduce or increase during liberalization.

Figure 2: Density of log of opposite of price effect - whole sample



tising oversight is considered an economic regulation by Viscusi et al., 2018 who also recognizes that restriction of advertising for unhealthy products such as cigarettes can be a social regulation because it can correct failures. The official reasons for the regulation of eyeglass advertising were typically the interest of public health and safety (see Benham, 1972 p. 340). In the sample, we categorized 123 observations as involving social regulation, 69 of which are deregulation, where previous regulation has been lifted, and 54 where social regulation has been introduced.

Regulation originating for economic reasons, on the other hand, refers to observations where the price or rate of return of capital is regulated, such as in infrastructure industries such as electricity, telecommunications, water and transportation; industries where the industry was "protected" from destructive competition such as road haulage, the pharmaceutical industry, or the banking sector; regulation arising from monopsony power would also count as economic regulation. Many of these observations occur in industries or segments of industries that have been opened to competition because of the realization at least some parts of their vertical chains are contestable. For instance, the airline industry and parts of the electricity, telecommunications, and transport industries in the most advanced economies were liberalized in the late 1970s and 1980s in the US and the UK, and in the 1990s in continental Europe. Economic regulation also applies in instances of cross-geographic comparison where the deregulated industry is compared to the regulated one.

2.2.3 Regulatory purposes

Many of these industries are regulated by government or governmental agencies to serve social goals; a breakdown is shown in Table 2. Some of the regulatory purposes classifications merit some explanation. An industry can be regulated for several reasons. Public utilities are regulated due to their natural monopoly aspect but also can fulfill universal service obligations (USO), as they provide many of the essential goods and services for daily life (Laffont, 2005). However, if a paper specifically studies a particular regulatory purpose, then only the concerned purpose is assigned. For example, electric utilities are generally economically and environmentally regulated. But if an observation specifically measures the effect of environmental regulation on electricity prices, the related observations are thus assigned the purpose Environment only.

[Table 2 about here]

3 Descriptive Statistics

One of the main points of interest in this note is how the gains from liberalization compare with the gains provided by the various arms of competition policy. To the extent that regulations suppress competition, it is likely that they do so by allowing or permitting firm behavior that antitrust laws generally prohibit, such as collusion or abuse of dominance. Table 3 classifies the regulations examined here according to the types of anti-competitive behavior contemplated in antitrust law. In this respect, the OECD provides a helpful identification of how each regulation observation might be expected to constrain or reduce competition in the market concerned.[9] We have reorganized the OECD list so that it corresponds to the two main parts of antitrust: (abuse of dominance/monopolization and collusion), and consumer protection. While consumer protection is not generally considered to be part of competition law, increasingly a variety of firms' activities (obfuscation, exploiting asymmetric information, etc.) are recognized to affect competitive conditions and have attracted the attention of consumer protection authorities.

[9]The OECD competition assessment materials, developed under the leadership of one of the authors (Sean Ennis), can be viewed as a default approach, as they have been a referenced in an OECD Council recommendation, approved by members of the OECD for release, and the checklist principles have been incorporated into various jurisdiction-specific guidance formats, including the OIRA October 2023 guidance and the European Commission Better Regulation Toolbox, Tool No. 24.

Table 2: Numbers of observations by by sector and reasons for regulation

Category	Number
Sector of regulation	
Energy	38
Telecoms	36
Transport	90
Pharma	11
Financial	14
Professions	70
Food	13
Distribution	35
Other manufacturing	18
Social or economic reason for regulation	
CON (congestion)	49
ENV (environment)	31
FCS (food/commodity safety)	49
FINPRO (financial protection)	14
H (health)	65
IPR (intellectual property rights)	16
SQ (safety & quality)	115
IPRO (industry protection)	72
NM (natural monopoly)	112
USO (universal service obligation)	81

The variable 'Price fect' is a continuous variable that captures a price change from moving towards a more competitive environment following a change in regulatory policy. In practice, this is generally a negative value in the dataset. Observations for which regulation or deregulation led to a less competitive situation generally result in a price increase. For such observations, prices were standardized to focus on shifting to more competitive states. Price fect's lowest value is -0.9 and the highest value is 0.205.

Because an industry can be regulated to achieve different goals, more than one regulatory purposes dummy can take the value of one for a given observation. Most observations cover instances of economic deregulation which represent over 60 per cent of the total observations. Nearly 25 per cent of the observations are based on the transport industry and approximately 32

per cent of observations are regulated for safety and quality purposes or for natural monopoly goals.

[Insert Table 3 about here]

Most studies on deregulation were conducted in the US, with it accounting for 50 per cent of observations. Time dummies measure decades, except for the dummies that cover the earliest and latest periods. Studies using data starting in the 1991 - 2000 period represent 39 per cent of the observations. The main sources of observations were academic journal articles, which totaled approximately 36 per cent of the total observations, closely followed by government documents, which accounted for almost 35 per cent of the observations.

Table 3 provides the mean and median price reduction OECD category of regulatory behavior and classifies these by anti-competitive analogues from competition and consumer protection law.

The medians of price reduction from economic and social regulation range between 15 and 19 per cent. These values may seem high, yet they are close to price overcharge estimates from the literature on cartel industries. This could be taken to suggest that government regulations can at times create comparable price effects to those of cartels.

The interpretation of price effect under deregulation observations is straightforward, as deregulation policies are here examined as those that make markets more competitive by the OECD criteria on restrictions of competition. Since all observations of social (de)regulation are distinct from economic deregulation, the price effect from economic deregulation should be interpreted as a price change in absence of the social regulation. We do not here restrict price movements in any particular directions as a result of procompetitive reform but rather let the data from prior studies speak on the ultimate effects.

4 Model and results

4.1 Model specification

The methodology of this paper consists of estimation of price effects by means of a OLS and quantile regressions. To analyze the effect of regulation and deregulation on price, we construct different sets of dummies to capture the nature and the type of reform as well as the industries and the market failures that those reforms aim to correct. All explanatory variables are binary variables taking the value of 1 when the variable characteristic (like economic deregulation, financial sector, etc.) is present or 0 when the characteristic is

Table 3: Price change by type of anti-competitive behavior and regulatory analogues

Type of competition distortion	Mean	Median	N
Abuse of dominance, Exclusivity etc 1. Grants exclusive rights for a supplier to provide goods or services 2. Significantly raises cost of entry or exit by a supplier 3. Creates a geographical barrier to the ability of companies to supply goods services or labor, or invest capital 4. Establishes a license, permit or authorisation process as a requirement of operation 5. Limits the ability of some types of suppliers to provide a good or service 6. Sets standards for product quality that provide an advantage to some suppliers over others or that are above the level that some well-informed customers would choose 7. Significantly raises costs of production for some suppliers relative to others (especially by treating incumbents differently from new entrants)	-0.19	-0.15	202
Facilitates Collusion 1. Limits sellers' ability to set the prices for goods or services 2. Limits freedom of suppliers to advertise or market their goods or services 3. Creates a self-regulatory or co-regulatory regime 4. Requires or encourages information on supplier outputs, prices, sales or costs to be published 5. Exempts the activity of a particular industry or group of suppliers from the operation of general competition law	-0.21	-0.17	83
Consumer Protection 1. Limits the ability of consumers to decide from whom they purchase 2. Reduces mobility of customers between suppliers of goods or services by increasing the explicit or implicit costs of changing suppliers	-0.27	-0.19	20

Note: Categories added to encompass sub-categories taken from OECD's Competition Assessment classification.

not present. The econometric model takes the following specification:

$$p_i = \alpha + \beta DR_i + \gamma F_i + \mu I_i + \delta C_i + \epsilon_i \tag{1}$$

where p_i is the percent price reduction for observation i in a more competitive environment (Price fect), DR is a vector containing policy type dummies, F is the set of dummies for regulatory purposes; the industry categories are captured by I; and C is a vector containing the OECD categories of competition distortion.

Following the different price changes reported in the literature survey, distinguishing between regulation and deregulation by including DR allows us to assess whether deregulation is more conducive to price reduction than regulation. It also enables us to estimate whether the effect of deregulation is different depending on the type (economic or social). Social regulation would tend to lead to higher prices, whereas the effect of economic regulation is ambiguous, given that some regulation may promote competition.

By controlling for regulatory purposes, we can assess whether the effect of regulation of deregulation is sensitive to the market failure that is being corrected. From the earlier discussion, the effects of policies depend on the reason for the regulation. For instance, regulating an industry to constrain market failure can have a different effect on price compared to regulating to protect firms from destructive competition. The same applies when differentiating between economic and social policies.

We include industry dummies to capture potential variation in the degree of competition and technological change. For example, technological change in the telecommunications industry has had profound implications on the efficient number of firms that can operate within an industry (ICN, 2002; Viscusi et al., 2018). In addition, we exploit information on the nature of competition restriction available in the database to assess the possible impact that several restrictions can have on prices.

Finally, like other broad regression exercises on prior studies, we include sample characteristic dummy variables like the starting year of the study and a variable indicating that the observation studies a US industry. Because the effect of deregulation or regulation can be confounded with time, we include a variant with 5 dummies that capture time periods in 10 year intervals.[10]

We recognize that articles reporting price effects may suffer selection bias, e.g., because authors and editors may tend to favor papers with statistically significant results (Stanley, 2008; Garg and Fetzer, 2024). Such a bias could

[10]Unlike exercises with consistent reporting of results for different samples, we are not able to take account of measures of error variance in the studies as the price variables, and resulting variances, are reported in many different formats.

also occur naturally because, for a constant level of standard error across coefficient estimates, lack of statistical significance is more likely to be found for price effects near zero. As a result, our results must be considered with the possibility of reporting bias. To reduce risks of overestimation from selection bias against effects close to zero, we therefore perform quantile regressions and report their results as our preferred results. This method has the advantage of emphasizing median observations.

4.2 Results

Table 4 shows the OLS results for five specifications of the model in Equation 1, using the entire set of observations. The first column contains only the types of regulation and deregulation dummies. In the subsequent columns, the OECD competition restriction classification dummies (column 2), the regulatory purposes (column 3), the industry types (4), and dummies for different ranges of years (column 5 are added. Column 5 shows the results of the general model which also includes country and starting year dummies of the data. From column 2 to column 5, the F test is performed on all explanatory variables except the regulation and deregulation dummies, and the p-value is the probability of erroneously rejecting the null hypothesis of the F test. In the whole sample, except for column 4 which has a p-value of 0.334, we reject the null hypothesis of no joint significant impact on price reduction. When added alone, the OECD competition restriction classifications have no joint effect on price (column 2).

[Insert Table 4 about here]

Table 4: OLS estimation results - full sample

Variables	(1) Price_fect	(2) Price_fect	(3) Price_fect	(4) Price_fect	(5) Price_fect
Constant	-0.118***	-0.175***	-0.188***	-0.182***	-0.157*
	(0.0255)	(0.051)	(0.0601)	(0.0667)	(0.083)
EconomicDeregulation	-0.115***	-0.112***	-0.101***	-0.0699*	-0.109**
	(0.0289)	(0.0292)	(0.0374)	(0.0387)	(0.0456)
SocialDeregulation	-0.0886***	-0.0787**	-0.0913***	-0.0896**	-0.0682*
	(0.0341)	(0.035)	(0.0351)	(0.0351)	(0.0386)
Abuse		0.0576	0.0683	0.061	0.0805
		(0.0447)	(0.0448)	(0.0443)	(0.0516)
Collusion		0.0532	0.0949*	0.0830*	0.0921
		(0.047)	(0.0487)	(0.0484)	(0.0567)

Table 4 (continued)

Variables	(1) Price_fect	(2) Price_fect	(3) Price_fect	(4) Price_fect	(5) Price_fect
Con			0.034		-0.0214
			(0.0422)		(0.0463)
Env			-0.0536		-0.0543
			(0.0441)		(0.049)
FCS			0.00104		-0.0552
			(0.0439)		(0.0513)
Finpro			-0.197***		-0.211***
			(0.0665)		(0.0812)
H			0.0285		-0.059
			(0.0395)		(0.0505)
IPR			-0.0443		-0.207*
			(0.0527)		(0.117)
Ipro			-0.0101		0.0247
			(0.0391)		(0.0477)
SQ			-0.000597		-0.0196
			(0.0336)		(0.0417)
NM			-0.035		0.0238
			(0.0317)		(0.0394)
USO			0.0445		0.108**
			(0.0458)		(0.0539)
Energy				-0.00119	-0.105
				(0.0583)	(0.0787)
Telecoms				-0.0684	-0.205**
				(0.0608)	(0.0843)
Transport				-0.0452	-0.0662
				(0.055)	(0.0647)
Pharma				-0.00769	0.237
				(0.0772)	(0.155)
Financial				-0.226***	
				(0.0733)	
Profession				-0.00596	-0.0326
				(0.0555)	(0.0701)
Food				-0.0539	-0.0198
				(0.0694)	(0.09)
Distribution				0.0759	0.0926
				(0.0581)	(0.0697)

Table 4 (continued)

Variables	(1) Price_fect	(2) Price_fect	(3) Price_fect	(4) Price_fect	(5) Price_fect
Start2					0.0335
					(0.0449)
Start3					-0.0038
					(0.0408)
Start4					0.000843
					(0.0423)
Start5					0.0605
					(0.065)
Observations	305	305	305	305	292
R-squared	0.05	0.055	0.121	0.133	0.177
F test:	7.97	0.83	1.94	2.79	1.83
p-value:	0	0.437	0.03	0.003	0.014

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Regressions performed on the full sample. The effect of social regulation is captured in the constant. The financial sector dummy is dropped due to collinearity with Finpro.

Table 5 shows the quantile regression results for the model in Equation 1 using the same specifications as in Table 4. These estimates also use the full set of observations.

[Insert Table 5 about here]

Table 5: Quantile estimation results - full sample

Variables	(1) Price_fect	(2) Price_fect	(3) Price_fect	(4) Price_fect	(5) Price_fect
Constant	-0.089***	-0.097*	-0.0853	-0.158***	-0.0978
	(0.0254)	(0.0525)	(0.0651)	(0.0726)	(0.0855)
Economic Deregulation	-0.101***	-0.103***	-0.075*	-0.084**	-0.099**
	(0.0288)	(0.0301)	(0.0404)	(0.0421)	(0.047)
Social Deregulation	-0.081**	-0.083**	-0.078**	-0.071*	-0.063
	(0.0340)	(0.0361)	(0.0379)	(0.0382)	(0.0398)
Abuse		0.010	0.019	0.056	0.06383
		(0.0460)	(0.0485)	(0.0482)	(0.0532)
Collusion		0.00	0.02	0.064	0.067

Table 5 (continued)

Variables	(1) Price_fect	(2) Price_fect	(3) Price_fect	(4) Price_fect	(5) Price_fect
		(0.0484)	(0.0527)	(0.0527)	(0.0585)
CON			0.029		0.015
			(0.0457)		(0.181)
ENV			-0.084*		-0.10**
			(0.0477)		(0.0506)
FCS			-0.021		-0.086
			(0.0474)		(0.0530)
FINPRO			-0.220		-0.177**
			(0.0718)		(0.0838)
H			-0.015		-0.058
			(0.0427)		(0.0521)
IPR			0.044		-0.227*
			(0.0570)		(0.120)
IPRO			-0.0077		0.0078
			(0.0423)		(0.0492)
SQ			-0.026		-0.022
			(0.0364)		(0.0430)
NM			-0.054		0.022
			(0.0342)		(0.0406)
USO			0.034		0.074
			(0.0496)		(0.0556)
Energy				-0.0042	-0.068
				(0.0634)	(0.0812)
Telecoms				0.062	-0.056
				(0.0661)	(0.0870)
Transport				-0.014	-0.038
				(0.0599)	(0.0667)
Pharma				0.104	0.361**
				(0.0840)	(0.16)
Financial				-0.182**	
				0.07975	
Profession				0.0028	-0.007
				(0.0604)	(0.0723)
Food				0.013	0.011
				(0.0755)	(0.0929)
Distribution				0.066	0.082

Table 5 (continued)

Variables	(1) Price_fect	(2) Price_fect	(3) Price_fect	(4) Price_fect	(5) Price_fect
				(0.0632)	(0.0719)
Start2					-0.054
					(0.0463)
Start3					-0.019
					(0.0421)
Start4					-0.031
					(0.0437)
Start5					-0.024
					(0.0670)
Observations	305	305	305	305	292
Psuedo R-squared	0.0388	0.0393	0.078	0.0856	0.0855
Raw sum of deviations	20.805	20.805	20.805	20.805	19.526
Min sum of deviations	19.998	19.986	19.1828	19.0255	17.201

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Regressions performed on the full sample. The effect of social regulation is captured in the constant. The financial sector dummy is dropped due to collinearity with Finpro.

For both Table 4 and Table 5, the price effect of social regulation is captured in the constant. This effect on price is positive even if there is a negative sign with the value of the constant because social regulations were associated with the OECD's competitive distortion classifications. Hence, in column 1 of Table 4/Table 5, social regulation leads to a price increase of 11.8/8.9 per cent on average.

The average effect of a policy other than social regulation is obtained by adding up the coefficient associated to the policy *and* the constant. The value should then be interpreted as a percentage. If we want to interpret the effect of economic deregulation with respect to social regulation (the constant), we interpret the coefficient at face value and measure it in percentage points. For instance, the price effect of economic deregulation is 11.5/10.1 percentage points (column 1, Table 4/Table 5) stronger than the price effect associated with social regulation. The price reduction estimated for economic deregulation is the sum of the constant plus the variable for economic deregulation. This ranges from -19.0 to -29.4 per cent/-16.0 to -24.1 (with the high values in column 4, Table 4/Table 5) and is significantly stronger than the price effect following social regulation by, e.g, 11.5/10.1 percentage points (in column 1,

Table 4/Table 5). The average price reduction associated with deregulation is estimated as 23.2/19.0 per cent (column 1, Table 4/Table 5). This varies according to the specification.

The first column of both Table 4 and Table 5 contains only the types of regulation and deregulation dummies and is the most relevant for illustrating the difference in results between them. To the extent that the OLS constant and economic and social deregulation results are driven by outliers, error asymmetries or an unspecified distribution of errors, the quantile regressions are preferred indication central tendencies. Lower estimates of price effect are found in the quantile regression of Table 5 and than under the OLS estimates of Table 4. The aggregate estimate of price reductions from economic deregulation in column 1 is then (-0.089 - 0.101) or -0.190. Therefore, even after ensuring a focus on median effects (and not mean effects), the effect of pro-competitive regulation is substantial.

Two reasons can explain this strong effect. First, the result indicates that, in the comparison between a more pro-competitive regulation and a less competitive regulation, the less competitive one can have effects on par with actions punished by competition law enforcement or monopoly. This competitive effect can be enabled, for example, by permitting competition in contestable parts of industries, like transport sector modes of trucking, railroads, and airlines. Therefore, even if economic regulation were effectively implemented, it did not incentivize firms to reduce their prices sufficiently compared to an environment in which multiple firms compete.

Second, the result is consistent with regulatory capture or other competition constraining forces. Put differently, economic regulation may in practice at times exacerbate the problems it was meant to solve, because it is a fertile ground for lobbying from industry groups that seek to bend policies in their favor at the expense of consumers and citizens (ICN, 2002). One notable example is the US trucking industry, where the Interstate Commerce Commission (ICC) economic regulator may have acted like a cartel rate-setter (Viscusi et al., 2018). The effect of economic deregulation is strongest in column 4 in both OLS and quantile regressions.

The effect of social deregulation on price reduction ranges from -16.1 to -25.1/-15.9 to -22.8 per cent in Table 4/Table 5. On the one hand, this reinforces the idea that social deregulation is associated with more competition through higher supply. For example, banning advertising restrictions or exclusive territories enhances the ability of suppliers to compete or increases the range of suppliers, as evidenced in the optometry or the alcoholic drink sector. In other instances, like the airline and taxi industries, congestion regulation has shrunk the number of suppliers. On the other hand, social deregulation can take the form of more efficient social regulation - for exam-

ple by integrating market-based mechanisms into regulation. The price effect is highest in column (4) for social deregulation for both OLS and quantile regressions.

However, the effect of social deregulation on price reduction is in most columns weaker than that of economic deregulation. This lower effect can at times be attributed to products that require quality guarantees from the consumer's point of view. In fact, even if regulations are not in place, the market, through the purchase decision of consumers, can influence firms to keep minimum quality standards (Viscusi et al., 2018). For example, air transport is one of the safest modes of transportation because consumers overestimate the associated risk. Even if consumers are not fully aware of the risks associated with the consumption of a product, the market does not necessarily supply sub-optimal safety levels. In fact, since economic deregulation, airline safety has increased in the U.S. (Rose, 1992).

Since social regulation leads to higher prices in this data set, the effect of social regulation is interpreted as a price increase after the reform is implemented. This effect is significant, but the price increase after social regulation is lower than the price reduction associated with social deregulation. This result suggests that markets that had a social regulation implemented were already anti-competitive or that an intertemporal effect took time to materialize.

In socially regulated sectors, the extra cost associated with accumulation of regulation can be borne by consumers (McLaughlin and Williams, 2014). For example, consumers can pay a higher price for a good due to a new regulation only after already having paid a higher price for complying with the existing regulation. Therefore, the lower effect of social regulation could come from capturing only the price effect of the incremental regulation, whereas deregulation observations would account for the whole price differential between a regulated and an unregulated good. This asymmetry can also be due to other state-specific effects that are not captured in the model. Indeed, regulations have been implemented in various intensities across U.S. states (Joskow and Rose, 1989) while a before-and-after effect can only be seen in the long run (Milyo and Waldfogel, 1999).

Of the three broad categories built up from OECD regulation classification (abuse, collusion, and consumer protection), one of the three is dropped to avoid collinearity. The remaining two are not statistically significant, separately from the constant, suggesting that the price effects are not different across the different types of regulation classification. Instead, the constant and deregulation variables seem to be most statistically significant.

Of the ten regulatory purposes, financial protection is significant in both the OLS and quantile regressions, whereas universal services obligation is

significant in the more general specification. Studies of deregulation in the financial sector are more likely to report a price reduction following deregulation than studies in other sectors, while industries that were formerly regulated for USO purposes have seen some increases in prices following deregulation. With respect to the type of industry, papers on the telecommunications sector tend to report a price reduction after deregulation. This can be explained by greater competition through technological progress that has particularly affected the industry (ICN, 2002).

The start year dummies are not significant; more recent studies seem to find no more price reductions than studies with older data time. This is particularly notable due to the coefficient for the post 2000 period being similar to the prior coefficients, as this later period experienced much greater economic focus on causal mechanisms (Garg and Fetzer, 2024). Regarding the country, there is no statistical evidence that deregulation in the US leads to more price reductions than in other countries. Finally, the results do not show evidence of any impact of the type of competition restriction on price.

For a robustness check, the simulations were replicated on the academic journal sub-sample which reduced the sample size by about two thirds to 114. While we do not report the regression results here, the constant and deregulation coefficients are similar to those of the full sample, but significance is lost for most variables except the constant, perhaps because of loss of degrees of freedom.

The coefficients for the impact of economic deregulation on price reduction are strong and significant, and the estimated coefficients remain large. The price effect of economic deregulation is 19 per cent in the most basic quantile regression (column 1). The price effect of social deregulation lower than that of economic deregulation in the most basic quantile regresssion (column 1). Although the sign of social deregulation is negative, there is not evidence that the corresponding price effect is significantly different in size from social regulation.

This result can be explained for methodological reasons. In the entire sample, the difference between social regulation and deregulation can be attributed to the methodological differences used to obtain price estimates from policies. For example, regulation cost-benefit analyses can vary in type and quality and can be incomplete (Guasch and Hahn, 1999). In some observations, the reported cost of imposing regulations can be greater than monetary benefits.

5 Implications and conclusion

The results of the previous section are in line with the view that regulatory policies can have a considerable impact on competition.

In this section, we discuss the trade-offs that can arise in the context of economic and social policies and how competition advocacy can relax them.

5.1 The trade-off between cost efficiency and market power

The variety of magnitudes of the effects of deregulation on price reduction suggests that liberalizing markets should be accompanied by a thorough understanding of market contestability and the degree of competition. In many network industries, economic deregulation involves a trade-off between efficient resource allocation and increased market power (MacKay and Mercadal, 2021). For economic deregulation to be fully effective (Viscusi et al., 2018, p 665) we find the price effects from inclusion of competitive effects are substantial.

5.2 The trade-off between efficiency and social goals

The results in the previous section do not suggest that social regulation should be abandoned to satisfy the economic efficiency criteria. Social objectives are needed to ensure the living standards that society requires. However, unlike economic deregulation which coincides with the readjustment of regulation with respect to economic factors like market power, social deregulation signifies making social regulation more efficient by incorporating market-based mechanisms in policy-making.

Like economic deregulation, social regulation, without considering the economic incentives at play, entails lower competition and higher prices across a wide range of industries. The regulation of airport slot control, designed to reduce airport congestion, led to higher air fares (Morrison and Winston, 1997) as it promoted the market concentration of a small number of airlines. However, this trade-off can be eased by making slot regulation more efficient. Market-based solutions, such as auctions and congestion pricing, can at times regulate congestion and reduce passenger fares (Ros, 2011; Morrison and Winston, 1997).

Market-based social regulation can be a solution to relax the trade-off between efficiency and achieving social goals. For instance, the cap-and-trade system replacing the command and control regulation of pollutant emissions has enabled firms to abate sulfur dioxide at a lower cost, which can then

be passed on to consumers through a lower price. In the professions, more efficient regulation takes the form of certificate recognition between states or countries. States allowing mobility to licensed workers have seen lower prices charged to consumers.

Social regulation can have unintended effects. When several markets are connected, social regulation should be considered in all markets concerned. For example, in the Japanese housing sector, a stricter quality standards regulation regarding new condominiums had the unintended effect of increasing the price of existing condominiums that did not comply with the stricter quality standards (Kawaguchi et al., 2014).

5.3 Conclusion

The analysis conducted in this paper allows us to quantitatively distinguish the effects of economic and social policies on price. In addition, we obtain a range of effects when controlling for the regulatory motive, industries, and types of competition restriction. These controls can be viewed as proxies for the various degrees of competition, and thus extend the insight given by related study reviews on the influence of competition on the effect of regulation or deregulation. Furthermore, we control the starting year of the data and the country.

Most of these proxies are not statistically significant. This may relate to the constant and regulatory change variables capturing most of the observable effects. But some of this lack of significance may relate to the inherent underweighting of an observation in our sample. For current purposes, we treat each observation as a unique data point. Yet individual observations of our study often report estimates of effects that were statistically significant based on models with more than 30 degrees of freedom underlying their empirical estimates.

Prices changes from pro-competitive regulatory reform are on average about 19 per cent, within a range of 16.0 to 24.1 per cent. The magnitude of the impact depends on the type of deregulation. The effects of economic deregulation are stronger than social deregulation both over the whole sample and the academic journal sub-sample.

We find that price increases resulting from the implementation of a social regulation are lower than the price reduction associated with social deregulation. The results found here are useful for considering potential trade-offs between pro-competitive regulation reforms and product regulations implemented for social reasons. They are also useful for considering the impacts of legislation that is intended to promote competition, but has unintended contrary consequences.

Extensions of this work would be worthwhile. For example, much more focus on quality and non-price benefits of social regulation would be essential for a full balancing between pro-competitive and anti-competitive effects of social regulation, but was not possible with our dataset. More subset analysis would be useful to distinguish those studies that have better control variables for ensuring quasi-experimental conditions for the reforms examined. More consideration of the distinguishing effects that arise from deregulation or technological improvement would be valuable. Finally, efforts to test for and control for potential bias in the activities studied and published would heighten confidence in the results. While potentially informative, these extensions are beyond the scope of the current work.

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